

LAUGH: Designing to enhance positive emotion for people living with dementia

Cathy Treadaway¹
ctreadaway@cardiffmet.ac.uk

Gail Kenning²
gail@gailkenning.com

David Prytherch³
david.prytherch@bcu.ac.uk

Jac Fennell¹
jfennell@cardiffmet.ac.uk

¹Cardiff Metropolitan University, United Kingdom

²University of Technology Sydney, Australia

³Birmingham City University, United Kingdom

Abstract Dementia comprises a number of degenerative neurological diseases. It is a complex condition and each person's experience and symptoms are different. There is a growing awareness of the need for well-designed products and services to assist with dementia care and to enhance wellbeing. This paper presents research investigating the design of playful objects for people with late stage dementia. The investigation described is a preliminary stage in the LAUGH (Ludic Artefacts Using Gesture and Haptics) project; an AHRC funded international, interdisciplinary design research project. People living with dementia, informal and professional carers, health professionals, art therapists, charity representatives, arts practitioners and designers are informing the research through a series of expert group participatory workshops and case study interviews. Observation, discussion, video, photography and reflective journals have been used to analyse and document the investigation. Findings presented in this paper focus on the importance of emotional memory and emotional expression in the care of people with late stage dementia; the value of sensory triggers and props to stimulate emotional remembering; and the importance of designing to promote high quality social connections between people. These findings will inform the future design prototyping and development stage of the LAUGH research.

Keywords Design, Dementia, Emotion, Play, Memory

Context

The number of people living with dementia worldwide is predicted to rise significantly over the next twenty years (Prince et al., 2015; WHO, 2012). The anticipated consequence of this on many societies around the world will be a steep increase in the requirement for provision of long-term specialist residential dementia care, in particular for people in the later stages of the disease, as well as respite care support for their families (RSA, 2012). Dementia detrimentally impacts memory, perception, communication and in particular, it disrupts associative thought processes. The condition comprises a number of degenerative neurological diseases, the most common of which are Alzheimer's disease and vascular dementia. Dementia is a complex condition; each person's experience and symptoms are different and the progression of the disease is individual and unique (Hughes, 2014).

There is a growing awareness of the lack of well-designed products and services to assist with dementia care and to enhance wellbeing (Design Council, 2012). The complexity of the disease is a challenge for designers. Design research is needed to develop new understandings, approaches, services and products to support both the practicalities of day-to-day care and also the emotional wellbeing of those living with the disease.

This paper describes international design research currently underway in the UK and Australia. The work focuses specifically on developing designs for playful

objects that stimulate positive emotion and increase subjective wellbeing for people with late stage dementia living in residential care. The LAUGH project is a three-year international research project funded by the UK Arts and Humanities Research Council and supported by the care industry and leading charities in the field including Alzheimer's Society and Age UK. Preliminary findings emerging from the first phase of participatory workshops and case study interviews are presented in this paper.

Understanding positive emotion

Many people in long-term dementia care suffer from depression (Chenoweth et al., 2009). Anti depressant and anti psychotic medication is widely used in residential care to treat both depression and the perceived associated challenging behaviours. There is however, growing research from academia, medical and care professionals to support non-pharmacological psychosocial approaches to care; these include music and singing, visual art appreciation and creative playful activities (Brooker & Duce, 2000; Zeisel, 2011). These approaches stimulate positive emotion *in the moment* and there is growing evidence that these activities provide sustained benefits to subjective wellbeing over the longer term (Killick, 2013). There are significant economic advantages to reducing the need for medication; for people living with dementia and their families there is also the potential for a richer experience of *living well*, as opposed to *existing* with the disease (Killick, 2013). These new approaches will challenge conventional

care patterns (Zeisel, 2011).

