

Lighting and Sound Installation for Elderly with Dementia

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Abstract — In this paper we present an interactive lighting and sound art installation designed for the elderly with dementia living in an confined area in an elderly care center. Inspired by lighting and music therapies for dementia, as well as the social and cultural activities of healthy elderly, the installation creates sensory stimulation and natural atmosphere, aiming at bringing joy and happiness to dementia elderly in a dull public space.

Keywords — lighting, sound, music, interactive installation, elderly care, dementia

I. INTRODUCTION

Nowadays, the number of elderly with dementia is increasing and the pressure put on caregiving is demanding. Research has indicated that the Behavioral and Psychological Symptoms of Dementia (BPSD) are associated with the increased burden of care, which has increased rates of institutionalization of patients [1]. The dementia elderly who live in the care centers have limited access to other people and outside environments. A large part of the life of the dementia elderly is confined to themselves. Emotional and mental wellbeing are not fully taken care in such settings. Although dementia elders suffer from some cognitive liabilities, they are eager about happiness and well-being, for which activities in care centers need to be carefully designed and organized.

One of the local care centers of de Vitalis WoonZorg Groep in Eindhoven, expressed their interests in designing a meaningful activity in a corridor through which the dementia elderly stroll from their bedrooms to the common room and cafe. Most of the elderly there are in second to fourth period of disease in their late eighties. The corridor connects bedrooms and common room in which the elders spend most of their time. The corridor is relatively dark for dementia people where no natural light sheds in and the lighting system keep static and constant. The space is perceived to be dull and boring.

The project started with looking into the concept of meaningful activities for dementia and its connection to the feeling of happiness. A meaningful activity for the dementia elderly should allow them to experience a sense of wellbeing, a sense of belonging and sustained identity, a sense of continuity of their lifestyle, and their very sense of self [2, 3]. Meaningful activities may lead to hedonic and eudaimonic happiness depending on whether the activity contributes to a pleasurable life or a meaningful life [4].

The project continued with getting inspiration from the lighting and music therapeutic methods for dementia as well as social and cultural activities of healthy elder, in order to design such a meaningful activity for the dementia elderly at Vitalis.

II. MEANINGFUL ACTIVITIES FOR DEMENTIA

Lighting has been used in many therapies for dementia. In general it is found that daily exposure to bright light is an effective anti-depressive [5]. A prolonged exposure to daytime lighting improves the stability of the rest-activity rhythm in the elderly with dementia [6]. Different colored lights might have different effects, for example, blue lights help to let body to produce the feel-good hormone that would contribute to a sense of wellbeing [7].

The elderly with dementia may still be touched by music, spontaneously be able to sing along with lyrics thought to be forgotten, or even remember how to play an instrument. Music stimuli may have positive effects on mood and cognitive functioning, including reduced anxieties, increased verbal fluency and spatial reasoning [8].

Reminiscence therapy goes beyond one sense, providing stimulation through multiple sensory channels, such as sound, movement, smell, flavor, changes in light and color etc. Doing so could induce vivid and strong reminiscences [9].

On the website of Open Knowledge there are many examples of people applying similar strategies in their social and cultural activities in protecting themselves from dementia [10]. Playing piano requires fine motor skills that improve the circulation to the brain, and the “brain work” reduces the risk of dementia (Fig. 1(a)). Music activities would decrease loss of hearing that can favor the development of dementia, and study shows that daily music-based dance sessions helps patients with dementia significantly (Fig. 1(b)). A more active lifestyle with physical activity or exercise helps to prevent a whole number of diseases, including dementia. Physical exercise may increase temporary arousal, stimulating cognitive capability (Fig. 1(c)).



Fig. 1. Social and cultural activities to protect from dementia [10]

III. CONCEPT AND PROTOTYPE

Inspired by the above mentioned methods, the design concept is to bring in light and sound in an installation to help the elderly to get rid of dull and passive feelings of the confined corridor area at Vitalis. By interacting with the

installation, the dementia elderly perceive the stimuli that resemble their memories of natural lighting and the sound of water drops with calm background sound of a brook, the experience of which is rare in the care center. Sound memory as proved in research, has a strong effect on mood and cognitive functioning until the very late stage of dementia. Lighting effects give solid feeling of the elapse of time and the feeling of liveliness. In a dim corridor where the dementia would spend hours every day to walk through, more exposure to light has been proved to be effective in preventing depression and improving rest-activity rhythm. The design implements the following scenario:

Rob is an elderly with dementia at Vitalis. One of the walls of the dull corridor is now decorated with a row of lights covered in curved fabrics (Fig. 2). At daytime, glowing blue lights gives a refreshing feeling for Rob and the others passing by (Fig. 2(a)). During night, the light is soothing yellow. The sound of a brook starts whispering gently, which reminds Rob of the fresh air and possibly an exciting outdoor travel experience in the childhood (Fig. 2(b)). Rob hears a chain of water drop sounds coming with the lights one by one. He is fascinated and finds it interesting. He is curious about the lighting and sound effects, and wonders he might be able to interact with it (Fig. 2(c)). When Rob comes close, the first light glows brighter. It glows in response to Rob's position (Fig. 2(d)). Rob touches the light and the touch seems to be sensed. It lights up with solid color with the sound of a water drop. As he walks faster and closer, the sound of the whispering brook becomes louder. The memory of refreshing and playful natural environment comes back (Fig. 2(e)). There comes the other elderly person, Marjolijn, walking in the same direction as Rob. The lights start to flow between Rob and Marjolijn, and the brook sounds running faster. Marjolijn walks closer to the lights slowly, and the lights near her become brighter yet glow slower (Fig. 2(f)). When Marjolijn walks towards Rob instead, the lights flow in the manner of joining together. The lighting augments the encounter of people and the sounds change as a response to the movements of the elderly just as what happen outdoors (Fig. 2(g)). We expect the multi-user interaction would also improve the feeling of social connectedness [11].

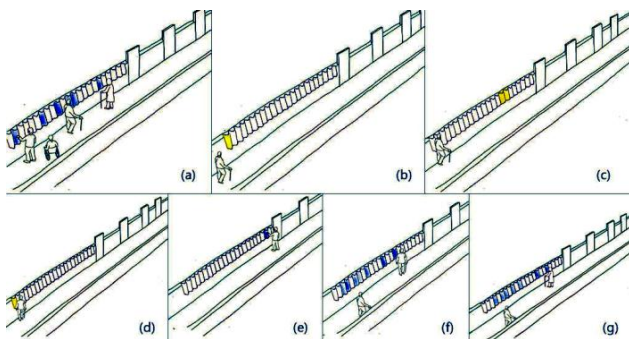


Fig. 2. Scenario

The prototype of concept was implemented (Fig. 3) and evaluated with the dementia elderly and the caregiving experts at Vitalis. In general, the prototype did bring come joy and happiness to the dementia elderly as expected. The Elderly

loved to keep trying and interacting with different behaviors of the installation. They loved to see the glowing and flowing light effects and to hear the curious water drop sounds after they had touched the lights. The experts commented it as "pleasant; the elderly love it; they are not bored any more in the corridor; this provides them with minutes of escape."



Fig. 3. Prototype

IV. CONCLUDING REMARKS

The concept of the lighting and sound installation for the elderly with dementia was directly inspired by the therapeutic methods and preventive social and cultural activities. The prototype of the concept was evaluated and it achieved the goal of bringing joy and happiness to the dementia elderly. However the scale of the prototype is much smaller than the designed dimension. A more comprehensive user study with a full scale implementation would make the claim stronger.

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