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Andrew Morrison
University of Oslo

Ole Smørðal
University of Oslo

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Choreographing Augmented Spaces.

Andrew Morrison

Ole Smørdal

InterMedia, University of Oslo

Objectives of the research

In *Windows and Mirrors: Interaction Design, Digital Art, and the Myth of Transparency*, Bolter and Gromala (2003) argue that every digital artifact shifts between being transparent and reflective. Discussing the potential of the interfaces of electronic arts for wider digital design practices and theories, these writers argue that we need to look both through and at the interface. The paper argues that in the domain of electronic arts the development of augmented expressive spaces needs further discussion on the place of mixed media types and expressive forms. We aim to explore how augmented spaces may be seen as extending beyond the desktop and into context of hybrid performance. In this performance, computers are incorporated into human activities (audiences/users) resulting in a dynamic of human-computer performance.

The paper investigates the design of such augmented spaces from two perspectives:

- 1** as a shift from screenspaces (desktops, net-art) to the design of spaces for audience interaction involving a blend of the physical/analogue and the digital, and,
- 2** as a move into conceptualising augmented electronic arts as performative. The paper has the overall aim of developing the notion of performativity in relation to the design of digitally mediated expressive discourses and concomitant vocabularies for description and analysis.

The approach or method used

A critical overview of conventions in Human Computer Interaction (HCI) and human-computer intersection approaches to interface, interaction and communication design will be presented. This will be contrasted with exploratory approaches to experimenting with the composition of augmented spaces from a research and educational project involving collaboration between choreography, informatics and media students in higher education in Norway. Illustrations will be given from 4 separate choreographic works. Links will be made to developments in the development of digital scenography more generally. Choreography will be used as a metaphor for the wider design of expressive digital media in which an interplay between the designed and audiences is cast in terms of audience activity. Examples from three consecutive years of *Ars Electronica* (2001-2003) will be used to support a further conceptualisation of performativity in augmented spaces. As part of its method, the paper will take the form of a visual essay, merging academic discourse with online resources, sites and digital representations of augmented spaces.

An indication of the nature of the main findings

This paper will develop the notion of performativity as increasingly central to electronic arts and communication/interaction design, one shaped in, as and by augmented space. Performativity will be situated with reference to code, signification, affordances in textual and installation composition, and the choreography of human-computer incorporated performance. The visual essay will embody elements from the structure and processes of the expressive discourse within incorporated computer systems. Discussion of interdisciplinary views of augmented spaces and performativity will be an additional outcome.

Choreographing augmented space

Andrew Morrison, Synne Skjulstad & Ole Smørdal
InterMedia, University of Oslo

Introduction

As design practitioners, educators and researchers, we probably associate choreography with the creative construction and shaping of dance for performance. Yet choreography, dance and performing arts have changed greatly over the past century (e.g. Blom & Chaplin 1982). We have witnessed a shift from formalist works by individual choreographers for large companies to contemporary pieces involving dancer-choreographers, improvisation and collaborative process-based designs. More recently, dance works have begun to appear which are a blend of human and computer generated artistry (Dils 2002, Obermaier & Haring 2002) with a hybrid of artistic forms, media types and information systems (Birringer 2002). Our understanding of choreography may be said to be being extended from the embodied 'scripting' of a dance work to the convergent design of blended movement of the human physical form and digitally generated and mediated entities and environments (Zeigler 2001, deLahunta 2003). This extension includes choreography as dance design and interaction or communication design as a mode of developing digital scenography, at times itself dynamically generated, in which the media and object oriented programming may also feature as actors (Sparacino et al. 2000, deLahunta 2002). There is still little research reported on interdisciplinary design for performance involving digital communication technologies, information systems and interaction design. This would appear to be a key area for design research to investigate further as embodied interaction (e.g. Dourish 2001), that is as tangible computing in 'smart' environments in which human computer interaction leaves the desktop and moves into locatively mediated spaces.