Research indicates that there is currently very little for people with late stage dementia to do, resulting in feelings of boredom and isolation (Chenoweth et al., 2014). As the disease progresses, verbal communication becomes increasingly difficult and moments of connection with other people, which are vital for sustaining positive emotion, are reduced. Studies in psychology by (Fredrickson, 2014) have shown that *positivity resonance* or moments of *high quality connection* between people, benefits not only mental health but also individual physiology and wellbeing. By broadening empathic moments of connection between people it is possible to lower heart rates, reduce stress, boost the immune system, lower blood pressure as well as developing a more positive outlook on life (Fredrickson, 2014).

Understanding how positive emotions manifest, what they 'look like' and how they 'feel' is vital for the development of new designs that are able to increase personal emotional wellbeing and support moments of high quality connections between people living with dementia, their family and carers. There is also a need to understand how positive emotion relates to memory, reminiscence and perception of experience, since memory impairment plays a significant role in how the diseases presents. Emotional memory is however, subjective, located with the individual, and difficult to elucidate (LeDoux, 1998).

The following sections describe a study that was designed to elicit moments of emotional remembering in the study participants, and make evident the processes involved in the reconstruction of emotional memory (Dourish, 2006). The study described is only a small part of the wider LAUGH design research project. Its purpose was to illuminate the common human experience of emotional memory and use this knowledge to inform the design of objects to be used in dementia care. The study therefore, involved participants who were experts involved in dementia care and who were able to identify and articulate how their own experiences of emotional memory might *correlate* or *differ* from people living with late stage dementia¹.

Methodology

The LAUGH design research uses Positive Design approaches in the development of playful objects for people with late stage dementia (Desmet & Pohlmeier, 2013). Building on methods used by international researchers working in the field of design for dementia, the research described in this paper is qualitative, inclusive and participatory (Bhömer, Tomico, Kleinsmann, Kuusk, & Wensveen, 2012; Branekaert, Snaphaan, & Ouden, 2014). The project is informed by the 'distributed expertise' of people living with dementia, care professionals and informal carers, as well as practice-based creative design in which physical objects are constructed as data for interrogation. These objects comprise paper prototypes, storyboards and models as well as photographs, video and reflective journals.

Prior to the study described in this paper, two inclusive participatory workshops and four interviews were held over a period of six months to gather data to inform the LAUGH design research process.

Participants attending these events formed an expert group including health professionals, carers, care managers, occupational therapists, charity representatives, people with dementia and academic researchers. Three case study interviews with healthcare professionals and a focus group with an Alzheimer's Service Users Panel comprising three people with dementia have also informed this study.

The workshops were held in the National Centre for Product Design Research, Cardiff Met University, in the User Centred Design Laboratory. The UCD lab is fully equipped with a video recording system capable of capturing four areas in the room. Data is fed to an adjacent room housing an editing suit running Noldus Observer XT® software, used to tag and analyse the video data. Still photography and audio recordings were also made to capture and document each event. Both workshops involved participants engaging in creative activities and the resulting artefacts were analysed to inform the research. Workshop 1 focused on the theme of hand-use and play. Participants were encouraged to reflect on practical handcraft activities such as bread making and making simple toys, as well as playing games involving the hands; the findings arising from it are discussed in detail in (Treadaway, Prytherch, Kenning, & Fennell, 2016). The second workshop specifically addressed questions concerning emotional memory and positive emotion and is described in detail in the following section of this paper.

Expert Group: Exploring emotional memory

Workshop 2 built on themes emanating from the first workshop concerning memory, play and dementia and comprised a series of activities designed to stimulate conversation around *emotional* memory. The activities included: 1) *smelly pots* which provided insights into olfactory sensory stimulation and memory, 2) *dressing up* which explored visual/embodied sensory stimulation and memory and finally 3) *pass the parcel* which stimulated dialogue around laughter, fun and games.

