

## REFLECTIONS ON THE CHOREOGRAPHIC PROCESS IN THE DIGITAL DOMAIN

A Discussion Document written after the Machines and Migratory Bodies Artists Lab held at Chichester Institute of Higher Education, UK, July 1998

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The question which arose after the machines *and Migratory Bodies* Lab was: how different is the role of the choreographer in the domain of live performance and in the digital domain? Does the choreographer need to re-think his or her understanding of the choreographic process? Or is working in the digital domain simply a reorientation or transposition of choreographic processes which have been developed in the latter part of the 20th century?

As with any question which addresses issues in contemporary art practices the answer to these questions cannot be couched in a simple 'yes' or 'no'. This paper constitutes a first attempt at unpick some of the artistic issues raised by the introduction of the digital media into the choreographic domain.

### ***Digital Dance and Digital Art***

There are as many genres of digital dance as there are of live dance performance, and artistic propensities and stylistic preferences are as various. As a result choreographers will find themselves forging a path within the digital domain which may demand a reformulation of choreographic concepts, but which may equally likely simply be an extension of choreographic practices in which they have engaged in the past. In the late twentieth century the strict distinctions between art forms have begun to break down. The visual arts now encompass performance and video art as well as sculpture and painting, dance encompasses videodance and physical theatre as well as dance itself, physical theatre straddles the boundaries between dance and theatre, contemporary music-theatre uses musical, theatrical and dance conventions in equal proportion; certain types of installation art, particularly interactive installations, could be seen as a form of improvised performance. And all art forms are developing practices which make use of, or exploit, digital media. In short, a significant proportion of late twentieth century art practice is hybrid. Hybrid art forms integrate modes of practice, concepts and procedures from different art forms, generating new and distinctive genres and forms as they do so.

Digital art forms incorporate modes of practice, concepts and procedures originally developed in the context of computer science into artistic practices. The meeting of the two modes of thinking have resulted in the development of new genres within the art world, and new roles for the artist. Digital dance specifically has developed through combining choreographic practice with arts practice in two distinctive domains, those of electroacoustic music, in particular compositions in which interactivity between performer and instrument takes place, or through a dialogue with digital artists who create graphic works which exploit digital media. The latter

frequently entail a measure of interactivity between viewer and work. The process of appropriation and transposition by artists of the concepts and strategies developed by computer scientists has been smoothed for artists through the employment of strategies used in, and principles underlying, postmodernist arts practice. These strategies, through their use of fragmentation, modular structures, open forms, network models, marry well with the structures and principles underpinning computer programs. Many of the artists, particularly composers and digital artists, who grapple with the accommodation of their distinctive artistic perspective to the new, digital, medium, are simultaneously artists and programmers.

The computer programs these artists develop (or the modifications they make to 'off-the-shelf' programs) are designed to meet specific artistic needs, and may even propel their artistic intentions into new directions. As such the process of developing a programme to serve an artistic idea is, at heart, little different to working with a more tangible material, such as clay, paint, or human bodies to serve an artistic idea. The computer programme developed by the digital artist does not simply realise the work (cause the image to appear, or to behave in a certain way) it forms a central part of the conceptualisation which underpins the work. Indeed, in many works the programme is as much a part of the material of the work as the images it allows to be made visible. It is not simply a medium through which it is realised. The importance of the thinking which goes into the programming cannot be overemphasised in artworks created in the digital domain.

The level of programming in which the digital artist engages varies. It may entail 1) creating an original programme (from the code up), 2) manipulating and modifying a pre-existing programme such as Macromedia Director through the writing of scripts which will make the programme behave in certain unique ways. 3) Selecting from a set of pre-programmed structures and effects which are built into a commercial programme (Xpose or Image/ine, for example).

The first level requires that the artist conceives the underlying principles of the programme for a work from scratch and constructs a programme which will realise those principles and thus the artwork (it may later be used as a template for the programming for other works). The second requires that the artist think beyond the purpose of the ready-made programme to create a new set of behaviours for which it was not designed in order to realise the artwork. (Many electroacoustic composers and digital artists have spent a considerable proportion of their creative energies stretching the parameters of ready-made composition programs to serve their idiosyncratic compositional needs.) An artist may find that a combination of programs which have not been designed to operate in tandem is needed to realise the structure of the artwork, in which instance the rationale and structure underlying one programme may be combined with, or imported in some way into, another in order to create behaviour more relevant to the artistic conception than the single programme is able to offer.

