



design for the happiness

report of design for the dementia

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Summary of the report

Nowadays, due to the increasing number of dementia elders, the pressure put on the caregivers is even demanding. Several reports have indicated that the Behavioral and Psychological Symptoms of Dementia (BPSD) are associated with increased burden of care, carer depression and increased rates of institutionalization of patients.¹

The report is on the discussion of happiness for a specific targeted dementia elders living in an confined area in a care house. In most cases, for those dementia elders who live in the care centers have limited access to other people and outside environments. Activities of all kinds are well conducted in most dementia care centers. However, a large part of the life of the elders is confined to themselves. Emotional and mental wellbeing are not fully considered in such settings. Although dementia elders suffer from some cognitive liabilities, however, as researches indicate, they are eager about happiness and well-being for which activities need to be carefully designed and organized.

The whole design is a process to discover and to approach what the happiness means to the elders and how can they feel it as a whole and as individuals. The design process goes as a design through research method. The ideation is combined with literature researches and expert evaluations. The process of concepts are hypotheses and evaluated in each iteration.

Introduction: the context of the project

client : Vitalis property

Design challenge is to design in a corridor through which the elders stroll from their bedrooms to the common room and cafe.

The corridor is relatively dark for dementia people where no natural light are allowed to shed in and the lighting system keep static and constant. Both sides of the corridor are joint to bedrooms and common room where the elders spend most of their time.

Most of the dementia elders treat the corridor as outdoor space like forest, bank, bus stop station through which they can get access to somewhere else. As I am informed from the client, most of the elders here are elders in second to fourth period of disease in their late eighties.

Iteration Design Process

The reason for iteration design process

The definition of happiness can be vague and is extremely personalized feeling related to personal background and cognitive ability of emotion. Most researches on dementia define practices whether play a positive effect on elders' performance. However, when it comes to design, more investigations into contextual and characteristics of a certain group of people are needed. These investigations include applying certain theories and theoretical findings on this topic and iterate the design process everytime to find a suitable entry. On the other hand, people who suffer from dementia tend to respond passively. Certain needs by observation can be perceived, however, to broaden their availability and lead a healthy attitude about life rather than only facilitate and maintain their way of living is intriguing to me.

A brief description about the process

In the first field research, design challenge and scenario of design is clear. Literature research was conducted afterwards, to get an impression of dementia diseases and their different states. Close attention is paid on positive methods to enhance the quality of dementia elders and distorted way of perception and performance due to the progress of the disease. The first concept in the first iteration has an implication of reminiscence therapy and communication between patients. The second concept is about perceiving the existence of oneself. The concept in the second iteration is a practice of exploring four ingredients of designing meaningful activities for dementia elders 11. The third iteration carried a more solid and specific explanation into engagement by augmenting surrounding responses and making meaningful changes as a response to surroundings. As a whole, these iterations are a progressive reflective process to verify the exploratory hypotheses to invite them to feel the well-being.

How can functional disorder affect one's life and inner self?

Memory

"Huff et al . have observed that patients with Alzheimer's have difficulties in producing names of objects and in distinguishing among objects within a category.He concludes that the anomia deficit is characterized by a loss of information about specific objects and their names rather than by a simple difficulty in retrieving information." [14]

Music&Languages

"the brain uses many different regions to process musical information, it's likely some of these areas take longer to be affected by different forms of dementia. musical perception, musical sensibility, musical emotion and musical memory can survive long after other forms of memory have disappeared." [12]

SAD &Lighting

"Seasonal affective disorder (SAD) is common among patients in the early stages of dementia "[4]
"A common symptom of dementia is dislocation of diurnal rhythms.5
Dementia sufferers who tend to be awake and active at night risk, first, inadequate exposure to daylight and, second, a disruption of the daily sequence of physiological changes, with the resulting symptoms of depression and sleep disorder." [3]

Visual impairment

"Van Rhijn et al.,studying people with dementia noted approximately half had impaired ability in face, object and letter-word perception tasks, while significantly fewer, 30%, were impaired in a spatial dot location task. Patients with Alzheimer's disease are, however, found to be significantly impaired in depth." [3]

Circadian rhythms

"Some people exhibit symptoms of the 'sundowning' syndrome, an increase in agitated behaviour as evening approaches.This tends to occur in the middle years of the disease, rather than in the early and final stages. The symptoms are associated with decreasing daylight, but this is not necessarily causal: they are also associated with decreased daytime activity and increased nocturnal disturbance. In care homes, residents with advancing dementia tend to make remarks such as 'I am just visiting here, I will be going home later'. We noted this in our surveys, and it supports the hypothesis that one cause of the sundowning syndrome is confusion or anger at being confined." [6]

After the first field research, I noticed the dementia elders have a serious loss of global cognitive ability. The way they perceive life differently from healthy people, which could make a difference on perceive happiness as well.



observation

The art becomes more abstract, the images are blurrier and vague, more surrealistic. Sometimes there's use of beautiful, subtle color.

literature research

"There are two main neuronal pathways with different functions in visual processing, one supporting colour perception, pattern recognition and recognition of people and objects, the other associated with spatial perception. Both can be impaired by Alzheimer's disease, but there appears to be agreement that the former ('what') pathway is more affected than the latter ('where') pathway. "[3]

starter questions

Perceive world in a even more different way while react on the very initial identity.

How can functional disorder affect one's life and inner self?

What is happiness or delightfulness for those who suffer from dementia?

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96



98



99



Self Portrait of artist William Utermohlen, an American diagnosed Alzheimer's in 1995

The meaningful activity

“Activity theory has long held that older adults who remain engaged in the world around them experience increased levels of psychological and physical well being as compared to those who are less involved (Havighurst & Albrecht, 1953). This position has been influential in the field of dementia care where the concept of meaningful activity has become ubiquitous. Health care professionals and researchers alike have placed great value on the idea that activity can be beneficial for persons with dementia (Bazan- Salazar, 2005; Dowling, 1995; Nolan, Ryan, Enderby, & Reid, 2002).”[18]

“There is further evidence suggesting that being involved in meaningful activity allows older adults to better difficult circumstances and experience a sense of well being (Lysack & Seipke, 2002; McIntyre & Howie, 2002; Ritchey, Ritchey, & Dietz, 2001), while others have argued that activity provides a sense of belonging and sustained identity (Christiansen, 1999; Hagerty, Williams, Coyne, & Early, 1996; Lysack & Seipke, 2002; Purves & Suto, 2004).

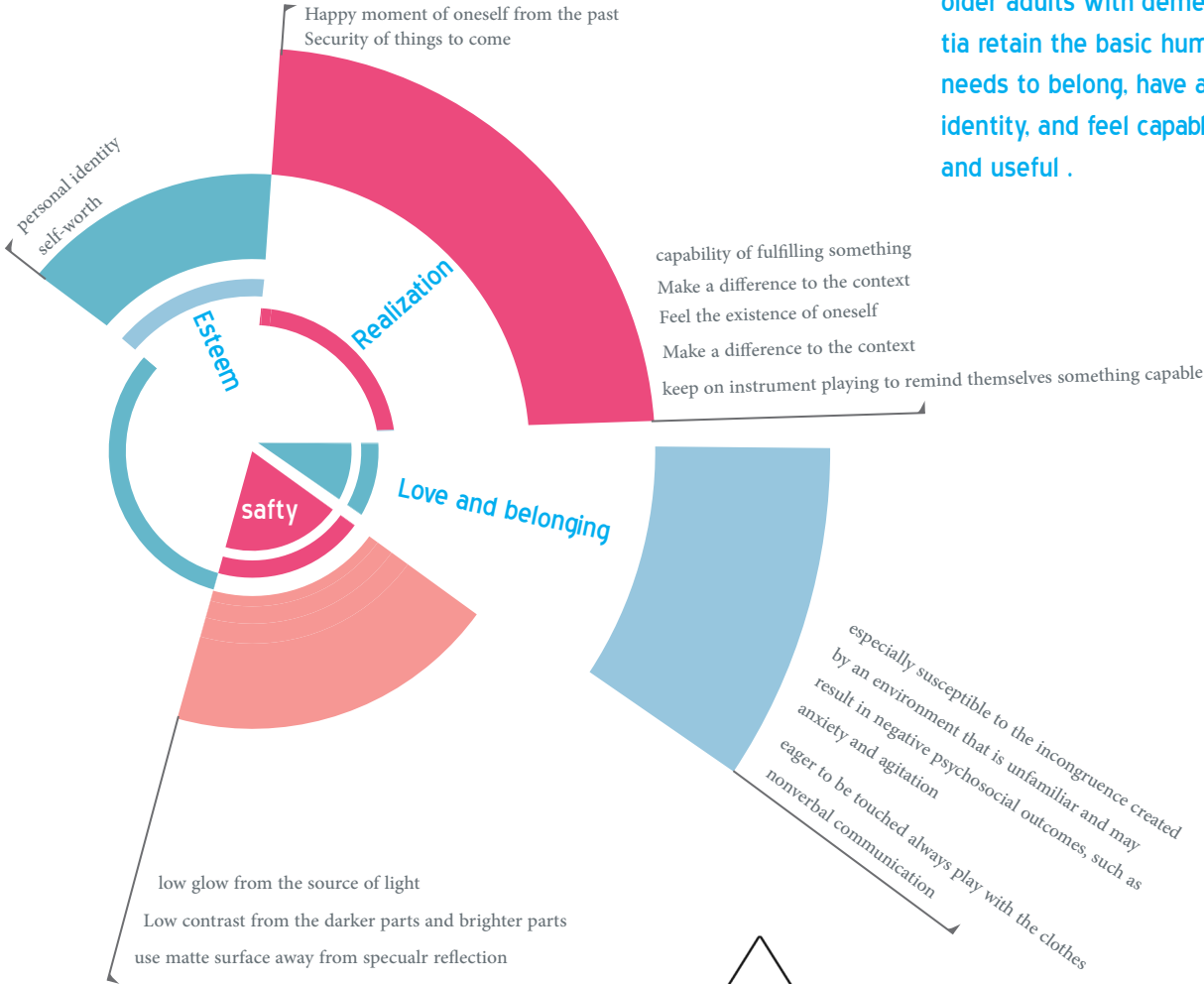
It might appear on the surface that the onset of dementia does not dramatically affect how people perceive the significance of activity in their lives. Overall themes are similar, implying that being involved in activity is meaningful as it has always been. This is supported by research showing that people's activity preferences do not change as they become demented (Kolanowski & Richards, 2002). It may be that activity provides a sense of continuity for people with dementia by allowing them to feel that their lives are fundamentally unchanged as long as they can still do those things that matter most to them. And it is not simply their lifestyle that is unchanged, but their very sense of self. Christiansen has argued that ‘identities are closely tied to what we do’ (1999, p.549). When faced with the cognitive losses that come with dementia, people may seek activity as a way to sustain their sense of self through habitual, taken-for-granted daily routines.”[19]