1) Smelly Pots

In this activity participants were each given two screw top jars, each one containing a different smell from a range of substances including herbs and spices, cleaning chemicals, lavender, engine oil etc. Participants were seated around a large table and asked to unscrew the jar, smell the content and if willing, volunteer to share memories evoked by the contents of the jars. The smells stimulated anecdotal and emotional memories and many of the participants noted how quickly they were transported back to past

1 People living with dementia, at an early stage of the disease, have informed the initial LAUGH project case study research and people in the late stages of the disease will evaluate design prototypes yet to be developed.

experiences. They were keen to share memories of life events, stories of childhood and reminiscences of being in particular places. As participants recognised the particular smell they were able to link it with a significant past experience along with other sensory cues and emotions associated with it. Some of these memories were deep, strongly emotional and were acknowledged as having been forgotten for a very long time. Discussions took place around the importance of olfactory stimulation in rekindling deep and emotional memories. Some participants were able to share with the group very detailed memories associated with and stimulated by the particular smell. After opening a jar containing the smell of bees wax polish, one participant noted:

'I don't know what it is, but it reminds me of the school gymnasium. Very familiar.'

Another participant noted that the smell reminded her *'of a hospital bed; a drink, diabetic sweets - hospital is a big thing.'* She went on to recall a childhood visit to hospital and her mother's illness and how she had felt emotionally at the time.

There followed a discussion about the use of words stimulated by the smelly pots. Participants were invited to list and then share some of the words stimulated by the smells. One participant, an author and poet, read poems written by people living with dementia followed by a group discussion about reminiscence in dementia care and the emotional challenges and benefits of stimulating emotional memory. He described his experience of the challenges of writing poetry with people living with dementia and how he believes it can bring a person emotional release:

'Many people living with dementia have feelings that need expressing and maybe the care home setting is not allowing them to share them. This can be done through all the arts. Our society values intellectual things over emotions. Expressing feelings, positive or negative - both have positive effect.'

When asked by a participant how he encouraged the sharing of words in the poetry writing sessions he noted the importance of empathy:

'I'm not there to speak to the person, but to listen to them. Sitting on their level, engaging with them to show you are there for them. Often carers say they (people with dementia) are no longer there, but it's the way they interact with them that take it away. You need to show you are here for them, to accept everything the person living with dementia says.'

The session concluded with a brief discussion about the importance of validating the individual person with dementia and allowing them to 'express who they are' and their 'expression for play.'

2) Dressing up

Participants were invited to watch a short video about contagious laughter. This was intended to relax them prior to the second activity session, which involved

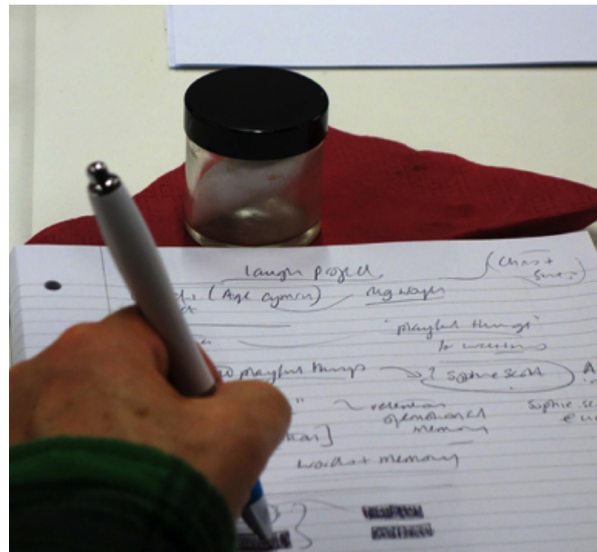


Figure 1. Smelly pots: writing words associated with the smell.

dressing up. Researchers were aware that some participants might be self-conscious and find the activity challenging so the laughter video was used to stimulate a light hearted, playful atmosphere in which it was hoped participants would willingly engage and then share their thoughts. The research team acknowledges that by influencing the emotional tone of the session an emotional bias was introduced. However, the intention was not to gauge emotional experience per se, but to encourage participants to be sufficiently relaxed that they could engage and reflect on, their responses to the playful activity. The aim of showing the video was to communicate to the group that they were being given permission to be playful (Rogerson, Treadaway, et al. 2013). While the majority of the group appeared to enjoy the activity the influence of the researchers' presence must also be acknowledged; participants may have felt under pressure to 'please' and perform for the sake of the research. This subjectivity and bias in the study is acknowledged.

