

Developing a music player for people with dementia

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A.J. Sixsmith, R.D. Orpwood, J.M. Torrington. Developing a music player for people with dementia 2010; 9(3):421-427; doi:10.4017/gt.2010.09.03.004.00 This paper concerns developing a device helping people with dementia to access music within their everyday lives. Requirements research with potential users indicated that music was a valued and important component of everyday life for people with moderate or severe cognitive impairments. However, access to music was often limited by issues such as device usability. An iterative, user-driven approach was adopted to develop a number of prototype music players to encourage and facilitate listening to music. Some limited trials suggest that an improved device could be successful in a nursing home. Rather than usability issues, the most important factors influencing device use were the complex social processes that occur within communal settings

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Music is an important part of the everyday lives of most people. For example the UK survey of social trends¹ found that around 70% of the population said that listening to music was an important free time activity and was ranked as the third most popular leisure activity after watching TV and spending time with friends and family. Sixsmith and Gibson² explored the role of music in the lives of people with dementia. While listening to music and participating in music-related activities contributed in a number of ways to the quality of life of people with dementia, accessing music was often problematic, due to problems with using music-playing devices, or even remembering preferred types of music. The aim of this paper is to describe the development of a device to help people with dementia to be able to

access and listen to music within their everyday lives and living circumstances.

METHODOLOGY

The first phase of the research was to outline user requirements for a music player, exploring the situations and constraints that impacted on how people with dementia interacted with music. Interviews were carried out with 26 participants, with 18 females and 8 males. Sixteen people lived in their own homes, and 10 people lived in residential care homes. The interviews used an open-ended agenda to examine the everyday and enjoyable activities people took part in, reasons why they enjoyed activities and any problems or constraints they had with activities. Interviews took 15-90 minutes, and were transcribed and coded prior

to data analysis. The open-ended format allowed an in-depth examination of an individual's experience of music and music-related activities, and also for observation by the researcher. The severity of cognitive impairment varied considerably between participants as the aim of the research was to be as inclusive as possible in respect to the wide range of needs and experiences of people with dementia. All participants were encouraged to describe their own views and experiences. Where this did not prove possible, the views of close family or caregivers were elicited³.

A second phase of work was the development of a prototype music playing device, based on the results of the first phase of work and involving end-users in an iterative design and development process. The engineering team had considerable experience of designing AT (Assistive Technology) for people with dementia, and has evolved methodologies for this process^{4,5}. A feature of the methodologies is the need for equipment to build on the sense of familiarity with everyday objects and devices. Beyond this, there was also a need to explore control interfaces that were intuitive for people with dementia. These interfaces were not necessarily based on familiarity but on what fundamentally constituted an intuitive or 'natural' control. This approach meant the design work had to be exploratory and iterative in nature so as to follow any feedback that was provided from observation of the way the clients behaved and used the various prototypes. These exploratory tests were carried out with supervision in users' own homes.

A third phase of work involved a trial of the music-playing device, and was carried out with people with dementia living in two residential care facilities in South Yorkshire, UK. A total of 10 people took part in the trial of the device: 8 females, 2 males; aged 67-88; MMSE (Mini-Mental State Examination) scores 2-24 (typically 15-19, indicating moderate levels of dementia, although several participants were rated as having severe

dementia). The music player was placed in the living areas of participants for periods of up to 1 week. The setting up included the installation of music that the person (or their carers) said they liked along with an explanation of how to use the device. Data gathered included: biographical data, photographs and floor plans for each of the two homes, and observational and semi-structured interviews based findings to determine the challenging or enabling factors in using the device, how the device was used and to determine the benefits and acceptability of the device for users.

The three phases of the project were approved by National Health Service research ethics committees. Written consent was sought from all individuals and reaffirmed throughout the interview. Attention was given to ensuring that participants understood the requirements of the study, and were able to retain the information long enough as to make an informed decision to take part. If a person was unable to provide informed consent, proxy interviews with carers were conducted.