Where artist and programmer are one and the same person s/he will also be responsible for the artistic conception which guides the project and for the source images which are manipulated by the program, in other words responsible for the artwork's underlying visual/sonic 'world', as well as for its structuring program. Where the artist/programmer is working in a collaborative context, s/he may be

responsible only for the development of the organising framework, that is the structure in which and through which the artistic images operate. In this instance the images themselves will have been made by a collaborating artist, who works alongside the artist/programmer to conceive and create the final work. Here the programme development is of equal importance to the artistic process as the generation of the images which form the raw material from which the work is created. The programmer consequently is not merely a technician but a contributing artist in the context of such works.

The programmer as artist is a new concept, but one which must be taken seriously in the world of late twentieth century art. Just as it is now accepted that theoretical scientists are creative, so it must be accepted that programme developers in the domain of computer science are similarly creative. Although many consider computer programmers to be non-creative, even unimaginative, the leaps of imagination which are made when a new programme is formulated to serve a particular purpose are as creative as the leaps of imagination made by the artist in pursuance of an artistic goal.

### ***Collaboration in the Digital Domain***

Although many visual artists and composers have become skilled at computer programming in order to realise their work, few choreographers are, at present, taking the time to become as skilled at manipulating the computer as they are at manipulating and organising movement images. This may very well change as dancers and choreographers become more familiar with computers. At present, however, most choreographers working in the digital domain (with some honourable exceptions ) collaborate with digital artists.

Several models of collaboration can be explored in the digital domain by choreographers and digital artists. These include:

- a collaboration characterised by the kind of discussion between both artists which results in the ideas, structures and images which constitute the work being generated as a result of the artists' discourse. The dialogue between the two ways of thinking which prevail in each of the art forms (which may be congruous at--- some junctures but conflictual at others) frequently results in the development of new processes, new understandings and new ideas.
- a collaboration in which the two artists agree that one or other will lead the collaboration, the other artists contributing, frequently extensively, to the realisation of the vision of the other. Ideally in this type of collaboration the dialogue between the two artists will be productive and the original idea developing in unexpected ways as a result of a combination of perspectives. However, the contribution of one of the artists to the final piece is not as great as that of the leading artist.
- a 'collaboration' in which one or other artist follows instructions given by their collaborator, modifying their developing vision as they progress in order to ensure that the vision of another artist is realised. In this case the artist following instructions becomes akin to a technician, albeit a creative technician.

A dialogic relationship between the two artists generates a rich source of ideas and works which exploit the principles and procedures of both digital art and the

choreographic art. In such collaborations the sensibilities of two artists working in different domains are brought together, extended and enriched by the dialogue in which they must engage. In a collaboration of type one the dialogue between artists remains as one of negotiation between equals. Decisions are made in tandem, although each of the artists may 'lead' at certain points of the collaboration. The pattern is, however, one of exchange.

This notwithstanding, choreographers and digital artists may find that certain aspects of their two media seem to be in opposition, most obviously the contradiction between the use of the corporeal body as the medium of expression and the use of digitised images and computer software as the expressive medium. The digitised image of the corporeal body literally loses the vitality which characterises live performance. This is replaced by a virtual figure, which has its own, but very different, kind of vitality. The body here becomes something else - a separate image divorced from its original source. For some digital artists the movement/body image may become an independent image, to which its source (that is, the performer or choreographer who created it) has no claim. If this is taken to be the nature of the imagery created by the choreographer (and this is by no means always the case) many issues are raised, not least those concerning authorship and ownership of the imagery (with the concomitant degree of control over the manipulation of that image which accompanies authorship). This is a question of considerable import to both collaborating artists.

A central device in digital art, just as it is in electroacoustic music, is the manipulation of a digitally recorded image to generate new and different forms. Some digital artists (whether video makers or computer based digital artists) believe that once the original image is converted into recorded or digitised form it ceases to be the 'property' of the individual who created the image but becomes the 'property' of the video/digital artists. Their claim is that, once the image is shot and digitised the authorship of the image, as it appears in the work, passes to the image manipulator. This is an acceptable claim if the images are framed and shot by the videomaker/photographer. Here the images constructed from the source material (the movement) are mediated from the start through the eye and mind of the image maker (the photographer or videomaker) and the image could be rightly claimed to be the intellectual property of the image maker.

