

Fair Exchanges

3DIS Computer/Dance/Music Project

HEAR THE DANCE, SEE THE MUSIC – *'Fair Exchanges'* was a collaborative large scale dance/music work made between October 1988 and March 1989 by Ros Bandt, Warren Burt, Shona Innes, Sylvia Staehli and Jane Refshauge, using

Simon Veitch's 3DIS computer vision control system. Earlier, in February 1988, Shona Innes and Warren Burt had made 3 very short dances using the system as a demonstration of its capabilities for Veitch's company, Perceptive Systems, and the Channel 7 TV program *Beyond 2000*.* From this work, it was decided that the system had enough potential that serious works of art could be made with it, and an application was made to the Performing Arts Board of the Australia Council for funding to develop a larger scale work with the system. Funding was approved, and work on the project began in late October at Extensions studio in Carlton, with performance at St. Martins Theatre in South Yarra from March 15-18, 1989, aided by further funding from the Victorian Health Promotion Foundation and Diabetes Australia.

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1 WARREN BURT

3DIS (Three Dimensional Interactive Space) is a generalised computer vision system which analyses information from different kinds of inputs and makes decisions and controls other machines on the basis of the information it receives. For our purposes, the input devices were four small television cameras (each about the size of two matchboxes), and the output devices were musical synthesizers and samplers. The operation of the system is based on extremely simple principles. The users of the system look at a live picture from one or more of the cameras, processed by the



computer. With a computer control device called a mouse, they indicate on the TV screen which particular area of the screen they wish the computer to be aware of. The computer then calculates, 30 times a second, the average brightness level of that particular area. If the area indicated was, for example, a black vase, and a pale-skinned person put their hand on the vase, the computer would register a great decrease in light level. What it would do now would be up to the users. They could, as one possible option, indicate via the program to the computer that each time the brightness of the vase changed even a little bit, the computer should send a signal to a synthesizer to play, for example, a high Bb with a piano-like tone. Or, the changes in brightness might control the changing speed of a prerecorded melody. In fact, any signal possible with MIDI (the industry standard for sending musical information between computers, synthesizers and other musical devices), can be sent by 3DIS, so that virtually any mapping of changing light levels into musical information will eventually be possible with the system.

Each area one isolates out from the view of the TV cameras is called a 'gang' and with the present system, one can have up to 99 separate areas like this. Each 'gang' may be active on up to four cameras, so that if two or more cameras look at the same space from different angles, one could define space from multiple perspectives, resulting in a truly three dimensional definition of space. With this system, one can define an entire space consisting of areas with separate musical functions, creating a conceptual equivalent of 'keyboards' which consist not of physical objects, but of invisible but sensitive shapes in space. This development is part of the massive redefinition of the concept of 'keyboard' that has been occurring throughout the musical instrument field in the past decade. Briefly, a 'keyboard' today can be thought of as any collection of control devices (which may or may not be switches, or even traditional 'keys') which can trigger off any musical events in any way. All sorts of devices have been developed recently, from devices which ape traditional musical functions (MIDI wind instruments, guitar controllers, and percussion pads) to those based on new concepts (gloves with many small mercury switches in them, each of which produces a computer signal based on the orientation of the hands in space). 3DIS stands out among these systems as being the most versatile, and the one least attached to the concept of physical contact with an object producing musical information.

This makes it both ideally suited to dancer control and yet simultaneously makes it conceptually one of the most difficult of new controllers to come to terms with. In addition, although the concept of dancers working with technology is not a particularly new one (Oskar Schlemmer's Bauhaus dances, the work of Australians Phillipa Cullen and Greg Schiemer, the work of American composer Joseph Pinzarone, and the Merce Cunningham/Gordon Mumma *Re-run* are all examples which spring immediately to mind), this particular application of technology forced both dancers and musicians to re-evaluate their traditional roles. Traditionally, all musicians, except perhaps unamplified solo singers have relied on some sort of external technology to make their music. Even such a simple device as a drum can have an enormously complex technology behind it. (For an example of Native American musical instrument technology see "Making a Cree Drum," by Albert Davis and Tina Pearson in *Musicworks* No. 37, Winter 1987, Toronto). In the end, musicians are largely dependent on their body-external tools. Dancers, on the other hand, though usually surrounded in performance by all the sophisticated technology of the modern theatre, are not actually dependent on any body-external tools or props, unless they consciously choose to use them.

