INTERNATIONAL MinD CONFERENCE 2019

DESIGNING WITH AND FOR PEOPLE WITH DEMENTIA
Wellbeing, Empowerment and Happiness

Soundplay for wellbeing: improvisation with people living with advanced dementia

Gail Kenning, Alon Ilsar, Rens Brankaert Mark Evans

gail.kenning@uts.edu.au, Faculty of Arts and Social Sciences, University of Technology Sydney
gail.kenning@unsw.edu.au, Ageing Futures Institute, University of Technology Sydney alon.ilsar@uts.edu.au, Faculty of engineering and IT, University of Technology Sydney
r.g.a.brankaert@tue.nl, Industrial design, Eindhoven University of Technology
mark.evans@uts.edu.au, Faculty of arts and Social Sciences, University of Technology Sydney

Abstract: Music has been shown to positively impact people living with advanced dementia, triggering fleeting recall and recollection and impacting emotional responses. Research and practice have focused on opportunities for people to engage with music by listening to playlists of favourite songs, revisiting existing skills by playing music, or by engaging in group music sessions or music therapy. Research has primarily focused on music and melodic sound, however our day-to-day lives are filled with ambient sound, soundscapes and percussive sound. Research in this area is limited. As is research in how to promote creative engagement with sound for those who do not have any existing musical skills. This paper will discuss a project to adapt an innovative electronic musical instrument, The AirSticks, invented by a professional musical performer for use in his own practice, to suit the needs of people living with advanced dementia. It will provide insights into workshops with a group of residents at two care homes and show the impact on one person in particular as she engaged in an emotive improvisation with the musician.

Keywords*: Dementia; sound; creativity; music, improvisation*

1. Introduction

With changes to philosophies of care that have occurred in the aged and dementia care domains there is a growing recognition of the importance of promoting general wellbeing and supporting quality of life, and not only, caring for clinical and medical needs (Brownie, 2012;

Manthorpe & Samsi, 2016; Nolan, Davies, Brown, Keady, & Nolan, 2004). Aged care providers giving residential care are increasingly looking for ways to keep residents engaged (Kenning, 2017b). There is a need for objects and activities that can simply give people 'something to do', combat loneliness, provide meaningful activity, engagement, and provide opportunities for social connection (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009; Cohen-Mansfield et al., 2012; Treadaway & Kenning, 2015). Many care providers schedule groups activities that involve exercise, music therapy, craft activities, and despite criticism from academic circles, games like Bingo are still played and are popular. While these activities provide a level of interaction and engagement and cater for the group, they do not necessarily support individuals to express themselves or provide creative outlet. Engaging people creatively builds resilience and self-esteem, promotes a sense of self, and supports personhood (Cohen-Mansfield et al., 2009; Cohen-Mansfield et al., 2012; Kenning 2016; Kitwood, 1997). But, to achieve this, activities are needed that support individual creativity and take into account individual abilities and limitations, and wants and needs. Research has shown how music can be used to support personhood and offer creative possibilities.

The impact of music on people living with dementia has been extensively researched and programs like Music and Memory (http://www.MusicandMemory.org, 2011). show how listening to music can impact memory, recall and recollection, even if only fleetingly It can also impact the body physically, causing a person's stature to change or for them to move in a way that is not familiar in their everyday, as shown in research into the impact of music therapy on people with Parkinson's disease (Cochen De Cock et al., 2018). In addition, music impacts emotionally causing people to laugh cry, sing along in joy. Making music, and not only listening to it, can have a similar impact (Sacks, 2008pp 375-377) . But, musical skills may be negatively impacted by reduced dexterity or ability to focus attention, or because of lack of hearing, particularly in advanced stages of dementia. This can cause frustration as people recognize their reduced capacity and are reluctant to engage (Sacks, 2008 p 314; Social care institute for excellence, 2015). For those who do not have any musical training or skills, they are often introduced to music through approaches that involve listening and copying, or learning about the theories and practices of music, rather than in being encouraged to engage in transformative, experimental or exploratory experiences (Costa & Creech, 2019 p 159). Where studies have encouraged improvisation in music it has often focused on music as therapy with the aim of understanding, gaining insights into, or changing behaviors rather than for the sheer joy of performing (Favilla & Pedell, 2013).

This paper will report on a workshop for people living with advanced dementia where they were introduced to unfamiliar innovative electronic instruments and encouraged to 'play' and find their own form of creative expression. While some of the participants engaged with the AirSticks in a perfunctory way, doing what was suggested to them, one participant, Violet began to improvise and to creatively explore.

Background

Before discussing the study, it is useful to briefly look at the relationship between music, sound and dementia and how digital media and electronic musical instruments can support creative engagements with sound and encourage soundplay. The term soundplay is used by the authors in this paper to refer to the act of engaging with instruments to create sound, and the possibilities for making sound in a playful way, that does involve therapeutic assessment, judgement on quality or aesthetics of sound, or assessment of the player's skills.

