EAI Endorsed Transactions
on Creative Technologies
Research Article EAI.EU

Enabling Active Interaction With Music And Sound In Multisensory Environments

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Abstract

In recognising a lack of established design principles for multisensory environments (MSEs), two case studies are described which challenge current trends for creating and resourcing sensory spaces. Both environments were regarded as spaces within which to work rather than as a given suite of technologies and the activities being explored placed much emphasis on moving beyond passive modes of interaction for sound and music. Stimulating interactive story-worlds were enabled for children with Special Educational Needs and assistive technologies were used to enable individuals to affect the environment as a whole. In using game-play within the activities, it was also recognised that adaptive-audio (as used in computer gaming) could offer considerable impact within physical spaces such as MSEs. Future directions are outlined including defining core design principles, embedding adaptive-audio techniques within specialist software and exploring the benefits of MSEs for stroke survivors.

Keywords: accessibility, music, dance, technology, multisensory environments, play, adaptive game audio

Received on 20 November 2016, accepted on 04 March 2017, published on 05 April 2017

doi: 10.4108/eai.5-9-2017.153060

1. Introduction

It is widely accepted that there are observable benefits to be gained for individuals with significant learning difficulties who regularly interact with sensory stimuli. The suggestion that fundamental sensory stimulation could be a more direct way of reaching out to individuals with profound and multiple learning difficulties (PMLD) was originally proposed by Hulsegge and Verheul [1] in the late 1970s. In their book 'Snoezelen: Another World' they described specialist rooms within the De Hartenberg Centre in the Netherlands being equipped as controlled sensory environments where a care assistant could work with an individual with PMLD as she or he interacted with a range of sensory stimuli. There was great emphasis placed on reaction and play within these sessions and though, at some level, learning might be achieved, it was not a primary aim of the sensory activities.

The Snoezelen model of having dedicated sensory rooms (sometimes referred to as 'dark' and 'light' rooms) is still relatively commonplace within current Special Educational Needs (SEN) provision and there are now specialist suppliers that will equip such spaces. As Pagliano [2] observes, many of the technologies being used in the 1970s were becoming available as a result of the arrival of the discotheque where audio-visual equipment was emerging that would enhance the sensory environments being created for mainstream entertainment; mirror-balls, sound-to-light units and projector wheels were all commonly used against a backdrop of amplified and beat-based music. Alongside these audio-visual technologies, a variety of new plastic materials was also becoming available such that soft-play furnishings could be manufactured using wipe-clean PVC, velcro could be used for rapid but secure fastenings and vacuum forming techniques were enabling the production of lightweight playground equipment. There were also key sociological advances happening that would lead to a progressive movement away from the institutionalisation of individuals with physical and cognitive challenges and more towards mainstream integration. The Snoezelen concept emerged out of these landmark events, offering safe environments where individuals with PMLD could be immersed in stimulating yet playful activities and all within a therapeutic context.

The longterm benefits of working with sensory spaces are still to be fully assessed and where research

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has been carried out the results have tended to be inconclusive (e.g. [3, 5]) or perhaps not open to generalisation (e.g. [4]). There is still substantial value to be attached to personal observations and experiences though as the special needs educator is typically working at an individual needs level where the opportunity to generalise rarely arises. This is an aspect that Mount and Cavet [6] identify in their review of similar studies into the relative merits of multisensory environments (MSEs), ultimately arguing that there is likely to be as much significance to be placed on the quality and abilities of the individual member of staff as the equipment and spaces they are operating within. MSEs can now be regarded as widely available within SEN provision in the UK and have evolved from the Snoezelen model to exist in a number of contrasting forms including rooms, gardens, corridors, trolleys, pools and even corners. However, there is little literature available on what 'good' design practice might be or, indeed, the kinds of activities that might be carried out within any given environment. Recent research into the design and use of MSEs in England and Wales [7] has identified a number of areas that are worthy of further investigation and these are outlined as follows:

Generic resources There is a noticeable trend for spaces to be equipped with a standardised set of resources (mirror-ball, bubble-tubes, infinity tunnel, audio playback etc.) yet with little evidence to suggest why this should be. In contrast to this, there is also some evidence of SEN educators making creative use of repurposed technologies within ad hoc spaces with very positive results.

