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Designing for playfulness through compassion: design for advanced dementia

Those who have the greatest need for excellent design are often the most vulnerable in society. These people may find it difficult or impossible to articulate their design requirements due to physical, sensory or memory impairment as a result of accident or disease. Finding ways to understand the challenges they face moment-by-moment and day-by-day is vital. Empathic and compassionate approaches that place an individual central to the design process can inform outcomes that significantly benefit the user as well as those that care for them.

This paper presents research that aims to support the wellbeing of people living with advanced dementia by designing to promote pleasure and positive emotion. The LAUGH project is a recently completed international three-year AHRC funded design research project. Outputs from the study include a collection of playful objects, designed to provide comfort, pleasure and fun. This paper describes the research process underpinning the development of the designs and the Compassionate Design methodology that has informed the work.

The design narratives behind the playful objects will be explained in relation to the three key themes of Compassionate Design, which stress the importance of personalisation, sensory stimulation and maintaining connections between people and the world.

Keywords: dementia; design; qualitative research methods; compassion

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Introduction

One of the major health challenges facing society, as a result of the rapidly ageing population, is how to meet the economic, social and personal costs of care for people who are

living with chronic diseases such as dementia (Livingston et al. 2017). Although dementia is not an inevitable consequence of ageing, the chance of developing the disease increases significantly over the age of 65 and is the fastest growing major cause of disability globally (Landeiro et al. 2018). In the UK 80% of older people living in residential care have a diagnosis of dementia, high levels of dependency and care requirements (Kane and Terry 2015, Prince et al. 2014). Dementia is a syndrome comprising over 100 different diseases of the brain, the most prevalent of which are Alzheimer's disease and vascular dementia. The disease may impact on cognition, perception, behaviour and memory, although each person is affected uniquely depending on the type of dementia and its progression (Prince et al. 2015). In the advanced stages, people are likely to need support with all the activities of daily living. Verbal communication can be severely affected by the disease, leading to withdrawal, depression and isolation. Many people living with dementia become confused, agitated and distressed, or suffer from boredom and apathy, so finding ways to help them live well, and to find pleasure in everyday life, is vitally important (Ógáin and Mountain 2015).

There are currently very few products and activities that have been designed specifically to address the needs of those living with the advanced stages of the disease. Companies that manufacture products for people living with dementia (such as Active Minds and Unforgettable.com in the UK) offer only a limited number of playful products suitable for this market sector (for example Fidget Widgets, Paro seals, etc). Until recently there has been a dearth of research concerning the design of playful objects for people living in the later stages of the disease. Product design research for dementia has focused on: the potential of digital technologies in aspects of assisted daily living, planning, communication, reminiscence and life story work to maintain personhood, (Lindsay 2012; Wallace et al. 2013; Bennett, Hinder, and Cater 2016; Maiden et al. 2013) or sensory enrichment (Jakob and Collier 2017; Zeisel 2013). Recent studies by Kenning (2017), and Maldonado Branco et

al (2017) have actively involved participants living with dementia, to explore the design of playful activities. Research described in this paper contributes to this body of work focussing specifically on designing to support the wellbeing of people living with advanced dementia.

Parameters and Limitations

The recently completed LAUGH project was funded by the UK AHRC and partnered by Pobl Gwalia Care and Support, one of the leading providers of care in south west Wales. The project involved over 170 participants and 70 organisations over its three-year duration, and worked intimately with people living with advanced dementia and their carers in two of the Pobl Gwalia Care residential care homes. Outputs from the research comprised a small range of bespoke playful objects that were evaluated qualitatively with the people they were designed for. This paper reports this initial phase of the research and focuses on the underpinning ethos of the project: ‘Compassionate Design’. It reveals ways in which this ethos has helped to shape the study and inform the development of a range of playful objects. This paper will not explain in depth the participatory data collection or evaluation processes used in the research, as these are reported elsewhere (Treadaway et al 2018; Kenning et al 2018). It will however, set out some of the overarching themes highlighted by the research, concerning playfulness and its relationship to wellbeing, as well as the resulting ethical implications that are key when designing for people who lack capacity. The second half of the paper will set out the Compassionate Design approach that underpinned the LAUGH study and will explain how this resulted in the playful objects developed during the research (Treadaway et al. 2018). Brief narratives will describe how each object was developed and the impact on and value to the person it was designed for. Further information about the research can be found at www.laughproject.info including photographs and publications documenting the various stages of the project.