connection between happiness and meaningful activity

“people will mostly mention activities when they are asked to name sources of happiness. Three main types of activities were reported: savoring pleasurable activities (e.g. reading a book in the sun; enjoying a nice glass of wine), spending time with loved ones (e.g. playing with my son; talking with my friends), and being creative and growing as a person (e.g. making a drawing; leaning something new). These findings correspond with the often-made distinction between hedonic and eudaimonic happiness (see, Ryan & Deci, 2001). Hedonic happiness is related to the pursuit of human appetites (see Fowers et al., 2010), and can be achieved by physical gratifications (enjoying wine, sex, beauty, etcetera) and from the attainment of goals (winning an award, painting a wall, etcetera). E daimonic happiness is related to personal growth and development, and can be achieved by striving for the realization of one's true potential (Waterman, 1993). Whereas hedonic happiness, the ‘pleasurable life’, is associated with being relaxed and away from problems, eudaimonic happiness, the ‘meaningful life’, is associated with being challenged and exerting effort. “[11]

What is happiness or delightfulness for those who suffer from dementia?

In spite of cognitive losses, older adults with dementia retain the basic human needs to belong, have an identity, and feel capable and useful .



The four core elements in the analysis is based on Maslow's hierarchy of needs, which reveals the relationship between all kinds of needs. The physiological needs is not under consideration in this project.

**“ The well-being of a person with dementia
can be substantially improved by increasing
the number of enjoyable activities undertaken.”**

[7]*Lighting for people with dementia*

What is happiness or delightfulness for those who suffer from dementia?

Table 1 Ranking of desirable activities mentioned by people with dementia and their carers in focus groups

Rank	Activity	Rank	Activity
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1	Social participation		
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2	Community participation		
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3	Physical activity		
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4	Creative activities		
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5	Activities of daily living (such as cleaning, cooking)		
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6	Music		
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7	Conversation		
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8	Pottering outside		
---	-------------------	--	--

9	Food and eating		
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10	Enjoyment of nature		
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10	Reminiscence		
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11	Pottering in the home		
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12	Humour		
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13	Mind games (such as jigsaws)		
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14	Reading		
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15	Television		
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88 JM Torrington and PR Tregenza

Lighting Res. Technol., 39,1 (2007) pp. 81-97

Therapies existing to support the well-being of dementia

Lighting Therapy

“When daily exposure to bright light is used clinically as an anti-depressive, typically the patient spends 30 minutes every morning facing a ‘light box’ – fluorescent lamps mounted behind a diffusing screen – which produces 10 klx at the patient’s eyes. A lower level of light, 2.5 klx, may be used with a dosage of 1–2 hours.”[3]
“Van Someren et al. (1997) showed that a prolonged increase in daytime environmental illuminance by ceiling-mounted lighting equipment improved the stability of the rest-activity rhythm in older adults with dementia. Sloane et al. “[9]

Reminiscence Therapy

“For elderly people with cognitive impairment and difficulties in communicating verbally, communicating in a nonverbal way may be of great importance (Coaten, 2001). A patient’s ability to derive pleasure from the use of some or all of the five senses is an important strength. Many activities can involve some sort of sensory stimulation, which helps to engage the person in reminiscence therapy (Spencer & Joyce, 2000). Providing sensory stimulation through sound, movement, smell, flavor, changes in light and color, objects, tactile surfaces and materials can provide vivid and strong reminiscence “[8].

Blue Light Therapy

“In daylight hours, exposure to blue light increases levels of serotonin and suppresses the release of melatonin. Blue light helps to let body to produce the feel-good hormone that among other things contributes to a sense of well-being. After sunset, the body halts the production of serotonin and releases melatonin, the sleep hormone.”[5]

Music Therapy

“A person with AD (Alzheimer’s dementia) may still be strongly moved by music, be able to identify familiar musical pieces, spontaneously sing lyrics thought to be already forgotten, or suddenly recall memories of past events after hearing familiar music. Numerous studies have reported that persons with AD and severe cognitive deficits are able to recognize familiar music and musical emotions. Spontaneously singing along with familiar songs or remembering how to play an instrument (if the patient has a musical background), which may often be preserved in patients with AD. Hearing pleasant and stimulating music may also have positive short-term effects on mood and cognitive functioning in PWDs, including reduced anxiety as well as improving autobiographical recall, verbal fluency, and spatial reasoning “[12].

Recreation Therapy

“Therapeutic recreation is the provision of treatment and recreation services to persons with illnesses or disabling conditions. The primary purposes of treatment services—often referred to as “recreational therapy”—are to restore, remediate, or rehabilitate to improve functioning and independence as well as decrease or eliminate the effects of illness or disability.”[13]
“Activity is a basic human need expressed in leisure and work pursuits. Unfortunately, people with dementia have a low rate of activity participation because of associated physical and cognitive constraints. The boredom and isolation that result from inactivity leads to many of the agitated and passive behaviors exhibited by this population.”[7]

positive self-image cases

The well-being of a person with dementia can be substantially improved by increasing the number of enjoyable activities undertaken.

Positive pursue and engagement can help them establish positive self-image and away from the timeless boredom and sense of loneliness.

To look into the dementia patients' life and to enhance the positive self-image is difficult, because they are passive to accept or reject things we provide to them. To find the possibilities on what healthy elders do to prevent the diseases is more practical since they can choose voluntarily what they like to do.

Reuters,2012,from <http://www.knowledge.allianz.com/demography/health/?1788/healthy-living-protect-against-dementia#popup-gallery>

Keep the brain at work

“Our brains need work. You are more likely to stay mentally active if you like to read, write, do cross-words, play a musical instrument or even if you like to talk a lot. The harder your brain has to work, the more active it stays in old age.

Playing the piano, for example, works wonders for the memory because the fine motor skills you need to play improve the circulation to the brain at the same time. You can achieve the same effect by using two tennis balls that you move across your hands using your fingers. Scientific studies show that “brain work” reduces the risk of dementia.”

lyric recall in patients with dementia was excellent in the music sessions versus remembering a short story or event in history during the cognitive activities.¹⁴



Hungarian-born Pianist Charles Brunner plays the piano to recapture the Guinness World Record for longest keyboard playing. Brunner broke the record of 103 hours and eight seconds.

source:

protect hearing to get inputs



British DJ Ruth Flowers. 69 years old, mixes music at a recording studio in Paris.

source: <http://www.knowledge.allianz.com/demography/health/?1788/healthy-living-protect-against-dementia#popup-gallery>

“There is evidence suggesting that increasing loss of hearing can favor the development of dementia in older people. With this in mind, you should make sure that you protect your ears from unhealthy influences as well.

This study showed that daily music-based dance sessions for three months led to significantly higher scores on the total MMSE score in patients with dementia.”

balance exercising



A woman balances the “Yue Ya Chan” (Crescent Moon Spade), a traditional Chinese pole weapon, on her head as she exercises in a park in Xi’an, Shaanxi province.

“Passive lifestyles that do not involve much physical activity or exercise favor the development of dementia. In fact, staying active for as long as possible helps to prevent a whole number of diseases. Scientists have proven that ample exercise in old age can reduce the risk of a decline in mental performance by around 50 percent.”

This suggestion is consistent with findings of improvement on speeded tasks[15]. As memory and attention deficits are among the first clinical manifestations to develop in Alzheimer’s disease, it is possible that physical exercise stimulation may increase temporary arousal, stimulating cognitive activity.

observation I was not allowed to take pictures in the care house



white is seemed as endless
place for the dementia

Bus



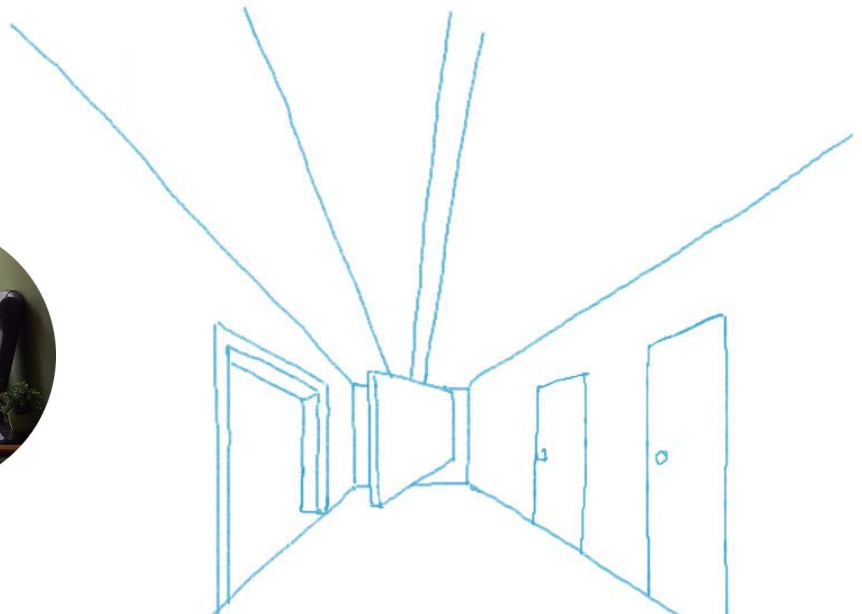
Elders in the care house spend hours every day to pass through the corridor, basically their footprints are limited to bedrooms, common rooms and corridor. They view the corridor as outside world, where they travelled every day to pass through to 'work' 'having dinner' and 'back to home'.



