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This chapter concentrates on issues of collaboration between the arts and sciences, with special reference to Choreography and Cognition, a joint research project (see http://www.choreocog.net) initiated by arts researcher Scott deLahunta and choreographer Wayne McGregor that engaged practitioners from the field of cognitive science in seeking connections between creativity, choreography and the scientific study of movement and the mind. First, deLahunta describes briefly how initial ideas evolved into a six-month research project involving several cognitive scientists and the support of an Arts and Science Research fund. There follows discussion about why a choreographer and a cognitive scientist might be interested in each other and in structured collaboration. Cognitive scientist Phil Barnard explains the background and one of the resulting experiments that took place and proposes further mutually beneficial research. In the final section, Wayne McGregor details his experience of working with cognitive scientists on Choreography and Cognition, which inspired the creation of *AtaXia* (2004) and motivated future plans.

### Introduction to Choreography and Cognition

Choreography and Cognition began as a discussion about developing new understandings of the choreographic process that might lead to alternative creative approaches and enhance collaboration processes, initiated by Wayne McGregor’s keen interest in Artificial Intelligence, the branch of computer science and engineering involved in creating intelligent machines, and the possibility of creating an *autonomous choreographic agent*. We knew that such an ostensibly impossible project would require not only a better grasp of the workings of the mind, the ‘intelligences’ involved in dance making, but would also rely on productive cooperation with scientists.

We organized a series of meetings with cognitive and neuroscientists in the United Kingdom and France. We visited their labs and gave each other short presentations, asked questions, described, explained; taking the initial steps towards mutual understanding. Since we knew relatively
little about their field of expertise, and the scientists, in general, knew almost nothing about the field of contemporary dance, both sides had to construct new frames of reference.

As a point of entry into choreographic practice, we provided the scientists with verbal description of improvisation tasks/problems that McGregor normally gives his dancers to solve as a mode of generating movement sequences at the beginning of a creative process. We tailored these by selecting examples of tasks involving a degree of complex mental work with specific cognitive requirements, for example visualizing shapes in space, to stimulate a focused conversation about how mind, brain and body interact.

We were fortunate to secure funding from a pilot Arts and Science Research Fellowship scheme in the UK to continue working over a period of six months with selected scientists: Alan Wing and Kris Hollands, SyMoN (Sensory Motor Neuroscience research group), University of Birmingham; Anthony Marcel and Phil Barnard, MRC Cognition and Brain Sciences Unit, Cambridge; Alan Blackwell of Crucible/Computer Lab, University of Cambridge; and Rosaleen McCarthy, Department of Experimental Psychology, University of Cambridge, where Wayne was hosted as a Research Fellow. In addition, James Leach, a social anthropologist doing fieldwork on arts and science collaborations, took part and made a significant contribution to our understanding of the nature of these exchanges (Leach 2006: 447–51).

The following three objectives guided the six-month project:

1. **Shared objective:** to seek connections between choreographic processes and the study of movement and the brain/mind that are scientifically and artistically interesting.

2. **Artistic objective:** to integrate the participation and contribution from the scientists into the fabric of the choreographic process while maintaining the integrity of the modes of looking and questioning pertaining to their respective research areas.

3. **Scientific objective:** to start to formulate specific questions and research methodologies that arise from the individual interests in this project in the context of the creative choreographic process.

In November 2003, the project began with a two-day shared session in London to watch McGregor and Random Dance working with some new scores and tasks for generating movement material. The goal was to elicit observations from the scientists as the basis for further investigation and experimentation. McGregor intended to use these interactions to conduct his own research into creative starting points and processes for his next piece, *AtaXia*. The project had several successful outcomes, which are documented on the Choreography and Cognition website (www.choreocog.net). The following sections of this chapter focus on some basic questions about shared interests and the collaborative organization of the project.
Why might a choreographer be interested in cognitive science?

