

# KooKo - Guiding cooking tools that motivate seniors with dementia engage in a group activity

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## ABSTRACT

Research has proven that lack of stimulation for a long amount of time is disadvantageous to seniors with dementia living in nursing homes. It increases their feeling of loneliness. In this paper we researched the effect of cooking therapy on the behavior of elderly with dementia. We wanted to know if guiding cooking tools could help the seniors engage more in a group activity. During this inductive qualitative research, consisting of ethnographic studies, interviews and co-design, we organised a cooking therapy session, KooKo, in a living unit within Pleyade (a nursing home) with the use of a tangible prototype. The seniors were given the task to cut fruits in a group of a small group of 4-6 seniors with dementia with the help of our guiding cooking tools. The main results of our studies showed the importance of rewarding and feedback during the cooking therapy session; that bonding is stimulated by an evoking the residents' feelings of care; that not everybody wanted to use our cooking tool, but everybody wanted to participate in the group activity; that mood is a huge factor in joining the activity and that simple activity is enough. Our findings recommend cooking therapy as a group activity to engage seniors with dementia to participate in a group activity and thus reduce the chance of developing feelings of loneliness. Further research could also look into the effectiveness of cooking therapy that seeks to improve the mood of participants. Moreover, exploration of cooking tools is interesting for follow-up research to prevent the 'Cooking Therapy' to be limited to merely cutting food.

## AUTHOR KEYWORDS

Dementia; design; behavioral problems; cooking therapy; social engagement.

## INTRODUCTION

### Aging population

The aging population in Europe has been growing at a worrying rate. In 2016, it was reported by the Eurostat that there was a 2.4% increase of elderly amongst the 510 million population in the EU-28 in the past 10 years. To add on, the median age rose from 38.3 years to 42.6 years and is expected to take on even higher numbers in the coming future due to the "baby boomers" who are getting older.

Another aspect is the progressive aging of the older population (80 years and above). The population of seniors aged 80 years and above in the EU-28 are expected to more than double between 2016 and 2080, from 5.4% to 12.7% (Eurostat, 2017).

In the Netherlands, there is a projected increase of senior citizens from 16% to 26% of the population in 2035 (Smits, Van den Beld, Aartsen, & Schroots, 2013). This is a troubling number that concerns the working population as well as the healthcare and caregiving industry.

Age is the strongest known risk factor for dementia, with most individuals with the disease aging 65 years and older (Alzheimer's Society, 2016). According to the Alzheimer's Association, one in nine people in this age group and nearly one-third of people age 85 years and older have Alzheimer's (Alzheimer's Association, 2018).

### Dementia

Dementia - a general term for the loss of memory and other mental abilities severe enough to interfere with daily life (Alzheimer's Association, 2018) - encompasses many types, as Alzheimer, vascular dementia, frontotemporal dementia and more (Alzheimer's Society, 2018). Alzheimer's is the most common form, representing about 60%-80% of the cases (OECD/EU, 2016).

The overall number of people with dementia living in Europe is expected to grow from 9.6 million in 2015 to 15 million in 2035, with the oldest seniors accounting for an increasing share (OECD/EU, 2016). In the Netherlands, the number of people with dementia is expected to grow parallel to the aging population, with the consideration that increasing age is the greatest known risk factor for the disease (Alzheimer Europe, 2014).

In 2015, around 117,000 elderly were living in a nursing home in the Netherlands. Almost three-quarters of these elderly are dealing with memory problems, forty percent is diagnosed with dementia (Verbeek-Oudijk & Van Campen, 2017).

Due to physical changes in the brain caused by dementia, mental and behavioral abilities of the patient are heavily affected (Lyketsos *et al.*, 2000). Almost every dementia

patient will experience mental or behavioral disturbances at some point in their illness (Lyketsos *et al.*, 2000).

### **Behavioral problems**

Research has shown that there are general behaviors observed across the different stages of dementia (Alzheimer's Association, 2018). In the mild stage of dementia, the patient is able to carry out day-to-day tasks and would require minor care. Whereas a patient with a moderate stage of dementia have difficulties expressing their thoughts and performing routine tasks which makes them more dependent on others (Alzheimer's Association, 2018).