*These dances are described in Warren Burt's article, "The 3DIS System," in *Sounds Australian* No 19, available from the Australian Music Centre, PO Box 49 Broadway NSW 2007.

In the end, the solo body, unadorned, is the basic stuff of which dance is made.

For this project, those conditions would not necessarily apply. If the dancer's movements were actually responsible for the sound, the dancer's function vis-a-vis music had changed. In essence, the dancer now was the musician. And the composer, who might usually give very precise instructions (notation) for performers to interpret (through that's not the usual way either Ros or I compose) was here faced with a different task: that of defining a system of spaces and sounds in conjunction with a dancer in such a way that both sequences of movement and the resulting sounds might have some sort of artistic potential.

In addition to making work which developed the latent artistic potential of this new technological system, we conceived, from the outset, of the project also having social and political briefs. Too often, technology is thought of an exclusive 'male' preserve, a 'hard' area of knowledge placed dialectically in opposition to 'soft', 'female' areas of work, such as dance. The logic used by computer programming is a paradigm of the hierarchical, sequential, positivist logic so typical of patriarchal power systems. In this project, we wanted to do more than simply give women already involved in experimental thinking about the arts access to this technology; we wanted for the work process itself to be co-operative; for the dealing with the system and the making of each work to be done by the group in communal, non-aggressive, non-hierarchical ways. We wanted to have the project, and the 3DIS system, function as liberating environments and tools, rather than as constraining ones. This process proved to be very difficult. We spent fully as much time dealing with the social dynamics of our group as we did in dealing with the technology or in making art with it. The social, technological and artistic processes were all new here, and we found that slowly we were able to approach each other, the technology, and the making of the works in a way consistent with our ideological goals. Many of the tensions we felt during the project were the direct result of placing a non-hierarchical consensus-based structure into contact with institutions (the business world and its demands for a kind of publicity we felt inappropriate to our work, the technical demands of a traditionally constituted theatre space, etc.).

The problem the 3DIS system raises most immediately is one which is central to much post-modern dance: the relationship between sound and movement. As implied above, in using this system, composers could not think in purely sonic terms, and choreographers could not think in purely kinesthetic ones. Rather, we found it necessary to surrender the integrity of our specialist art forms in order to evolve a working method that would address both our needs and the capabilities of the system in a more holistic manner.

This also, of course, creates problems for the viewer. If the rules are changed for us, they are also changed for the viewer. The work demands to be perceived differently from either silent dance work or work where music is used as either accompaniment or decoration.

Each of the pieces was developed to explore both a different relationship of sound and movement and to explore a different way of using the 3DIS system. In *awaywithwords*, the opening work, ten 'gangs' were placed at the edges of the space in two groups of five. Each gang triggered off a recording of a different single word. These words were chosen from a vocabulary of words mostly common to both dance and computer languages, with a few words thrown in that were common to neither. The dance began with a silent duet between Shona and Sylvia. They crossed the space until they crossed the gangs and triggered off the words. At this point their dancing changed. They used the words as triggers, or instructions, for improvising movement. In some cases, the relations to the words were quite direct and humorous. In others, they were more oblique. A series of duets and quartets followed, with Ros and myself also triggering off the words with our movements. In this way, we hoped to establish the contrast between musicians' (untrained) movement, which was almost always

directly concerned with making sound, and dancers' movement, which might or might not be directed, in this case, to sound production.