There have been big advances in our understanding of the brain in the past fifty years, bringing with it new descriptions of what it is to think and how things like sensory perception, movement control and memory, as working parts of the mind as a whole, might interact. Research ranges from building intelligent computer models and developing clinical diagnostics to brain imaging and consciousness studies. For any artist interested in learning new things about creativity, cognitive science presents a possible pool of insights for both self-knowledge as well as understanding artistic collaborators, viewers and audiences better.

On teaching cognitive science and arts, Cynthia Freeland, University of Houston philosopher, writes that cognitive science:

> is revolutionizing our understanding of ourselves by providing new accounts of human rationality and consciousness, perceptions, emotions, and desires, with great consequences for our understanding of the creation, interpretation, and appreciation of artworks in all mediums.

(Freeland 2001)

Freeland’s three-part paper explores the idea of a course bringing cognitive science into relation with visual arts, film and music theory. The article’s emphasis is on seeking connections between mind/brain research and art theory and less creative practice, and tackling some of the difficult problems of inter-disciplinary knowledge exchange.

In neuroscience, a discipline often seen to be part of the cognitive science field, a controversial new line of research has emerged in the last decade known as neuro-aesthetics, which attempts to explain some aspects of the perception of art based on scientific study of the brain. Early proponents include Zeki (1999) and Ramachandran (1999), focusing on visual arts with more emphasis on historical than on contemporary references, and there is some related research in music. In the field of contemporary dance, independent researcher Ivar Hagendoorn has written articles about choreography drawing on the same fascination with the explanatory strength of cognitive neuroscience; some of his writings explore the possibility that such scientific study can inspire dance. Indeed, William Forsythe’s own curiosity about neuroscience stems from an interest in refining his intuition about what people watch in his dances through understanding some of the cognitive mechanisms of attention (Forsythe, personal communication, April 2006).
Why might a cognitive scientist be interested in choreography?

Phil Barnard's aim is to develop useful ways of thinking about the workings of the mind. His research programme is focused on meaning – not only the kind of meaning that is expressed in language and symbols, but also deeper meanings about the self – living, moving, thinking and feeling in a complicated social world. In his own work at the Cognition and Brain Studies Unit in Cambridge, Barnard first develops models of the healthy mind, and then considers how things might go wrong in clinical conditions such as major depression, mania, anxiety, anorexia or schizophrenia. One characteristic of the cognitive psychology community is that different groups of researchers focus on particular mental faculties – such as language, perception, memory, attention, motor skills or emotion. As a modeller interested in clinical conditions, Barnard seeks to understand how these individual mental faculties all work together in a unified mental system.

In these clinical cases, it is natural to emphasize dysfunctional thinking about the self, the world and other people and its emotional consequences. However, psychologists know that bodies clearly play an important role and that embodiment and multimodal sensation are an integral part of self-meaning. The difficulty is that any efforts to understand how bodies relate to meaning typically involve massive over-simplification. Against this background, choreography provides interesting research opportunities for Barnard:

First, dance is inherently multimodal. In dance performance, thematic elements are packaged as movement, music and staging, all contributing to the viewer's emotional and intellectual experience. Secondly, this package challenges the psychologist's ability to think at the same time about many research topics embedded in a single rich context. Third, the experience of performing or viewing dance appears to provide conditions where, at least to some degree, it is possible to separate out the contribution of abstract senses of self and others from specific thoughts about those senses. Dance ... can be performed or experienced without a continual flow of explicit verbal thoughts. Yet in domains of making dance, notating it, or discussing it those abstract senses of meanings are translated into verbal thoughts or graphic notations. Thus, dance and choreography provide a unique platform for studying, using both quantitative and qualitative methods on how thought and abstract senses of the embodied self work.

(Barnard and deLahunta 2006)

Barnard's understanding of what dance had to offer to scientists developed quickly during the project. Other scientists similarly expressed their realization that dance and choreography involves an exceptional
multimodal blend of physical and mental processes. Initially we had hoped that choreography would be an exciting research challenge for cognitive scientists already accustomed to working in an interdisciplinary mode. However, it was not yet known how this predisposition towards broad interdisciplinary research would work in collaboration with artists.