There are some wall printings of trees and fake bus stop in the corridor



real grass and flowers are kept away from being eaten and pulled down



1st iteration

Kaleidoscope: a fantastic world from enlarging the beauty of colorful glass bits



concept 1

Hang on the wall of the corridor, the *Kaleidoshare* encourages elderly to become actively involved in reliving and sharing their past with others in the present either verbally or non-verbally. As a means of psychological support, reminiscence therapy helps generating a feeling of self-worth and the expression of individual identity.





Based on reminiscence therapy, reminders such as personal belongings familiar music are already confirmed to bring the patients who impair with cognition great satisfaction. Reminiscence therapy allows patients to relive events from their pasts. It is a process which focuses on the personal way the patient experiences and remembers events. When elders play with the old disc-like gadget, commonly-interested themes like children, old-fashioned auto, scenery would appear on the wall of the corridor. As most of them have trouble to recognize the character in the picture, such way of common emotional arousal would be preferable to start a short conversation and response among the elders who encounter each other at the corridor.

Next to it, when the elders rotate the disc, they can feel the speed of the rotation and the feeling of control under the fingertips. The Kaleidoscope gives glittering bits and pieces of life, and thus when elders play with the disc, they can feel actually they are making something beautiful and meaningful to their lives.



Evaluation

I doubted how the elders can start to manipulate the *Kaleidoshare* for their sight view is confined to a certain small area like a tube, my client explained that as one elder starts to play with the gadget, the other would mimic what he/she did since they found it interesting.

client (expert 1) (Plas, Ralf van der, dementia, dementia expert, head of a department voor inhabitants with dementia)

valued points

It's good to design kaleidoscope by simple action while the picture will change because sometimes they will forget to turn page on the life book (logical action: I saw the page, then want to go on and turn to the next page).

Also it will trigger interaction between people walking by and generating welcomed topics (own children, own adventure).

When one elder plays with it, others will notice, they will copy from each other's behavior since they found it interesting .(Mimicing behavior)

advice

Maybe make it general, one story with general pictures.one side personal, the other side has general general ones.

user test

I chose some general pictures and let the elders choose the pictures they like. Apparently, they tended to show interest in general topic like children, food, families by touching the screen.

expert2 from GGze

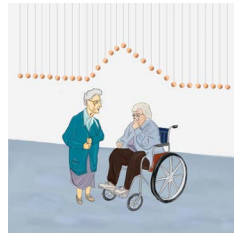
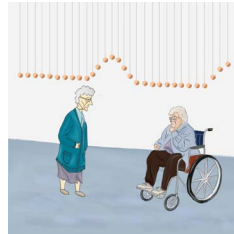
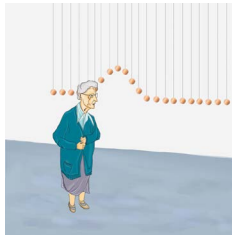
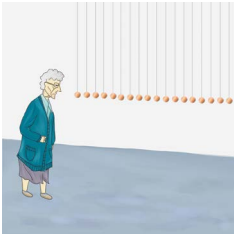
It is not comfortable for the elders to stand in front of the wall for a long time. If provided sitting place, the common room would be more suitable to the scenario.

concept 2

The conversation between the caregiver and each dementia patients are somehow limited, as the disease itself disable elders to observe and response to the surroundings is constricted. There are not much carefully designed activities for the elders to notice the existence of themselves and have delightful feedback .

Most of the time the elders who do not need assistance in the care house walk alone through the corridor which the elders regard as the road or lane and pathway of the forest. However, As shown in the birdview of the corridor, there are just wall paintings to indicate the outside world. In the true nature, there is substantial unique responses from the environments and from the companions for every single person. The sound of stepping on debris, footprints in the mud, and shadow through the person casting on the floor are all direct responses from the nature.

Views of the everyday activity of people are attractive to those who are confined indoors. Partially the reason is outside world is full of responses and consequences, other than the indoor confined settings: a timeless and unchangeable status has nothing to do with what the elders have done themselves. Such status adds weight to the timeless tendency of the disease for the elders. This concept intends to help the elders notice the existence of themselves and have delightful feedback.



the balls would rise a mountain shape according to the position of the elder and the peak reflects the walking manner.

the elders can see the movements of the whole system is in accordance with themselves and due to the different rate and walking manner, everyone has a different pattern, when two persons come together, there will also be a transaction of the wave.

Evaluation (Plas, Ralf van der, dementia, dementia expert, head of a department voor inhabitants with dementia)

client (expert 1)

The link between the realization of movements of balls to themselves or to stimulate the existence of others is hard for them to detect (take long to make connection between cup and what's it used for: first identify the image as a cup, and thinking what it is used for) they focus on one thing at a time. They can recognize things with solid past point of view, if it changes a little, they will not be able to recognize it and then analyze it.

user test

I interviewed 3 dementia elders about this concept. Two of them gave positive feedback and the other commented nothing while kept staring at it. I brought several handful balls and manipulated them behind a curtain. The elders could notice the balls on the movements and show interest in it.

One elder said: "It's like balls for babies." and the other lady would link them to a set of notes by keeping asking "Is it the music ? It's really like it."

It' was hard for elders to relate concept models without distinct connection to what they are familiar to. They were curious actually about the things they were familiar to but organized and worked in different ways.

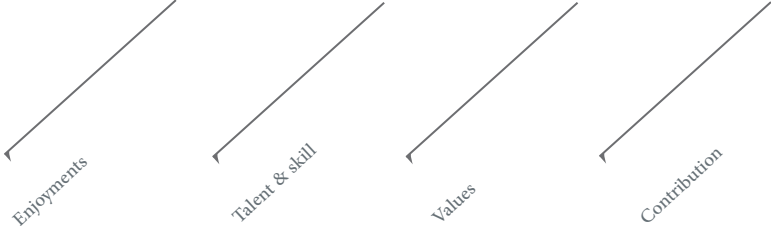
reflection on the 1st iteration

In the first iteration, I tried to apply reminiscence therapy in a playful and enjoyable way to evoke happy memory and conversation starter between elders. the second concept was an experiment to test to what extent elders could perceive the changes. The result was that they could perceive the changes, two-thirds of them would like to discuss and express their own views about it with wide imagination related to their own experience. However, they could not make the connection of the changes to themselves by viewing the graphical changes in positions of the balls. Both of the elders asked the question "what it is used for"? And one of the lady's answered connect eagerly to her ability to achieve her potentials.

These are input to my second iteration, further more research into happiness itself was followed.

"Lyubormiski (2007) has introduced various happiness-increasing strategies that specifically aims to tap in the 40 percent potential by modifying one's behavior. Examples are 'cultivating optimism,' 'nurturing social relationships,' 'taking care of your body,' and 'practicing acts of kindness.' We can conceive products and services that support people in following each of the strategies proposed in positive psychology. One of the proposed strategies that has received substantial empirical support is 'committing to your goals.' This strategy has gained general acceptance within the broad context of research on happiness (Sheldon et al., 2010). In this view, happiness stems from the fulfillment through engaging in meaningful activity and the actualization of one's true potential (Deci & Ryan, 2000). This requires an ability to identify meaningful goals, and to attain them. " [1]

2nd iteration



four ingredients analysis for happiness

As in the 1st round of iteration, playing instruments like piano can leave very deep impression on the elders. In many cases, for these patients who are able to play piano in their heyday, most of them tend to sitting in front of the instrument for hours. Some of them can no longer play decent melodies but would confine themselves alone in the room and enjoy simply making sounds; others can only play broken melodies and play the piece of music again and again.

I talked to the old lady who viewed the changing balls as musical notes, she started to tell her stories of piano playing. She still loved to listen to music and hun part of the rynthem, and she noted her music brought admiration and happiness of her audiance which she picked up at 4 years old. Although she seemed shy to play the piano in front of me,but according to the caregiver, she would play the piano

These researches and investigations showed a constitutional goal of happiness when playing the piano,more generally,music.

Although these elders can no longer play a fluent piece of music, we can fascilitate them by simplyfing playing method to achieve their personal goals.



making sounds
others will have the
empathy



value the sense
of freedom and
achievement



talent for playing some
broken pieces on piano
and hunning the tones



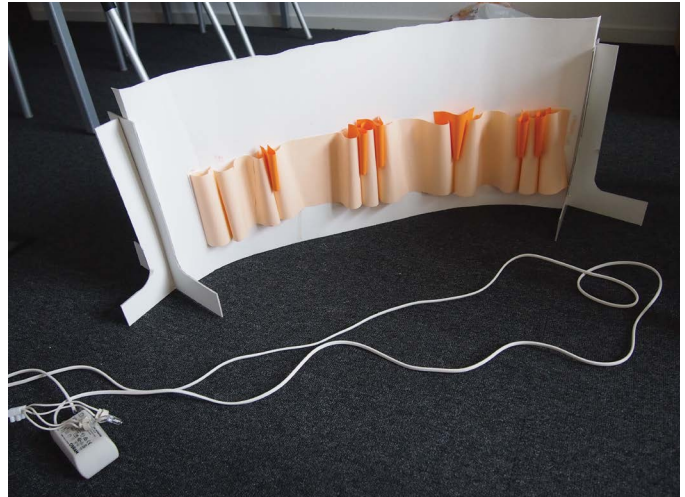
talk to others about her
stories related to music and
singing

movie prototype

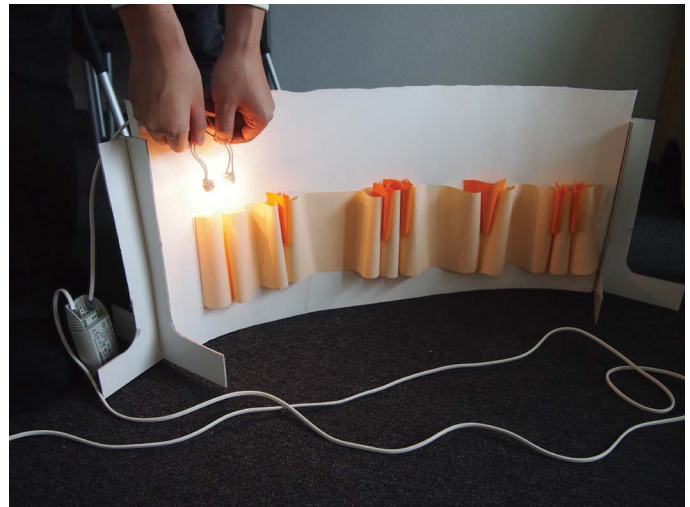
Playing instruments will give them great satisfaction to have the pleasure to make sounds.