For *Percy Grainger and Burnett Cross*, the second work, had a direct historical basis. The Australian composer Percy Grainger spent much of the last 30 years of his life, from 1931-1961, developing instruments to play his 'free music', a music consisting of gliding tones and beatless rhythms. He was aided in this quest by the then young scientist Burnett Cross. One of the instruments they built in the early 1950s was called the 'reed-box tone-tool', a collection of pump organ reeds, tuned to 36 notes to the octave, and played by revolving a large paper roll into which they had cut patterns, just like a player piano roll. With this machine, they could at least simulate the glides that Grainger was interested in hearing. Their later experiments led them to develop a prototype of the voltage-controlled synthesizer, but we felt the reed-box concept left open possibilities they had not explored, and so the 3DIS system was set up to provide an S-shaped invisible 'keyboard' stretched across the dance floor playing just two octaves of Grainger's 36 tone scale, using the sampled sounds of the actual 'reed-box' itself, now on display at the Grainger Museum. The dancers' movements along and across this 'keyboard', played music directly related to the Grainger-Cross 'gliding-tone' work. In some cases, movement material came directly out of dealing with the nature of sound production. For example, Sylvia observed that more than one person moving along the S-shaped path to produce the counterpoint of glides Grainger wanted invariably meant that meetings and partings would occur. Meetings and partings, so much a part of behaviour in formal Edwardian England, were therefore incorporated as a major motif in the piece. In other cases, movement came out of a desire to subvert the system, such as the silent waltz (away from the sound producing path) done by Shona and Jane, which is immediately followed by the same waltz in the opposite direction, (now along the sound making path), which produces a music of brief glides and abbreviated musical gestures. In this piece, the struggle was to find movements which produced interesting music faithful to the Grainger/Cross investigations which also made sense both dramatically and as part of an absurdist narrative.

In *Inside/Out*, the areas of space around Jane, the solo dancer, were set up so that drum-kit sounds were played. In effect, she was surrounded by an invisible drum-kit suspended in space. It was here that the limitations of the system were most apparent. One of the problems of working with invisible areas of space as sound triggers in comparison with making music with physical objects is the lack of kinesthetic feedback. Even the most insensitive synthesizer or organ keyboard allows one to feel physical contact when a sound is produced. In the case of percussion instruments, the feedback is even more pronounced, as the physical nature of playing the instrument defines much of the player's movement. In *Inside/Out* the contradictions inherent in triggering percussive sounds with non-percussive gestures were explored, making a dance/music which used the seeming contradictions and limitations of the system. This was especially clear in the last section when the sound was suddenly switched off in the busiest part of the piece, leaving Jane to bring the energy level of the piece down, using gestures she had developed to make sound, gestures which now suddenly functioned quite differently as movement.

In the first three pieces, the 3DIS system was used in a very simple way, with one gesture in one area producing one predictable musical or verbal event. In the last three pieces, other ways of using the system were explored. *Free Trade Zones*, a solo for Sylvia, was a political piece.

A text was printed in the program. This text was not an ornament – it was an essential part of the piece. The piece was not just a dance/music composition, but was intended to be viewed by an audience that had knowledge of the text. The perception of the dance was to be conditioned by the text- it formed the essential political and moral environment within

which the dance/music occurred. The text:

Labour costs in Hong Kong and Taiwan, the new bases for Atari production, have been estimated at one fifth the wages earned by non-union American employees.

Female migrants and urban working class women are channelled into labour intensive jobs in foreign industries. These international high-tech corporations treat the majority of their labour force (female production workers) as a labour reserve whom they employ as disposable temporaries, poorly paid and given no social security. Fresh single women from the countryside provide a constant flow of replacements.

The third most dangerous industry, in terms of exposure to cancer-causing substances, is electronics. Throughout the production process electronics workers in the Philippines are exposed to acids, solvents and gases which have various physically damaging effects, causing, for example, eye defects, cancer, lung disease, and liver and kidney troubles.

In one soldering job, every girl gets sick from the smells after a year of work, but the company forbids transferring to another work unit...Often, women displaced from assembly plants are forced to seek work in hotels and brothels.

As members of a Western society, we are all involved in a consumptive lifestyle which exploits others. We must be aware of the flaws in our tools, which contradict our efforts at positive change.

- BASED ON WRITINGS OF AIHWA ONG AND SISTER MARY SOLEDAD PERPINAN

Seven areas were defined, each of which played a recording of a quotation from a performance by a master world musician. Music from China, Upper Volta, Laos, Japan and Zaire was used. Sylvia's movement around the space produced a mixing and overlapping of these loops of musical quotations.