Themed play and story-telling The technologies that typically populate MSEs are not always flexible in terms of enabling the creation of thematic environments. Indeed such spaces can often be fixed environments with a relatively common set of resources similar to those just described. When considered alongside the constraints that can be imposed by relying on such a set of generic technologies, it could be suggested that greater emphasis is being placed upon the value of the technological suite as a standalone resource rather than considering the potential activities the space might afford and using that as the basis for drawing in complementary technologies where appropriate.

Passive use of sound and music Though there is evidence of individuals with PMLD responding positively to musical stimuli, much of the typical interaction with music in MSEs will tend to be passive; a backdrop against which other activities might be carried out. This is also reflected in a general lack of assistive music technologies being incorporated into MSEs even though there is a considerable body of evidence that would point towards positive outcomes from doing so (e.g. [8], [9], [10] and [11]).

Working with groups Although the Snoezelen model for the MSE was originally aimed at working exclusively with individuals with PMLD, there is now a wider recognition that exposure to sensory stimulation can offer potential benefits across a broader spectrum of people with individual challenges; this can offer clearer opportunities for working with groups.

2. Case studies

Two case studies are described as initial attempts at addressing some of the issues that have just been outlined. They are also the start of a collaboration between the Department of Contemporary Arts (Manchester Metropolitan University) and Apollo Ensemble, a UK company that creates assistive technologies for use in SEN schools. The academic team at Manchester brings specialisms in assistive music-technologies, community-music and community-dance and has ongoing partnerships with a number of local schools and community groups. Apollo Ensemble's key software platform enables the integration and control of a range of SEN and commercial technologies for sensory interaction and is frequently used within MSEs. Having inbuilt programming capabilities, the software also offers the potential for bridging the gap between commercial and novel music technologies and MSEs and it is anticipated that the project's findings will inform the design of new methods for interaction within such specialist software environments. Both case studies have focused on the design of music workshops for children with cognitive and/or physical challenges attending SEN schools in the North West of England and a number of common themes have been explored and as outlined in the following sections:

Environments Both sets of workshops were hosted in theatre 'black box' rehearsal spaces. This offered a relatively large space to work with such that a group of around fifteen individuals could work safely across the whole space if required. With 'black-out' being available, any coloured lighting and projected images could have greater impact, offering a more immersive sense of 'place' within the themed environments being created. Though there were specialist lighting facilities available within the spaces, use of these was limited to offering background lighting for avoiding total darkness with all other technologies being either portable or regarded as commonly available in portable form.

Technology A key aim was to create an immediately stimulating and almost 'magical' environment where simply being in the space would be fun or exciting. Added to this was the notion of being able to progress from one environment to another to create a journey or story to use as a backdrop for encouraging game play. To enable this, a core suite of wireless controllers was identified that could form the basis for rapidly establishing a themed environment or 'story world'. At the heart of this was an RFID card reading sensor that could be used to immediately switch from one environment to another with the participants being able to choose where to travel to next. The image printed on each card corresponded to a larger image being projected onto a backdrop screen along with an ambient soundscape that would complement that particular environment. In addition to this, coloured DMX lighting was being controlled to further enhance the immersive experience being created; blue for water, green for jungle, red for volcano etc. Colour changing LED spot lights were distributed on either side of the screen and partly around the workshop group in such a way that all lights could be switched to a specific colour simultaneously. Control over the colour of the lighting was achieved using a large but lightweight PVC dice housing an orientation sensor. Each side of the dice was a different colour and the lights were programmed to match the colour of that side which was face up; rotating the dice would rotate through the colours.

Game play As will already be apparent, great emphasis was placed on using game play throughout the workshops. Other than being a stimulating environment to experience in a passive sense it was important that the workshop should remain engaging throughout; offering opportunities for the group to make choices and to lead the way where possible. With this in mind, there was a careful balance to be maintained between prescribed and improvised activities such that there would always be a new activity to explore but wherever the opportunity might arise to react to an idea that emerged from the group it could be taken.