Specifically, personality changes are most commonly noted in Alzheimer's Diseases (AD) and affect about 70% of dementia patients (Müller-Spahn, 2003). These personality changes often include disinterest or inappropriate social behavior (Müller-Spahn, 2003). As such, disordered communication and interaction between the elderly with dementia would often disrupt the mood in a community setting. This may result in a lack of feeling connected to people in their social circle, which heavily influences the feeling of loneliness (Alzheimer's Association, 2018). Symptoms of depression are often seen in dementia patients, ranging from 20% to 60% in most epidemiological studies and 10% to 30% meet criteria for a major depressive disorder (Müller-Spahn, 2003).

Furthermore, nursing home residents spend their majority of time not engaged in any meaningful activity. Lack of stimulation for a long amount of time is proven to be disadvantageous to seniors with dementia living in nursing homes. It increases the apathy, boredom, depression and loneliness which often accompany the progression of their dementia (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009).

### **Field of research**

In-depth research has been conducted in the area of dementia, such as single pharmacological interventions and symptom reduction, which have proven to be short-term (Lyketsos *et al.*, 2002). This calls for a critical need into research that explores more complex interventions and focuses on a broader range of outcomes.

As a result of the lack of stimulation in nursing homes, it is of critical importance that engagement of these residents becomes a priority within nursing facilities (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009). Although this concept of engagement seems of major importance in the field of dementia, not much relevant studies have been published and a lot is unknown (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009). Furthermore, research has stated that the quality of life of elderly with dementia can be enhanced by engaging them in activities with others (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009). It increases positive emotions and improves activities of daily living (ADL) (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009). Most importantly, activities that are part of their daily living are effective,

such as making dinner together with others. Aspects of daily life should remain the same and be strengthened, such as mealtime routines including preparation and eating (Ferman, Smith, & Melom, 2018).

This calls for more in-depth research into the selected field of engagement within elderly with dementia living in nursing homes. We have decided to focus on cooking as part of ADL, a familiar activity amongst the elderly. For the purposes of this paper, the scope of the user research would be confined to elderly aged 65 and above with mild to moderate dementia.

Akin to the title of this research paper, the main research question is: Does preparing a meal with guiding cooking tools motivate seniors with mild to moderate dementia engage in a group activity in a nursing home environment?

### **Research strategy**

A tangible prototype will be used as part of the research process. Studies on engagement are the foundation for the development of non-pharmacological interventions for persons with dementia (Cohen-Mansfield, Dakheel-Ali, & Marx, 2009). Furthermore, design is able to do more than shaping the physical environment to counter the impairments coming with dementia. Design involves changing the way seniors with dementia engage within environments they live in (The Dementia Centre, 2012). That is why design is the solution.

The research strategy employed would consist mostly of qualitative methods. This will further be elaborated in the 'Methodology' section as well as the studies conducted in this paper.

### **Interactive Cooking**

One project similar to the chosen area of this study is reported in the paper: 'A therapeutic cooking program for older adults with dementia: Effects on agitation and apathy' by S. Fitzsimmons and L. Buettner, see the Related Work section (Fitzsimmons & Buettner, 2003). It shows the positive effects of a therapeutic cooking program for people with dementia set up by researchers. Residents of the care home who were studied showed a positive behavioural change. What is different about the study of Fitzsimmons and Buettner in comparison to this paper is that the one of Fitzsimmons and Buettner has a very scheduled way of testing. Multiple days they follow a schedule with their cooking program. Moreover, their paper lacks the part of encouraging cooking gear, where within the KooKo study a tangible prototype was made to stimulate the people with dementia to engage and join cooking with their fellow residents.

### **RELATED WORK**

The team has gathered examples of projects similar to the chosen area of study.

One of these papers is 'A therapeutic cooking program for older adults with dementia: Effects on agitation and apathy'

(Fitzsimmons & Buettner, 2003). This paper informs about the effect of therapeutic cooking on the behaviour of a group of people with dementia who meet 4 times a week to cook together.