However, if the image maker's collaborator is a choreographer or performing artist this claim to authorship can be disputed. When a digital artist is working in collaboration with a choreographer the framing of the image is not solely authored by the former, but is the result of a dialogue between the two artists. The constructed image is not simply an image of a human body (and even then the notion that the image is owned by the artist and the model has no stake in it is open to challenge) but is in and of itself a constructed (choreographed) image. The recorded image is therefore the result of a two-stage process conducted by two artists and is not authored (and consequently cannot be 'owned') exclusively by one or other artist. The choreographer has a sizeable stake in the movement image which is generated by the digital artist, and consequently a genuine claim to shared authorship of the images used, even if they are not responsible for the visual framing of the images. In many collaborations the dialogue with the choreographer continues through to choice of images, and even extends into the manipulation process, allowing the dialogic

relationship between the two art forms to continue much further into the creative process. This collaborative model approximates that of Type 2 above.

If the digital artist considers that the constructed image is their intellectual property, as some do, the nature of the collaboration between digital artist is closer to that of artist and technician. The choreographer serves as a kind of 'technician', their role being to provide the raw material for the digital artist, who then uses it for his or her own artistic ends. The choreographer's job is completed once the movement material has been produced. This collaborative imbalance can operate in the other direction, however. A choreographer in a collaboration may wish to maintain control not only over the movement material but also the structural framework in which it is set and its behaviour in the completed work (most digital artworks, even interactive works, are timebased and thus subject to the kind of temporal structuring devices with which the choreographer is familiar). If this is the nature of the collaboration it is the digital artist who becomes a technician, their role being to generate or modify a computer programme which will realise the choreographer's artistic vision. Here the choreographer has control over both the imagery and the structure.

Both of these examples are 'worst case' scenarios for artists who wish to develop their artistic ideas through a dialogue between art forms (although such collaborations frequently result in interesting artworks and are not to be decried simply because of the imbalance). In each, one or other artist (and thus their art form) becomes the servant to his or her collaborator, the means through which the artistic vision of the collaborating partner is realised. This is clearly an unsatisfactory model for artists who entered the partnership with ideas they wished to realise within the framework of a collaborative dialogue. In such a circumstance, instead of combining the artistic strategies used in both media, and in doing so producing a work which exploits to the full the artistic possibilities of both art forms, one or other vision dominates the proceeding. (It is, however, a perfectly satisfactory model for those artists who wish to make a work which uses another medium as an extra tool if the 'collaborating' artist understands the limits of their role.)

A further scenario may emerge from the dialogue between choreography and digital art, however. Either choreographer or digital artist may become the sole author of the digital dance work, selecting, using and even modifying the computer programme and/or movement material to create a digital dance work of his or her own design at all its levels. For the digital artist this would be a continuation of the mode of practice of the visual artist, who traditionally works alone. For the choreographer this would constitute something of a shift in practice, from a generally collaborative art form to one more akin to the visual arts and/or the art of the electronic composer, wherein the choreographer has total control over every element of the work.

No one of these collaborative practices is intrinsically 'better' than any other. Different artists and choreographers will find different modes of collaboration appropriate, either for them as artists or for particular projects. Whatever the circumstance, however, the digital artist using images of the moving body and the choreographer creating dance work in the digital domain will find that there are certain overlaps in their creative processes, their structuring devices and their uses of material. They will also find that there are equally significant differences in both sensibility and procedures which must be negotiated if works which cross the two media are to be

produced. If the former is the case it will behave us, as choreographers, to look at shared compositional strategies if we are to understand the role of the choreographer in the digital domain. This role is complex, and varies in different circumstances. Indeed, the digital choreographer may lean towards many modes of artistic expression, drawn from many media, when working within the context of digital dance.

Many compositional concepts and practices in late twentieth century arts and choreography are shared across the media. Although their material realisations may differ from one art form to another, the principles underlying them have similar sources. This 'invisible' connection between different media of expression is an important one to keep in mind for the choreographer working in the digital domain, for much of the 'art' in the work lies beneath the surface of the piece in its framework and its structures. This is, in fact, no different in live choreography, for the organising principle and the structures through which a dance work is realised, are recognised as an equally essential part of the art of choreography as the generation of movement materials.

Many of the strategies used in digital dance works can be seen as an extension of late modernist and postmodernist time-based arts (that is dramatic, musical, video and choreographic arts.) The thrust to unity and expressive or narrative coherence which characterised realist and expressionist art (the telling of a story, the communication of an intended message or feeling, for example) is giving way to ambiguity, fragmentation and disjuncture in postmodern art. With the advent of postmodern artistic practice artists have begun to address, in their art, the inherent differences in viewers' ways of perceiving and understanding the same phenomenon, rather than focusing on the communication of a clear theme or message, as they had in the past. They also began to take on board the notion of the 'writerly reader', a term coined by Roland Barthes to describe the role the reader plays when engaged in reading a novel or poem, viewing a work of art, or listening to a piece of music. Rather than having something specific communicated to them spectators are now frequently required to construct their own means of reading (and reading of) the work.