Participants were invited to rummage in two large bags of dressing up clothes, hats and accessories and select some items to wear that stimulated memories of a particularly happy point in their life. The selection of items of clothing and how they were worn created a great amount of laughter and conversation. Photographs were taken of each member of the group and a 'Personae' card completed which captured preferences of individuals at the chosen happy/favourite point in life. The researchers made an assumption that a favourite point in life would also be happy and this was confirmed by participant responses. The card asked each participant to complete the following sentences under the title of: 'A time when...'

1. I wore...
2. I listened to music by....
3. At the cinema/TV I watched...
4. My ambitions were...

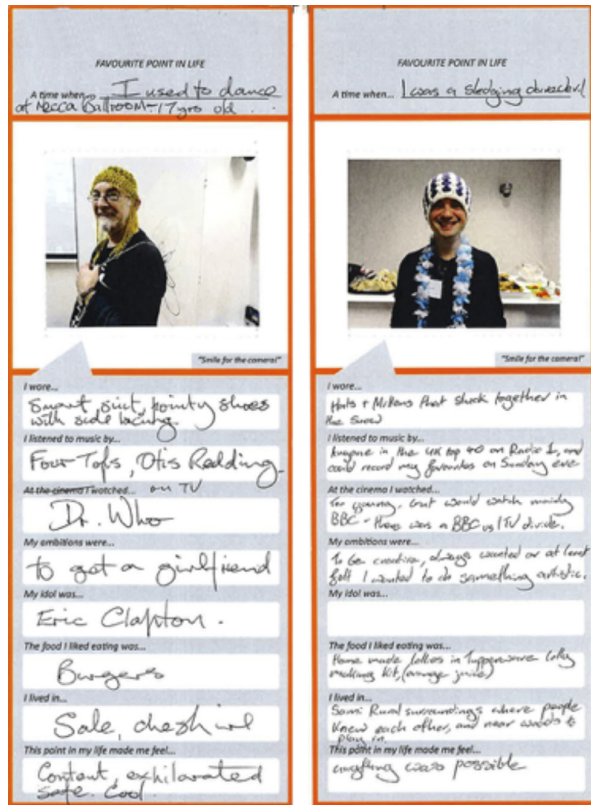


Figure 2. Examples of participants' Personae Cards.

5. My idol was....
6. The food I liked eating was....
7. I lived in....
8. This point in my life made me feel....

Figure 2 shows examples of two personae cards. Once completed, participants were invited to share the information they had written on them with the group. A discussion followed about why these periods of life had been selected as instances stimulating positive emotion and the role of sensory stimulation in these memories.

In the discussion that followed, participants noted that the 'Props (dressing up clothes) were the triggers' for memories and another participant noted:

'The process takes away the fear. Allows a space to reminisce. The 'doing' of the activity reinforced a space to reminisce. Gave permission.'

One participant commented:

I picked this as it was the only prop that triggered a memory. The danger is getting channeled into one memory as that's all that is triggered by the prop. The prop reduced it to one memory but the conversation triggered more.....

The default option was 'I can't think of anything', but the activity forced me to think of something.'



Figure 3. Dressing up as a princess (left).

In addition, the props provided a deeply embodied and sensory experience. One person described how *'the dress up provoked the period chosen. I had a genuine feeling of being a princess.'*

On reflecting how this might apply to caring for people living with late stage dementia it was noted that *'props facilitate communication'* and that *'When people visit relatives, they bring photos and props to spark conversation. It is quite difficult otherwise.'*

Most participants were eager to engage with the activity but a small minority of the group found the session very challenging. Reasons for this included embarrassment, a feeling of coercion and a lack of interest in engaging in this type of play. Those who were eager to engage with the activity found themselves transported to a different time and sense of self, for example, one participant became a magician another a princess (Figure 3). The majority of the group remembered childhood experiences or those of their children. One participant reflected:

'No one wanted to be an adult. It's all about childhood or our children.' When a participant who had been reticent to join in challenged this, various members of the group noted that many of the comments written on the Personae cards concerned *safety*, the excitement of early life and potential of what the future might bring. This was evidenced in comments such as: *'I felt content, exhilarated, safe and 'cool''; 'I felt secure'; 'I was a young child, I felt happy'; and 'I felt very happy, safe and excited.'*

Music was a common theme that emerged as having great significance and discussion then focused on the importance of music in stimulating positive emotion within dementia care. The group shared anecdotes of music related experiences with people living with late stage dementia such as people who had lost spoken language but who were able to continue to sing with words or could be stirred to dance on hearing particular significant types of music. A strong relationship between music and emotion was noted by many of the participants and the ways it provides an alternative way of connecting and communicating was discussed:

'Music is a way of connecting emotionally, positive responses. A connection with somebody through music when they find it difficult to connect with people in other ways.' It provides 'Mutual connection'.

Key themes that were raised following the dressing up activity included: vulnerability in relation to playfulness, the need for feelings of safety and the use of props and music to stimulate emotional memory. The final activity brought together these themes: it involved the use of music and props to challenge participants' willingness to be playful and an opportunity to reflect on their feelings of vulnerability.

3) Pass the Parcel

This activity involved playing the well-known party game in which a prize is wrapped in layers of paper, each layer containing a forfeit to challenge the person who had unwrapped it as the music stopped. Forfeits included memory challenges such as: 'name the seven dwarfs', 'describe how to boil an egg' and performative activities such as 'pat your head and rub your tummy' and 'balancing biscuits on noses' (Figure 4). The overall winner of the game is the person who unwraps the present in the final layer of paper. This activity created a great deal of emotional expression in body language, facial expression and verbally. Lively music was played as the parcel was passed around the table. Both positive and negative emotions were expressed such as anticipation and excitement when passing the parcel around, fear when discovering a forfeit and joy when receiving a reward. The activity generated lively banter, conversation and much laughter.

Researchers began changing (simplifying or making easier) the requirements of the forfeits ad hoc, to mitigate participants' feelings of embarrassment and to reduce stress. Other members of the group made helpful contributions and there was a sense of camaraderie in helping the individual execute the challenge. Any attempt to complete the forfeit was rewarded with group praise, laughter, clapping and smiles.

The Pass the Parcel activity raised a number of negative issues around feelings of vulnerability, embarrassment and lack of confidence. It was noted that in order to have fun, participants had to be prepared to be vulnerable, make mistakes, appear foolish and let people laugh at them. In a loving, closely connected social group, such as a family setting, this is easier to achieve than in more socially stressed situations with people who are unfamiliar. Moments of joy also occurred as the group responded supportively to help an individual achieve the forfeit and then to congratulate them (clap, cheer, smile, laugh) once the challenge had been completed. It was also noted that when children play this game they are more goal oriented and less concerned with humiliation by their peers. By contrast, in the activity described here, the focus was on participation and performance rather than winning the prize.

Following the activity, participants were divided into three groups and asked to note on a flip chart the things that promote fun, laughter and humour and



Figure 4. Forfeits in pass the parcel: participants balancing biscuits on noses.

how this experience might differ for someone with dementia. A number of themes were identified including:

- *Embarrassment: the sharing of embarrassing experiences to promote empathy and connection*
- *Slapstick humour: being made to look foolish e.g. falling on a banana skin which reflect personal mistakes and accidental breaches of social conformity*
- *Children and childhood tales: portrayal of naivety and innocence*
- *Sea-side or bawdy humour: suggestion of risky, sexual or non politically correct behaviour*
- *Basic word play: using metaphor, simile, rhythm and rhyme*
- *Dressing up: embodied visual humour, including becoming another, changed identity or incongruous visual behaviour*
- *Dancing: moving in a way that is inconsistent with social expectations*

It was noted that people with dementia sometimes are less inhibited or constrained by social expectations of conformity and so may be amused spontaneously by some incidents, words, actions that would be considered impolite by social convention.