Before the treatment began every participants' apathy and passivity were measured. The apathy measurements were carried out with an exhibition of specific behavior of the participant during the day. Passivity was measured with the Passivity in Dementia Scale. Their blood pressure and heart rate were also measured. Results after two weeks of the program showed that overall passivity decreased and apathy increased. With the blood pressure and heart rate results, it was inferred that the participants whom data was lowered had to calm down. On the other hand, participants that became more alert showed an increased level of blood pressure and heart rate.

The project states that it was able to mix individuals with various stages of cognitive impairments successfully. The participants enjoyed sharing their creations with each other. Prior to the test, the residents were unfamiliar with one another. After each day passed, they did not want to split up and wanted to stay together as a group, which led to initiatives such as going for walks or remain talking.

This research bears similarities to what we aim to achieve, however it lacks the physical elements that could better support and match the cognitive abilities of the elderly. With reference to this study, it is beneficial for us as it shows that cooking together indeed has a positive impact on the behaviour of people with dementia. The activity also connects people with different stages of dementia as well.

An additional design case for the elderly with dementia is the 'Tovertafel' project (Anderiesen Le Riche, 2017). 'Tovertafel' consists of a projector that is mounted on the ceiling that produces light projections on a table directly below. Two Microsoft Kinect motion sensor devices then detect arm and hand movements of participants. With this setup, specially developed games can be played by the elderly with dementia, such as sweeping leaves. The aim of this project is to reduce apathy by stimulating physical activities that people with moderate to severe dementia can participate in.

To put this design to test, a group of 6 elderly with moderate to severe dementia who live in a care home played with the Tovertafel 3 times a day for 30 minutes. This was in place of their regular coffee time. The results after 5 days were as follows: The Tovertafel seems to decrease the residents' negative feelings, increase their positive emotions and increase their engagement in comparison to the regular coffee time. Usually, coffee time was spent quietly, without much interactions between the residents. However, during the 30 minutes of play on the Tovertafel, the residents laughed together and pointed out to each other interesting projections on the table. An interesting insight with regards to communication is that the periods of talking

were still relatively short, but when the projections changed, conversations started again.

The Tovertafel is similar to our project in terms of its intent to spark interaction in the form of gesture movements. Engaging the elderly with dementia through hands-on activities seems to evoke positive feedback in this project. Through our research project, we strive to find out if cooking would aid more bonding between residents.

## DESIGN

The specified objective of this research is to ascertain whether preparing a meal with guiding cooking tools could motivate the elderly with mild to moderate dementia engage in a group activity. The context of the research would be within a nursing home environment, where six elderly live together in a common space, attended to by two caregivers. Ultimately, the research is focused on finding out if engaging in a common activity together would spark more interaction and meaningful conversations.

## Methodology

The team centered the data collection methods to be mostly qualitative, due to the nature of the research scope. In consideration of the fact that we are conducting research with elderly with dementia, qualitative data would be better suited and achievable within the timeline of the project. Furthermore, we feel that a human-centered approach would be more applicable when designing for the elderly. Throughout the course of the research, various methods were employed to collect data i.e. Ethnographic studies, interviews and co-design. More details would be further elaborated in the 'User Study' sections below.

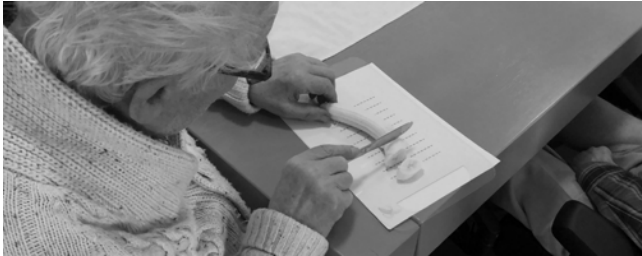
The data collected was analyzed using the Thematic Analysis method, with the main purpose of identifying meaningful patterns that could provide an answer to our research question. The patterns were identified through a rigorous process of data familiarisation, data coding, theme development and revision. This method was selected as it could be used within different frames, addressing the research question from different angles. The insights and answer to the research question will be discussed in the 'User Study' sections as well.