The following section of the paper provides the context for the research; the need for playful objects and the rationale for a Compassionate Design approach that places concern for the person living with dementia at its heart. It explains the importance of playfulness, meaningful occupation, hand-use and sensory stimulation in relation to the wellbeing of people living with advanced dementia.

Playfulness

Wellbeing and play

The LAUGH project ethos is predicated on research evidence that playful play is fundamentally beneficial for health and wellbeing for all and at all stages of life, not just in childhood (Tonkin and Whitaker 2016). Although there is sound research to evidence the benefits, many in society continue to consider playful adult behaviour to be inappropriate or childish (Woodyer 2012). The use of the word ‘toy’ in the context of older people is also problematic and is frequently considered infantilising, offensive and negative (Mitchel 2016). In later adult life, when more free time is available and people have opportunities to play, lack of energy, poor health, disability and social isolation can curtail playful activities. Research evidence indicates that participation of healthy older adults in leisure activities helps them to keep mentally and physically active and to maintain strong social relationships. This has a positive effect on wellbeing, lowering stress levels and providing a more positive outlook on life (Huppert et al 2005).

People living with the advanced stages of dementia can lack opportunities for fun, laughter and playful activity and are frequently bored, anxious and depressed. They may become withdrawn, confused, dejected and sometimes agitated, due to the impact of the disease on memory and their ability to communicate (Livingston et al. 2017). Their care can be challenging and their needs complex, since the world they perceive does not mirror that

experienced by those around them. When a person is in the advanced stages of the disease and verbal communication is severely affected, conversations can become ‘one-sided’, frustrating and upsetting for caregivers. Family members and friends often feel that their loved one is ‘absent’, ‘no longer there’ or ‘lost’ and that visits are futile. On the contrary, however, social contact is vital to support their care and wellbeing (Zeisel 2011, Shouse 2016). Finding ways to help caregivers and loved ones interact and maintain meaningful and loving connections with a person living with advanced dementia, are vital to supporting their wellbeing and maintaining their quality of life (Smebye and Kirkevold 2013).

Memory

Playfulness has been shown to be a good way to maintain positive interaction between individuals and can sustain non-verbal communication even when memory and language is compromised by dementia (Killick 2013). Ludic play that is unfocused, in the moment and undirected, is particularly appropriate. Although explicit memory is often severely affected by dementia, implicit (procedural and emotional) memories, are retained even into the later stages of the disease (Holton 2016). These types of memories are tacit, do not rely on cognition and can be stimulated by engaging the senses (Low 2014). Activities of daily living, craft skills and behaviours that have become embedded through repeated experience, do not rely on conscious recall. These can provide a person in the later stages of dementia with pleasure and a sense of purpose given the right sensory prompts. Activities that involve the hands are particularly significant for stimulating implicit memory (Linden 2015).

Hand-use

People living with advanced dementia may spend many hours in a chair or bed. As their mobility becomes limited through the progression of the disease, their hands gain importance as a vital (and sometimes primary) interface with the world. It is widely acknowledged that

activities that involve the hands in manipulation, touch and gesture have therapeutic benefit for people with emotional and communication difficulties. Craft skills including knitting and sewing have been shown to provide emotional support for people with depression (Molson, 2005 cited in Lambert 2008). Playful activities using the hands have the potential therefore, to have a beneficial effect on the emotional wellbeing of people with advanced dementia.