Music, sound and dementia

The relationship between music, health and wellbeing, particularly for older people and people with dementia is well-researched and documented (A. Baird & Samson, 2009; Aimee Baird & Samson, 2015; Amee Baird & Thompson, 2018; Sacks, 2008). Research has increasingly shown how music can stimulate, calm, excite and affect people living with mild cognitive impairment, limited cognitive function, and dementia (Aimee Baird & Samson, 2015; Gold, 2013). The impact of listening to familiar and loved music has been shown to stimulate oral responses in people who have been nonverbal, stimulate memories that have been seemingly lost, and bring comfort (http://www.MusicandMemory.org, 2011).

Making music as part of social engagement or music therapy has also been shown to impact on self-esteem and sense of self. For people who are skilled in playing musical instruments they often retain the ability to play after other abilities are lost (A. Baird & Samson, 2009; Aimee Baird & Samson, 2015; Sacks, 2008). However, some people may lose their love of music when they recognize their skills are not as good as they have been, and for people without any music making background or interest in music, music may appear inaccessible (Costa & Creech, 2019; Riley, Alm, & Newell, 2009; Social care institute for excellence, 2015). Non-melodic percussion instruments can introduce or re-introduce people to music making, because they do not require the player to understand or read music. Drums, tambourines and instruments such as rhythm sticks are often used to explore creativity, often focusing on the group experience rather than individual creativity (Riley et al., 2009). This type of music promotes physical movements, and encourages synchronization through repetition and the coordination of rhythmic movements with others (Amee Baird & Thompson, 2018; Kontos & Martin, 2013). In this way, musical activities are social and can stimulate interaction and communication. In addition, music played in this way is physical and embodied, felt and not only heard. It has an impact on the self (Amee Baird & Thompson, 2018; Kontos & Martin, 2013). While much of the research has focused on the impact of music (both melodic and non-melodic), there is an increasing interest in the impact of ambient sound and non-melodic soundscapes that draw on the sounds that are an important part of our everyday lives, or provide opportunities to create new sounds. (Houben et al., 2019; Kenning, Brankaert, & Houben, 2018; van den Bosch, Andringa,

Baskent, & Vlaskamp, 2016). Research is beginning to suggest that sounds and soundscapes can provide listening experiences, different to, but similarly impactful, to listening to music (Houben et al., 2019; Kenning et al., 2018; van den Bosch et al., 2016).

Digital media and electronic instruments

Increasing digital media is being used in the care environment for entertainment, activity and engagement. Computers, tablets and smartphones are used to provide access to carefully selected playlists of music streamed or downloaded (Favilla & Pedell, 2013; Houben et al., 2019). This digital media can also be used to access everyday sounds that can be listened to, to simulate, calm or entertain. These sounds can be recorded in the everyday, accessed from sound archives to create soundscapes that suggests places, spaces, events or time (https://remarc.bbcrewind.co.uk). Software applications also allow people to play musical instruments such as keyboards or piano, or engage with percussion instruments such as drums (Favilla & Pedell, 2013; https://gismart.com). However, these types of digital media are not always intuitive to people with cognitive and physical limitations (Riley et al., 2009). Tapping a screen does not equate with hitting a drum and the experience can be confusing. When used for music making, they often fail to engage the body in the music making experience. In addition, the sound of these music applications often have a 'blunted expression' and may be less than satisfactory (Favilla & Pedell, 2013 p 482).

In the care space a range of interfaces have been tested to explore how people can engage with digitally stored music and sound in a way that is intuitive They include cushions, plush animals, and foam 'noodles' (exercise equipment adapted to play music) (Beilharz, 2016; Brankaert & Ouden, 2017; Favilla & Pedell, 2013; Kenning, 2017a; Treadaway, Taylor, & Fennell, 2018). The aim of each of these objects is to allow the body to engage through touch or movement with the sounds created. While they provide easy access to sounds for people living with dementia, they do not necessarily afford a full exploration of an individual's creative potential (Kenning, 2017b). Furthermore, while much of the research in this area has produced highly customized and personalized prototypes, these prototypes have infrequently been developed into products where they are readily available for use in the care environment. Therefore, this project engaged with an advanced prototype that aims to be market ready for a general population within twelve months and modified versions available thereafter.

The AirSticks™

To encourage creative engagement with music and sound for people living with dementia it is necessary to take a transdisciplinary approach. In this project researchers working in the area of design for dementia collaborated with a musicologist, and a musician and performer and inventor of an innovative electronic musical instrument. It highlights how innovation occurs in the re-application of emerging technologies and as a result of transdisciplinary thinking and collaboration, by working with an already highly developed technology, and using

participatory approaches in its redevelopment for a new population of users (Hendriks, Huybrechts, Wilkinson, & Slegers, 2014; Kenning, 2018b). It stands in contrast to many current approaches used in the design and development of technologies for older people and people with dementia that focus on personalized, 'bottom up', 'from scratch' co-creation. While there are undoubtedly benefits of working with the target population for a product, service or technology from outset, the development process is often slow, and many technologies are stalled at prototype stages and never make it to market. As a result, the population are unable to benefit from the input they have in the development process (Hendriks et al., 2014; Maldonado Branco, Quental , & Ribeiro, 2017).