Feedback General observations were gathered that included reflections by workshop coordinators along with comments offered by educators and care-workers in attendance with each group. The input of these individuals was particularly valuable in terms of better understanding how stimulating and enjoyable the activities appeared to be for the groups with whom they were so familiar. They were also able to suggest how appropriate these same activities and environments might be for other groups that they were working with.

2.1. Artscool 2015

For this series of workshops, technologies were used primarily to help create an interactive environment within which to explore and improvise. Though there were opportunities for participants to trigger sound these were generally designed to complement the landscape that was being presented; wildlife sounds to enhance the ambient soundscape for example. A story world was constructed around a tropical island adventure featuring ten locations including a beach, a jungle, rope bridges, paths, waterfalls, pools and a volcano. There were animal images that could be selected to appear on demand including an elephant, tiger, monkeys and parrots and hand percussion was used to allow the group to create jungle rhythms throughout. In addition to this, carefully selected tuned percussion such as chime bars and glockenspiels were used to allow serene pentatonic textures to be created at key locations such as the beach and pool. Figure 1 shows the layout of the theatre space with DMX controlled stage lighting situated on either side of the projector screen, a dice shaped 'orientation' sensor to the left of this and a selection of hand-percussion to the right. In the middle of the floor was a wireless RFID reader and the colour of the lights could be changed by turning the dice sensor to have the desired colour on the most upward face.

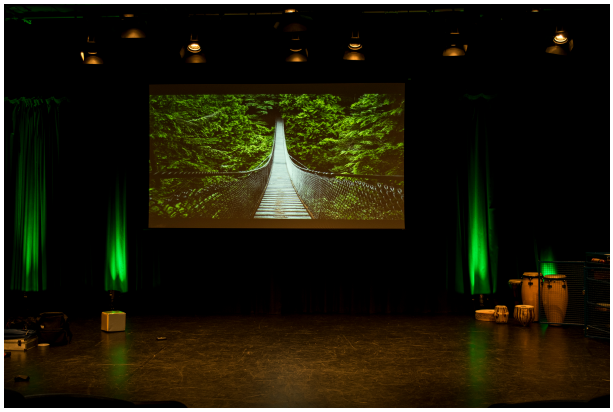

Figure 1. Jungle themed environment with rope bridge.

Simple rhythm-games were employed as ice-breaker activities at the opening of the workshop but the main focus from then on was the creation of a musical journey across the island moving between the different locations. There would be a starting location set by the workshop leaders but this choice could be passed to someone from the group by selecting a picture card to be placed on the RFID reader. The new environment would appear automatically and some time would be allowed to absorb the ambient soundscape and identify the sounds and images within it. Someone might be prompted to use the dice sensor to pick a lighting colour

to go with the scene and the activity could switch to playing musical games within the current location.

For the jungle images, the group might copy a simple rhythm to represent the sound of walking but then be ready to drop into a slower 'stomping' rhythm if the image of the elephant appeared on screen for example. The leaders would employ obvious physical gestures to suggest when to play loud or quiet, fast or slow, long or short and, finally, when to stop. At images of towering jungle rope-bridges, someone from the group might be asked to take a walk across the floor as if crossing a real bridge whilst the rest of the group would time their rhythm to match the footsteps. Walking steadily, pretending to teeter, becoming steady again and then a last dash to the end would all be supported by spontaneous but matching rhythms: steady, chaotic, steady, fast.

At the various waterside locations the musical activities would focus on creating serene textures with each member of the group having two or three selected chime bars to strike. The music specialists were key in coordinating the balance between sound, space and silence at these locations, encouraging participants to take their time to fully appreciate and immerse themselves in the multisensory environment before making any music. This was an important part of the process, managing the time effectively and avoiding any sense of urgency, perhaps employing breathing exercises whilst absorbing the waterside soundscape before exploring the kind of additional layers that might be added to this. For example, the music specialists could then conduct the group to gradually enter into the texture one-by-one, perhaps with a set rhythm or perhaps quite randomly. As with the rhythm games, the leaders would use physical gestures or body position to suggest whether the chimes should be struck loudly or quietly, quickly or slowly and shakers might be added to strengthen the water-like effect.