Discussion

A number of themes related to positive emotion and memory arose from analysis of the data gathered during the workshop activities. These included: the use of sensory triggers and props to stimulate emotional memory; the need for emotional and playful expression; self-perception and perception by others and how this relates to positive feelings of social connectivity.

Sensory triggers and props to stimulate emotional memory

People living with dementia continue to experience emotional memory, that is the memory of the feelings associated with an event, rather than the facts about what happened (Zeisel, 2011). Using cues around those types of memories, for example favourite clothing, textures, pictures, foods and songs, it is possible to

positively support how people feel and respond in that moment (Treadaway and Kenning). Positive moments of past experiences can be rekindled through nostalgic reminiscing (Batcho, Nave, & DaRin, 2011). Childhood memories in particular, are recalled and positive feelings generated as a result of experiencing sensory triggers (Boren, 2013). Those expert participants, who work directly with people with dementia, confirmed this.

In the workshop, participants were able to reflect on their own personal experiences and give examples of ways in which poetry, music and the arts are able to stimulate emotional memory for people living with dementia. It was acknowledged by the group that rekindled emotions are not always positive and that current care practice tends to inhibit rather than promote emotional expression. Olfactory senses are able to rapidly reinstate memories of places and events and this, combined with conversation with others, can stimulate associative thinking and remembering. Music, like smell, can also transport an individual to past experiences very quickly and can impact on the ability to remember words when verbal communication is limited or lost. It can also stimulate rhythm and body movement that help a person feel good, such as dancing, clapping and tapping.

There was a consensus that emotional expression should be a vital constituent of dementia care and that stimulating positive emotional memory can enhance the subjective wellbeing of people with dementia.

Emotional and playful expression

The challenge in this design research is to understand ways in which positive emotions can be stimulated for people with late stage dementia using playful objects. Playfulness is a fundamental and vital way in which human beings engage in fun, pleasure and laughter, not only in childhood but also throughout life (Rogerson et al., 2013). *Fun* and *play* are considered both appropriate and acceptable in children and regarded as valid vehicles for childhood self-expression, learning and positive emotional connection. Despite many decades of research findings affirming play in adulthood, (M. Csikszentmihalyi, 1990; Deci & Ryan, 1987; Proyer, 2013; Starbuck & Webster, 1991) society at large still seems to regard playfulness as incompatible with serious adult activities (Kane, 2005). Toys, such as dolls and teddy bears, are used in dementia care, however they are often considered infantilising and inappropriate by relatives and some health professionals (Mitchell & O'Donnell, 2013).

Nevertheless, there is research evidence that playful activities in later life have positive benefits to wellbeing. Waldman-Levi et al. (2015) contend that playfulness contributes to 'adaptability and resilience in life, especially in later life,' (Waldman-Levi et al, 2015, p. 5). Although fun is largely intrinsic and internally motivated, socially focused playful activities bring external rewards including conversation and laughter. Ryan & Deci (2000) contend that internally motivated activities result in 'greater persistence, more positive self-perceptions, and better quality of engagement' (Ryan & Deci, 2000 pp. 60-61).

Objects that encourage independent playful interaction provide intrinsic reward by fostering self-directed interaction and re-igniting feelings of efficacy and interest in the world.

The playful activities experienced by workshop participants' stimulated discussion about ways in which people living with dementia experience positive emotions through props (reminiscence material), music, dance and creative activities, many of which take place in a social context.

Social connectivity

People living with dementia have a heightened sensitivity to emotion and this can lead to communication that is largely receptive and dependent on the moods of others (Logsdon, Gibbons, McCurry, & Teri, 2005). Although emotions and emotional memory continue to be experienced, it can be difficult for a person with dementia to express what they are feeling verbally and with clarity. Workshop participants agreed that greater opportunities are needed for people with dementia to express their emotions as this can help build resilience and positivity. Since verbal expression can be problematic, activities that encourage non-verbal emotional expression can become a way of sharing, understanding and build positive feelings of happiness and comfort (Treadaway, Kenning, & Coleman, 2015).