Over the course of two user studies, we were assigned to a unit consisting of 6 elderly with varying levels of dementia (i.e. mild to severe) living together in the nursing home Pleyade. The team prepared consent forms and personalized notes for the family members of the elderly, as part of the ethics procedure. As a follow up measure, we also sent the family members emails to remind them about the studies that we will be conducting with the elderly. In addition, we personally called the family members to ensure that they are properly informed. The data from the residents we did not manage to get consent of, was reported anonymously.

## USER STUDY 1

### Prototype

A simple prototype was crafted for the first user study, to gauge the reaction and observe some initial insights. A Vivak sheet was laser-cut in the shape of a typical chopping board. Illustrated fruits were printed on A4 sheets of paper that could be placed behind the transparent Vivak sheet. This setup can be seen in figure 1. Participants are to place the fruits on the cutting plate and cut over the guiding lines on top of the illustrated fruit. This way, the fruits are prepared solely by them and ready to eat.



**Figure 1.**One of the participants cutting a banana during user study 1.

An alternative method was also studied - Cutting virtual fruits on a screen. A tablet installed with the 'Cooking Mama' application was used as an equipment for the study. 'Cooking Mama' is a cooking simulation game that tasks players with stages of cooking ranging from preparation to execution, using gestures on a touch screen (Juul, 2007). A simple task was chosen for the study with the elderly, cutting an onion into small pieces and swiping it into a pan. The practice mode was used as there were no time limit or results of the activity.

### Method

Ethnographic studies were the focus for this first study, to thoroughly understand and empathise with the elderly living in the nursing home. We prepared a list of interview questions and conversational topics to engage with the elderly in their living environment. This was to break the ice and allow some warm-up time before introducing the prototype and tablet for observation. Throughout the process, we also observed their facial expressions, actions and interactions between one another. The goal here was to find out if doing an activity together, in this case cooking, would evoke more interaction between the housemates.

Videos and notes were taken throughout the activity solely for analysis purposes, where the team referred to in order to identify insights. All photos and videos did not capture the faces of the participants for confidentiality.

### Participants

Three out of six elderly of a living unit in Pleyade participated in the user study. All of them were given the 'Cooking Mama' application to try, as well as the cutting plate with bananas and strawberries to cut.

Before the activity started, we clarified with the caregiver as to whether the elderly could handle a knife. Thankfully, all could still manage a fruit knife.

### The 'Cooking Mama' Application

We set up the tablet in front of each elderly, with the instructions to cut the onion seen on the screen. No further explanation was given so as to observe the natural gestures that the elderly are used to and their familiarity with technology. When they could not figure it out, further probing such as: 'You should slice it with your finger' were given, and we showed an example of the gesture to be made to carry out the cutting.

Throughout the activity, we focused on observing the resultant response and behavioural changes of the elderly i.e. Smiling, positive feedback. With this, we were able to deduce if the elderly were comfortable with this approach of joining cooking preparations in a group, considering that the action of cutting might be too difficult or dangerous. Another concern was the feeling of exclusion or 'being fooled'. The augmented reality could result in the elderly feeling fooled as something virtual is shown with the aim to create real feelings. Therefore it is vital that we ensure that the users take the actions seriously and are aware that it is part of a virtual game.

### The Cutting Plate

The Vivak sheet was set up in front of the elderly, with the choice between a peeled banana or strawberry. The fruit was handed to them and they were asked to place it on the illustrated fruit on the cutting plate. Following that, they were asked to cut the fruits following the guiding lines. There were 2 separate sheets for the strawberry - Cutting the crown off before cutting it into smaller pieces. They could eat the fruits after it was cut successfully.

The focus here was to observe the motor skills of the elderly and their understanding of the guided cutting sheets. In addition, we also wanted to identify if engaging in a common activity together would encourage conversations with one another. The overall behavioural changes, facial expressions and chats exchanged were noted down.