Reflections and observations. Two groups of about ten children were involved with these workshops and, although the sessions were approximately one hour long, both groups remained completely engaged throughout and were clearly enthusiastic to take part. This was reinforced as an observation by both educators and care workers alike who made specific reference to these particular groups as being quite challenging to keep engaged; this level of sustained attention was far beyond their initial expectations. A key factor in this was probably the level of contrast being offered between the different locations where there was already much to absorb in terms of image, soundscape and lighting; simply changing locations would offer great variety and therefore new interest even in a quite passive sense.

Participants were eager to contribute to the various musical games being led at each new location and opportunities to affect the environment directly were met with similar enthusiasm. Within the space, technology was being used to translate small movements into large gestures such that choices being made in a game-like way would dramatically affect the mood and feel of the immediate environment; rotating the dice would alter the colour of the whole environment and changing the image placed on the card-reader would transform the look and sound of landscape being visited. With this in mind, the outcomes being offered were really quite empowering even though the interaction required for each was easy to achieve.

Though the technology was enabling swift transitions between potentially exciting environments, the musical games and activities that were then explored were reliant on leadership from the workshop coordinators working with acoustic instruments. In this sense, the workshop design being explored here suggested a promising balance between technology enhanced environment and traditional music techniques but with considerable reliance on one or more music specialists to lead and improvise around the activities. In many respects, this reinforces Mount and Cavet's [6] observations that the experience and abilities of the professionals working within the space become a significant and valuable component of the multisensory environment itself.

Having music specialists available in these workshops opened up numerous novel opportunities for acoustic instruments to be used to create responses to gestures that were been enabled using assistive technologies and vice versa. For example, the workshops all made use of pitched instruments that had been selected to sound in key. However, several children noticed that there was also a piano in the room; showing considerable awareness that there could be other opportunities with which to respond to the soundscapes and musical activities taking place around them. By quickly marking out a set of piano-keys that would complement the current musical key being used the piano was easily brought into the emerging musical textures. As proposed earlier, it could be a misguided to consider the MSE as being a discrete or fixed set of technologies rather than placing greater emphasis on the environment and the activities it might offer; this becoming the basis for identifying additional assistive technologies where suitable.

2.2. Cheshire Buddies 2015

In contrast to Artscool, this workshop placed greater emphasis on the use of assistive technologies in triggering and controlling sound within the sensory environment. Again, efforts were made to create an exciting and magical atmosphere with images and soundscapes that could be used to create story-lines

for game play. The design behind the workshop was tailored to allow for input from an experienced community dance practitioner. She would lead much of the gameplay within the environment, encouraging actions that would make use of body movement across the available space. The themed environments included outer space, walking on the moon, scuba diving, mountain climbing and skiing and as with the earlier workshops, each set of images would have unique soundscapes and controllable lighting to enhance the overall effect.

Figure 2 shows the layout of the theatre space for an underwater themed activity. As with the previous workshop, DMX lighting was placed to either side of the screen but with twice as many lights being used this time such that the coloured light being cast could surround the group more effectively. Additional technologies were incorporated such that all the music supporting the dance could be shaped and controlled by the physical movement of the participants. To achieve this, four floor-pads were situated in the main area in front of the screen, a motion sensor with an active area that just reached into the main movement area was on the left hand side (out of sight in the image) and there was a space next to this for interacting with a table-top Leapmotion™ sensor. Again, the lighting colours could be altered by using the dice-shaped orientation sensor.

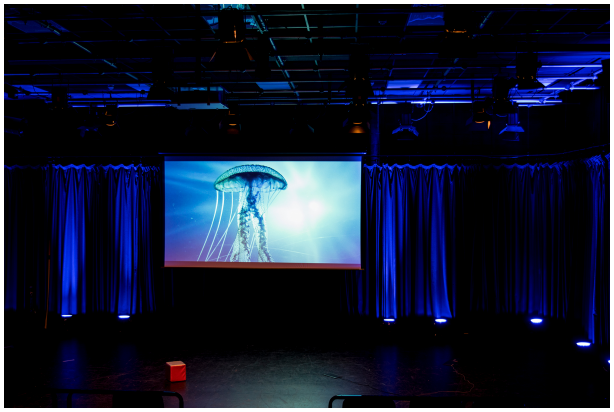

Figure 2. Underwater themed environment with jellyfish.