Late modernist and postmodernist practices across the arts share certain structuring principles which encourage the writerly reader to engage with the work (although the intention, and choice of imagery, of the modernist artist differs significantly from that of the postmodern artist). Amongst these are fragmentation, rupture, multiplicity, lack of closure, parallel images. The use of constructional strategies and images which have been made possible by the electronic technologies developed in the twentieth century are also commonalities in the two modes of artistic practice. The principles underlying the employment of twentieth century technologies such as the tape recorder, the film and/or video camera, many of which centred around editing techniques, have also contributed to the generation of new forms of compositional structure in the various art forms (both live and---electronic).

In music this took the form of the composition of modular works (works in which small sections or segments of music were created by the originating composer, and performed according to (more or less) loose instructions for their organisation and their sonic characteristics). The internal characteristics of the musical material (i.e. timbre, tempo, dynamic range and quality, the order in which the segments were

played and so on.) or instrumentation became a matter of performer choice. In the visual arts art objects became disjointed, fragmented, initially as a mode of structuring and combining images on a canvas or in sculptural form, later as a features of the object itself. Modular works were created, the components of which could be rearranged each time the piece was shown (Some of Claus Oldenberg's work had this characteristic) or, as with Calder's mobiles, re-arranged themselves in response to the effects of air passing by---them or collision with more tangible substances.

In dance similar devices were used by Cunningham and post-Cunningham dance artists. The latter created pieces in which the performers learned phrases of material which were then used as a base for improvised performances which operated within the constraints of a set of parameters determined by the choreographer. The incidence of the performance of specific movement material, its organisation in time and space, its spatial and temporal combination with movement material performed by other dancers, were decided according to a set of pre-determined rules, the use of which activated changes in the progression and/or the incidence of the movement material when applied. (Such strategies have been given the label of structured improvisation.) The rigour of the structural rule-base and the consistency of the movement material ensured that, even though the form of the work was not predetermined, the piece was coherent from performance to performance. In postmodernist art practice similar structural devices are used but the character of the materials and images differ. Much use is made of quotation (sampling), of the reclamation and re-reading of familiar images, the use of multiples (particularly images produced for the mass media). There tends also to be a move towards the engagement of the viewer, the introduction of a sense of participation in the formation of the work, as well as in the construction of its meaning.

All these structures can be seen as analogous to those which underpin certain computer programs. A computer programme allows the release of intelligible data generated by human operators in digital form. This data, which may be textual, visual or audial, is decoded and released in its original form in response to signals triggered by a user operating an interface (keyboard, mouse, etc.) The precise nature of the release is activated in accordance with certain rule-based parameters which are designed into computer programs (the latter generated by human operators to fulfil certain functions). The programme 'decides' the order in which the information is released, its combination with other pieces of information, its 'behaviour', and so on, in accordance with signals sent from the interface. (A simple database, for example, will order a set of items of information in a particular way, and in a particular order when a specific signal is sent to the computer. A different set, or a set in a different order, will be brought up on the screen if a different signal is sent. More complex programme release the data in concomitantly more complex forms with regard to their behaviour.)

The intricacies of the design of computer programme need not concern us here. However, the similarities between some of the structuring devices used by postmodern artists and the structures which underpin computer programme may serve to explain the relatively easy relationship, at a structural level, between the thinking of contemporary choreographers and of the digital artist. Digital artists began experimenting with works in which fragments of visual material (still or moving) and sound (analogous to the items of information discussed above) were created, stored in

the computer and accessed and displayed (in their original form or in manipulated form) on some kind of interface, either through an automatic process which was set in motion when the computer through which the work was displayed was turned on, or (in interactive works) manually by viewers when certain triggers were activated by their behaviour in relation to a computer interface. The latter could be activated unwittingly, simply by moving through an electronically sensitised space, or they could be activated deliberately by pressing a button, pressure pad, computer mouse, touching an appropriately sensitised screen, using a MIDI device, or activating a sensor through the movement of small muscle groups or even heartbeats. The activated trigger sends a simple signal to the computer which in turn activates the computer programme in accordance with pre-programmed instructions.

The temporal progression of the piece, and the detail of its thematic organisation is, in this way, arranged, or structured, in real time, from the materials provided by the artist, on a signal given by the viewer. The artist maintains a degree of control over the character of the emergent structures as he or she is responsible for the parameters through which the procedural processes written into the programme are circumscribed. (Although in genuine emergent works, the programme itself would develop new procedural processes in response to new behaviours by users/viewers, and thus begin to 'author' the emerging work.)