Thus I came up with the concept of piano lighting, everytime one elder pass through the lighting, there follows a background music and the keyboard-like design would invited them to touch it and make note sounds.

When more than one person walk through the corriddor, the keys between them play a melody to augment the sense of the surrounding of the environment. Such elegant coonection between people are expected to bring conversations between them.



stage prop for a movie prototype



stage prop for a movie prototype

Movie prototype: http://youtu.be/aPzypvbcN_g

Evaluation

expert2 (Erik Kuijpers,expert of dementia, GGzE)

Music and piano are a broad entry for the elders, most of them fancy making beautiful sounds. The manner to play through the corridor is suitable for the function of circulation in the corridor. It offers more fun for the elders to walk through.

feedback received

Random sounds according to something relates to people involved other than pre-loaded notes would be preferable and interesting in the designers' eyes.

Piano and other kinds of instruments may not be attractive to every elder especially who have no such experience in that. Also, choosing music in the corridor which is such a common place where everyone can be the subject is difficult because the choice is adherence to the personal taste and interest. If there is no strong connection between the musical instruments and one elder, then the design would seem almost brand new. The elders would be indifferent to it.

reflection on the 2nd iteration

Embodiments such as piano is a broad enough for dementia elders because everyone is familiar with how it is played. However, it is not enough to arouse the eagerness of emotional attachment. For some elders, it can arouse the positive emotion about the past, however, for others it functions no more than a equipment.

Behind the embodiment, it is appreciated that the idea that make something beautiful or positive influence on surroundings as part of the aim of activity in the concept. The dementia are fond of feeling capable of themselves. And the directional implication of the design conform to the circulation function of the corridor.

When looked back into the design environment again, the dim and confined atmosphere is what we can first perceive. There are fake bus stop and wall paintings to create an outside feeling and to bring in fresh atmosphere. However, some essences of delicate diurnal changes and circadian rhythms are missed. The setting doesn't benefit the wellbeing of the dementia. This would not only arise problems such as SAD symptom or 'sundowning' syndrome but also lead to low stimulation from the environment, low engagement in thinking, and little source for enjoyment.

brief overview of the inputs

Based on the previous literature researches and 2 literation, My main focus is to bring something that offer responses from the surroundings and companions to the elders to let them set free when walking in a confined corridor which they view it as an outside world. These responses which perform partially to their input are more like an activity for them to engage in. The intention is to provide a stage to evoke the liveliness with attention, thinking and responses.

The virtual interface for the interaction should be an entry interested and familier to the general.

research about the circulation area

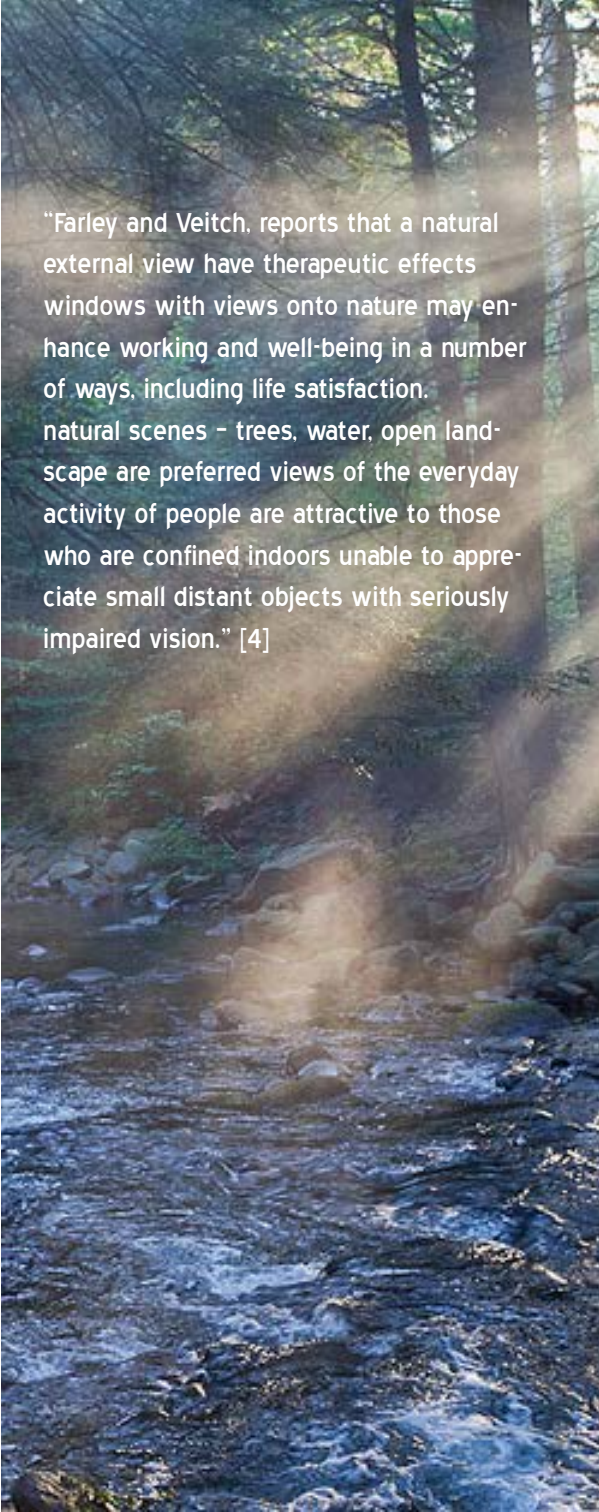
Acording to the research about the circulation spaces in the care house, it is preferable to bring views and natural light into the building; and they can incorporate secondary spaces and points of interest that enhance social interactions and provide places for individual activities. "The provision of such areas - seats by a window, alcoves with good lighting, comfortable chairs overlooking a public space - is strongly welcomed by residents; in our surveys, we noted that where these are provided in residential homes they are widely used." [4]

"The habit of continuously walking about, a symptom of many dementia sufferers, is distressing when the person becomes disorientated or is mistaken in recognising a location. This occurs especially in buildings with symmetrical plan forms and where floor layouts are identical between stories¹⁶. We suggest that lighting could significantly assist wayfinding in two ways."

source: dementiasymptoms http://www.psychiatry24x7.com/bgdisplay.jhtml?itemName=dementia_symptoms

Final Concept

Design Concept

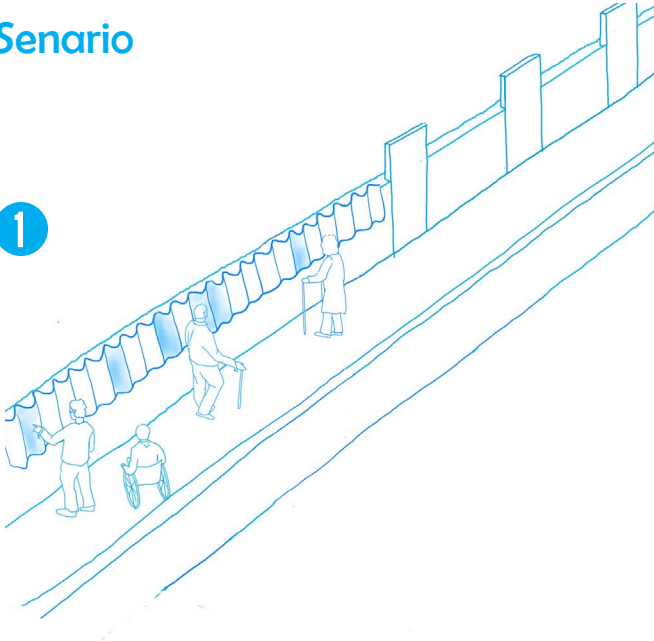
A photograph of a forest stream with sunlight filtering through the trees. The water is clear and flows over rocks, creating small white rapids. The surrounding forest is dense with green foliage and tall trees. Sunlight beams through the canopy, creating a warm, golden glow in the water and on the rocks.

"Farley and Veitch, reports that a natural external view have therapeutic effects windows with views onto nature may enhance working and well-being in a number of ways, including life satisfaction. natural scenes - trees, water, open landscape are preferred views of the everyday activity of people are attractive to those who are confined indoors unable to appreciate small distant objects with seriously impaired vision." [4]

The design concept is to augment the actual responses of the outside world to help the elders get rid of dull and passive timeless feelings of the confined circulation area. In the interaction, the dementia perceive the response from nature also can be active to play their part to make fancy light and water drop sound, the experience of which is rare in the care home although delights the dementia to make something beautiful with their effort. The natural feeling of water drop and ware whispering is familiar to everyone only if in their youth have wandered in the wild. Sound memory as proved in the previous literature research, have a stick memory of recognition until the very late stage of dementia. Light is most significant solid support for the elapse of time and liveliness of living. In a dim corridor where the dementia would spend hours every day to walk through, more exposure to light has been proved to prevent depression and irregularation.