**What might happen in the structure of a collaboration?**

Having established points of mutual interest, we can say more about the set-up of the Choreography and Cognition project. We understand that arts and science collaborations will always encounter some generic points of difference. Both domains are involved in processes of investigation and creation, but these processes are markedly different in each field. For example, in order for science to make progress it needs to make a *simple* model of the problems it wishes to investigate; and it is a requirement in science that the same investigation gets the same result. For the artist, an investigation or research period may also involve breaking down a larger problem, but here the process tends to be dominated by internal self-referencing. As long as artwork is the outcome, this process can be unique; and no one else need assume the position of the artist in order to verify the working procedures. For the shared research we assumed and accepted these generic differences. Moreover, we extended this embrace of difference to the concept that any professional specialization, such as cognitive psychology, might effect a way of observing and describing phenomena in terms consistent with this specialization.

As Barnard noted, in the domain of making dance, verbal and graphic description is clearly part of the creation process even though the resulting performance can be experienced (on the part of both performer and audience) without the need for these explicit representations. For the cognitive scientist, these verbal and graphic elements provide clues to the processes of mind involved in dance making. This explains why we began our collaborative encounter by focusing on an early stage of the creative process, researching and making movement material that may be used in the final piece. When the cognitive scientists attended the two-day session to observe McGregor and his dancers generate new movement material, afternoon discussion sessions (which included McGregor and two of the dancers) allowed them to present responses based on their individual areas of specialization.

The scientists described what they had observed, using their own frames of reference, individually articulating the themes they thought of interest. Not surprisingly, this triggered a lively debate amongst the scientists, since they shared these references more immediately amongst each other than with the artists present. However, the shared respect and curiosity that drew us together during the initial meetings now provided a critical foundation for the project's success. Bridges of understanding were forged between artists and scientists through the mutual generation of what McGregor has described as 'conceptual frameworks, discussions,
debate, explanation and dialogue that surround the practical events themselves).

The aim was to elicit observations from the scientists that could become the basis for further investigation and experimentation; on the second day, they were invited to present a hypothesis or tentative theory to investigate through subsequent experimental or empirical methods. The ultimate goal was to arrive at different scientific starting points that might have implications for McGregor's creative research for *AtaXia*. Time was set aside over the next two months when each scientist could return to Sadler's Wells to work with McGregor and the dancers to pursue these lines of enquiry. Eventually, each scientist evolved a separate set of questions and a proposal for an experiment to investigate these further. The experiment devised by Barnard and his colleague Tony Marcel was the viewing and parsing exercise described in the following dialogue.

**The viewing and parsing exercise: a dialogue between Phil Barnard (PB) and Scott deLahunta (SD)**

*SD:* Can you briefly describe your experience of first encountering Wayne and the dancers creating dance material in the rehearsal studio?

*PB:* The invitation to observe Wayne generating movement material for a future dance piece came with the offer that we could each do some empirical research in collaboration with his dance company. I entered this enterprise with a vaguely formed and naive ambition to study how properties of movement influenced the emotional experience of the viewer. Unsurprisingly, the first thing to fall by the wayside is the predetermined plan. As I watched Wayne work developing his movement material with the dancers, I was quickly perplexed. Wayne briefed, observed and re-instructed the dancers and periodically interacted with his own notebook. But I realized I didn't have a clue what was going on in his mind. My questions suddenly changed. What was he 'seeing' in what the dancers were doing and how was he seeing it? When he saw something, what was he using to support his thought process and creativity? To what extent was there a shared understanding between the choreographer and dancers? How did the exploration of small phrases of movement like these relate to the wider context of creating and staging a piece intended to explore the theme of dysfunction (Wayne's starting point for the research for his next work)? Choreographers would no doubt have their own clearly framed ideas about this. As a cognitive scientist, I was entirely in the dark.