But what are the implications of the above with regard to the choreographer working in the digital domain? Do these new artistic concepts demand a reconceptualisation of choreographic practice and of the role of the choreographer, or does it simply require a realignment of our understanding of the nature of the dance work, and of the role of technology in it?

### ***Choreographing in the Digital Domain***

In the context of this discussion it is taken as a given that dance can take many forms, minimalist; dense, imagistic postmodernist, narrative, non-literal, indeed any of the genres and/or styles of dance extant in the late twentieth century are acceptable modes of dance practice. Choreographers working in the digital domain bring their broad stylistic propensities with them, incorporating them into the new medium, only changing them when, and if, their aesthetic changes, by no means a necessary result of engaging with digital art. Thus, there is no movement vocabulary or genre which cannot be used in the context of digital choreographic work, although some may lend themselves more easily to work in this domain, or need more radical modification to accommodate themselves to the new medium. It could also be posited that, although there are some significant differences practices and conceptual frameworks between digital arts practice and live performance, 'digital dance' does not constitute a whole new mode of dance practice, but is, rather, an extension of current dance practices transposed to a new medium.

The choreographic process used in creating dance in the digital domain bear significant similarities to those used in some forms of late twentieth century live choreographic performance, particularly that developed in the context of postmodernist practice in dance.

### ***The Choreographic Process in live performance***

The choreographic process constitutes several stages. Broadly, the first stage normally constitutes the generation of 'raw' movement materials for a piece, usually with and almost always 'on' the performers. This is the 'clay' from which the choreographer

will mould the work. This material is then used to generate phrases, ore sequences, of movement material. Some choreographers develop the movement material in response to the theme they are following, others have no pre-emptive theme or subject matter, merely the minimal artistic intention to make a dance work , the subject matter emerging from the choreographic process itself. Some use a codified movement vocabulary, some develop a 'new' movement vocabulary.

This is followed by a second stage wherein those raw phrases of movement are subjected to various structuring processes such as variation and development, augmentation, repetition, fragmentation, accumulation, and so on. Through the use of such processes a single phrase may engender multiple phrases or strands of movement material which become the blocks from which the work is constructed. (These strategies find a parallel in the process used by electro-acoustic composers who sample a sound image and treat it using digital technology, or those used by a digital artist when s/he treats a visual image in package such as Photoshop, and then constructs a collage of images to make a piece.)

The third stage in the choreographic process comprises the construction of the micro-sections of the dance (e.g. sections A.B.C. etc.). If it is a dance for more than one person, for each micro-section, the numerical organisation of the dancers' relationships (duet, trio, quartet, etc., combinations of duets, trios, etc.) and their organisation in space, both in relation to each other and to the performance space are plotted. The temporal organisation of the manipulated movement materials (e.g. canonic, unison, contrapuntal relationships, etc.) is also organised. (These three stages recur throughout the choreographic process.)

The final stage generally sees the construction of the overarching form of the work. Here the micro-sections made in the previous stage are organised into a final presentational form in both space and time. The character of the temporal progression, whether it constitutes a continuous development with smooth transitions between sections, or a fragmented, discontinuous progression in time characterised by abrupt changes from one choreographic image to another, depends upon the choice of compositional genre the artist has made.

At all stages in the process the choreographer makes choices and decisions, the aim being to create a stable, reproducible 'work for performance' (even if the presentational form of the work is open to change from performance to performance as it is in the 'open' work or a structured improvisation) which articulates the theme (emergent or fully formed) with which the choreographer is dealing.

The final dance piece tends to have a temporal and dynamic shape which enables an audience to follow its progression over time (repetition and variation are devices which facilitate this). Even where a choreographer deliberately makes a work which is discontinuous certain patterns within the macro structure of the work as a whole tend to emerge which allow the audience to grasp the general framework of a piece. The question to be asked is whether this process, designed in the context of the domain of live performance, differs in the context of choreography in the digital domain, and if so, how.

### ***The Choreographic Process in Digital Dance.***

As a working definition let us say that digital dance works are those works fabricated using computer technology to present, create and/or structure the work which exhibit

a markedly evident and important movement component, accompanied by a choreographic sensibility. They may or may not feature dancing bodies.