RESULTS

The results of the three phases of research are presented below to provide an overall account of the development of the music player.

User requirements: music and dementia

People with dementia engaged with music in many different ways². As well as sitting and listening to music, some people were involved in making music, while for others it was a part of a range of activities. Music-based activities occurred in different places, such as the person's own home, pubs, churches, concert halls, day centres and residential homes. Some musical activities were solitary experiences, but in many cases music was integral to social interaction and participation at both an intimate and larger scale. Involvement in music conferred many benefits to people with dementia. It brought enjoyment and pleasure, stimulated memories and provided people with oppor-

tunities to interact with others and take part in meaningful activities, often using non-verbal forms of communication and interaction, such as touch.

As well as the benefits, the research documented a number of barriers, both personal and contextual, that constraint the person's ability to engage with music and music-related activities. Some people may be unwilling to listen to or interact with music, instead being happy to just sit and to remain inactive. Other subjects, although enjoying music, often experienced increased difficulty with expressing their desire to listen to music, or engage in musical activity. Within residential settings, the willingness of people to use music of their own accord appeared to be limited. Residents commonly felt that they were unable to use the equipment, had to ask permission, or had to follow perceived rules about the use of equipment. In such situations, a person might say they have little interest in music. A number of other problems in accessing music go beyond usability and address issues such as recognition of the device, choice of music and the person's awareness of music.

Prototype development

The aim of the second phase of our research was to use the insights gained from the first phase to develop a music player to provide people with dementia the opportunity to lis-

ten to and interact with music on their own terms, by designing a device that was appropriate to their preferences, abilities and circumstances. As suggested by the initial user research, device design often precludes use by people with dementia.

The incorporation of familiar features into environmental and product design may increase usability for people with dementia, as long term memory function tends to remain more intact, while only short term memory function and the capacity to learn and internalize new knowledge tend to be impaired. While there is some merit in this argument, the empirical basis remains inconclusive⁶, while an emphasis on using retro designs in developing products has a number of potential weaknesses. Some technologies change very rapidly making it difficult to actually determine what design features a population is familiar with. In addition, there are substantial inter- and intra-generational differences in this respect, based on age, socio-economic circumstances, etc. Inherently, a retro-approach to design will limit the device to a specific group within the population. Moreover, a study of faucet design⁶ suggests that unfamiliarity is not an issue for people with mild or moderate dementia, while severely impaired people require assistance regardless of the design. We took a different approach to device design, with an emphasis on incorporating innovative design features that were intuitive to use and developed through direct involvement of end-users (*Figure 1*) to ensure optimum and inclusive design for the majority of potential users.

Prototype 1 was a single switch CD player. The user had to lift the cover to insert the CD and then turn it on and off using the single switch. Volume could be preset by a carer using a control at the back of the device. The device was tested with nursing home residents of residential homes and community dwelling people. All the users were in the early stages of dementia. A simple check list was used by the researcher to note down any preferences or problems encountered by the



Figure 1. Iterations of music player prototype; A: Prototype 1, B: Prototype 2, C: Prototype 3, D: Prototype 4

users. Users found the device straightforward to use but several areas required attention. For example, the manipulation of the CD and a time delay in the music starting caused problems for some users, especially those who were not familiar with this medium. Also the single on/off switch was not perceived as an obvious means of controlling the device.

The difficulty in manipulating CDs led to the development of a second prototype based on solid-state MP3 technology that provided instant music on pressing a large single switch. In addition, concern about the overall appearance of the device led to a pictorial questionnaire to be developed to explore what kinds of images users associated with a device that played music. An illuminated button included a picture of someone playing an instrument. The unit housing had a sloping top to enhance visibility. User testing indicated the device was easier to use, but that further issues needed to be addressed: the single button was not obvious to control the device; the illumination from the button was not strong enough for use in brightly lit rooms; the image on the button did not convey the idea of 'music' adequately; some users would try pressing the two loud-speaker grills at the back of the device.