DeLaHunta (2004: 309) suggests that 'Perhaps if choreographic processes are better understood, they could be used to produce things other than performances.' While this paper centres on the design of dance and digital media for performance, it is only not about dance choreography but rather the design of digital scenography as part of embodied interaction. We draw on choreography as a metaphor for the broader participatory design of dynamic and kinetic performance works composed and comprised of a hybrid of media and design approaches involving human and non-human actors. The notion of extended or augmented space (e.g. Lervig & Halskov Madsen 2003) is used to refer to a braiding of the material and virtual in which a variety of information communication technologies may extend time and place based representations. This braiding often contains a blend of the live and mediated (Auslander 1999) and the physical and digital in mixed reality environments. Such partnerings have implications for the modes of performance and for the roles of audiences as active participants. The malleability of digitally stored and streamed material, together with the combinatorial potential of objects in information systems, allows both performance designers (as choreographers) and performers (from dancers to avatars) to respond to and improvise along with elements generated from within a database. Splits and linkages between the live and the mediated may also be extended to include audience members as active participants, that is in playing within and against the designed or performed and their own designing or performing of the work (Sha & Kuzmanovic 2000).

Outline

The paper reports on experimental choreographies of augmented spaces. We depict a shift from desktop screenspaces and computer projections to the design of spaces for audience interaction and movement involving a blend of the physical/analogue and the digital. We refer to three research and development projects. These projects have involved interdisciplinary collaboration and participatory design between choreography, digital media and information system design. We close with brief discussion of the concept of performativity as central to choreography and analysis of enactment in augmented space.

Ballectro

We began working with choreographers in a project called *Ballectro* (Morrison & Skjulstad 2002). We collaborated with a choreography teacher and six final year higher education choreography students to develop a multimedia enhanced dance work. Participatory and process related design techniques — devising, improvising, workshopping and reiterating material with different sequencing and prominence of dance and media — were central. Subsequent to six live performances, we developed a project website called the *BallectroWeb* (www.intermedia.uio.no/ballectro). In this site, we were motivated to interconnect object oriented informatics with multimediated reporting, interdisciplinary practice and research reporting (Skjulstad et al. 2002). The *BallectroWeb* is thus an experimental interface design for the articulation of multimodal research reporting (Skjulstad & Morrison forthcoming).

A second project, *Extended*, was developed with the same dance institution to expand experimentation, learning and research about dance and digital media. Dance students collaborated with media graduate students to develop works to investigate how the design of dance for the human body and of digital media in and for performance might be extruded, altered and enhanced beyond the conventional stage.

Extended

The three examples below *Extended* (www.intermedia.uio.no/extended) are based in a situated learning, development and research context. A project website (*Extended* 2003) includes term papers containing video material; we have also researched the duet of dance and digital scenography in relation to the African cultural setting of one of the works (Morrison 2003). Two of the researchers taught the joint dance and media course connected to the project: we contributed to and observed the creative and technical development of the works, we discussed the works with choreography and media students alike and observed the final performances. We have engaged in open-ended discussions on the devising, developing and performing of the works with the choreography teacher, the media and choreography students, and a choreographer-dancer researcher connected to the same dance institution. In *Ballectro* the researcher-designers were part of the choreographic process, digital media was ancillary to dance. In *Extended*, the design of the performance works was entirely developed by choreography and media students (choreography students' names are given first below).

Example 1. 'Du skal Plasjon': Mia Habib, Idunn Sem & Kristoffer Kjelling

This was a two part performance which played on the proximity of the audience to dancers and digital scenography. First, an extended space was created through combination of video projections on parallel screens of opaque and transparent cloth (Fig. 1 left). The alternating panels were suspended to create a mediated tunnel through which the dancers moved. The projections had varied texture and visibility. The audience was split into two groups on either side of the tunnel; each was able to move along their side of the tunnel and peer into the narrow mediated performance space. The action in this space varied from very poised and delicate movements to dancers sprinting up and down its length, narrowly missing one another.