Such works may be exhibited using a range of media and combination of media. Digital dance works may be exclusively screen based (the screen could be the size of a computer monitor or a large screen onto which images are projected) or they may include an element of performance, the performers engaging in a dialogue with digitally generated visual and/or sonic imagery. They may have a relatively fixed form, that is a form with a fixed progression in time (a videodance created using digital media could be seen as a form of digital dance work), or they may have a malleable or protean form, whereby micro-sections, or modules, of choreographed material, are open to reorganisation in terms of temporal or spatial elements from performance to performance. A work may comprise a combination of fixed form and protean form (for example, a fixed form dance may trigger different visual images from performance to performance. Works with a protean form may be designed simply to be viewed by an audience, any interactivity between the work and a human agent taking place at the juncture of performer and/or director and work. In this sense the work will be following the underlying conventions of dance as a performing art. Or they may be interactive at the juncture between audience and work, rendering the reception of the work a genuinely participatory experience. (In the latter work the dance component may be located in the digitally constructed figures, or may be---perceived in the movement on the interacting viewers.) If the choreographer constructs the temporal progression of the work and 'fixes' it, allowing for a replication of the temporal progression from performance to performance, the choices made by the choreographer determine the overarching structure of the work. If, however, as in an interactive work, the originating choreographer leaves those choices open to the performers (through structured improvisation ) or to a director, or to the audience, the micro-sections or movement components are constantly open to new organisational arrangements (both in terms of the linear temporal progression, the juxtaposition and/or the superimposition of micro-sections/movement components in a single temporal span).

Although there are some similarities in the choreographic procedures used in digital dance, postmodern dance and video dance, working in the digital domain, particularly in the domain of interactive work, requires that choreographers rethink their understanding of choreographic 'logic', and of the role of the choreographer. Whereas conventional live dance works which are non-protean at the level of structure, or video dance works, both of which follow a choreographic logic which is based on a temporal framework subject to closure (the beginning and end are fixed, predetermined), present their materials in a predetermined order, choreographic work in the digital domain, particularly interactive work, frequently presents its materials using a multilinear temporal and/or thematic structure. This multilinear structure may be simple or complex, depending on the requirements of the work. In a work with a multilinear structure several choices of subsequent events are offered by a single event. The chronological progression of the events from which the work is constructed is not fixed. In a digital dance work which has a multilinear structure the choreographer constructs the piece with no pre-determined sense of the 'right' order for the progression of events. No single choice of event when structuring a occurrence of the work is an intrinsically privileged choice in the work as a whole, that is there is no strict predetermined hierarchy within the set of choices which make up the work.

(Some choreographers may build in hierarchical levels in the structure, however - certain choices leading to one loosely linked body of events rather than another. Consequently certain choices will determine the range of materials from which subsequent choices are made, this range being replaced when another choice with a significant place in the hierarchical structure is made.)

In an interactive (open) digital artwork the director, performers, or viewer, chooses the pathway of the chronological or structural progression as s/he proceeds in the reading of the piece. The artist has built into the underlying structure of the work (through the programming), several potential choices at each juncture in the work. Each choice the user/reader makes leads him or her on a different pathway through the work, and thus to a different end result. The author provides several potential lines of development in the work, several possibilities for the progression of the 'narrative' lines, and several possible endings. (Each 'ending' may in another version of the work, appear as an intermediary event, which leads on to another set of choices). Whilst the structure does not remain stable, the content of the narrative line is contained within a loose thematic framework.

The originating artist creates the events, occurrences, characters, from which the work is composed and thus establishes the tone and range of content of the work. At this level the work is 'authored', its broad thematic content being under the control of the originating author. However, the full complement of these elements might not make an appearance in any single 'reading' of the story. At this level the user becomes author of the specific rendering of the work. This mode of structuring a narrative is modelled on the structure of a hypertext document. In a hypertext document the 'user' navigates his or her way through the text by clicking on 'links' (underlined phrases or words which lead the user to another page which either explains the word, or leads to a connected topic). Each of those pages in turn has 'links' which the user may choose to pursue or not. The user also has the choice of returning to a previous page, enabling them to continue the progression of the text or work from a given point in the process. Any individual rendition of the work may see the user explore several pathways from a single event.

'Links' operate at a variety of levels of complexity. In a simple hypertext document (of which a CDROM is an example) the 'links' operate on the basis of a simple one to one correspondence - that is, if you click on 'x', a specific page of text, or a specific image, appears. In more complex multilinear programs, the signal (e.g. a mouse 'click' or other trigger such as pressure pads, light recognition systems such as BigEye, a MIDI device [a keyboard, microphone, etc.], sets in motion a section of the programme (a 'script') which determines the subsequent activity of the images. In many programs, particularly those based on the principles of Artificial Intelligence, the programme itself is able to make a choice from the possibilities available to it. In this way the broad structural framework of---a work is programmed in by the originating author/s, but the operation of the details of the programme are in the hands of the users. In artworks made using complex multilinear programs the work is embodied as much in conceptualisation of the programming as it is in the images which appear on the screen.

