



An interactive tool to promote musical creativity in people with dementia

Philippa Riley*, Norman Alm, Alan Newell

School of Computing, University of Dundee, Perth Road, Dundee, DD1 4HN Scotland, UK

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ABSTRACT

Dementia is a growing problem that affects the lives of those diagnosed and caregivers, with symptoms having an effect on memory, communication, the ability to learn new skills and problems with behaviour, such as aggression, agitation and depression. Participation in activities can improve quality of life for people with dementia, reducing behavioural problems and aiding relaxation. Research has established that people with dementia can be both artistically and musically creative, and have an appreciation of music even in the latter stages of the disease. The symptoms of the disease, however, mean that supporting music making activities with this group of people is challenging. This paper describes a prototype system designed to enable people with dementia to create music, using a touch screen interface to control a system which utilises chords to create pleasant-sounding music regardless of any prior musical knowledge. Results of usability studies suggest the system is easy to use, and that pleasant-sounding music can be created with it. Participants, including people with dementia, appeared actively engaged during use of the system, many reporting they enjoyed the experience. Future testing will establish the degree to which people with dementia could be musically creative using such a system.

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1. Introduction

Dementia currently affects over 27.5 million people worldwide (Wimo, Jonsson, & Winblad, 2006), and with the aging population steadily increasing, the number of people with dementia is expected to rise. Ferri et al. (2005) estimate that the number will double every 20 years and will exceed 81 million in the year 2040. Given the problems associated with the condition, such an increase in the number of people with dementia is likely to have far-reaching consequences on families and available community resources. Dementia, a condition that more commonly affects older people, encompasses a range of brain disorders that progressively damage extensive areas of the brain, eventually leading to cerebral failure. The main symptoms of dementia are memory impairment, a decline in cognitive function, and problems with executive functioning (affecting the ability to use imagination, organise and forward plan). Normal everyday functioning is affected because of this damage, and an individual's condition will deteriorate over time (LoGiudice, 2002).

Although finding a cure for such a debilitating condition is important, researchers also recognise the need to provide a better quality of care for people with dementia with facilities that enhance day-to-day living. There are various ways in which the safety and care of people with dementia can be improved, for instance by training and educating caregivers (Jacques & Jackson,

2000; Kitwood, 2005) and using assistive technology (Astell, 2005). Another successful strategy is to provide meaningful activities that people with dementia can participate in on a daily basis. These activities should reflect both what individuals would like to do and what they are able to do. Volicer and Bloom-Charette (1999, p. 8) believe the provision of meaningful activities for people with dementia 'is the most important factor, but the hardest to achieve'. Their investigations, involving people with dementia who also had a diagnosis of depression, found a 90% improvement in mood when participants were involved in meaningful activities.

Although there are benefits associated with participation in activities, the symptoms of the condition make it difficult to devise activities that are accessible. This is caused by the person's problems with short-term memory, communication difficulties, decreased concentration levels and their inability to learn new skills. Research is therefore being carried out to develop novel and interesting activities for this group that are nevertheless failure-free – that is, activities for which there is always a successful outcome. If effectively implemented, such activities could enhance the lives of people with dementia and improve their social interaction and day-to-day living (Alm et al., 2005). Research has established that people with dementia have the capacity to continue to participate in a variety of activities and tasks. It has been suggested that they can retain existing and develop new creative skills, both artistically and musically, despite the dementia (Miller, Boone, Cummings, Read, & Mishkin, 2000; Miller, Yener, & Akdal, 2005).

It has been thought for some time that music can be experienced and enjoyed by people with dementia, and recent research

* Corresponding author. Tel.: +44 (0)1382 386537; fax: +44 (0)1382 385509.
E-mail address: philippariley@computing.dundee.ac.uk (P. Riley).

suggests this is evident even in the latter stages of the condition (Clair, Mathews, & Kosloski, 2005; Cuddy & Duffin, 2004). However, without a specialist music therapist present, musical activities provided by caregivers tend to be passive, i.e. listening to music or to others singing. Where music therapists provide active music making sessions, they often opt for simple percussion instruments for basic rhythm making (Vink, 2002). This is because the use of traditional musical instruments for this group would be impractical, not only because the symptoms of the condition would make it difficult to learn to play such an instrument, but also because playing musical instruments successfully usually requires prior training. Thus, although there are recognised benefits associated with the provision of musical activities, caregivers lack the resources and possibly the skill to support active music making sessions. There is thus a need to develop a novel instrument that could make creative music making accessible to people with dementia.

This research explored the development of a system that could enable people with dementia to be creative through active music making, whether they had pre-existing skills or not. The system was designed to be easy for caregivers to support, providing an engaging and enjoyable activity for those participating, with the added potential to increase social interactions if used in pairs or groups. It was hoped that the quality of life for people with dementia and caregivers could be improved through this creative musical activity.