To enable this, the music for the workshop was created using a compositional approach drawn from computer gaming that is generally described as adaptive audio. Such approaches can allow a constant soundtrack to adapt as the game-play follows a non-linear narrative. For example, a single parameter of 'intensity' might be used to match a game's levels of action, influencing the pace, texture and style of accompanying music in addition to any environmental ambiences, sound effects and musical stingers. Though there are several different approaches for creating adaptive audio environments (see [12]), one key approach is to create looped music as a series of layers that are always in play but where the overall audio-mix will be dependant on the changing value of just one or two parameters.

For the purposes of this workshop, a number of pieces of adaptive music were produced that could all be mapped and controlled using only a small number of parameters. To achieve this, each looped piece was based on six separate layers each of which had independent volume control. Two layers (typically bass and percussion) were controlled using a Leap Motion sensor (a non-contact desktop gaming device that monitors hand and finger gestures). This particular sensor was chosen knowing that there could be one or two individuals within the group with mobility challenges yet just simple hand movement could enable these individuals to still take part and to contribute in a particularly effective way.

The remaining four layers would be musically textural, made of harmonic patterns and incidental melodic phrases, all mapped along the single dimension offered by an ultrasound sensor with a range of about three metres. Though only offering a single dimension to work with, adaptive audio techniques were employed to map this sole dynamic value across four envelope parameters such that a variety of mixes could be manipulated along the length of the sensor's reach. The aim was for one or two people to work with the beam, exploring the different layered mixes in an expressive way. Lastly, each of four floor-pad sensors could trigger a variety of 'stingers', again, a technique associated with game audio where a musical flourish can be triggered at any point in the game play whilst always appearing to 'fit' against the changing musical backdrop. Although the Apollo Ensemble software could be adapted to offer some of these modes of interaction and control, it was more immediate to prototype this aspect of the environment using MaxMsp; a specialist visual programming environment for working with sound and image. In practice, this meant using both platforms simultaneously to create the overall interactive environment.

As with the earlier workshops, the structure behind the activities was part-prescribed and part-improvised to once again enable the leader to respond and react to opportunities that might emerge from within the group. An initial ice-breaker game involved the dice sensor being passed around the group in a circle. Each person created a dance gesture with the dice which would also effectively set the colour of the environment until the next person's turn. Though the same theatre black-box space was used for this workshop as with the previous ones, more DMX lights were used this time such that changing the colour offered even greater impact. Again, the card reader sensor was used to help choose the different locations and the leader would

then look for body movement being suggested within the image to take the group on a journey across the floor space, imitating the movements of the leader. Once established as a game, the lead would be offered over to someone else in the group. Gradually, the three music controlling technologies were introduced to the group, once again playing and improvising through copying whilst creating the music which would support the activity for the rest of the group. Once all the different music making actions had been explored by the majority of the group a semi-improvised piece was devised that gradually involved more and more movement and music. Finally, some of the group members choreographed the actions of the others by indicating when and how to move.

Reflections and observations. One group of approximately fourteen children took part in this particular event and comments from the workshop's dance-coordinators suggested that the general levels of engagement and enthusiasm were very positive and similar to those observed in the Artscool workshops. This was further reinforced by the care-workers whose comments focused almost entirely on the high levels of engagement and overall enthusiasm that the group were showing. They were keen to point out that it can be very difficult to maintain sustained engagement across the kind of time scale that had been allocated for the workshop which was divided into two forty-five minute sessions with a short break in-between. The care workers highlighted that they had anticipated a greater need for helping to keep individual children attentive but this was not the case. Where they were required it was typically in a supportive capacity for those children who perhaps had more challenging needs and could have struggled without some level of additional assistance.