The conclusions of the evaluation of the 2nd prototype, suggested that a considerable re-design was required. Moreover, further consideration of the initial qualitative user research suggested that design considerations had to go beyond issues of usability and to address how the device would be contextualised in the everyday abilities and circumstance of the person using it. For example, it was clear that many people, even though they enjoyed listening to music and were able to use the device, would require some prompting to think about listening to music in the first place. The design of a 3rd prototype carried on with the MP3 technology but involved some key changes to the housing and controls. Specifically, the device used a lid over the single button. Opening the lid (like a music-box) turned the device

on and closing the lid switched it off. The lid was transparent to allow the user to see the music icon on the button. Pressing the button allowed users to change to the next music track. The lid also only opened a limited amount in order to encourage shutting on completion of listening. A further phase of user testing produced positive feedback and further recommendations that were incorporated into a 4th and final prototype for field testing. The final prototype incorporated a small handle at the front of the lid and different graphics on the button. In addition a simple illuminated display was built at the back of the housing, which periodically displayed a prompt message and simple instructions to encourage the person to switch on the device⁷.

Field trials

The device was introduced into the living rooms in the two homes, and placed at the opposite corner of the living rooms from the televisions, which were operated by the staff, as it was thought that a music player in the TV corner would be perceived as not for them to touch or use. It was also placed so as to be seen by a person entering the room. Each home had some residents who were able to walk on their own, so there was potential that people would walk over to it. Also, it was visible from a number of seats in the room so somebody might be enticed to get up and walk over to it. After discussion with care workers, it was decided to keep the television on with the sound turned down so that the music could be heard. This worked well and it was observed that residents who were watching television did not seem to mind being able to hear the music player.

In general, participants enjoyed the music player both when they initially used the device and after using it for a while. Typical comments from residents were:

"Isn't it marvellous".

"It's right handy. My husband might have one... I was amazed. I've not seen anything before".

Music player

"It has a lovely tone... ..you can use it without having to move furniture about".

Usability of devices

Switching on and off using the lid. People were able to use the lid to operate the device. On initial installation several people attempted to operate the device via the push button, often trying to push the button through the lid. However, once described to participants, none had any subsequent problems with using the lid to turn the device on. Using the lid to turn off the device appeared to be less clear for participants. Using the lid did not appear to be intuitive, given that few other devices are turned off in this way. In particular, the lack of a written instruction to turn the device off on the player contributed to this difficulty.

Changing songs. Participants appeared not to have any difficulty with using the button to change songs. In most cases people were happy to let music play through the pre-set playlist pre-configured rather than change songs themselves.

Button design. The button did not operate in an intuitive way. It operated when pressure was removed from the button (when a person let go). Also the button was a touch sensitive pad and the lack of sensory feedback was confusing.

Visual prompter. The visual prompter was a useful feature of the device. The illumination made the message easier to read for people with poor eyesight. The illumination of the screen also drew people's attention to the device to encourage them to switch on the music.

Size of device. Size did not appear to be a major issue with the device. At its current size it was large enough to see and use clearly, but not so large that it dominated a room.

Power. Battery life itself was not an issue, as the player was run directly from the main power supply.

Music installation. Music was installed by the researchers prior to installation of the device within the home. The process of installing music would present problems to someone with limited skills. Choice of music required considerable skill and effort on the part of the researcher to determine the person's musical preferences.

Volume control. Visible controls were restricted to the lid and button. A volume control was hidden from view underneath one of the speaker covers. While this avoided people accidentally changing or playing with the volume control, it also prevented appropriate volume changes.

Impact

Many of the residents visibly enjoyed having music on and were observed singing along, tapping the furniture and tapping their feet. The observed use of the device, the feedback from participants and care-workers indicated a positive reaction. A key part of both initial use, and continued use of these devices was of installing music selected by the individual. Playing such music ensured that the device played personally meaningful music, making it more likely for an individual to use the player in the future.