Fig. 1: Stills from 'Du Skal Plasjon'. Seven projectors are used in the tunnel (left). An authoritarian commentator directs the audience's viewing positions (right).

Second, the tunnel was replaced by a brightly-lit open, circular space around which the audience could now see its' other half. One of the performers (Fig. 1 right) used voice commands to steer the public to move to a different sector of the room. In one corner a very small monitor showed live feed of her actions, minaturised and facing away from the round. Layering and projection are useful concepts in understanding the texturing and spatial unfolding of this work.

Example 2. 'In Between': Emilia Adeløv, Kristoffer Kjelling & Idunn Sem

This work was a weave of movements involving two duets, two tables and video and sound feedback (Fig. 2 left). As can be seen in Fig. 2 (right), the dancer dances with a live video feed of his own movement which is projected onto the large screen behind him. This parallel sequence was then replaced by a pre-recorded sequence designed to look as if was a live feed and a continuance of the previous video feedback. It appeared as though the mirror-like image had taken on a life of its own, with the dancer in real time being overridden by the mediated material. The dancer then mimicked his own projected performance, lagging behind it.

In keeping with the overall title of the project, *Extended*, this piece demonstrated how the performance space and the dancers' bodies may be stretched. A mediated live and stored augmentation of the performance created spaces and indeed dancers not physically present on the

Fig. 2: 'In Between'. Live video projection (left) and dancing with a pre-recorded mirror sequence manipulated via live video projection (right).

material stage. The work illustrates that augmentation may be realised through a combination of physical objects and digital media resulting in new articulations, that is a choreography of dance and media.

Example 3. 'Proximal': Inger-Reidun Olsen, Idunn Sem & Kristoffer Kjelling

In this work, five dancers became a part of mediated screen space. Clad in stiff, noisy white paper costumes, the dancers moved across a large empty stage. This piece drew on the notion of presence and proximity, signalled by the intimacy of the amplified sounds of the moving costumes. The interrelation between computer generated and performer actions was enacted when the large back screen was filled with an image of a small boat recursively moving across what appeared to be a level in a computer game. A band of white, peppered with red pixels then rolled up and down over this image, 'scanning' the dancers costumes (Fig. 3 left). The viewer, could see the different dancers in different depths of field, but within the same light source.

Fig. 3: 'Proximal'. The bar of projected Flash animation scans the dancers (left); digital still of moving dancers and projected media (right).

Later and in formation, the dancers moved towards the seated audience so that the large projection was gradually centred onto the costume of one of the dancers, with the dancer again knowingly positioning it on her stomach. In summary, this work was achieved through a convergence and a divergence of the dancer and the media (suggested in Fig 3 right), namely through the changing movement of lighting, dancers' actions and the projection of animated media.

Augmented

These three examples emphasised the relations between choreography as dance design and scenography as digital, interaction design. However, the works still placed the dancer at the centre of performance; digital media was incorporated within staging in which the audience and the media did not interrupt, direct or spontaneously influence the performance. The media was keyed, mixed and choreographed for live performers. The project was successful educationally and received largely favourable comments from audiences, but we were interested to delve further into augmented spaces which might include the media as actors (Sparacino et al. 2000) and the audience as participants who needed to drive some of the action, identify characteristics and properties of the system and devise some of their own performative expression. We were keen to maintain the presence of an experimental choreographer and a degree of professional dance yet we also wanted to motivate audiences to move and to generate their own narratives, kinetic and reflective. This led us into a third project, called *Augmented*.

We report on two sections of *Augmented* in mid-development at the time of writing (see the project website for updates). Cast in an experimental research and development 'lab' setting, these works investigate the notion of augmented or mixed reality and related modes of performativity in which a major part of the movement is provided by the audience (e.g. Sha & Kuzmanovic 2000). Both these pieces blend theories of narrative, performance and information systems design with the building of material and 'virtual' sets.