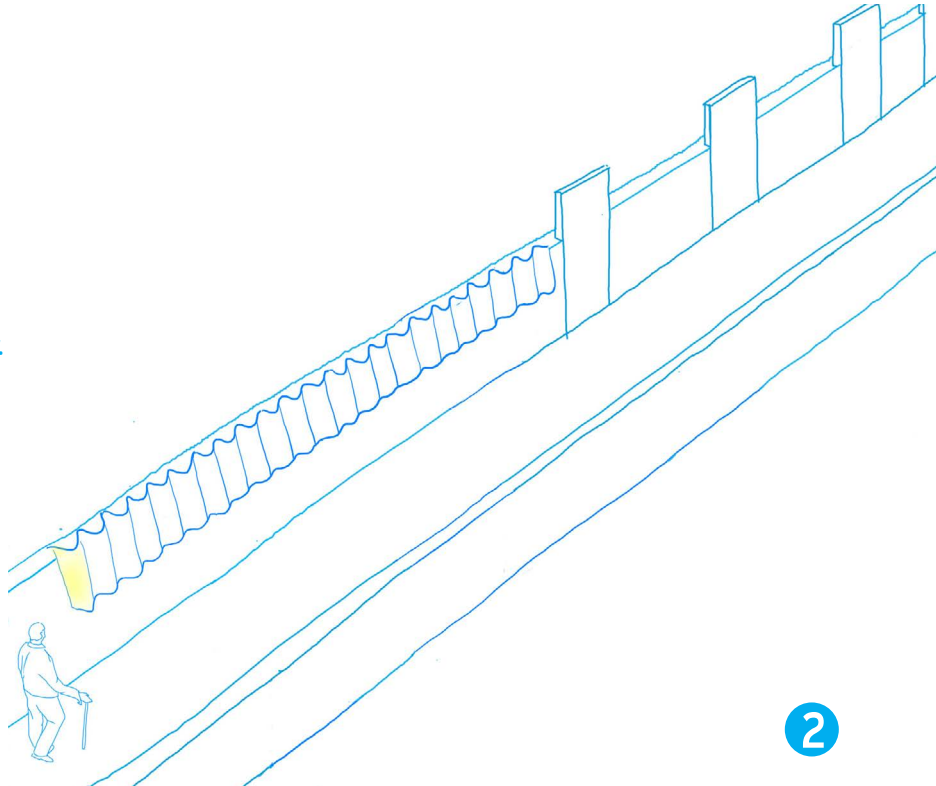
Senario

1



At daytime, there will be blue light glowing from perceptive lighting, giving a refreshing feeling for the people passing through.

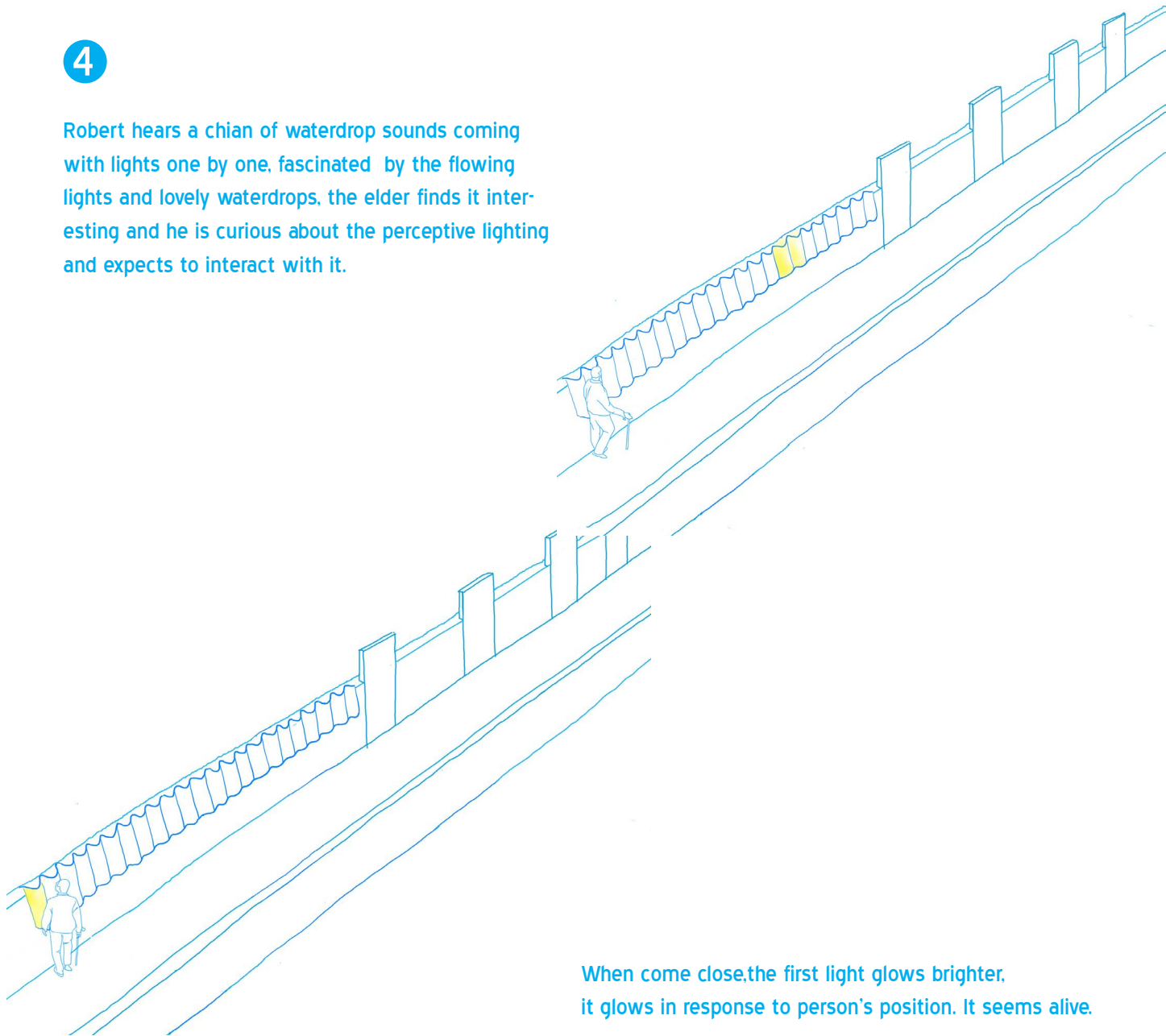
while at night, the light is sothing yellow.
The sound of brook starts gently, which reminds the man about the fresh air and an exciting travel experience in the childhood.



2

4

Robert hears a chain of waterdrop sounds coming with lights one by one, fascinated by the flowing lights and lovely waterdrops, the elder finds it interesting and he is curious about the perceptive lighting and expects to interact with it.

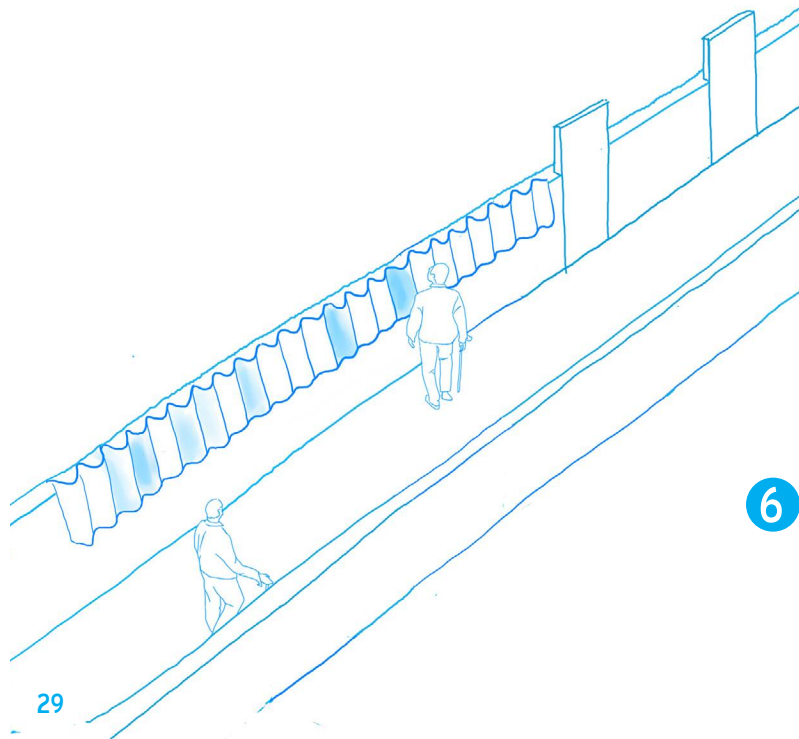
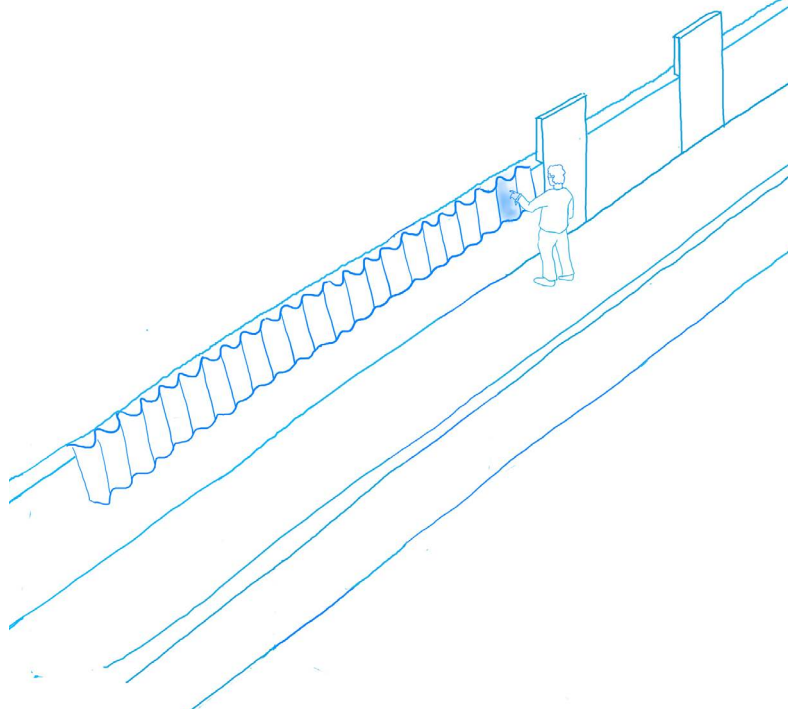


When come close, the first light glows brighter, it glows in response to person's position. It seems alive.