The choreographer working in the digital domain, particularly in interactive works, must accommodate this type of structure in his or her thinking. S/he must

acknowledge that the micro-sections of movement material, and (in some works) their 'framing' on the screen, are the main elements of the work over which the choreographer has total control. Inasmuch as the movement images provide the basis of the thematic content and tenor of the work, they are a seminal element in its construction, and are frequently developed in dialogue with the digital artist. The choice of imagery and the ways each of these elements interrelates with other, independent, elements become crucial structuring devices in and of themselves and ultimately determine the character of the work. However, in interactive works the organisation of movement images in real time, both in terms of tempo and temporal progression, is passed either to the computer program, or the user, or both. Initially, unless the choreographer is a programmer, or at least able to manipulate a pre-existing programme to suit their artistic needs, s/he will pass the artistic mantle to an artist/programmer at this stage. This is not to say that the choreographer has no voice in the structuring of the programme which drives the work, indeed discussion may take place during this stage. Nevertheless, in most collaborations, the artist/programmer at this point makes as significant a contribution to the development of the work as the collaborating choreographer did in the development of the imagery. The contribution made by the artist/programmer is thus crucial to the artistic content of the work, for it is in their work that the structure which drives the range of possibilities for the organisation of the images in time is sited. (This structure takes the form of a multidimensional network, analogous to the 'neural network' model of the mind, which comprises nodes and connections between nodes.)

### ***Choreographer as Programmer***

A choreographer who wishes to retain artistic control over his or her work may decide to become responsible for the programming of the work, as well as for the production of the images from which it is constructed. There are many programs which have an interface which is relatively easy to use for the non-specialist (Xpose, and Image/ine are two such programs). Interesting effects can be generated using such programs, which have a variety of effects which can be used to manipulate the image in space, in texture and in time. Other programs, such as Macromedia's Director, are more complex and require considerable time to master. A choreographer wishing to script in Director will have to commit themselves to learning the programme and then to going beyond to solutions built into its interface. Many choreographers would find themselves temperamentally unsuited to using the highly detailed symbolic language (which is more akin to mathematical logic than to 'dance logic') in which programs such as Director are written (I am one such choreographer). Here a collaboration with a digital artist would serve such choreographers well, for the latter have mastered the program, the symbolic language in which its instructions are written and are able to transcend these to create artistic effects. However, even if the choreographer has the kind of mind which enables them to take the role of the programmer in their work, in an interactive work s/he relinquishes the final control over the presentational form of the work, the ultimate decisions as to the form of the work being made by the user (whether this be performer, director or viewer) as s/he is using it

### ***Interactive Works***

Interactive dance works are analogous to interactive art works. Here the artist provides the materials from which a piece is constructed, and the broad framework in which these can be displayed. The relationship of the interactive dance work to the temporally fixed performance (whether it be digitally constructed or not) is as the

relationship between the book and a hypertext document. The book has a beginning and an end, and events occur in the order set by the author. A hypertext has no preconceived beginning or end. It comprises a collection of materials from which the user selects when reading the text. Several pathways can be taken from one image, each leading to a different image, and thus progression of the work. The images are not arbitrary, but are authored, their content pursuing the idea which drove the text. The number of pathways from each image, the choices available to the user, is determined by the author. The degree of authorial control over the coherence of the various presentations of the work is sited at this juncture. In a live dance work (excluding improvised works), the choreographer controls the overall shape of the work in time (its temporal organisation: the order in which events occur, the transitions between choreographic images, the start and finish of the work). In an interactive digital work the choreographer has control over the images which are available for presentation and over the broad structure of linkages between the images, but not over the order in which they are presented, nor indeed over whether all the images created appear in any one instantiation of the work.

The notion of a beginning and an end, and of a 'logical' development as the piece progresses, which are central to the choreographing of a live work, begin to lose their meaning in interactive digital works. The choreographer must therefore think in terms of an open-ended piece, one which has no conventional resolution or conclusion, but rather comprises a collection of images which articulate the theme of the work, and which can be presented in any order and still make artistic sense. If a work is to be constructed by the viewer, or by an interacting performer, on each of its occurrences, certain choreographic issues have to be taken into account. As a great deal of digital dance work comprises digitised images presented on a screen (either a computer monitor or a large projection surface) the parameters of video dance apply to some degree. For example, because the 'shaping' of a digital dance work is not conditioned by the temporal requirements of live performance and/or video dance, in many works the scale (the size) of the images, available for selection, and/or their tempo, may need to vary in order to provide sufficient diversity in the image which results from the interaction. The user will want to produce an artistically satisfying event, in a relatively short period of time. The artist must provide sufficiently varied materials to facilitate this, and to accommodate a range of potentially 'satisfying artistic events'.