Example 4: '(here)' Idunn Sem (media) & Inger-Reidun Olsen (choreographer)

In this piece, the articulation of space and time of performance are not primarily in the hands of the choreographer or the media designer. (*here*) stresses the experience of the individual audience member as a participant, with the dancer as performer herself digitally mediated. The participant becomes part of the content of the choreography as well as its enactor. (*here*) also adopts an ironic stance to the 'new' of digital artworks by incorporating the known technique of video keying along with 1970s style wallpaper and a stuffed bird as part of the scenography.

A participant enters a room consisting of three spaces. On the right hand side is a physical scenographic space in the form of a forest landscape conveyed through printed photographic wallpaper. On the left hand side is a virtual space conveyed via back projection containing a digital video of dancer who is at rest. The background in this virtual space is the same as the landscape wallpaper. The space occupied by the audience is video taped. This video stream is projected onto the virtual background (dancer and wallpaper). Motion sensors and software identify movement on the part of the participant. This movement is then connected to 32 pre-

recorded dance elements prepared, integrated and displayed via MPEG-4 allowing multiple performative permutations .

Fig. 4: (here). The media designer choreographs the choreographer-dancer via blue screen & MPEG (left); studio experimental trials (right).

The dancer moves in relation to one's position. When there is little movement, short sequences play in which she adopts a playful stance, as if saying 'Come on, give it a go!' The idea is that the audience meets itself observing itself observing the dancer, always having to choreograph with the virtual dance through its own movement. The choreographic component is knowingly overruled by the technology so as to highlight the constructedness of the augmented space as one in which an active audience is placed in the foreground rather than the dancers as primary performers.

Example 5: 'Karakuri'. Even Westwang

This notion of the constructed is coded in 'Karakuri' by a media developer with experience in multimedia and software design, and electronic arts. Interested to investigate the borders between narrative, simulation and performativity, his work is framed in what might be called an anticipatory design framework. Choreography is stretched to encompass interrelated information systems, aesthetic and performance design in an installation in which no choreographer or dancer is present. Instead, the artist-designer has devised a space into which a participant may begin to understand the components, logic and dynamics of this environment by way of his or her own movements.

The participant becomes the choreographer-dancer. This piece is a double exchange between the system and the user acting on one another. Here an interactive shadow is created which provides a bridge between the physical and the augmented.. Physical movement on the part of the participant generates an augmented and responsive spatialisation of shape, pattern, sense and sensibility which is up to the enactor to engage with further. The work plays with sense, experience, expectation and anticipation (Salter 2004) at the same time as it provides a sense of 'virtual narrative' (Ryan 2001), generated in real time and with the potential for personal interpretation.

Fig. 5: 'Karakuri'. System and participant choreograph the performance (left); user and system relations loop to create live digital scenography (right).

The work suggests a blend in the process of designing for participation as well as in anticipation of participation. Design affordances, therefore, are written into potential event driven actions, themselves a form of live iteration and negotiation.

Discussion

In designing, enacting and researching the choreography of dance, digital media and audience participation we have found the concept of performativity to be useful. Although a somewhat exhausted term in Performance Studies, performativity nonetheless provides us with a core concept for approaching the intersections and diversions between the technologised and the social. Such a focus is not very visible in the recent book on design studies edited by Brenda Laurel (2004). In terms of 'future ground', however, performativity is already being investigated in work on narrative performance, story and gaming such as presented in the recent collection *First Person* (Wardrip-Fruin & Harrigan 2004). However, as McIntyre et al. (2001) comment, performativity in augmented spaces needs be designed for more than solitary participation; to this we might also add a theorising of the collaborative and the participatory relating to performativity. In terms of performativity, the works under the *Augmented* project are also intended for use by students of media and dance choreography in ongoing learning design into augmented space and embodied interaction. We also intend that these works are presented in public venues for use by more general audiences so that choreographing augmented spaces may move from an experimental design laboratory setting and into public, performative domains.

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