*SD:* Can you briefly describe the experiment you devised to investigate these questions further?

*PB:* We set out to develop a simple exploratory method for addressing some of these questions. Wayne and the dancers developed eight short
Augmenting choreography

Figure 28.1 The Quicktime software used for the viewing and parsing exercise in the Choreography and Cognition project.

Figure 28.2 Image of Matthias Sperling watching the sequence.
dance sequences of between one and a half minutes and two minutes in duration, which we videotaped and digitized. Using software that made it possible to watch, stop, start and move forwards or backwards through the sequence we asked the ten dancers and Wayne to analyse each of the eight sequences and identify temporal units of movement in them – like parsing a sentence into words and phrases.

The study was as follows: first, each dancer watched each sequence through, indicating where the particular units they saw began and ended, stopping and starting the video when necessary. We recorded their judgements of where units of movement started and ended as our primary quantitative data; these were read off the panel in the right side of the interface shown here [see Figures 28.1 and 28.2]. Importantly, each individual could determine what a unit was – we were very careful not to bias them about what might or might not be a phrase or what properties they should focus on. At the end of the data collection, we asked the dancers to discuss their experiences of viewing the movement material.

SD: Did you have any expectations about what the results might be from this viewing and parsing experiment?

PB: One simple principle of cognitive psychology is that we can only 'think' about a limited range of things at a time. Movements of the kind the dancers were watching have many attributes, including bodily configurations, energy, use of space, or underlying intention and no one can attend to all at the same time. It would be astonishing if all ten dancers plus Wayne were to focus on exactly the same things: so in the parsing experiment we expected considerable variation. And indeed there was a great deal of variation; but at the same time there was a great deal of overlap.

Here are two ways [Figure 28.3] we developed for presenting the quantitative data. On the lower panel, eleven horizontal lines show, as expected, that the eleven viewers all segmented the sequence differently and this was a consistent feature across all eight sequences. Notice that the middle line only shows just seven black segments. This is the representation of Wayne's results. Whereas the other dancers all parsed the whole sequence, he, the choreographer, focused only on selecting the elements he found interesting. The upper panel is a new visualization invented by our statistician, Ian Nimmo-Smith, by placing time on both the vertical and horizontal axes. The pyramid-like structure that results uses greyscale to show the extent to which the dancers agreed. Regions where it is completely black index total agreement that adjacent frames were part of a coherent unit. The lightest shade of grey indicates where only one observer saw a coherent unit. Here in a single visualization is a statistical summary of the variation in phrase structure that we observed. Simultaneously, you can see multiple structures assigned to exactly the same movement sequence.
It is fascinating how this single visualization captures all eleven viewers simultaneously; the exercise registers what each individual dancer sees in the movement sequence without resorting to verbal description making it possible to compare and contrast these different registrations. The set-up of the viewing experiment itself forces a unique mode of analysis using video, a common tool for dancers. I am tempted to see this representation of movement analysis as a sort of dance notation.

What we have here is not a dance notation. These visualizations simply make explicit abstract properties of the perception of dance as seen by eleven different viewers. It makes it possible to directly see relationships that cannot be captured in simple numbers. For example, we see immediately from the branching structure that there are regions where there is agreement on where something starts but greater indeterminacy about its perceived end and vice versa. The visualization makes explicit attributes that might otherwise have remained implicit or difficult to articulate verbally in a discussion about the phrase. The pyramids expose contrasts within and between pieces and render them intellectually tangible. From this platform we can think back to the questions we posed initially.

This might have interesting consequences for students of choreography who might be encouraged through seeing this visualization of the parsing exercise not to get lost in the detail, to maintain an overview of the range of possible meanings of any one particular moment in a dance phrase. Our representations imply that while viewers are unlikely to agree on particular moments, they do agree in more general ways and that these densities of agreement can be
featured hierarchically, making it possible to discuss more than one level of ‘seeing’ or noticing and noting how different levels might happen simultaneously.