The AirSticks are a *gestural instrument* for electronic percussionists (Ilsar, 2018b). They were designed by drummer and electronic producer Dr Alon Ilsar and computer programmer and composer Mark Havryliv. Both hold PhDs in instrument design at the University of Technology, Sydney and the University of Wollongong, Australia, respectively. The term *gestural instrument* refers to how the technology uses motion capture to convert physical movement into sound (Ilsar, 2018a, 2018b). The AirSticks currently consists of the Custom AirSticks Midi Software (CAMS) a custom-designed spatial mapping software, accessed via 'off the shelf' Razer Hydra Gaming Controllers. The custom-built hardware is in final stages of development, but was not sufficiently robust for testing in these workshops and so the game controllers were used. These controllers can be moved freely in space and their orientation and position is determined by their relationship to a spherical base station through the use of an electro-magnetic sensing system.

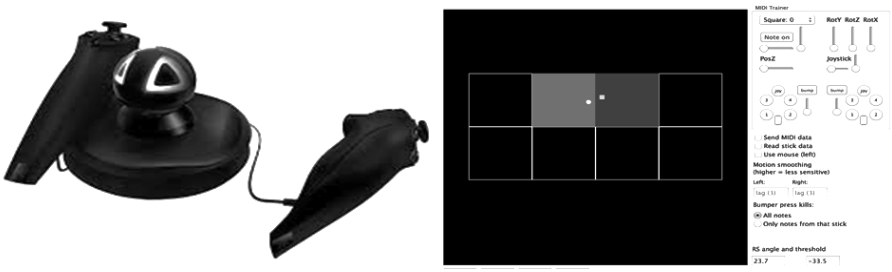

Figure 1 Razer Hydra Gaming Controllers were used with the Custom AirSticks MIDI Software

The AirSticks were originally developed for professional musicians and performers to explore how movement could be mapped to sound. They were designed to allow the composition, improvisation and performance of live percussive electronic music using hand and finger movements captured by gestural controllers. This facilitated the control of complex sound textures and allowed the performer to time and execute rhythmic gestures within various collaborative musical situations. The gestures of the performer is mapped spatially, it allows for sound to be created by large and small gestural movements (Ilsar, 2018a). The

range of sounds available through the AirSticks is extensive because of the capabilities offered through the custom software which interfaces with sophisticated sound applications and so offers a wide range of digital sound possibilities (see examples in preworkshop mappings).

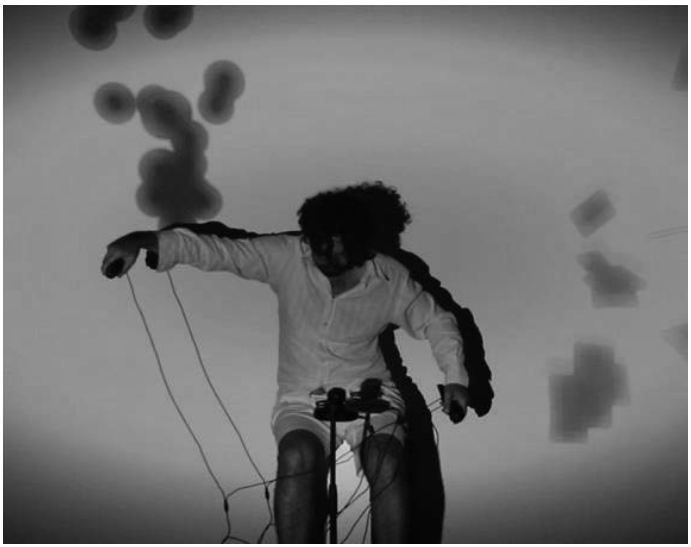

Figure 2 Alon Ilsar plays The AirSticks™ as part of a performance for Sydney City Recital Hall

The study

As the AirSticks were developed to promote creative engagement and overcome 'creative paralysis' in professional performers, we wanted to explore the extent to which the gestural innovative instrument would be intuitive for people living with dementia and would support creative expression and sound play. We set up a series of workshops with people living with advanced dementia to assess their level of engagement, and to what extent did the existing instrument need to be adapted to suit their needs.

The aim of the study was to understand, in relation to people living with advanced dementia:

- to what extent existing engagement with sound could include engaging in a gestural way with sound and music;
- how could the AirSticks support both listening experiences and music or sound making;
- how did the technology need to be adapted and changed;
- how could engaging with electronic and digitally produced sound support creativity.

We worked with two residential aged care homes in Sydney, Australia. This paper will focus and report on just one of the workshops, and primarily on one participant. The focus on this participant is due to the intensity of the response observed. The project was developed as a participatory project with the team working closely with people living in a residential care home with advanced dementia to understand their responses, level of engagement or disengagement, how cognitive and physical limitations impacted on their engagement, and whether we could observe creative engagement.