3

5

He touches the light and it senses the touch. It lights up with the waterdrop sound. As he walks faster and closer, the sound of not as gentle as whispering brook any more. The familiar memory of refreshing and playful of the wilds comes back.

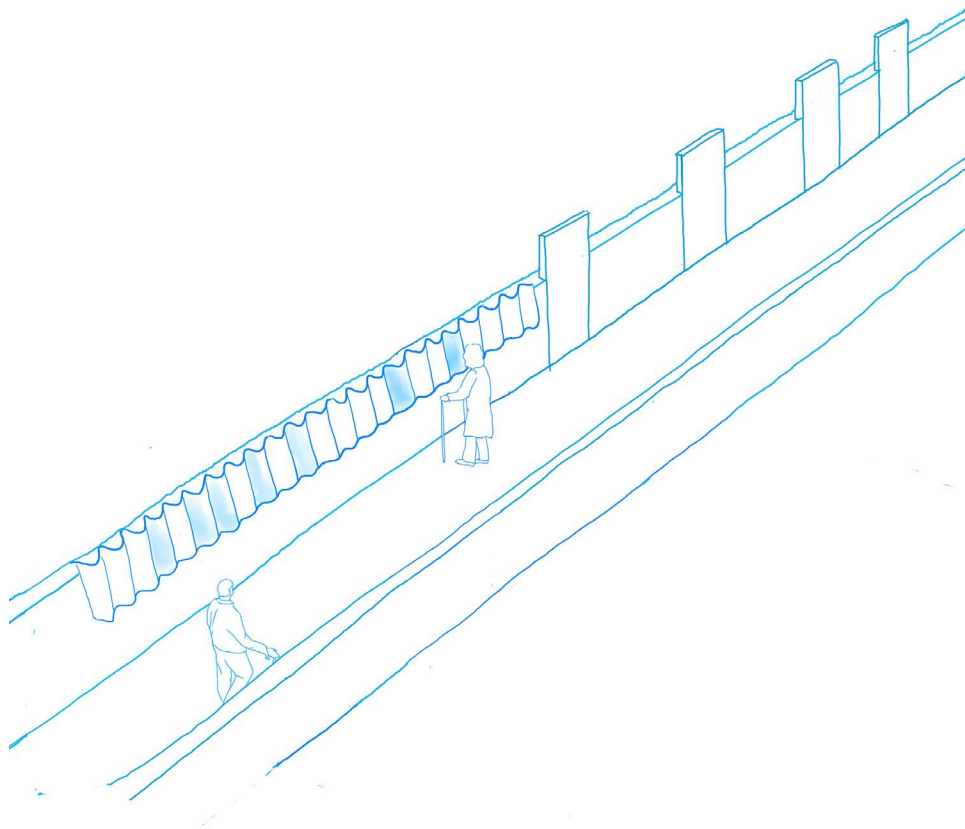


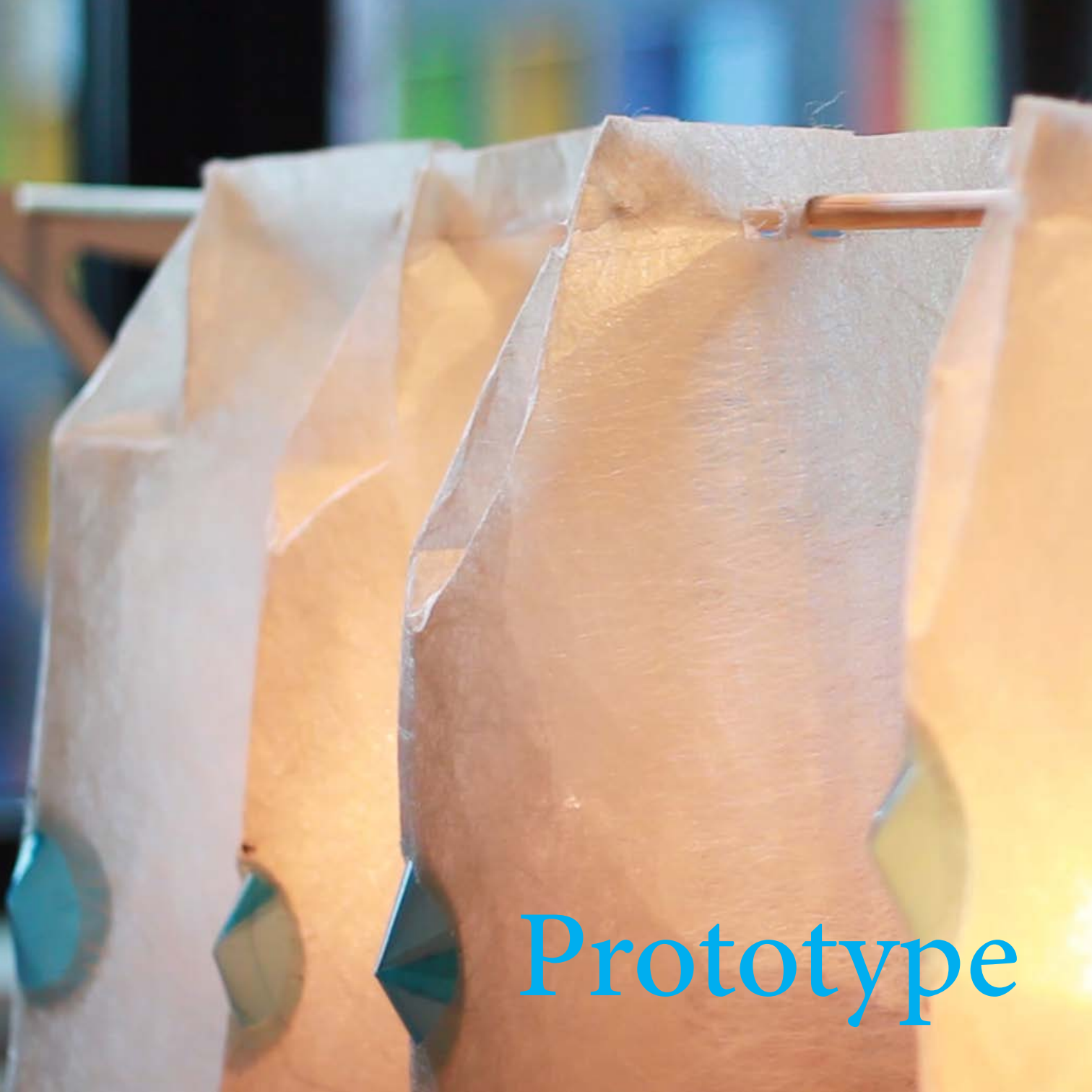
6

There comes the other elder walking in the same direction as Robert. The lights starts to flow between the two person and the brook sounds running faster. The elder in front of Robert walks closer to the lights slowly, and the lights near him become brighter yet glows more slowly.

7

As one lady walks towards Robert, the lights flow in the manner to joint them together. Perceptive lighting augments the encounter of people and the sounds change as a response to the elders' movement just as what happen outdoors.





Prototype

The prototype includes the part of interaction with people in the distance, the touch part and interaction between 2 persons. I chose infrared distance sensors and capsensors to detect the rough position of people.

Reasons to choose these parts

The reason of choosing these parts to prototype is to test whether the elders are comfortable to hold hand to certain height to interact with perceptive lighting. This is the main part of direct responses the elders get from the surroundings (design model) by making something beautiful by themselves, which involves a car- giver-free activity not common in the care houses nowadays.

Interaction between 2 persons : if 2 persons stands in a distance the light between them will glow. This means to see whether the elders will notice the augmented changes brought about from themselves. These changes are noticeable by normal healthy people yet not seen in the dementias' eyes. Although this might be easier for them to perceive in a more delicate interactive manner with speed and direction, it is interesting to find whether they can sense it in direction by themselves.



one person



background sound water whispering



avoid noise



touchlight drop sounds



waving light of waterdrops



avoid noise

walking towards the firstlight



brighter as closer

decode binary codes

01xxxxxx
10xxxxxx
11xxxxxx

All the dots are separate functions. The first infrared sensor is separated in the programming. It only sends data to the function walking towards the firstlight and in front of first light. I learnt to wait for several value and analyse them as a group to avoid noise.

two persons



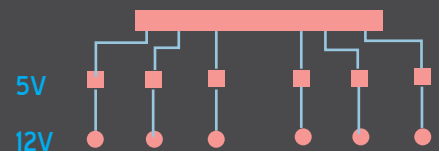
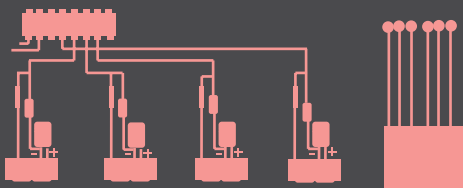
flashing lights with roaming water

in front of first light

Data of capsensors are collected each time there is a change in the state, while the states of distances(more than 40cm output 0, less than 40 output 1) are transferred with every reading. Sounds and music is preset in the prototype, while in concept, it generates voluntarily in a general waterflowing manner but changes with the rate, distance of people and groups of people walked by.