PB: As a cognitive scientist, I have my own questions about attention and meaning. Of more significance to choreographic processes, we might ask: What properties applied in those regions that Wayne considered interesting and how did they differ from those that he did not select? Are dancers seeing units in terms of the same or different properties to the choreographer or even a naive audience? While it is tempting to speculate about the mechanisms of attention to movement, one area we would like to focus on in the future is how the methods and concepts from cognitive science could potentially be applied to augment dance analysis as well as choreographic construction.

SD: It would be fascinating if an experiment to try and generate valuable scientific results could also be used to augment the choreographic creation process. Can you explain what you mean?

PB: From this initial exercise, it became clear that through the parsing exercise the dancers had arrived at interesting insights about the movement they were looking at. Although they had obviously viewed dance material many times on video before, here they were asked to attend to many different features at any one of several ‘levels’ of decomposition and make decisions about what a unit of movement was for them individually. Additionally, using the software tool for viewing and marking times in the movement sequence rendered their observations explicit through non-verbal means. Here is one observation made during the post-data collection discussions:

as the exercise went on, also I felt my perspective of how I was looking at the exercise started to change a bit. I think I started off feeling like a unit to me in the beginning was more of a chain of movement. Then eventually it became not only just a chain of movement but perhaps looking at the intention of where the movement was coming from. I guess that came out through the quality of what was happening. So it wasn’t just about starting and stopping. ... There is another level that comes into it after a while, after you really watch it again and again.

(Kham Halsackda in deLahunta and Barnard 2005)

Other similar observations were made by the dancers such as enhanced perception of movement features where initially they had only an ‘implicit’ feeling or empathizing in a new way with the point of view of the choreographer (deLahunta and Barnard 2005). We cannot be certain what it was about the parsing exercise that led to such changes in understandings. Perhaps it was the combination of specificity and ambiguity in the
instructions combined with the ability to review detail many times over using the software tool that was significant. But the dancers' experience and our speculation about the various choreographic meanings that may be latent in the resulting visualizations suggest that students and mentors of choreography could benefit from sharing intellectual territory with cognitive science.

**Developing augmentation techniques: a proposal by Phil Barnard**

While interdisciplinary collaborations can focus on reciprocal exchange of concepts and ideas about the significance of movement and dance, there is an inherent danger that the different disciplines will tend to talk at each other rather than with each other. During our collaboration, it occurred to us that a useful approach to counter this would be to target future research on developing a range of techniques for augmenting choreographic processes. In this way we might develop the scientific study of choreographic cognition while offering back into the dance community something of immediate value – a possibility suggested by the apparent mutual benefits of the exercise just described.

The parsing exercise, while productive for us, dealt only with a tiny fraction of the full making process. To develop this as an area of research, we need also to explore how to visualize and summarize longer sequences in a much richer way. In order to work effectively, choreographers and dancers need to develop a frame of mind that supports analysis, creativity, criticism or just the replication of a performance. Already we have many clues about potentially productive avenues for future research. Reviewing and analysing dance on video is common practice in the dance community and technological support of various kinds is currently being explored (Forsythe 2000).

We all know that photographs provide powerful reminders of past experiences, and that trailers for TV shows will sample brief components of the previous episode to remind us where we are in the overall story. There is evidence that video snaps (very short time slices) of the recent past can help patients with severe memory problems to prompt recollections that otherwise would have been inaccessible. Annotated replays of short segments of action are now an integral part of commentaries on sport. Such observations raise the prospect of using dynamic images to reinstate past choreographic experiences and frames of mind in the context of making or discussing dance (Berry et al. 2007).