Though it is clearly positive that the environment was stimulating for the participants, the observations from the dance-coordinator leading the workshop are fundamental in terms of appreciating how the environment was suggesting and enabling particular modes of activity to take place. One of the most significant observations was that the environment and the technology within it were creating active opportunities for movement to occur. The environment provided an open structure to play within and because of this the role of the leader became one of facilitating participants towards being creative and playful on their terms, making choices about their engagement with the stimuli. Participants appeared to own their own movement and decisions with a sense of empowerment being created through the use of appropriate technologies; desires into active-opportunities into larger sonic and visual outcomes.

The interactive enhancements to the environment enabled play with no suggestion of 'right' or 'wrong' and individuals could be encouraged to improvise and explore the various technologies in their own way, inviting a range of responses and possibilities with every individual bringing something different into the space expressed though their own physicality. For example, some participants, where physicality allowed, were engaging with the technology not just with their hands, but also by interacting with it through their feet and other body parts. The combination of technologies appeared to encourage and enable a variety of interactions and, in this respect, the environment was enabling whole-body integration of dance elements in to the overall performance activity.

From a dance and movement perspective, there is much potential here for innovative and original outcomes to be produced as the technology invites the body to work in ways that are perhaps unexpected or surprising. This can create rich and interesting movement that emerges from that particular individual's physicality. In this way, the potential for self-expression becomes much richer than a 'taught' sequence of movements, as the participants can really feel that they 'own' the movement. Managing to retain a sense of ownership in this way whilst also working within technology assisted activities is an issue that Healey [13] outlines within a context of community-music identifying that over reliance on assistive means can also erode the individual's creative contribution and self-expression.

Within Human Computer Interaction there is strong awareness of this balance of person versus machine in terms of who is in control at any given point, the individual working with the technology or the technology 'itself'? In recognising that music technologies will have rules and constraints that lie within the system, Malloch et al. [14] have proposed a continuum of 'performance behaviours' which can accommodate traditional instruments and novel technologies alongside each other. Ranging from *skill-based* behaviours through those that are *rule-based* and ultimately on to those which are *model-based*, the continuum helps 'place' individual technologies within a context of how much control is available to the performer and it would seem that there is considerable relevance to be recognised within the enhance MSE workshops being described here. Though the activities involved dance and movement, they also involved expressive interaction with sound and music, the two coming together to create a single expressive experience. Though the music was adaptive in nature and could therefore offer over considerable expressive control to the performer this was greatly enhanced by the way in which the individuality of movement could be explored within the creative process. In this sense, the dance-like gestures and body movement being

explored significantly enhanced the extent to which a sense of ownership was being attained.

3. Enhancing the Multisensory Environment

One of the key criticisms that was identified at the outset of the two case studies was that current design practices appear to favour an almost standard suite of technologies to work with. However, conceiving of the MSE as being a space within which to work as opposed to a discrete set of technologies could offer greater flexibility for creating stimulating interactive experiences. So, the design questions being asked would ultimately be more focused on what might be achievable within a particular space and for what kinds of activities; these requirements then becoming the driving force behind the selection of any technologies that could be of use.

Having this additional flexibility in terms of size and layout of environment will also enable group based activities to occur more readily. As highlighted in the background research survey that was outlined earlier, MSEs in SEN schools are often housed in small spaces such that there is perhaps a natural tendency towards focusing on one-on-one activities even though there were examples of successful and engaging group based activities happening in ad-hoc environments.

Using technology within MSEs to enable actions and choices can clearly help make the environment accessible but the benefits of designing the environment to respond more coherently as a whole is perhaps less apparent; offering considerable empowerment by mapping small interactions into greater outcomes that transform the look, sound and 'feel' of the space. This can be taken further by devising an experience that is thematic in nature; offering a complete story-world to work within. A further enhancement can then be found by conceiving of the story as being a journey across a series of connected spaces. In many respects, this is game-play employing a non-linear narrative where players can make choices on where to explore next and both case studies recognised that having specialists with performance experience featuring within this framework could be paramount. The technology enhanced environment becomes a space within which improvisation can be used as the vehicle for creating and adapting activities to be responsive and playful.