### Insights

With the gathered data, six key insights were identified from this user study. The reasoning behind not further exploring virtual reality options will also be discussed in this section.

1. *Provide varied tools for the elderly with different levels of motor skills to engage in a common activity*

The elderly with mild dementia were able to carry out the activities accurately, cutting directly on the guided lines. It was clear that they were aware of the tools and were precise in cutting. On the other hand, elderly with a more severe

type of dementia was unable to follow the guides. Instead, she cut the banana in her own way, despite extra guidance. The tool in this case, does not affect how she cuts fruits. Therefore, we should provide varied tools that would suit and cater to the different needs of the elderly. This way, they would be able to engage in a common activity together.

*2. Coffee break seemed like a good time for interaction due to its casualness*

The daily routine of the residents consist of lunch at 1200, followed by a coffee break at 1400. Lunch usually takes a while and ends at about 1300, where residents would rest. This was when we broke the ice and asked some questions before carrying out the activity. Along with their coffee break, we introduced the activity of cutting fruits. We noticed that due to the casualness of the atmosphere, it was a good time to encourage interaction between the residents. This shows that the time of day when an activity is carried out plays an important part in setting the mood. This is crucial to the outcome of the activity as a casual atmosphere could spark more conversations.

*3. Mismatch of interests between the elderly and caregiver*

The caregivers carry a lot of responsibilities that come with looking after 6 elderly. Most of the time, the elderly that need more care and attention are those with a more severe type of dementia. As a result, there is a lack of meaningful conversations i.e. personal interests between the caregiver and the residents. This was especially observed when we asked the caregiver if the residents liked cooking, and the answer was no. We asked the elderly the same question and some replies were “Gerre koken” (Translation: “Like to cook”) and “Ja vind ik wel leuk” (Translation: “Yes, I do like that”). Despite some small talks and jokes between the caregiver and the residents, there still seems to be a lack of intimate conversations and interactions, most likely due to the heavy day-to-day responsibilities that keep the caregivers busy.

*4. Living in a common space with five other elderly attempts to stimulate more interaction naturally but seems to be insufficient. How can we trigger intrinsic motivation in the elderly to engage more in a group?*

The caregivers indeed try to bring the residents closer through daily meals, however there is still clear segregation and the unit does not seem bonded despite living together. For instance, the residents do not go out for an activity together, even when some are joining. After meals, they leave the table and keep to themselves. We identified that not enough is in place to encourage interaction between the residents. With the cutting plate where they could do something together, more interaction was observed. The

seniors react and respond to each other during the activity. They crack jokes such as ‘Ha krullenbol’ (Translation: Ha curly hair). When one starts making crying sounds, the others urge her not to cry (‘We gaan niet huilen he vandaag’ (Translation: We are not going to cry today) or ‘Niet snotten hoor’ (Translation: Don’t sniff)). Though one of the elderly is handicapped and has severe dementia, everyone else were willing to involve him in their lunch experience and conversations, encouraging him to eat his yoghurt. This insight called for deeper thought into finding out how we are able to trigger such intrinsic motivations to encourage the elderly to engage more in a group.

*5. The mood of one influences the others. How can we spark a similar atmosphere so as to set the mood right?*

One interesting observation was that when one of the elderly started singing, the others joined in as well. This was an effective way of lightening the mood, as songs are generally a positive mood lifter, especially when it is sung together. In addition, since the residents are in the same age range, they would know they same songs that were sang often in their childhood. This was a vital insight that triggered the question of sparking a similar atmosphere. We will develop and explore this aspect in the later stages of the process, to analyse if there are possibilities or situations that can result in the influence of one another.

**Additional insights**

In this section, we revisited our findings that steered follow up concept development.