In the workshop, participants engaged in eye contact, touch, laughter and physical connection with others. Laughter and smiles have evolved and create emotional connection between people – they are contagious and have a positive impact on both mental and physical health. These forms of high quality connections with others enhance health and wellbeing, '*...positive emotions provide benefits - each... broadens your mind-set and builds your resourcefulness*' (Fredrickson, 2014, p10). Fredrickson (2014, p19) equates these high quality moments of connection between people, which she terms *positivity resonance*, as moments of love. Evidence from the workshop described in this paper reveals ways in which emotional experiences and memories can elicit positive emotion that can be shared through empathic high quality connections.

Conclusion

Designing specifically for connectedness, to encourage social connections, will be a powerful tool to support the ageing population (Wildevuur et al., 2013). Designs that can stimulate moments of high quality connection between people will help them experience and share positive emotion. The need is for playful, personally significant designs that are amusing, fun and have potential to stimulate social connections. Findings from this study suggest that moments of positive emotion can be shared socially when people feel relaxed and safe. Empathy and reciprocity enable potentially difficult or embarrassing experiences to be transformed into positive moments of humour and fun, shared through smiles and laughter.

In this workshop, participants were given permission to play and encouraged to experience positive

emotions. Their reflections on personal experiences of positive emotion during the workshop, and the perceived relevance of this to people living with dementia with whom they work, will be used to inform the design of playful objects for people with late stage dementia in the subsequent phases of the LAUGH project. The key considerations arising from this study that will be used to inform the design phase include the following:

- *Props and sensory triggers are useful ways of stimulating associations and rekindling emotional memories*
- *Wearable props can enable a person to explore their sense of self so that they are seen and can feel differently about themselves and others*
- *Smell and music were identified as being particularly significant sensory tools to rapidly elicit emotional memory*
- *Visual and tactile sensory cues can prompt deep memories and associations but the triggers for these are highly personal and related to individual preferences and experiences*

Design concepts will be informed by the knowledge generated by this study but will not necessarily relate physically to the props and activities used in the workshop described. The subsequent design phase of the LAUGH project proposes to generate new types of objects that can stimulate positive emotion and moments of connection for people living with late stage dementia. The intention is to explore new materials and technologies that can enable greater personalisation, extend sensory experiences and facilitate social connectivity.

Acknowledgements

This research has been undertaken with the support of funding from the UK Arts and Humanities Research Council and with support from Gwalia Cyf; Alzheimer's Society, Age Cymru and Dementia Positive.

References

Batcho, K. I., Nave, A. M., & DaRin, M. L. (2011). A retrospective survey of childhood experiences. *Journal of Happiness Studies*, 12(4), 531-545.

Bhömer, M. t., Tomico, O., Kleinsmann, M., Kuusk, K., & Wensveen, S. (2012). *Designing Smart Textile Services through value networks, team mental models and shared ownership*. Paper presented at the Third Nordic Conference on Service Design and Service Innovation, Norway.

Boren, Z. (2013). The Nature of Nostalgia. *E-Journal of Contemporary Psychotherapy*, 5(1). <http://www.contemporarypsychotherapy.org/volume-5-no-1-spring-2013/the-nature-of-nostalgia/>.

Branekaert, R., Snaphaan, L., & Ouden, E. d. (2014). *Including people with dementia in user-drive research - a qualitative Living Lab Protocol*. Paper presented at the 5th Living Lab Summer School, Amsterdam. NL.

Brooker, D., & Duce, L. (2000). Wellbeing and activity in dementia: A comparison of group reminiscence therapy, structured goal-directed group activity and unstructured time. *Ageing and Mental Health*, 4, 354-358.

Chenoweth, L., Forbes, I., Fleming, R., King, M., Stein-Parbury, J., Luscombe, G., . . . Brodaty, H. (2014). PerGEN: a cluster randomized controlled trial of person-centred residential care and environment for people with dementia. *International Psychogeriatrics*.

Chenoweth, L., King, M., Jeon, Y.-H., Brodaty, H., Stein-Parbury, J., Norman, R., . . . Luscombe, G. (2009). Caring for aged dementia care resident study (CADRES) of person-centred care, dementia-care mapping and usual care. *Lancet Neural*, 8, 317-325.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper and Row.

Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of personality and social psychology*, 53(6), 815-822.

Design Council, (2012). *Living well with dementia*. London: Design Council UK.

Desmet, P. M. A., & Pohlmeier, A. E. (2013). Positive design: An introduction to design for subjective well-being. *International Journal of Design*, 7(3), 5-19.

Dourish, P. (2006). *Implications for design*. Paper presented at the Conference on Human Factors in Computing Systems.

Fredrickson, B. L. (2014). *Love 2.0 Creating happiness and health in moments of connection*. New York: Plume.

Hughes, J. C. (2014). *How we think about dementia: personhood, rights, ethics, the arts and what they mean for care*. London: Jessica Kingsley.

Kane, P. (2005). *The play ethic: a manifesto for a different way of living*. London: Pan.

Killick, J. (2013). *Dementia Positive*. Edinburgh: Luath Press Ltd.

LeDoux, J. E. (1998). *The emotional brain: the mysterious underpinnings of emotional life*. London: Weidenfeld & Nicolson.

Logsdon, R. G., Gibbons, L. E., McCurry, S. M., & Teri, L. (2005). Assessing changes in quality of life in Alzheimer's disease. In B. Vellas, M. Grundman, H. Feldman, L. J. Fitten, B. Winblad & E. Giacobini (Eds.), *Research and Practice in Alzheimer's Disease* (Vol. 10, pp. 221-225). Paris: Serdi Publisher.

Mitchell, G., & O'Donnell, H. (2013). The therapeutic use of doll therapy in dementia. *British Journal of Nursing*, 22(6), 329-334.

Prince, M., Wimo, A., Guerchet, M., Ali, G., Wu, Y., & Prina, M. (2015). World Alzheimer Report 2015: The Global Impact of Dementia - an analysis of prevalence, incidence, cost and trend. London.

Proyer, R. T. (2013). The well-being of playful adults : Adult playfulness, subjective well-being, physical well-being, and the pursuit of enjoyable activities. *The European Journal of Humour Research*, 1(1), 84-98. doi: 10.5167/uzh-78008

Rogerson, R., Treadaway, C., Lorimer, H., Billington, J., & Fyfe, H. (2013). Permission to Play: taking play seriously in adulthood *AHRC Connected Communities Reports* (pp. 11). Swindon: AHRC.

RSA. (2012). Long term care for older people, social productivity and the 'big society': the case of dementia *2020 Public Services Hub*. London: Royal Society of Arts.

Ryan, R., & Deci, E. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54-67. doi:10.1006/ceps.1999.1020

Starbuck, W. H., & Webster, J. (1991). When is play productive? *Accounting, Management, and Information Technology*, 1, 71-90. doi:10.1016/0959-8022(91)90013-5

Treadaway, C., Kenning, G., & Coleman, S. (2015). *Proceedings of the Third European Conference on Design4Health 2015, 13 – 16 July 2015*. Paper presented at the Design4Health European Conference 2015, Sheffield, UK.

Treadaway, C., Prytherch, D., Kenning, G., & Fennell, J. (2016). *In the moment: designing for late stage dementia* Paper presented at the Design Research Society Conference, Brighton. <http://www.dr2016.org>

Waldman-Levi, A., Erez, A. B., & Katz, N. (2015). Healthy aging is reflected in well-being, participation, playfulness, and cognitive-emotional functioning. *Healthy Aging Research*. doi: 10.12715/har.2015.4.8

WHO. (2012). Dementia: A Public Health Priority. UK: World Health Organisation, Alzheimer's Disease International.

Wildeveur, S., van Dijk, D., Hammer Jakobsen, T., Bjerre, M., Ayvari, A., & Liund, J. (Eds.). (2013). *Connect: Design for an empathic society*. Amsterdam: BIS Publishers.

Zeisel, J. (2011). *I'm Still Here: Creating a better life for a loved one living with Alzheimer's*: Piatkus.