However, a random time-delay was built into the triggering-on of each sound, and the sensitivity of the areas was set very low, so that there was as great a chance that a sound would only begin some time after Sylvia had gone through its area, or even that she would turn on, and then turn off, a sound, before any actual sound had been heard, as there was that a sound would turn on when she actually went through the gang. This created an unpredictable mix of fragments of third world music where the presence of the dancer created the probability of a particular music happening, but not, perhaps, its actuality. It effectively divorced the locating of an individual sound at an individual point in space triggered off by an individual movement. Only if one knew the functioning of the system very well was it possible to follow the logic of Sylvia's movements.

Mungo was conceived from the beginning as a piece which dealt with the system in a more oblique, or "poetic" way. The main sound in the piece, in fact, was not produced by either the dancers' movements or 3DIS at all. It was a recording of a wind-driven aeolian harp, an original sound sculpture made in Red Cliffs, Victoria, by Ros Bandt and Steve Naylor. This recording formed the sonic 'bed' for the rest of the piece, a journey through time and space inspired by the interior landscape of the ancient dry salt Lake Mungo, NSW. The gangs contained sounds assembled from natural and fossilized materials such as rocks, shell wind-chimes, snail shells, quandongs and the like. The placement of the gangs was traditional (one gang in one place produces one sound), but the ways they were used was not. For example, both Sylvia and Jane had solos in the gang that produced the shell wind-chime sounds at different times in the piece. In each case, the solo was completely different in character, although the sounds produced were similiar. The idea here was to blur the edges and the character of the gestures that produced the sound as much as possible. Another example was Shona's solo in the stone wind-chime gang. While she was performing that, Jane was



ABOVE: *Fair Exchanges*

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producing snailshell sounds in her gang, but Shona would respond to Jane's sounds, and dance to them, while continuing to produce her own sound. In this way, a richer relationship than the normal one was set up between sound and movement.

In addition, the theatrical lighting was constantly changing. Since the 3DIS system is triggered off by changes in light level, this meant that in addition to the dancers' movements, many of the sounds would be triggered off at 'random' times, whenever the rate of the changing light levels exceeded the present thresholds. This created a system where the dancers' movements were only part of the activity creating the sounds, and tended to focus attention away from the utilitarian nature of their sound producing gestures. Each dancer created their own movement sequence/identity independently. These independent sequences were then brought together and tailored to fit the work. A polyphony of choreographic identities was thus created, contributing another layer of complexity to a very slow, and richly multi-layered environment.

Random, the final piece, was the most extreme use of the system. In this piece, random fluctuations of light levels played a texture of music boxes, water samples and bird calls. The presence of performers increased the probability of sound happening, but did not directly trigger it. This freed the dancers from the necessity of making gestures which triggered

sound, but still made their presence necessary for the overall effect. The feeling here was one of liberation. After a program of works where precise positioning of the body was very important, a final work where one could move freely provided a great sense of release.

This was further accentuated by the nature of the movement itself, freely improvised swinging on three suspended ropes. Various choreographic strategies for this piece were tried and discarded. It was found that only improvisation, with all its pitfalls and dangers, could produce the feelings of release and freedom this piece seemed to call for. Another element of the piece were the costumes by Sharon Muir, which were made with a semi-random drip-screening process. The luminous colouring of the silk used for these was enhanced by the lighting changes (which also affected the mix of sounds the system was producing), which turned the blue and green patternings into phosphorescent shades of silver.

The 3DIS system here functioned as one voice in a three voice improvisation texture. I played keyboard synthesizer, and Ros played Casio Digital Horn, a new electronic wind instrument (yet another new kind of musical controller) with quite a nice tone. Here, dancers, musicians, designers, lighting personnel and the electronic system were all freed to produce independent activities which nonetheless influenced each other, creating a counterpoint of activity. It is this kind of use of the 3DIS system that, it seems to me, offers the most possibilities for the future, in that it opens the way for dancers to move about with their accustomed freedom, but allows that freedom to influence the musical course of events. Future uses of the system I would be interested in would have 3DIS used as control input into a program that composes musical events in real-time, so that the dancers' positions influenced the logic or the structure of the piece, but not its moment to moment details. This kind of work would, it seems to me, take the work we have already done in this project to another level of sophistication, one that I would be most eager to explore.