*The design will not include any virtual reality*

A compelling challenge when designing for elderly with dementia is whether they are able to comprehend their actions, especially with the use of virtual reality and modern technology. Technology is often used in modern solutions and design due to its convenience and limitless possibilities. Despite captivating the user’s attention, it might also be deceptive to some, as it is merely a platform for execution. For the elderly with dementia, this differentiation might be difficult to realize, which may result in an adverse reaction that they are being tricked. During User Study 1, it was brought to attention that virtual reality did not add value in terms of stimulating interaction between residents. All of the participants seem to know that the ‘Cooking Mama’ activity was make-believe. One of the residents even joked that the virtual onions could not make her cry, saying “Nou rollen de tranen me over de wangen” (Translation: Now I am crying). With this in mind, the team decided that we will not explore the possibility of designing with virtual reality, and instead focus on the more tangible aspects.

## USER STUDY 2

### Prototype

We further developed the chopping board whilst preparing for the second user study, going through two prototype iterations before finalising the design. Some feedback collected from the first user study included using non-slip materials, making the board sturdier and integrating the illustrated sheets into the prototype.

In the final design, a removable transparent plate enables easy changes of the paper sheets, with the board coated in paint for easy cleaning. Silicone was added on the bottom of the board for added stability. The illustrated sheets were kept the same as it was more direct to understand. In comparison to using photos of fruits, which would often differ as fruits came in different shapes and sizes.

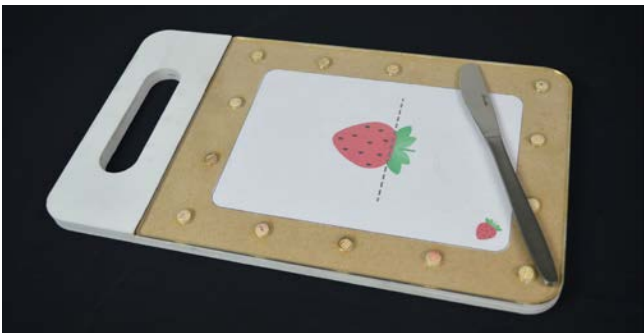


Figure 2. Final prototype used in user study 2.

We also explored the possibility of creating more tools for the cooking process, and a pot-stirring guide was created. This was to aid in the action of stirring, and could be used on pots to guide the user.

### Method

To attain a more accurate answer to the research question, on whether preparing a meal together with guiding cooking tools could motivate seniors with mild to moderate dementia engage in a group activity together, this second user study was framed as ‘Cooking Therapy’, where the participants had to prepare a fruit salad together. This was carried out during the scheduled coffee time. The goal was to evoke more social engagement between the elderly, where they did not have to perform the same activity, instead engage in the preparation process together. Different roles were divided according to their motor skills.

This study was inductive and focused on analysing social engagement, changes in mood as well as motivation. These were achieved by means of evaluation forms (Figure..) and observations on behavioural changes. In addition, we also conducted in-depth interviews with their caregiver as a spokesperson. This method of ‘Surrogate Standpoint’ (Baker et al., 2003) was able to balance and facilitate the results collected.

mood.	Before the activity	During the activity	After the activity
Names of participant	😊😊😊😊😊	😊😊😊😊😊	😊😊😊😊😊

social engagement.	Level of Refusal	Duration	Level of Attention	Level of Attitude
Names of participant	whether or not the participant refused the activity	the duration of time the participant was involved in the activity	up to 100%, 100% attentive, very attentive	100% happy, 100% smiling, 100% engaged, 100% motivated, 100% positive, 100% and very positive

Figure 3. Evaluation forms used in user study 2.

Videos, notes and voice recordings were taken from the session solely for analysis purposes and to solidify our insights. All photos and videos did not capture the faces of the participants for confidentiality.

### Participants

Four of of six of the elderly in the same living unit at Pleyade participated in the user study. Roles were divided according to the varied motor skills of the elderly. One of them was given the cutting board to cut strawberries, a banana and an apple. One was given grapes to peel off the bunch and an orange to peel. The third senior was handicapped and could not participate, but he remained at the table, enjoying the company and the fruits that his friends cut. The fourth senior refused the activity, however, she remained at the table and insisted on cutting fruits her own way.

### The Cutting Board

The elderly that was given the board was able to use the cutting board accordingly as he was familiar with the set up in the first user study. This time, as the board was made to resemble a typical cutting board, the participant was more comfortable with the tool and was seen resting his arm on the board.