Imagine viewing a short part of a recent live performance you have seen. Then imagine how much you might be able to recall. To what extent can you reconstruct movements only in your mind’s eye or through empathic bodily feelings? One approach we have been exploring to aid movement recollection is through making a temporal montage of video snaps from longer sequences with each snap lasting around one second.
In Figure 28.4, we reproduce a sequence of stills from one of the videos we used in our parsing exercise. Try to imagine how viewing these in sequence, like a series of almost arbitrary jump cuts, might bring certain parts of the movement sequence back to your mind. Unlike a succession of static stills (as seen in Figure 28.4), a short time slice of the video captures something of the dancer’s dynamic, and his use of space. In our initial explorations, we sampled mechanically a small segment from every ten seconds of the kind of short sequences used in our parsing study, the average duration of a perceived unit in that study. We made no attempt to align the cuts with the perceived units that are represented in the graphic visualization. A sequence of dynamic snapshots effectively summarizes the whole movement sequence and its mechanical nature could be important partly because it can be easily automated at low expense in terms of time. Something that can be done quickly and rapidly reviewed may be more supportive to the creative process of making dances than techniques requiring an army of editors.

This rapid and disjointed juxtaposition of fragments brings together different yet related elements. It could be significant precisely because it does not allow time for thought about each one as it happens but rapidly reinjects or reinstates large amounts of movement material back from the past into the present moment. It is potentially a tool with properties that might be of interest to choreographers to stimulate recollection and creativity. If we can stimulate by reinstatement certain prior thinking states in the mind of the choreographer, we may be able to provide a range of technical resources for augmenting choreographic processes that are especially tuned to current understanding of how cognition works.

Notebooks full of words, sentences and graphical notations have one set of properties—they require time to inspect and mentally analyse and they omit the physical context from which they were derived. Perhaps they promote one particular slow mode of propositional thinking. It can even be argued that this mode could inhibit rather than promote creativity. Creativity seems to be linked to an alternative mode of thought in which generic and experiential senses in the mind are more prominent than specific propositions—intuition if you like. We are already researching how these modes of mind might work in psychopathologies such as the rapid and fragmentary thinking involved in mania or the slow propositional ruminations that accompany depression; and using that understanding to guide the development of new therapeutic interventions. It is potentially very exciting to uncover intellectual common ground between the domain of normal laboratory work and the world of dance.

Science/dance collaborations: a dialogue between Wayne McGregor (WM) and Scott deLahunta (SD)

SD: The process of making both *AtaXia* and *Amu* brought you into close working relationship with scientists. Can you say something about
Figure 28.4 Twelve stills from the video of Kham Halsackda, a dancer with Random Dance, during the Choreography and Cognition project.
this working relationship, this collaboration, in general, e.g. how it started, what sustained it? What were some of your discoveries?

WM: All collaborations, whether they function between artists and other artists or artists and scientists, are demanding. Their success is based not so much on the nature of each individual's specialism or level of expertise but on an ability to communicate well, to share ideas and to listen. This openness of approach and willingness to think outside of the box is vital to true collaborative endeavour where all parties are taken on a journey of mutual exploration. The science/dance collaborations that have been the most productive for me have been those that tread this path of investigation in a dynamic, fluid and ever-evolving form. It is very difficult to establish exactly why a particular relationship works and why certain ones do not. The alchemy of collaboration, especially when you are blurring the boundaries of thinking, throws out new challenges for everyone and sets the tone for fruitful exchange. I understand from my investigation with Phil Barnard, for example, that what I articulate to be important in my creative process is, in retrospect, a memory of the process and often, if not always, not reflective of the actual creative decision-making process. It is a form of theatre in its own right, a construct. We have all acquired formulas to articulate our processes that are not accurate records, but traces of the events that take place. This is a fascinating revelation and pushes one to genuinely reflect on one's process utilizing a completely different intellectual framework. These encounters have the potential to change thinking and bring us to an altered state; this is what provides the biggest catalyst for creation.

SD: Could you say something about how both scientific processes (experiment/data collection) and outcomes (descriptions/explanations) informed your creative process? For example, I have heard you describe the idea of the prisms/vision disorientation for AtaXia. What information did you take back into the studio, and how did you use it?