Working within thematic and game-like interactive environments also offers opportunities for exploring adaptive techniques for controlling sound and music similar to those used in computer game design. In practice, these appears to offer intuitive interaction and exploration within a given sonic landscape that is just as in place within an MSE as it is within the story-world of a computer game. This allows artists to compose interactive soundtracks without knowing the exact gestures to be harnessed whilst also enabling workshop leaders who are perhaps musically inexperienced to lead group-based activities that offer expressive opportunities for interacting with music and sound.

4. Future directions

In concluding these exploratory projects two themes have emerged which are both now being taken forward to form the basis of more detailed research enquiries. Perhaps most significant is the acknowledgement that there is a distinct lack of evidence-informed design principles to refer to to when designing or adapting sensory spaces. In the absence of any such set of core principles to work with, MSEs appear to be simplified into general suites of technologies with which to work rather than allowing the technologies to be defined according to the needs of the individuals and the spaces within which they will be working. With this in mind, a bid is in progress to the UK's Arts and Humanities Research Council to fund research with the primary aim of establishing a set of core design principles for the creation of multisensory environments.

The other theme to emerge was the apparent place for game-like models for activities within MSEs with particular emphasis on ways of creating expressive modes of interaction with sound and music. A simple model for employing adaptive audio techniques in MSEs has been demonstrated as a prototype and work is now under way to explore how best to enable this same concept within software tools such as Apollo Ensemble.

Though the activities described here are regarded as novel, the participants for the case studies were all from SEN schools and in that sense can be regarded as relatively typical within a context of MSEs, however, there are likely to be other user groups who would benefit from engaging in sensory play where specific rehabilitative outcomes are desirable. MMU's Department of Contemporary Arts works closely with a number of local community groups offering music and movement workshops and recently hosted one such workshop for a group of stroke survivors. Using an approach that was very similar to the Artscool workshop, the group took part in a number of percussion based improvised pieces within a series of thematic environments that were interconnected to offer a sense of journey.

The percussion pieces were game-like as with the original workshop but this time there was just as much emphasis on relaxation as there was on music making. Stroke survivors can experience increased levels of fatigue yet there were comments from the group that they actually felt quite invigorated by the experience. Although only anecdotal, this does at least present

the possibility that engaging with activities in MSEs might offer temporary alleviation from the effects of hypervigilance which can often include physical and mental exhaustion. To explore this further, the current project is being extended to enable work with stroke survivors where head-related trauma has led to often quite complex physical and cognitive challenges. The research enquiries will be in collaboration with a regional branch of the Stroke Association with whom MMU has established a strong community relationship. There are two potential benefits to explore here and these are likely to be the subject of separate studies.

One aim will be to consider how adaptive game-audio techniques, similar to those used within the Cheshire Buddies workshop, might be mapped to quite specific individual movements and gestures that can complement a given programme of rehabilitation. By taking prescribed rehabilitative exercises and exploring how these might be attached to various sensory activities it is hoped that these routine and perhaps tiring activities can be embedded within MSEs that offer additional stimulation and positive engagement.

The other interest will be focused on establishing whether engagement with expressive activities in MSEs can contribute to the reduction of levels of fatigue induced by hypervigilance. Though initially working with stroke survivors as an example group, it is also recognised that the same issue exists for other chronic conditions and that evidence gathered with this study could be meaningful to other self-help groups.

For reasons stated at the start of this article, considerable emphasis has been placed on the use of interactivity with music and sound to enhance the current models of MSE that are commonly in use; there is evidence to suggest that there could be benefits from doing this whilst there is also evidence that this tends not to happen. However, though this could offer a useful starting point for such future studies it would be misguided to fail to acknowledge that any benefits in terms of reduced fatigue could also stem from other aspects of the workshops experience: an aid to distraction, increased social inclusion, a change of surroundings, the perceived landscape being presented, the immersive qualities of a given story-world and so on. With this in mind, it is likely that the focus will be primarily on creating immersive sensory landscapes within which to explore all manner of engaging and expressive activities.

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