In two cases care workers noted that the participant was regularly listening to music via the player, and that appeared to be a change from their normal experience of life prior to the trial. In these cases listening to their own music had previously reduced to a complete stop. However, as a result of installing the player, these two participants had regained an interest and desire to listen to the music. The introduction of music into the daily life of a person with dementia, was received positively by all participants to varying degrees. The device also acted as a prompt for social interaction and was seen as 'sparking off' interactions between residents and visitors in the home.

Interaction

The person's degree of impairment (emotionally, cognitively, functionally) impacted on

how much a person used the device. Two people were only able to touch the device if a carer moved their hand onto the device for them. One of these people showed a striking positive response to the intervention.

However, one of the key aims behind developing the music player was to encourage and facilitate people to use a device themselves to listen to music at times they preferred, as opposed to music being played as background 'noise' or as part of group sessions or music therapy.

The field trial also provided evidence of residents using the device unaided. For example, a resident was observed to open the lid at 10:40H and it played uninterrupted right up until dinner time (noon). During that time one resident was observed singing along to at least six songs while also watching television or looking out the window.

Residents were happy to listen to the music but were often unwilling to use the device themselves. When prompted they changed songs or closed and reopened the lid. Residents appeared to be discouraged from using the device themselves if a care worker was seen touching it. It was then recommended that care workers should avoid touching the device, but give verbal encouragement for residents to use it. Care workers were also asked to close the lid when the room was empty (during meal times), giving residents the opportunity at least three times a day to turn it on themselves.

It is also important to understand the way the residents perceive their own situations in relation to using the device. Many of the participants felt that they were 'just visiting' rather than permanently living in the residential home. Typically, their behaviour towards anything in the home (such as entertainment equipment, television, radio, windows, doors, furniture, ornaments, items on tables, etc.) was to leave it alone:

"We don't interfere with that. I know my place".

"They (the other residents or visitors) don't come in and change the station. It's not theirs to touch. Shouldn't be allowed to touch it...broke it wouldn't they?"

"They touch it but I don't. I don't think its right to put people's things on".

There were exceptions to this. One resident had taken ownership of the device and considered it to be her personal possession. If others were listening to it and showing interest she either picked up the device and put it in her lap or reached over and closed the lid.

For two participants with higher cognitive abilities, the device appeared to be too simple and too easy to use. They were aware that for others in the room it was a challenge and this awareness seemed to detract from their desire to use the music player. With both participants, after encouragement, they did play it and derived enjoyment from it, but initially they resisted associating themselves with something so simple: *"We've had this at home for years".*

DISCUSSION

It should be highlighted that the field trials were carried out with participants living in institutional settings rather than in their own homes. The social dynamics and barriers in these two settings are different and are likely to have significant implications for using devices. The very nature of living in a communal environment is likely to constrain how a person behaves⁸. Future evaluation should include testing in more homelike environments.

As Tom Kitwood⁹ suggested, while the problems associated with dementia should not be underestimated, to characterize the experience of dementia in a wholly negative way is too simplistic. Our qualitative research suggested that even when a person is severely cognitively impaired, s/he is still able to respond to and enjoy music, even gain some 'self esteem'¹⁰ by being able to 'independently' choose his/her musical environment. The research results also indicated

that people with dementia can be involved in the process of developing prototypes. Although this requires considerable effort and expertise, the benefit is that issues of usability, acceptability and appropriateness can be quickly addressed and problems rectified.

Interestingly, rather than usability issues, the most important factors influencing device

use were the complex social processes that occur within communal settings. Use or non-use was not a direct result of cognitive decline itself, but a result of how cognitive decline impacted on the person's ability to understand and perceive the nature of their surroundings and their own place within a social world.

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