Participants

The workshop, discussed in this paper, had between 6 participants and 3 care staff (carers) in close proximity, who maintained the duty of care. The study required a purposive sample, that is a nonprobability sample based on the characteristics of a specific population and the objectives of the study. Participants were selected by staff of the care organization based on criteria that they:

- had a diagnosis of dementia;
- would be unlikely to feel agitated or stressed as a result of the 2-hour workshop;
- were cognitively and physically able to attend and join in activties;
- would be likely to enjoy the workshop experience.

Verbal consent was sought from all participants. A process consent approach was used, whereby any behavior that suggests a participant no longer wished to take part is deemed a withdrawal of consent (Dewing, 2007). Participants could reinstate consent at any time if their words or behaviors suggested they wished to reengage with researchers. Consent was constantly revisited throughout the workshop, by monitoring responses to ensure that participants were willing and able to continue taking part. Written consent was also attained from family members and guardians by the care organization.

Methodology

A modified participatory action research approach was used, together with a modified grounded practical theory approach (Craig & Tracy, 1995; Macdonald, 2012). A design research through practice approach was also employed in working with prototypes in the workshop space to enable us to understand responses to the objects as well as to the engagement with sound in context (I. Koskinen, 2011; I. K. Koskinen, Zimmerman, Binder, Redstrom, & Wensveen, 2011). Importantly the study also used a reciprocal approach to ensure that while the researchers were able to benefit from the workshops, that all participants were able to benefit 'in the moment' (Kenning, 2018a). Everyone in the space of the workshop was invited to comment and provide feedback on the technology, sounds, level of engagement, and any other aspect of the workshop. The workshops were recorded using an unobtrusive GoPro camera and digitally audio recorded for post event analysis.

Pre-workshop mapping

Before the workshop Author 1 and Author 2 began by making three sound mappings. The first was for a demonstration of soundplay at a conference in the UK. The first mapping, which was called 'Warmth', created 'warmer' sounds to the left (and included instruments such as marimba) and 'colder' sounds to the right of the mapping (where metallic sounds and instruments were located). Variations on these sounds could be made by moving the AirSticks up and down. One controller created a drone sound while the other played these sounds in a rhythmic pattern. The mapping included fades and crossfades up and down and left and right. Pointing the controller at the centre meant all sounds could be heard at once. This complex morphing of sounds created fluid sound-world around the participant which they could navigate through by pointing the controllers at different angles. To engage the sound, the user simply to pressed the forefinger on the trigger button.

The second mapping 'Exploration Two' located nine different sound tracks spatially. They were (from top left).

1. Birds
2. Famous speeches
3. Wind
4. 50s pop
5. A ticking clock
6. Chopin piano pieces
7. Waves
8. Gentle poddle
9. Waves

Each of the tracks could be accessed by pointing in different directions and locating the sounds spatially in the CAMS system. The controller buttons were not in use for this version.

The third mapping, 'Piano One', enabled a simple piano note sound to be triggered by pressing the controller button with the thumb. The notes played a simple pentatonic scale with lower notes to the left, and higher to the right. The attack of the sound was stronger pointing downwards, and airier pointing upwards. Holding the triggering button down produced a six-note sequence going up the scale from the bottom note. The sequence played slowly to the left and sped up and gets higher as the hand is moved to the right.

MakeyMakey™ instruments

In addition, to The Airsticks the workshops provided access to MakeyMakey musical instruments, to further assess the interest of participants in engaging in music and digital technology. MakeyMakey is a simple circuit board kit that connects objects to computers where they can be used to interface with software, such as music making software (MakeyMakey.com). A MakeyMakey 'piano' had been used in an earlier study with some success and it was decided to use this approach again, alongside the AirSticks (Kenning, 2018a). The 'piano'

instrument was made from conductive metal sticky tape attached to an acrylic base-board connected to a MakeyMakey microcontroller and a computer providing access to piano music software. Touching the tape, positioned like the keys of a piano, played piano music. A second instrument consisted of a 'drum kit' and 'piano' ensemble. The drum was made from foil, with drum sticks made from large knitting needles. They were connected to the music making software in the same way as the MakeyMakey piano. The MakeyMakey instruments played simple musical and percussion sounds. They were included in the workshop because of their simplicity of sound and appearance and to provide an alternative to the more sophisticated looking AirSticks.

Figure 3 The MakeyMakey™ 'Piano' and 'Drum Kit'

Approach

The workshop took place in an activities room which was bright and airy but, had no windows to the outside. The researchers set up the room before the workshop participants arrived. Four sound 'stations', consisting of a table and two chairs, were set up in each of the corners of the room. Station 1 consisted of The Airsticks with the 'Piano One' mapping, at station 2 was the MakeyMakey 'piano', at station 3 was the AirSticks 'Exploration One' mapping, and at station 4 was the MakeyMakey 'drum kit' and 'piano' ensemble. The instruments were connected to computers with the relevant software loaded and a speaker, headphone, or shoulder speakers.

Participants were brought into the workshop individually each with a carer and seated at one of the stations. A researcher was located at each station to work one-on-one with each participant and show them how to engage with the technology at their station. Over a period of time six participants were brought in to the workshop. The maximum number of people at any time was five.