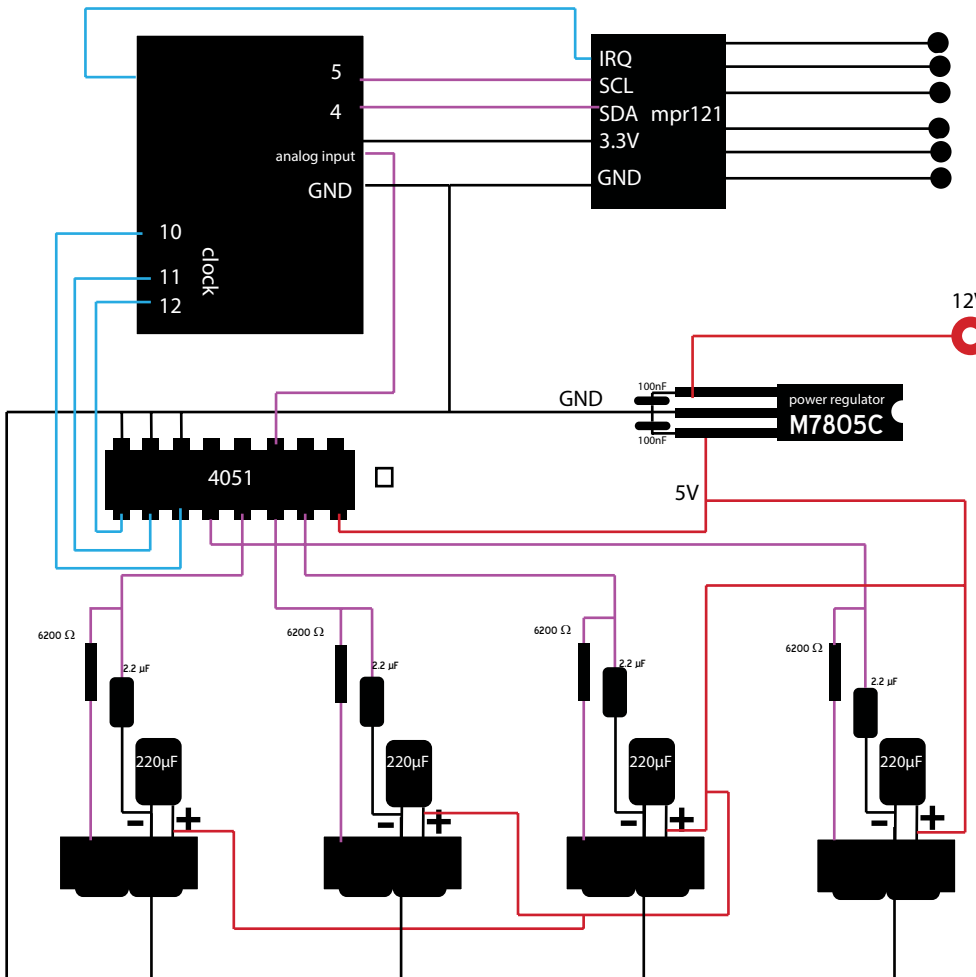
PROGRAMMING

firmata



Arduino receives data
All the data collected is coded binary 0 or 1 according to the range of distance of infrared sensors and touch status for capsensor and sent to processing.

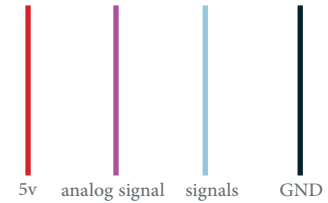
The MPRI21 is a capacitive touch sensor controller driven by an I2C interface..Although I tried to change the address, the capsensor on mpr121 cannot perceive touch from a distance. However, up to 8 foils can attach to the interface.



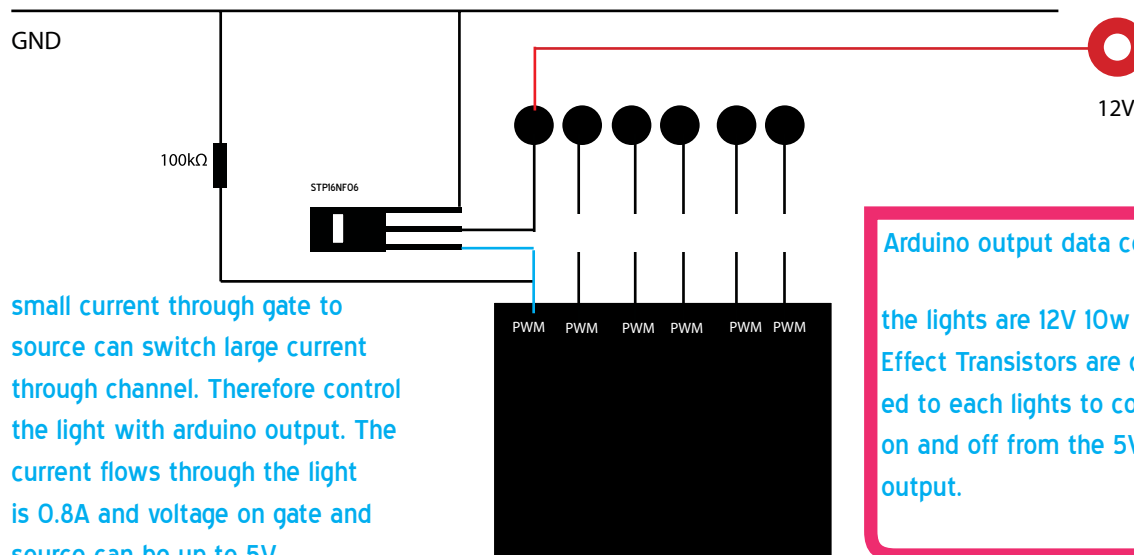
sharp infrared sensor is really unstable. As read in oscilloscope, there are high frequency noise, thus I use low pass filter circuit.

220 μ F capacitor stabilizes the sharp input of power supply. The large pulse output from infrared sensor can affect its own power supply and cause peak shape from oscilloscope.

4051 is a multiplexer holds 8 analog inputs channels and routes them to a analog input pin on Arduino. Every channel has an code on the interface and everytime there is a read from muxpin of 4051 accompanied with a channel number. I learnt to write a function with bitwise operator to verify the number and set the selection pin LOW or HIGH accordingly.



Field Effect Transistor



small current through gate to source can switch large current through channel. Therefore control the light with arduino output. The current flows through the light is 0.8A and voltage on gate and source can be up to 5V.

Arduino output data control lamps

the lights are 12V 10w ones, Field Effect Transistors are connected to each lights to control the on and off from the 5V arduino output.

evaluation of the 3rd iteration

purpose

In a dementia focused design, designers try to invite the elders to engage themselves in certain activity voluntarily. Or more specifically, designers are trying to find a good entry to relieve agitation and reduce the side effect of SAD. The various kinds of engagements of elders is even self-explanatory to the success of design. Thus whether these elders feel relaxed and remind them of the positive self-image are expected to observe in the evaluation.

However, the prototype is only displayed for a relatively short period of time approximately at 16.00 for 1.5 hours. The diurnal behavior change of dementia elders cannot be evaluated. And also, the actual concept covers one side walking space in the corridor and thus the full size of the concept would have an effect on the circulation function in the corridor. Such effect is interviewed with experts.

methods involved

mood board

"Mood boards are a collection of visual images (e.g. photographs, material samples) gathered together. Mood boards are a powerful tool to communicate users' emotions, experiences, aspirations, and perceptions to designers. Sanders (2000) uses similar techniques (image collages) as part of a broad toolkit to identify the aspirations of everyday people rather than customers or consumers—long before concrete product ideas have been developed. They enable users to communicate beyond linguistic restrictions. Also in this particular case, it supports the elders to describe their feelings and thoughts with less stress." [20]

exact form of mood board in the evaluation

I chose a simpler form of mood board because it can be the time consuming when locating suitable images, and allocating the time for participants to cut out images and arrange them. The dementia elders would not have such energy and ability to go through the process. Instead, I use the method of asking participants to make choice from a restricted selection of images for certain aspects. This supports a more formalised analysis, but restricts the choices. This way is more suitable because mood board is carried out after interaction with the perceptive light. During the interview, they will also required to describe why they choose the picture because it will help to perspect their thinking.

which image resemble
your mood while play-
ing with the lighting?



Which image represents
what you are thinking
of while plaining with the
lighting?



Which image can recall
the memory you once
had while playing with
the lighting?



Interview process

To expert

- 1.Let him experience the prototype first and observe how he interacts with the prototype.(wait until he stops).
- 2.Ask him about the manner of the interaction:
Q1: Please describe the atmosphere created by the interaction.
Q2: What kind of interaction it brings you?
Q3: How does the interaction make you feel?

further explanation with movie and storyboard

reflection on ideas

- Q1: Will elders notice the change of rate in water flow and intensity of light according to their own walking pace? If so, how they feel? If not will they appreciate it?
- Q2: Will elders appreciate the changing rhythm when there are several of them walk by?
- Q3: Which behaviors would arise when the elders are alone and in groups?
- Q4: In which ways do you think it will relax them by the created atmosphere??
- Q5: Please describe, if any, the ways of interaction are acceptable for an elder, and the ways of interaction would bring more agitation.
- Q6: Will they still keep engaging to interaction after experiencing several times?
- Q7:Which following activity implications do you think the interactions would have ? HOW?

1 Social participation

2 Community participation

3 Physical activity

4 Creative activities

5 Activities of daily living (such as cleaning, cooking)

6 Music

7 Conversation

8 Pottering outside

9 Food and eating

10 Enjoyment of nature

10 Reminiscence

11 Pottering in the home

12 Humour

13 Mind games (such as jigsaws)

14 Reading

15 Television

- Q7: If it covers the wall, do you think it will bring disturbance for the elders to enter into the room? (give the picture) should it cover both walls? why?
- Q8: Or which part of the corridor is suitable for elders to interact with the light?(connect to the habit of elders for further question) .

To elders

Let them explore the interaction with the design and observe.

T: Choose the pictures of emotion and things they think of. Tell why.

Q1: which image resembles your mood while playing with the lighting?

View the movie.

Q2: Which image represents what you are thinking of while playing with the lighting?

Q3: Which image can recall the memory you once had while playing with the lighting?

To care givers

They observed the elders also.