2. Literature review

2.1. Dementia

Dementia is caused by widespread disorders of the brain. There are over seventy conditions that cause dementia, with each one having a 'particular pattern of cognitive change that may be accompanied by physical signs' (LoGiudice, 2002). Alzheimer's Disease (AD) is the most prevalent of these causes, accounting for 60% of cases, with Lewy body variant (of Alzheimer's Disease) accounting for 20% of cases, frontotemporal dementia (FTD) (including Pick's) 5%, vascular dementia (VaD) 5% and the remaining causes 5% (Terry, 2006).

Dementia is progressive and leads to multiple dysfunctions in the brain causing problems with memory, communication and judgement (Jacques & Jackson, 2000). Various characteristics have been found to exist in all types of dementia (Aldridge, 2005; LoGiudice, 2002), including short and long-term memory impairment; multiple cognitive dysfunctions, including memory impairment, language disorders and problems with abstract thinking and judgement (aphasia), an inability to comprehend what is said, felt and heard (agnosia), difficulty finding names of words (anomia) and problems carrying out motor activities (apraxia); and frontal executive dysfunction, affecting the ability to plan, to use one's imagination (abstraction) and the capacity to organise.

Memory loss is often seen to be the essence of the condition (Huub, 2005), this generalisation possibly arising because the majority of people with dementia suffer from AD where memory loss is a prominent feature. For those with AD, short-term memory loss (working memory) becomes more severely affected as the dementia progresses to the extent where it is virtually lost (Alm et al., 2007). However, people suffering from FTD and VaD are much less likely to have problems with memory impairment. In FTD, memory is preserved to some extent (Mendez et al., 2006), and in VaD, memory impairment may be mild, or not present at all (Roman, 2003). In contrast to Huub (op cit), Roman (2003) believes frontal executive dysfunction and cognitive decline are the core symptoms of dementia, and not memory impairment.

The complexity of dementia, the way it affects individuals differently, and the potential to suffer from multiple causes of dementia at the same time, adds to the difficulty in fully understanding the condition. Although some patterns are certain, such as the various stages of deterioration those with AD will progress through, it is still impossible to predict effects precisely, i.e. determining how quickly individuals will progress from one stage to another. In the past, the final stages of dementia were thought to leave individuals without any mental powers, incapable of understanding, communicating or being able to reason, needing everything done for them (Jacques & Jackson, 2000). However, it is now thought that people in the latter stages may still retain some mental abilities, such as the capacity to recognise emotion in facial expressions (Luzzi, Piccirilli, & Provinciali, 2007), forward plan and set goals (Sabat, 2001) and to appreciate music (Sixsmith & Gibson, 2007). Dementia is currently one of the top five causes of death in the Western world (Huub, 2005), it being thought that as the functions of the brain continue to deteriorate, its inability to adjust to changes in the environment mean life can no longer be supported.

2.2. Dementia care

Dementia has a huge impact on the person with the condition, as well as those in the family unit and other caregivers (LoGiudice, 2002). People with dementia may need continual care, depending on the severity of their condition and this can make it extremely difficult for carers to cope, whether family or professional. The treatment of people with dementia has been, and in some cases is still less than ideal (BBC, 2007), and this is partly due to people not recognising or appreciating the remaining capabilities of individuals with the condition (Sabat, 2001). Individuals are currently provided with a variety of medications and care methods, including:

Medical; drugs continue to be developed to manage the symptoms of dementia.

Person-centred care; in the past, poor results received in tests measuring cognitive function meant people in the latter stages of dementia were considered to be in a vegetative state with no awareness. However, Sabat's (2001) research suggested people with dementia were able to retain the capacity to do and feel things that such cognitive tests were not designed to measure. Sabat found that people with dementia retained the ability to experience shame, embarrassment and pride; feel concern for others; maintain dignity; display and experience self-hood and find novel forms of communication to compensate for an inability to communicate verbally.

Residential care homes and day centres; as well as housing people with dementia and providing 24-h care, respite is also provided for people with dementia still living at home, allowing family members to have a break from care duties.

Provision of activities; shown to have a positive effect on people with dementia, increasing relaxation, enjoyment, empowering the person with dementia and ultimately improving quality of life.

Technology – assistive and leisure; assistive technologies are used to help people with dementia retain some independence, or to help others to care for people with dementia, in that systems can be developed as useful reminders as well as to alert carers when a person is out of bed, or in a position of danger (e.g. near a kettle, or oven) (Astell, 2005). Leisure technologies aim to improve the day-to-day living of people with dementia by providing access to activities that might otherwise be unavailable or too difficult to do (Alm et al., 2007).

2.3. Activities for people with dementia

There are various challenging behavioural symptoms associated with dementia, for example apathy, agitation, aggression and

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