Vanessa was in a reclining chair, had no mobility and a restricted range of movement in her hands. She was brought to station 1 with The Airsticks and 'Piano One' Mapping. The controller was placed into her hands and she was shown how she could 'play the piano'. It took great effort for her to move the controllers. But she found that she was able to vary the

sounds of the piano. Her range of movement however restricted the extent to which the sounds could be changed. Vanessa engaged with interest at stations 2 and 4 (the MakeyMakey instruments). It was hard for her to reach and the chair needed to be brought close to the table. Vanessa commented that "I always wanted to learn the piano" (Researcher 1 notes). At station 3 she engaged with the AirSticks and the "Exploration Two" mapping. She was able to move her hands and point in space to locate the Chopin music and the 1950 rock and roll. She enjoyed having the choice of what music she played simply from pointing the controller. One researcher 2 observed "One participant with more limited mobility seemed to enjoy coming back to a resting hand position with Chopin playing, but she would occasionally explore the other sound words even though it stretched her mobility" (Researcher 2 notes). Vanessa stayed the entire two hours of the workshop engaging with each of the instruments.

Margery was one of the first to explore each of the instruments and was only mildly interested. After an hour she wanted to leave so that she could go outside and have a cigarette.

Vera was keen engage with the instruments, however it became apparent that her main interest was in talking to researchers and any piece of sound or music prompted the telling of a story, a conversation or a concern. When she engaged with station 3 and the 'Exploration Two' mapping she said, "I don't recognize this tune" (Researcher 2 notes) as if she was being tested on the pieces of music. But once she realized it was just a tool to explore sound and melody and the emotion that it brings, she seemed to explore it with open curiosity. She sang along to every tune and recounted stories of ballroom dancing.

Violet came in to the workshop just after Vera. While the other participants were engaging with the AirSticks she was taken to station 4 by her career. They both sat down and began to engage with the 'drum kit' 'piano' ensemble, without any prompting from the researchers. Violet was highly enthusiastic, laughing and singing along. Her speech was compromised and she was not able to talk. The carer and Violet played 'follow my lead' using the instrument. As the carer hit certain 'piano' keys' and the 'drum' Violet copied. They became increasingly excited, and the 'drum', made from a tough foil, began to tear. It didn't stop them they found they could still play and did so enthusiastically. Violet took this level of enthusiasm to all of the stations.

Violet was taken to station 1 with The Airsticks and the 'Piano One' mapping. A male researcher sat with her and showed her how to engage with it. She very quickly understood the change of sound related to how she moved the game controller. She began moving the controller from side to side, swaying and singing along loudly. The researcher joined in. Violet was non-verbal, however she continued to sing although the words were not intelligible. She seemed focused, paying little attention to the researcher, and becoming 'lost' in her playing and singing. Her singing consisted of a form of wailing and moaning with great intensity. A researcher reflected "she began to sing over the sequence, rapidly moving from left to right creating a 'harp' arpeggio type affect. The singing was so spontaneous and present

and continued for a while with little variation but great intensity" (Researcher 2 Notes). She continued engaging with the music and singing with the researcher for more than fifteen minutes.

At the MakeyMakey 'piano' she laughed out frequently and with great intensity. She was less engaged with the 'piano' at this point and was highly active engaging with or looking at her carer and the researchers. She was clearly enjoying their attention.

After a period of time Violet was taken to station 3 the AirSticks with the 'Exploration Two' mapping. She appeared to remember how to use the controllers and seemed to understood quickly how to change the sound by moving the controller in space. A researcher observed "she took a very similar approach [to how she engaged with the previous mapping] with this mapping, moving her right hand from left to right, sweeping through sounds, not stopping to hear out what each sample was. She also continued to sing over it, but not with as much cohesion. The sound she was creating was quite disjointed, jumping from Chopin to 50s pop and a ticking of a clock in microseconds" (Researcher 2 notes). Violet seemed less interested in these sounds.

The researcher and developer of the AirSticks (and professional musician) decided to change the mapping and let Violet experience the 'Warmth' mapping (we had not intended to use it in the workshop). As Violet began to play the musician researcher was able to show her how to move the controllers to access the different sounds, volume and pitch. The researchers observed the experience and then made detailed notes immediately following the experience: "The participant again took to this mapping with vigour, sweeping left to right and singing confidently on top, in a strangely tuned scale that lacked technique but no shortage of emotional content. She would also raise 'intensity' either in volume, pitch and/or timbre when raising her hand higher" (Researcher 2 notes). The researcher who was also musician engaged with her in an improvisation "So I grabbed the second controller and started to improvise with her, firstly mirroring movements, and then trying to get her to follow me, which she did in a truly collaborative way, picking moments to go with and against both the music and the movement...She would build to little climaxes as her movement and singing intensified. I attempted to bring the improvisation to a slow finish, by gradually winding down the sound with less and less movement and a slow placing of my controller on the table. She wound down a little, both movement and singing lessening in intensity, a feeling of melancholy coming over the phrasing and tone of her voice. But she didn't want to end the improvisation. The longer I waited for her to wind down completely the more she hinted at bringing the intensity of the piece back up. So, I picked up my controller again and rejoined her in large gestures. All the way up and down we moved together again, her voice breaking into laughter as we reached our highest points, and her highest pitches. We slowly wound down together again, this time all the way until she put the controller down and let go of the trigger button." (Researcher 2 notes)