The concept of temporal progression used in computer technology, which eschews a stable, chronologically linear timeline, differs considerably from the sense of temporal progression which dominates in most live dance works, and, to an extent video dance works. In these works time is shaped, either using the Western concept of climax and resolution, or the Eastern concept of ongoing flow of time, which may or may not be broken by distinctive events. In both cases the concept of the transition between features is brought into play. In many digital dance works, time is shaped in a more arbitrary way, the progression from one image to another disjunctive rather than fluent. In an interactive work the notion of choreographing to facilitate a spatially and dynamic coherent progression in time gives way to the need to choreograph elements which can be organised in a multitude of different ways at different times, yet (if this is what is wanted) maintain a measure of coherence. Not all the images will be produced in any one 'rendering' of the work. The artist must be aware of this and provide images which will be satisfying both when exhibited in limited numbers and in their full variety.

In a digital dance work the organisation of movement elements in time are not always the sole preserve of the choreographer. Frequently the responsibility for the temporal organisation of the work is in the 'hands' of the computer itself. When certain data is sent to the computer (via the click of a mouse, or the triggering of a pressure pad, or the passing through a space in a particular direction) the computer responds by activating one of several sets of previously programmed instruction 'strings', which activate the presence of a collection of images, organised according to a set of flexible structures. The nature of many of the transitions from one image component to another may also be taken over by the computer program, rather than being predetermined by the choreographer in the studio. So, instead of creating a finished form, the choreographer in the digital domain provides raw movement materials which are fed into a computer program designed for the piece, the latter structuring the material in time at the point of contact with an interactor. (In this context the choreographer has only reached one of the earlier stages of the studio choreographic process, the one before the forming of the overarching choreographic shape takes place.)

When the material has been produced, and the underlying concept of the piece developed, the choreographer (and/or collaborator) employ various programming instructions to enable a user to 'call up' images as they interact with the piece (either through using a mouse or touch screen, or through walking around in an installation environment). The content of the dynamic elements (the phrasing, acceleration and deceleration, pauses, tempo, etc.) of the movement images, rather than being intrinsic to the movement elements themselves is frequently provided either through the process of editing the video images (speeding them up or slowing them down, repeating short gestures, playing a gesture forwards and backwards) or through the (piece-specific) design of the computer programme which drives the work. In other words the process of forming the material takes place in the digital domain, not in the physical domain.

In interactive works standard compositional devices such as linking images into a coherent strand of movement with intrinsic dynamic shape gives way to the insertion of instructions for the use of selected compositional devices into the computer program. The instructions can be for the repetition of sections of movement material, retrograding the playback of sections of movement material, manipulating the size and shape of the image and so on. The choreographer and/or her collaborator make decisions as to which compositional devices are appropriate to a piece, and therefore which instructions to build into the computer program. Questions and---Challenges Working in the digital domain raises many questions, questions which choreographers are answering both in their work and through more theoretical discussions of the issues their work raises. Questions of authorship, of the role of the body in the digital domain exercise the minds of many choreographers working in the field. An examination of the choreographic process also takes place as the choreographer adapts and accommodates his or her practice to the new requirements of the new medium. However, although the choreographer in the digital domain may find themselves challenging the conventional roles of the choreographer the degree to which they have control over the piece, etc., and performer, their challenge to choreographic practice itself is not as radical.

Choreographing in the digital domain is, I would suggest, an extension of the work of choreographers such as Cunningham and his successors, who developed strategies suitable for digital media long before those media had become sufficiently sophisticated to be of use to the choreographic artist. However, although the choreographic tools used by choreographers in the digital domain may be similar to those used in live performance the works produced in this environment are not. The works choreographers produce in the digital domain are the result of the dialogue between two artistic practices. What makes them distinctive in the domain of digital art is that they have a particularity which is derived from the choreographic and artistic sensibility that is brought to bear on them. This differs from a musical sensibility, or the sensibility of the visual artist by virtue of an emphasis not merely on the body, but on corporeal rhythms of motion (even if there is no human body evident in a work) and the motion of corporeality. There may also be a particularity about the structuring procedures used by choreographers in the digital domain. These draw on the complex interweavings of spatial and temporal rhythms with which the choreographer is familiar. These are transposed to the digital domain, and in the process explore new territory, both for the choreographer and for digital arts practice.

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