Q1: you think the elders like the lighting? Sounds?

Q2: Do they behave relaxed or interested or agitated? (Positive or negative)

Q3: does the design gives activity to elders? What kind of them?

further explanation with movie and storyboard

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interview

settings

The pototype opened to users at 3.30 pm. Instead of hanging out in the corridor, the prototype was set on a long table in the living room where 8 elders sitting at another table 2 meters away could see and experience when others played with the prototype.

elders' interaction record

All the elders noticed the existence of the prototype at once. A carer simply told them it was a lighting project. Lady A who was very active was invited to walk through.

When she stood at the beginning and triggered the lights, she was surprised. At that time I walked by, the lights between us are triggered. And I walked away from the prototype and the lady continued to sway her body in front of the prototype.

Only after I told her to touch the blue circle, she did so, but prefer to sway and wait for response.

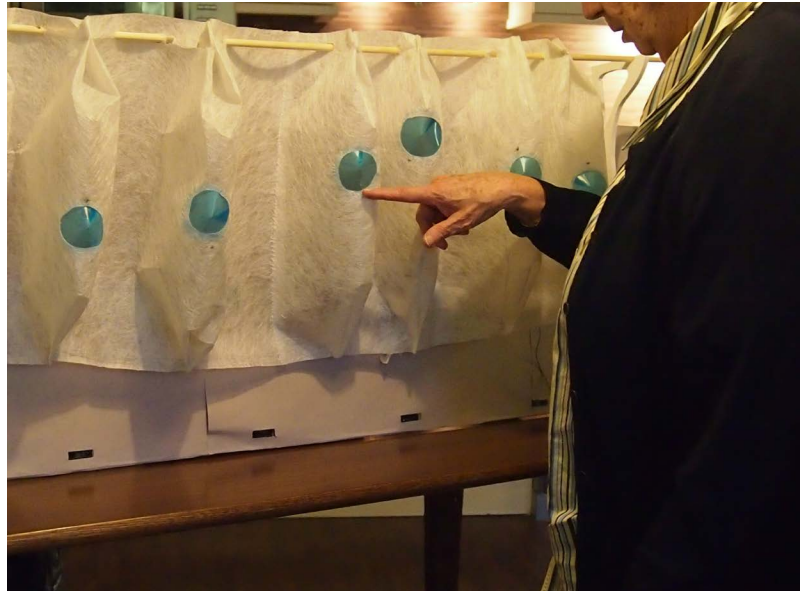
She continued to say 'beautiful' to me.

The attention span lasted about 5 minutes, and 10 minutes later, she came back from other place and continued to stand in front of it and sway voluntarily. She mentioned to me 'everytime is the same sound'.

Lady B was invited to interact. She stood up and walked in front of the prototype started to touch the blue circle. After one time failure, she started to touch other circles and kept trying. The attention span was 4 minutes. After that, she turned back and find the seat escort by carer. All the participants touched the circle with their finger prints instead of the palm.

A third lady walked by, she started touching voluntarily.

Only one elder kept away from the prototype with a wondering face. When I asked how he felt, he commented 'Its function is not clear'. All other elders sitting by didn't show any sign of agitation during the whole process.



Although not all the elders tried by themselves, the carer said 'They all like it, it feels relaxing and pleasing'.

user's evaluation

A group of elders were sat around the tables with prototype working at the same time. The elders all found it difficult to reflect the emotion when they experience with the prototype. In mood board test, one lady pointed at 1st picture a girl crying said 'a nice girl friend'. It is not easy for them to reflect and analyze images. To think something they can think of, they choose the waterdrops which was noticable in the sound. Others sounds and representations are too vague for the elders to recognize.

expert evaluation (Plas, Ralf van der, dementia, dementia expert, head of a department voor inhabitants with dementia)

Elders are fond of interaction by giving stimulants such as light and sounds. And it gives them stimulants for minutes of attention which allow them into another place in a pleasing way and make them active and be more healthy.

Elders will not notice the volume change and brightness of the lighting, However, other inputs like change of color and smell would be helpful to let them into another place.

The choice of sound is nice and natural. Dementia would find it interesting even though they have experienced it for several times. They would react to something as their characteristics, but they would not remember which one and how to choose between the difference. (which I do not completely agree, one lady has mentioned the same sound, which means she actually notice it. Maybe because it would get her into the same place in mind, or she just has the ability to tell the difference.)

The activity involved in the interaction: '3 Physical activity" 7 Conversation" 8 Pottering outside" 10 Enjoyment of nature" 10 Reminiscence'. (table 1)
However, to realize reminiscence, more stimulants with explicit aims should be involved.

The lighting is preferred to be placed near the living room where they come across for a couple of times. It will not cause the disturbance in function of circulation, once ther elders saw a door, they may open it if they want to get into a room when they forget the lighting and the place to where they have escaped to.

Certain shape is not preferred because it has strong implication to fold or unfold it. Soft colorful material in the touching place with grain would be more suitable to attract attention and for touching.

Discussion and conclusion of the final iteration

In general, based on the final user experience test and expert evaluation, the prototype which was partially based on my concept brought joy and happiness to dementia elders in Vitalis. Elders loved to keep trying and interacting with different behaviors. Elders loved to see the lights flows through them or the curious water drop sound after they had touched the blue surface. My client commented it as “pleasant, elders love it, they are not bored any more in the corridor this provides them with minutes’ escape.” However, according to the user test, whether the concept had achieved the level of my ideation to provoke outside feeling by creating atmosphere and attract elders in a calm way is needed to be further considered.

There are also several points needed to be further investigated:

1. Different elders behave variously to the prototype. Although no one showed irritation and all of them kept seeing keenly on the prototype, some of them seemed no voluntary motivation to walk in front of it. When they are invited, they kept interacting with the prototype. It showed they need a ‘starter’. How to trigger the immediate willingness to interact is what I want to find out in the next step.
2. One elder doubted the function of the lighting, he only saw it as bulb and I think it was natural for him to doubt it and felt anxious about what was not understandable to him because the atmosphere it creates is not concrete and vivid for elders to think of something.
3. The mood board test was not successful. There are two reasons behind it. One is the cognitive status of dementia elders leads the disability to reflect their emotion on faces of others which also conveyed certain emotion. However, the elders had the ability to directly tell the water drops from the sounds and pointed it out in the “pictures you can think of”. It indicated they can recognize the sounds and relate it to certain image, Yet a more broad atmosphere is constraint.

In conclusion, how the concept actually interact with elders to conform to and also to guide elders’ behaviors are needed be to tested and prototyped. And a new reminiscent scenery with more concrete outdoor feel is also needed to be further developed. According to experts, stimulation of different senses are preferred for elders to recall and recognize in this case.

design guidelines for redesign

More stimulants like scents and colorful lights can be used.

Create a more specific atmosphere.

Behave more differently in response to people's behaviour in front of it. For example, when two people stand still in front of it, it creates a peaceful manner of a specific atmosphere to hold the conversation.

Soft material with grain should be tried.

Explore the scenery, elders are fond of different scenery. More exploration into material and detailed interaction should be explored.

Explore into nature and users to find out how to embody circadian rhythm.

As a design in the common place, different modes are applied to respond to various interactions differ for everyone. More explicit implication of nature could bring more memory to them. The intention in the design to start a conversation is the part needs to be further explored. On the other hand, to hold a conversation is what easier to achieve from the experiment up to now.

Conclusion

The concept is a happiness-driven platform designed for a group of dementia elders. The methods used in the process include implemented prototypes, observation users, and evaluations by experts and literature research. The process encompasses 3 iterations all with evaluations and the final one followed with experiment with prototype. Dementia elders are fond of such stimulation and natural atmosphere it creates. It gave them several minutes 'escape to other place every time they go through the corridor. Direct response to the body movements and respond to touching also make them to play with it.

In general, the concept embedded in the prototype has achieved the level of 'pleasure and enjoyment' and based on the theoretical researches, it also should have a positive influence on interruption of circadian rhythm. Yet how the elders are set free to interact with the concept actively or in other words, in what exact modes the concept response and guide elders'behaviour are needed to be further investigated.

Above the concept, the whether the concept satisfied the eagerness to access to outside world is needed to be investigate the elders'behaviuir in a long run by compared tests.

evolvment of ideation in detail

Throughout the whole design process, I am seeking a way to let dementia elders to be happy. As the definition of happiness, it is a state of physical and psyche well-being. To carry out such vague and personal feeling, it needs close study into what is valued at the bottom of these elders' heart. Therapies and activities they are fond of can illustrate part of the picture.

Instead of only focusing on the way of treatments, it is more significant to in this case to find the reasons for such therapies. For example, the reason for reminiscence is to generate a feeling of self-worth and the expression of individual identity by actively involved in reliving and sharing their past with others in the present. The reasons are concluded on page 10, sectioned by 4 core reasons: esteem, love and belonging, realization, safety. There are representations behind every reason. In the context of a common area of corridor, representations do not have a personal characteristics is more suitable. In general, dementia elders need facilitation to achieve these core values.

A good way is by activities which encompass engagements and enjoyments. As many researches have indicated "The well-being of a person with dementia can be substantially improved by increasing the number of enjoyable activities undertaken. 40% happiness is involved in daily life and is approachable"[1]. In the design context, a willingness to access to the outside world is apparent. However, the lack of essence of the vibrant natural world and delicate diurnal changes and circadian rhythms are missed. This would not only arise problems such as SAD symptom or 'sun downing' syndrome but also lead to low stimulation from the environment low engagement in thinking, and little source for enjoyment.

The design is a happiness-driven design, like a stage, every elders can try what they can to interacted with the design and feel relaxed and back to the simply pleasure of play with water in the sun in their childhood. It allows the elders feel the capability of playing and making something beautiful and these interact and beauties are augmented for them to sense. It is like a augmented surrounding, the actions elders do to the surroundings would response to them. It is interesting to observe in an pleasing augmented surrounding, whether it will trigger different behavior towards companions or relieving self to play with natural.

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