The researcher and musician reflected on the experience: "It was a truly magical and spiritual moment of improvising with someone I had never met. As a seasoned improviser myself, and often finding myself in situations where I'm playing for the first time with a musician I'd never met, in front of people, I found the level of non-verbal communication that can be expressed in improvisation to be one of the greatest and most unexplainable elements of music making, particularly social music making." (Researcher 2 notes)

Figure 4 The researcher musician and Violet improvised together

The musician picked up a second controller and began to improvise alongside her. For a period of time she copied his movements and they performed together. As he confidence grew, she started to take the lead and waited for him to copy her. The singing grew louder, it took on a melancholic wailing, sounding primal. At times there were suggestions of words and then she returned to the wailing. The musician and Violet continued to play together. As he suggested the end of the improvisation by putting down his controller Violet began to place hers down to, then stopped. She lifted it again and continued playing. As she played she wiped a tear from her cheek. The playing became more intense.

Observations

One of the aims of the workshops was to assess to what extent people with advanced dementia would be prepared to engage with the digital technology in music making, their level of engagement with the AirSticks and to what extent they could support soundplay and improvisation and be a creative experience. All participants across the two workshops engaged with all of the technologies and sounds. However, two people engaged for a short period and wanted to leave, one person stayed for half of the workshop. Most participants engaged with the technology and appeared to enjoy the experience, they sang, laughed, talked and engaged with researchers, care staff and each other. However, there was noticeable difference between how Violet engaged and the other participants did. For the most part participants gained some understanding of the relationship between the instruments and the sound they produced. But they often needed to be prompted to 'try this', 'move this way', 'touch here', or be asked 'can you hear that?' 'do you like that?' It was apparent that they

were also concerned about 'breaking it' and 'doing it wrong' Violet did not share these inhibitions.

All participants in the workshop were verbal apart from Violet. Some participants made the most of the time in the workshop to talk and tell stories to people who had not heard the stories previously. Carers commented that they had heard some stories many times. Laughing, singing and making music with the instruments provided was Violets expression through sound throughout two hours of the workshop. However, she communicated with great intensity even though she was not able to speak.

We had underestimated the ability of participants to use the game controllers in a sophisticated way. For example, as they were 'off the shelf' games controllers they were equipped with standard buttons and toggles. At one of the AirSticks stations the buttons and toggles had been disabled so that they could not be used. The participants who were enthused about playing sounds and engaging gravitated to the buttons immediately and were disappointed when they made no change. When they went to the second AirSticks station where the buttons were active, and they could change volume and the pitch, they seemed pleased to have a level of autonomy in how they engaged.

The enthusiasm of the majority of the participants was evident they invested time and energy in engaging with the technology and finding out what it could do. Participants were able to offer feedback on what they liked and what they did not. For example, Vanessa stated that she like to listen to Chopin and was pleased to be able to use the controller to navigate and find the music she liked. It was clear that for some the enthusiasm in the workshop was in some part due to being given attention in how to engage with the AirSticks and having someone different to talk to. Vera used the opportunity to tell stories and reminisce.

While the participants had fun, it was noticeable that Violet engaged at a level we had not expected. We recognized that while she appeared to experience some 'in the moment' pleasure, it was also an experience that was engaging and meaningful, and at times appeared melancholic. She appeared to have a deep connection and meaning to the music making, her singing, and in her engagement with the researcher musician. The researcher commented that he felt a profound sense of connection, and while we were not able to ask Violet about the experience directly, researchers' notes commented on the sense of communication and connection that took place. While little work has been done in this area of dementia in relation to eudaimonic wellbeing (Ryan & Deci, 2001), because of the difficulty in gathering reliable data, it is an area worthy of more research.

Discussion

Importantly the project engaged in a reciprocal approach. All researchers in the room engaged with all participants to observe and gather data, but also to breakdown any hierarchies or power relations as much as possible. The improvisational engagement between Vi-

olet and the researcher musician was the most successful example of this breakdown of hierarchies and an authentic partnering that we have seen in this environment. We observed Violet engaging in 'in the moment pleasure' which has been shown to support wellbeing in a general population and in particular for people with limited opportunities for social engagement, connection, and creative outlets, such as those living with dementia. We also observed her engaging in meaningful engagement. Her engagement with the researcher in musical improvisation was sustained and brought a tear to her eye. The researcher engaging in the improvisation also reported a sense of connection and similar emotions to his experiences of engaging in music improvisation with his peers.

The AirSticks were able to be adapted for use using 'off-the-shelf' gaming controllers and while there was some hesitancy by staff at the organization about the extent to which participants would engage. We found there was little hesitancy by participants in engaging with the technology. For those who did not engage, or not for long, it did not seem to be because of the technology, but because of a lack of interest in music making, or because of being distracted by other activities. The AirSticks are being developed to be lighter, easier to hold and wireless. There development will continue with people living with dementia.