Meaningful occupation

One of the challenges in advanced dementia care is to find stimulating activities that are appropriate, playful, pleasurable and 'in the moment'. There is an innate human need to be engaged in activity and the drive to be autonomous, self-motivated and competent in life is a vital factor in providing a person with a sense of wellbeing (Ryan and Deci 2000). A loss of sense of competency and resulting lack of engagement in activities, has a serious negative impact on an individual's sense of worth and their ability to relate to others (ibid). As dementia progresses, an individual may become increasingly withdrawn and unable to intrinsically motivate their own meaningful activities or socialise with others; they may become passive recipients of care. Finding ways to motivate them to be involved in meaningful occupation is, therefore, vitally important. However, activities that may be construed as 'meaningful' for somebody living with dementia may be disregarded by caregivers as pointless or insignificant. The context of the activity and the capacity of the person it is engaging, are key to understanding its value (Harmer and Orrell 2008).

Simple fiddling and fidgeting activities may be meaningful and provide pleasure for someone with limited mental capacity and mobility. These micro-activities can be easily misinterpreted as displays of agitation or anxiety but, in some cases, may provide a significant sensory activity that is both physically satisfying and meaningful. The key to ensuring the appropriateness of an activity lies in understanding the needs, desires and

capabilities of the individual and gaining an insight as to who they are as a person (Livingston et al. 2017; Harmer and Orrell 2008).

Ethics: dignity and personhood

One of the most devastating aspects of dementia is its progressive impact on a person's perceived sense of identity. Cognitive decline and memory loss can have a negative effect on social wellbeing and quality of life of a person following diagnosis (Milne 2010). Societal perceptions and negative stereotypes dominate and people living with advanced dementia are often described as 'no longer there', 'effectively dead' or 'gone' (Kontos 2005, Smebye and Kirkevold 2013). Caregivers and loved ones, who are engaged in an on-going process of 'iterative grief', can experience a sense of hopelessness and may even withdraw from the person living with dementia (Kenning and Treadaway 2017). This can result in a person living with dementia becoming socially isolated, receiving few visitors or being ignored.

Selfhood is constructed socially through interactions with others and so a person's decline in ability to socialise and reduced opportunities for shared experiences, has a profound effect on how they are perceived (Kontos 2005). Kitwood (1997) wrote extensively on personhood and dementia and challenged the prevailing medical view, advocating seeing the person and not the disease. His theory of wellbeing identifies key psychological needs, including *'a sense of identity, attachment, psychological comfort, occupation and social inclusion'* (Kitwood 1997: 81-84). Kitwood contended that personhood exists as a result of relationships with others and can be nurtured or diminished depending on how the person living with dementia is regarded and treated. This view positions personhood as something external that is bestowed socially upon another (Smebye and Kirkevold 2013). Sabat and Harré (2008) build on this, contending that personhood also exists intrinsically and is not just constructed socially. They claim that despite the progressive nature of the disease *'the self of*

personal identity remains intact even in the face of quite severe deterioration in other cognitive and motor functions. (pp459)'. Kontos and Naglie (2006) also argue that selfhood is embodied and that it exists at a pre-reflexive level in gestures, behaviours and body language. Hughes (2014) describes how lived experience is sedimented into the corporal body of a person, helping to build the person that they are, even when they no longer remember for themselves. The fact that our personhood is *situated* within a social world implies a mutuality, which ought to be reflected in a just and civilized society, where there is a compassionate desire to care for each other.

The importance of selfhood in designing for dementia therefore, cannot be underestimated. This is particularly so when addressing the contentious areas of designing for playfulness, pleasure and meaningful occupation. If dignity and human rights are to be maintained and sense of wellbeing supported, then a person living with dementia needs to be kept central to the design process. In addition, caregivers and loved ones contribute to the 'situatedness' of the person living with dementia and so they too can make an important contribution to the design process.

Including people affected by dementia in research is vital therefore, as it recognises their value as individual citizens with their own unique perspectives and opinions. Gaining informed consent for their inclusion in research, however, poses some complex ethical issues. Someone living with dementia may have limited mental capacity, memory loss and communication difficulties. Although it may be possible to gain assent for inclusion of a person living with dementia from relatives and carers, the proxy may override the person's view, were they able to express it. A person living with dementia does not automatically lack the capacity to consent for themselves and ways can be found to help identify their wishes. A 'process method' of gaining consent, which is used each time a person takes part in a research activity, can help a person living with dementia indicate their wish to be included in

a study (Mullins 2018). A process method of gaining consent was used in the LAUGH study and included: visual and written information, non-verbal methods of communication and interpretation by carers who knew the body language of the person well.