WM: The scientific 'experiments' Random undertook during the AtaXia process directly fed back into the dance making to generate a new physical language. It's easy to see how and why this was possible. There was a very clear relationship between the aspiration of the research project and my interest in undermining the relationship between the body and the brain, quite literally making the behaviour of the body dysfunctional. Experiments were facilitated to disrupt the body's ability to coordinate its movements and these scientific choreographic interventions or perturbations actually made extremely able-bodied, virtuosic dancers unable to stand up, let alone balance. Through a series of dual tasks, vision disorientation techniques, motion capture/motor control experiments, etc. there was a very practical puzzle for the body and the brain to solve. The process of solving the puzzles, the time it took to see the body and
brain attempt to come to terms with the difficulty and the ensuing solutions provided the most useful information to capitalize on in the studio. The journey of thinking through the unfamiliar was a greater resource than the actual end results. Because ultimately the brain finds a solution, it maps a framework that now easily facilitates the task – the brain learns fast.

This very practical experimentation is only one of the valuable aspects of a collaborative process with science. As important are the conceptual frameworks, discussions, debate, explanation and dialogue that surround the practical events themselves. This transfer of knowledge(s) permeates the process in many fundamental ways. Choreography is about making decisions, and decisions are shaped by immersing oneself in the actual content of the work. This total immersion allows strategies for making to emerge. It inspires new choreographic form with possibilities drawn from science but applied in dance; and opens up totally new territories of language because the currencies of language we expose ourselves to are non-arts-based. This was keenly seen in the *Amu* process where Random Dance were exposed to biological, medical, mechanical, spiritual 'learning' sessions focused around building a knowledge system for the heart. This included having our hearts scanned, watching open-heart surgery, understanding flow and dynamics of the heart, meditation techniques, etc. Each new session built a more dynamic, richer imagination for the heart and resonated very individually with each artist. This approach of immersion fuelled improvisations and physical investigations that drew directly upon our collective experience of learning about the functions of the heart and our individual experiences of building an empathy with our own heart. That is, science makes visible the unknown, art uses that discovery and translates it into something equally meaningful, but in a very different language. Sensibilities converge ...

*SD:* Where would you say the evidence of these projects (these working relationships) is demonstrated in both the choreography (the art) and the science?

*WM:* What is vital in genuine collaboration is the notion that science cannot be used merely to serve the artist in the same way that artists cannot merely provide data for the scientist. These may be outcomes or aspects of the collaboration, but not the points of departure. Therefore, in all of the collaborative processes undertaken with the scientists, I have not prioritized the making of a new work. New work has resulted from these dynamic exchanges but the focus has been a series of questions, propositions, ideas to be thrown between us, tested, examined and explored. Some questions lead to actual experiments, some remain in the abstract and are no less important. Equally, some of the scientists have published journal articles and given papers on work we have undertaken because during the
evolution of our interchange particular points of interest converge with their science. Again, these have emerged and have not been a condition of collaboration. The outcomes of the science/dance collaborations have been varied and remain alive. The questions for all of us live on.

SD: You are about to embark on another period of research with scientists that will inform the creation of the new work ENTITY. Would you describe this as an evolutionary step?

WM: The intention to develop ENTITY, an autonomous choreographic agent, has been with me for some time. Both AtaXia and Amu helped provide a framework for this research. AtaXia looked at the direct connection between the body and the brain and discovered what happened when this connection was interfered with. The whole project was driven from the perspective of the brain being the central organism that controls everything the body experiences. Amu looked at the biological functions of the body through the filter of the heart and attempted to explore a connection between the heart and brain, ultimately exposing the generation of emotion. Both of these projects used kinaesthetic intelligence as a starting point for exploration. The human body, connected to itself and its environment, a complex, complicated, virtuosic, thinking, memory-laden entity, provides an unrivalled window into human experience. And dance – the most complete amalgam of all of the technologies of the body and brain – is a rich subject for never-ending research.