Violets response has shown that creative engagement is available regardless of physical limitations, however part of the difficulty in stimulating this level of engagement is in finding individual and personal catalysts that works for the individual, works in the context of a workshop, and can be supported by staff, management of the care organization and the participants family in the residential care home when the workshops are over.

In addition, the qualitative study relying close observation revealed a shared connection between the researcher and the workshop participant, and similarities were observed in their response to the improvisational engagement with the AirSticks. There is further research to be carried out in response to these findings to explore how authentic shared engagement and connection can be facilitated with people living with advanced dementia and stakeholders in their care

Conclusion

Two hours with Violet has opened up possibilities for new areas of research in relation to the importance of creativity, accessibility to tools or materials, and the need to put into place activities that enable participants to engage at their own level. The musical improvisation was unexpected but a delight and also has implications for how we design engagements, objects and activities for this space.

Feedback from the workshops will shape the development of the AirSticks to enable a range of activities to be developed based on their use, including the potential for people with dementia to use the AirSticks individually and in group performances and music making. It also provided insights into the type of music and sounds people want to listen to, and what types of sounds they may want to make.

References

Baird, A., & Samson, S. (2009). Memory for Music in Alzheimer's Disease: Unforgettable? *Neuropsychol Rev, 19*(85). doi:*https://doi.org/10.1007/s11065-009-9085-2*

Baird, A., & Samson, S. (2015). Music and dementia. *Progress in brain research, 217*, 207-235. doi:DOI: 10.1016/bs.pbr.2014.11.028

Baird, A., & Thompson, W. F. (2018). The Impact of Music on the Self in Dementia. *Journal of Alzheimer's Disease, 61*(3), pp. 827-841. doi:DOI: 10.3233/JAD-170737

Beilharz, K. (2016). Engaging and connecting through music: enablement in practice. *Australian Journal of Dementia Care*.

Brankaert, R., & Ouden, E. d. (2017). The Design-Driven Living Lab: A New Approach to Exploring Solutions to Complex Societal Challenges. *Technology Innovation Management Review*. Retrieved from *https://timreview.ca/article/1049*

Brownie, S. (2012). A culture change in aged care: The Eden AlternativeTM. *Australian Journal of Advanced Nursing, 29*(1).

Cochen De Cock, V., Dotov, G., Ihalainen, P., Bégel, V., Galtier, F., Lebrun, C., . . . Dalla Bella, S. (2018). Rhythmic abilities and musical training in Parkinson's disease: do they help? *NPJ Parkinsons Dis., 4*:(8). doi:doi: 10.1038/s41531-018-0043-7

Cohen-Mansfield, J., Dakheel-Ali, M., & Marx, M. S. (2009). Engagement in Persons With Dementia; The Concept and Its Measurement. *The American Journal of Geriatric Psychiatry*(17.4), 299-307.

Cohen-Mansfield, J., Marx, M., S., Freedman, L., Murad, H., Thein, K., & Dakheel-Ali, M. (2012). What affects pleasure in persons with advanced stage dementia? *J Psychiatr Res, 46*(3), 402-406. doi:doi:10.1016/j.jpsychires.2011.12.003.

Costa, J. A., & Creech, A. (2019). Teaching and learning in unfamiliar territory. In G. G. Johansen, K. Holdhus, C. Larsson, & U. MacGlone (Eds.), *Expanding the space for improvisation pedagogy in music*. London: Routledge.

Craig, R., T, & Tracy, K. (1995). Grounded practical theory: The case of intellectual discussion. *Communication theory, 5*(3), 248-272. doi:10.1111/j.1468-2885.1995.tb00108.x

Dewing, J. (2007). Participatory reseach: A method for process consent for people who have dementia. *Dementia: International journal of social research and practice, 6*, 11-25.

Favilla, S., & Pedell, S. (2013, November 25 - 29, 2013). *Touch screen ensemble music: collaborative interaction for older people with dementia.* Paper presented at the OzCHI '13 Proceedings of the 25th Australian Computer-Human Interaction Conference: Augmentation, Application, Innovation, Collaboration, Adelaide, Australia.

Gold, K. (2013). But does it do any good? Measuring the impact of music therapy on people with advanced dementia (innovative practice). *Dementia: International journal of social research and practice, 13*(2), 258-264. doi:10.1177/1471301213494512

Hendriks, N., Huybrechts, L., Wilkinson, A., & Slegers, K. (2014). Challenges in doing participatory design with people with dementia. *Proceedings of the 13th Participatory Design Conference on Short Papers, Industry Cases, Workshop Descriptions, Doctoral Consortium papers, and Keynote abstracts - PDC '14, 2*, 33-36.