Compassionate Design

The LAUGH research is underpinned by ‘Compassionate Design’ - a methodological approach that aspires to identify the key requirements when designing for people living with advanced dementia, in order to maintain their dignity and personhood (Treadaway, Fennell, Prytherch, et al. 2018). It places loving kindness for the individual at the heart of the design process and identifies i) personalisation, ii) sensory stimulation and iii) connecting with others and the world, as being priority themes to guide design development (Figure 1). The theory is underpinned by positive psychology and in particular the work of Fredrickson (2014) and builds on Positive Design (Desmet and Pohlmeier 2013). Positive design identifies 1) *pleasure*, 2) *personal significance* and 3) *virtue*, as key components for designing for happiness. The theory advocates combining these three key elements in order to design to promote human flourishing. The themes include experiencing positive affect (pleasure), being a morally good person (virtue) and pursuing personal goals (personal significance) (Desmet and Pohlmeier 2013). In the context of advanced dementia these themes are tricky, due to the negative impact of the disease on a person’s perceived agency and memory. Pleasure, as a component of designing for happiness, is also more nuanced for someone living with advanced dementia; it is more likely to be stimulated in the moment and through the senses rather than via explicit memory cues.

Compassionate Design, therefore, takes an asset-based approach and strives to highlight the ‘positive’ and ‘potential’ for enhancing a person’s subjective wellbeing. The focus on *sensory* stimulation promotes ‘in the moment’ positive experiences and the potential rekindling of

pleasurable implicit emotional memories. The *personalisation* theme ensures that design acknowledges an individual's personhood and identity. It may reference 'lived life' that a person may no longer remember, but that has been sedimented (through their experiences) into who they are. The *connecting* theme recognises the value of social relationships, to maintain the construction of personhood and to promote love, pleasure and meaning. The three key themes are focused around the need to keep loving-kindness for a person living with dementia at the very heart of the process, acknowledging the complicated ethical context within which the design process takes place (Treadaway, Taylor, and Fennell 2018).

The LAUGH research project provided an opportunity to test the effectiveness of the Compassionate Design approach in practice. The following sections describe the LAUGH research methodology and the resulting playful object prototypes designed for people living with advanced dementia.

Research methodology and methods

The LAUGH project used a qualitative and interpretivist methodology. This included action research and grounded practical theory approaches, in which both verbal and non-verbal social interaction and engagement in activities were observed in detail (Craig and Tracy 2014). Methods used to gather data included participatory and co-design workshops, comparative case studies involving semi-structured interviews and Live Lab evaluations (Brankaert, den Ouden, and Brombacher 2015) including real-time and post-event observation. Audio visual tools helped to document the research and drawing, sketching, field notes, photography and practical making contributed data for analysis at key stages in the research. Narrative, thematic and text analysis of this rich data has provided insights into the experiences of those involved in the study and contribute to the outcomes from the research.

Video documentary was coded by up to four coders to provide validation and tools including NVivo 11 and Excel were used in the data analysis.

The project involved contributions from a group of interdisciplinary experts (health and care professionals, charity representatives, psychologists, technologists, artists, designers etc.) and included people living with dementia at various stages of the disease and their carers. Six people living with advanced dementia and their families were recruited for the study via the partner organisation Pobl Gwalia Care. Their criteria for selection included being in the advanced stage of the disease and having family members willing and able to contribute to the research.