With this physical thinking in mind, the aspiration of building a new form of body, this ENTITY that has embedded inside it kinaesthetic intelligence, has come to fruition. We do not want to build a body that replicates human physical behaviour, but one that can do the unexpected, without the restrictions of a ‘real’ body. Its decision-making processes and learning, although based on human kinaesthetic intelligence, should surpass human capabilities with an embodied imagination of its own. ENTITY should be able to interact with us in the studio but provide us with challenging encounters with the alien, the unfamiliar, an uncertain artistic future that destabilizes our formulas of making and disrupts our aesthetic sensibilities.

Unfamiliar thinking territories: a brief glance back by Scott deLahunta

The Choreography and Cognition project was initiated in 2001 when we collaborated on the Software for Dancers project: a research into new concepts for digital creative tools for choreographers. Now, we plan a ten-week research period at the University of California San Diego (UCSD) where Wayne will be Innovator-in-Residence, with the intention to conduct
initial research on the ENTITY project. Again, the idea of the ‘autono­
mous choreographic agent’ is intended to be both a stimulus for shared
dance and science research and creative impetus for a new artwork.

The urge to create this agent (or collection of agents) that can generate
unique solutions to choreographic problems alongside his own decision­
making processes, has been with Wayne for some time. It has taken several
years, however, to gain enough collective experience and understanding
to be able to approach the idea productively. Working together in the late
summer of 2006 on a site visit to UCSD, Wayne, Phil and I drew on our
past experiences to make concrete suggestions for the forthcoming resi­
dency. The proposal is to continue probing the interconnection of mental,
emotional and physical processes involved in dance creation; Wayne
outlined a three-stage development that emphasizes building conceptual
frameworks through dialogue and practical investigation through various
experimental formats. With the coordinators at UCSD, we identified key
research areas and laboratories, which can bring interesting perspectives
to bear on the ENTITY project, for example, memory, attention, distrib­
uted cognition, creativity, reasoning, decision making, protocol analysis
in rich task environments, design rationale and cognitive design tools.

In the past, support for arts and science collaboration has often required
increased public understanding of science as one of its key objectives; but as
more collaborations are undertaken and more open-ended funding oppor­
tunities appear, it has become possible to pursue joint research under other
terms. This creates the possibility of doing collaborative research that, as
Barnard states, uncovers intellectual common ground and leads to valuable
outcomes in both domains. Interdisciplinary collaborations between artists
and cognitive sciences in particular, in which differences are understood
and exploited in shared description, research and creation processes, stand
a chance of making unforeseen discoveries and of giving rise to new insights.
Ultimately, this requires all involved to go beyond the clearly defined and
relatively safe objectives outlined at the start of the Choreography and
Cognition project, to follow the creative need to journey into unfamiliar
thinking territory. This compels us, at least momentarily, to step away
from the shelter of institutionalized categories. As Anthony Marcel wrote
to Wayne, ‘what you and the dancers are doing IS science. It’s just another
way of doing it’ (Marcel, letter to Wayne McGregor, November 2003).

This chapter is adapted from presentations at the Underskin Sym­
posium, La Biennale di Venezia Dance sector, Venice on 9 June 2006.

Notes
1 The pilot Arts and Science Research Fellowships scheme was jointly funded by
the Arts Council England and the Arts and Humanities Research Board (now
Council) of the UK.
2 The decision not to show video at this stage reduced the amount of informa­
tion to process together; the descriptions coupled with some physical demon­
stration were thought sufficient.


6 For information about AMU and the collaborative research with heart specialists see <http://www.oftheheart.org> (accessed 28 November 2006).


8 In Australia, another extensive research project involving cognitive scientists and dancers took place. More information can be found online. Available at <http://www.ausdance.org.au/unspoken/> (accessed 28 November 2006). See also Grove, Stevens and McKechnie (2005).

References