Houben, M., Brankaert, R., Bakker, S., Kenning, G., Bongers, I., & Eggen, B. (2019). *Foregrounding Everyday Sounds in Dementia.* Paper presented at the DIS 2019, San Diego.

http://www.MusicandMemory.org (Producer). (2011). Alive Inside Film of Music and Memory Project - Henry's Story. [Video] Retrieved from *https://www.youtube.com/watch?v=5FWn4JB2YLU*

https://gismart.com, . *https://gismart.com*

https://remarc.bbcrewind.co.uk. from BBC *https://remarc.bbcrewind.co.uk*

Ilsar, A. (2018a). Airsticks - About. Retrieved from *https://airsticks.xyz/about*

Ilsar, A. (2018b). *The AirSticks: a new instrument for live electronic percussion within an ensemble.* (PhD), University of Technology Sydney, Sydney. Retrieved from *http://hdl.handle.net/10453/125647*

Kenning , G. (2016). *Arts engagement for people with dementia: Independent evaluation of the art access program*. Retrieved from Sydney:

Kenning, G. (2017a). *Making It Together: Reciprocal design to promote positive wellbeing for people living with dementia*. Retrieved from Sydney:

Kenning, G. (2017b). *Reciprocal design: inclusive design approaches for people with late stage dementia*. Paper presented at the Design 4 Health 2017, Melbourne. *https://research.shu.ac.uk/design4health/wp-content/uploads/2012/09/D4H2017-Proceedings-Master-File-PDF2.pdf*

Kenning, G. (2018a). Reciprocal design: inclusive design approaches for people with late stage dementia. *Design for Health, 2*(1), 1-21. doi:10.1080/24735132.2018.1453638

Kenning, G. (2018b). Visual Stimulation and Visual Analysis in Design: Participatory and Co-Design Approaches for People Living with Dementia. In S. Griffith, K. Carruthers, & M. Bliemel (Eds.), *Visual tools for developing student capacity for cross-disciplinary collaboration, innovation and entrepreneurship* (Vol. Transformative Pedagogies in the Visual Domain: Book No. 6.). Champaign, IL: Common Ground Research Networks.

Kenning, G., Brankaert, R., & Houben, M. (2018). *Exploring your Soundscape - Kenning, Brankaert & Houben 2018.* Paper presented at the Dementia Lab, Newcastle, UK.

Kitwood, T. M. (1997). *Dementia reconsidered : the person comes first*. Buckingham England ; Philadelphia: Open University Press.

Kontos, P. C., & Martin, W. (2013). Embodiment and dementia: Exploring critical narratives of selfhood, surveillance, and dementia care. *Dementia, 12*(288), 288-302.

Koskinen, I. (2011). How to Follow Design Through Society. In I. Koskinen, J. Zimmerman, T. Binder, J. Redstrom, & S. Wensveen (Eds.), *Design research through practice : from the lab, field, and showroom* (pp. xvii, 204 p.). Waltham, MA: Morgan Kaufmann/Elsevier.

Koskinen, I. K., Zimmerman, J., Binder, T., Redstrom, J., & Wensveen, S. (2011). *Design research through practice : from the lab, field, and showroom*. Waltham, MA: Morgan Kaufmann/Elsevier.

Macdonald, C. (2012). Understanding participatory action research: a qualitative research methodology option. *Canadian journal of action research, 13*(2), 34-40.

Maldonado Branco, R., Quental , J., & Ribeiro, Ó. (2017). Personalised participation: an approach to involve

people with dementia and their families in a

participatory design project. *CoDesign, 13*(2), 127-143. doi:10.1080/15710882.2017.1310903

Manthorpe, J., & Samsi, K. (2016). Person-centered dementia care: current perspectives. *Clinical Interventions in Aging*.

Nolan, M., R., Davies, S., Brown, J., Keady, J., & Nolan, J. (2004). Beyond 'person-centred' care: a new vision for gerontologcal nursing. *International Journal of older people nursing, 13*(3a), 45-53.

Riley, P., Alm, N., & Newell, A. (2009). An interactive tool to promote musical creativity in people with dementia. *Computers in Human Behavior, 25*, 599-608.

Ryan, R. M., & Deci, E. L. (2001). ON HAPPINESS AND HUMAN POTENTIALS: A Review of Research on Hedonic and Eudaimonic Well-Being. *Annu. Rev. Psychol., 52*, 141–166

Sacks, O. (2008). *Musicophilia : tales of music and the brain* (Rev. and expanded, 1st Vintage Books ed.). New York: Vintage Books.

Social care institute for excellence. (2015). Withdrawing because of a loss of abilities. *social care institute for excellence*. Retrieved from *https://www.scie.org.uk/dementia/living-with-dementia/difficult-situations/being-withdrawn.asp*

Treadaway, C., & Kenning, G. (2015). Sensor e-Textiles: person centred co-design for people with later stage dementia. *Working with older people, 20*(2), 76-85.

Treadaway, C., Taylor, A., & Fennell, J. (2018). Compassionate design for dementia care. *International Journal of Design Creativity and Innovation*. doi:DOI: 10.1080/21650349.2018.1501280

van den Bosch, K. A., Andringa, T. C., Baskent, D., & Vlaskamp, C. (2016). The Role of Sound in Residential Facilities for People With Profound Intellectual and Multiple Disabilities. *Journal of Policy and Practice in Intellectual Disabilities, 13*(1), pp 61–68. doi:doi: 10.1111/jppi.12147