The four key phases of the LAUGH study included:

- (1) Knowledge gathering: case study; participatory workshops
- (2) Reflection: analysis of data from 1) and development of 'Portrait' information
- (3) Design and prototyping: participatory co-design workshops; designing; prototyping
- (4) Testing and evaluating in an iterative cycle to refine concepts: participatory evaluation workshops; Live Lab evaluations with i) carers to ensure designs were safe
ii) people living with advanced dementia and their carers

Further detail of the LAUGH participatory and co-design workshops and findings from the initial phases of the study (phase 1&2) are published in (Treadaway, Fennell, Prytherch 2018; Treadaway, Kenning, et al. 2016). A range of evaluation methods were used to ensure that the project was thoroughly assessed. A description of the mixed method evaluation process and evidenced based findings are reported in (Kenning et al. 2018).

Persona or Portrait

The initial knowledge gathering phase of the research aimed to understand issues around playfulness, memory and hand-use in relation to dementia. Data analysis led to the identification of six themes that were considered by participants to be widely applicable for people living with advanced dementia and had potential for guiding design concept development. The following key words were used to identify these themes: 1) nurturing, 2) attention, 3) movement, 4) re-play 5) security and 6) purposeful. These themes are explained later in this paper in relation to the objects that were developed.

Guided by Compassionate Design principles, the LAUGH team worked closely with six people living with advanced dementia in two of the partner organisation's care homes. University ethics approval was obtained and the partner company protocols were adhered to in an on-going iterative process method of gaining consent (Mullins 2018). Professional carers or family members were present during each research visit. The aim at this stage was to develop a relationship with the person and their caregivers in order to collaboratively sketch a portrait of the individual's life history and their personal preferences (past and current). The portrait included written and visual material (photographs and drawings), which was developed into a profile that could be used in a co-design workshop to scope design concepts.

The workshop (20 participants plus 5 research team) explored design ideas related to the individual people living with dementia described in the portraits. Design concepts were developed to align with the six key themes identified in phases 1 and 2 of the research. In addition, a rich variety of participatory workshop information including: recorded focus group discussions, post-it note concept boards, sketches, diagrams and photographs was used to inform the design concept development stage. These were developed and prototyped in an iterative process by 3 designers from the research team. The result was a series of six bespoke

prototype playful objects, each designed to provide sensory stimulation, encourage interaction with the object and connection with other people. The following section explains each of the objects and their development.

LAUGH playful objects

HUG

Finding how to comfort and bring pleasure to people who are increasingly withdrawn and unable to communicate is challenging. HUG (Figure 2) was designed to bring comfort to someone living with dementia who was approaching the end of her life. The participant was in bed for most of the day, had frequent falls, was no longer able to communicate verbally and had poor appetite and general health. Her carers suggested to the design team that the only thing she really needed was a hug. A soft cushion-like wearable was designed that provides the sensation of being given a hug and provides an experience reminiscent of nursing a small child. The body cavity of the object contains a programmed microcontroller with attached electronics that simulate a beating heart, and speakers through which her favourite music can be played – a selection of Vera Lynn songs.

HUG is made from a soft washable fleece textile and is stuffed with extra soft polyester filling. The arms and legs are long and weighted, and designed to wrap around the body. The resident's immediate response to HUG was observed to be positive and she cried when carers attempted to take it from her. HUG was left with her and the research team returned after a week, then at one-month and then three-month intervals, to observe and evaluate her response. After three months with HUG, the benefits to her wellbeing were clearly evident. She was out of bed for most of the day, talking, eating better, her general health had improved, her hands were no longer stiff and contorted and significantly, she had

no further falls. According to reports by care staff and a close relative, improvements to her wellbeing could be attributed to HUG as no other significant changes to her care had taken place during the three-month period. One of the carers commented:

'She's come alive so much, whereas before she was sitting in her chair all day, not interacting with anyone, just laying there and then going to bed for most of the day. She's like a different lady now.... it's like a miracle in a way.'

The HUG design concept is aligned to the theme of *nurturing* and meets the innate human need to give care to other living things (people, animals and plants) as well as to be cared for oneself. The design, guided by the principles of Compassionate Design, provides sensory stimulation both through the tactile qualities of the soft fury fleece fabric and also via the beating heart and personalised music. HUG also provided positive opportunities for the participant to interact with caregivers and other residents, stimulating conversations with her about her 'baby' or 'HUG buddy'.

Giggle Balls

Laughter is infectious - particularly children's laughter. Findings from phase 1 of the LAUGH study found that playful activities that stimulate laughter are highly beneficial to wellbeing. In response to this, a set of six Giggle Balls (Figure 3) were developed for a woman who had enjoyed being a bowling club member for many years. The soft felt woolen balls contain electronics comprising a small tilt sensor, speakers and microcontroller with sound files of children's laughter. When turned over in the hand the balls 'giggle'. Sadly, the participant passed away before she received them. The design team continued to develop the concept as a social activity to be used in a group situation with residents in a shared lounge. Giggle Balls were found to be particularly popular with care staff who found them useful for

changing the mood in stressful interactions with residents during the working day. One carer commented: *'If someone's sad you can cheer them up with a Giggle Ball.'* The Giggle Ball design aligns with the theme: 'Attention' and provides caregivers with a resource that can quickly divert attention to produce positive and humorous interaction when someone is feeling insecure or upset.

Steering Wheel

The steering wheel (Figure 4) was developed for a person who had enjoyed driving throughout his life and had worked as a mechanic and roadside recovery driver. In the first phase of the project, case study interviews with men living with early stage dementia (who were part of an Alzheimer's Service User's Review Panel) identified that people with a diagnosis of dementia find it particularly depressing to no longer be able to drive.

The steering wheel aims to rekindle the pleasurable act of driving and utilises a microcontroller to provide haptic vibration to simulate the car engine running. It also has functioning indicators with dashboard lights and a 'tune-in' old fashioned radio that enables a playlist of the user's favourite songs to be stored and played back. The Live Lab evaluation prompted a playful 30-minute activity in which the participant 'drove' into the lounge in his wheelchair and enacted an imaginary journey to the seaside to buy ice-cream with two carers at his side. The care home manager commented:

'We had a very personal journey, on a trip, and he was driving us to Porthcawl. It was absolutely the most interaction I have ever seen from him. It was absolutely amazing... it was!'

The steering wheel aligns with the theme of 'Movement' and provided sensory stimulation to

evoke the memory of driving a car via a hand-held device, even when the participant was no longer able to move independently.

Telephone

People living with advanced dementia often struggle with communication due to the way the disease impacts on language and hearing. The telephone (Figure 5) was developed initially for a participant whose first language was Spanish and the interactive device was programmed to provide spoken and sung sound files in Spanish. During the evaluation the telephone also proved very popular with the residents as a communal activity. In particular they loved listening to the music on the telephone. It was subsequently reprogrammed to contain a selection of Welsh music appropriate for these residents, some of whom were native Welsh speakers.

The retro telephone, with a dial mechanism and handset, is housed in a wooden box. When switched on, it rings spontaneously and following the traditional dialling tone sound, plays a random music track from a pre-programmed favourite playlist. The sprung dial mechanism is reminiscent of analogue telephones that existed prior to the advent of press or touch button devices. It is operated by inserting a finger into the dial and rotating the mechanism clockwise and is designed to prompt procedural memories through haptic touch. Any number can be dialled to randomly select a favourite music track. The hand-set containing the speakers is attached to the box via a coiled cable.

The telephone proved successful as a social activity amongst residents and stimulated conversation, singing, laughter and smiles. It aligned to the Re-play theme, involving:

procedural memory of the haptic activity of dialling a number on a telephone, implicit reminiscence (emotional familiarity) and playfulness.

Fidget jewellery

One of the challenges in living in residential care is the vulnerability that people experience around security and safety. Without a wallet, front door key or handbag, people living with dementia can feel disempowered and insecure. Personal possessions provide a sense of security and reveal something of a person's identity. The fidget jewellery box (Figure 6) aligns to the theme of 'Security'; a treasured personal possession that helps the keeper retain a sense of autonomy and communicates to others their personal preferences and lived experience.

The wooden box containing three sensory items was made for a woman of 94 who loved jewellery and pearls in particular. Each one is designed to rest gently over the fingers and dangle into the palm of one hand where they can be manipulated by the fingers of the other and provide the person living with dementia something to fiddle with. The pieces are strung with beads, buttons and small items that reference the hobbies and preferences of the person for whom they were made. Extra strong thread, spun with a wire core, was used for threading the beads, shells and other small objects, which can be slid up and down or rattled to make a noise. These jewellery pieces are interactive (but without technology) and can be easily replicated and personalized using traditional simple craft skills by a carer or family member.

The three items in the box include a piece containing pearls, shells and driftwood; the others reference textile crafts the participant had once enjoyed as hobbies, including: threaded buttons, feathers, lace and embroidery. The participant's favourite piece was seaside themed. She held it on her fingers, stroking the beads and shells and amazed her carers by speaking

for the first time in many weeks saying: *'I used to like going to the beach.'* The jewellery was used by her carers to stimulate conversation and share songs and rhymes together.

LUMA

Many people living in residential care sit for many hours in a chair with very little to occupy them. Sometimes quite simple activities can bring pleasure, such as watching the birds in the garden through the window. LUMA (Figure 7) is an interactive, hand-held device that was designed to bring a sense of 'the outside' inside. It references a garden bird peanut feeder in shape. When activated, a central wooden tube decorated with laser cut garden bird motifs is illuminated. As the outer turned wooden ring is slid along the tube, the internal lights change colour and different bird-song sounds are activated. The sound is emitted via small speakers, which are contained in the two wooden end pieces. LUMA aligns to the theme of 'Purposeful'. By deliberately moving the ring it is possible to change the colour of the birds and alter the birdsong. It provides a sense of autonomy to a person living with advanced dementia and enables them to control the device for themselves. This object was made for a person who had become increasingly passive and withdrawn and was ultimately unable to assist with the final evaluation. Designing for people who are unresponsive can be a real challenge. Sometimes the design process requires an iterative process of trial and error; observing micro responses to an object and modifying the design to include any minor element that attracts a person's attention or gains a positive response. Objects like LUMA can be used successfully to engage a non-responsive person in conversation by providing an activity to do or talk about together.

Discussion and Future work

This paper presents an illustrated description of the outputs from the LAUGH design research: a series of six interactive playful objects for people living with advanced dementia.

It has focused on the design development of these objects, which has been underpinned by Compassionate Design, an approach that places loving-kindness for the person living with dementia at the heart of the process. Compassionate Design prioritises three key areas: i) personalisation, ii) sensory stimulation and iii) connecting the person living with advanced dementia to others and the world around them. The six bespoke prototype objects described in the previous section align to six themes that emerged from the initial participatory phase of the research: *nurturing*, *attention*, *re-play*, *movement*, *security* and *purposeful*. They indicate how designs can be developed that are highly personalised and also meet universal human needs. The integrated technology provides potential for personalisation that is easy to fine tune to the requirements of the person for whom the object is designed and can be modified for a different user.

This design research resulted in bespoke designs and no claim is being made in this paper to generalise the findings of this limited study. However, the process of engagement, approaches and methodology are transferable to similar circumstances and therefore scalability is possible. Observations by the research team of the people living with advanced dementia using the objects, indicate that these highly personalised hand-held objects enhanced the wellbeing of those they were designed for. Carers interviewed for the study were confident in reporting that use of the playful objects had helped them in their jobs and had made their work more rewarding (Treadaway 2018). They had observed an improved quality of life of the people who had used the playful objects, evidenced in laughter, smiles and improved interaction. Findings also indicate that there may be potential health benefits from using the objects, including reduction in falls, increased appetite, improved socialisation and reduction in anxiety and depression. Research is currently underway that will provide quantitative medical evidence and in-depth wellbeing evaluation involving a larger

participant group, to support the observations reported from this study. Should this second phase of the research confirm that these playful objects have health and wellbeing benefits, it will be important to address issues concerning how to scale up production of highly personalised designs. One approach, tested via this work has been through the integration of programmable embedded digital technology. Alternatively, small-scale methods of community manufacturing could provide avenues to be explored in future research.

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(All photographs are courtesy of the LAUGH® project and ©)

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