**Figure 4.** One of the participants cutting a banana during user study 2.

### Peeling The Fruits

The participant was given a bunch of grapes that she had to peel off the bunch and put them in another bowl. She completed the task relatively fast, which resulted in some idle time while waiting for the others. However, she placed the peeled grapes in the same bowl and ate the fruits on her own. The observations were similar when she was given an orange to peel.

### Pot-stirring Guide

The tool was fitted on a pot filled with water in place of 'soup', and the participants were told to stir the soup following the guide.

This tool received mixed reactions, as one of the elderly could follow the guide and stir the pot accordingly. On the contrary, another elderly could not understand the guide and merely moved the spatula within the gap. However, since this tool was developed as part of further exploration, further refinement will be discussed in the Recommendations section.

### Data Analysis

The data analysis this time used the paper written by Brown and Clarke as a base for the steps taken to analyze the qualitative data. These steps include "familiarizing yourself with the data"; "generating initial codes"; "searching for themes"; "reviewing themes"; "defining and naming themes" and "producing the report" (Brown, Clarke, 2008).

The team referred to the completed evaluation forms, observational notes, videos and transcripts to identify key insights. These can be found in Appendix E *Transcriptions user study 2*.

### Insights

4 key insights were identified in from the data gathered in the second user study.

#### *Feedback and reward*

The observations and caregiver interview showed the importance of rewarding and feedback during the cooking therapy session. Residents asked for feedback on how they did a certain task, for example one of them asked feedback as "*nou?*" (Translation: Well?); "*kijk eens?*" (Translation:

*Look?*); "*Zo mevrouw?*" (Translation: So madam?) and "*gewoon doormidden of niet?*" (Translation: In half or no?) while cutting a strawberry and another said "*kijk eens even?*" while she was peeling grapes. Asking for feedback shows the fact that KooKo evokes a feeling of interest in each other. Furthermore, the elderly liked to give high fives when they completed a task to share their feeling of triumph. Rewarding encourages seniors with dementia to participate in an activity and it motivates them even more when the supervisor of the cooking therapy session, is enthusiastic. Moreover, the elderly with dementia can be cheered up by treats in periods when they feel down. A caregiver describes: "Good food, nice food, cake, ice creams, whipped cream. Yes, that cheers them up." Moreover, the caregivers were organizing a karaoke afternoon for the elderly and you could tell that they thought it would be a huge success. Moments of surprise help the residents to overcome moments of moodiness.

#### *Mood is a huge factor in joining the activity*

Behavioral observations showed that elderly with a mild type of dementia were more inclined to refuse using the cutting plate prototype since it felt patronizing. For one senior with dementia, who was quite moody, the activity felt absurd. She wanted to cut the fruits in her own way. However, she remained seated around the dinner table to be close to the cooking therapy session where the others were participating. At the end of the session she still participated through small talk about which fruits they liked most and made comments on the clothing we wore that day. Therefore, the refusal of joining the activity versus the acceptance of joining seems to depend on the mood of the seniors and less on their individual level of motor skills. On the other hand, joining the activity, by cutting; peeling fruits or having small talk, creates a shared mood. Although the residents might show acceptance or rejection, as long as they stay together during the activity, bonding should happen between them.

#### *Increased bonding and evoked feeling of care*

During the cooking therapy session we noticed the importance of the session with the help of KooKo in the bonding process between the elderly with dementia. One of the caregivers described the relationship between the residents as follows, "*Their relations are very strong, they know each other well. They ask for each other. If one of them is not there, or is resting, they ask things as hey, where is that tall guy? or is that person okay?*" "*Even though there is sometimes lack of good communication between them, they care about each other.*" Although, the elderly in this particular living unit were already bonded quite well, the caregiver told us that the elderly lived very much independent from each other in the house. We observed that their innate feeling of concern for one another is evoked during the cooking therapy session and helped in the bonding. This indicates that cooking therapy sessions



with the help of KooKo as a group activity could be effective in less bonded groups as well.

Cutting and peeling fruits together helped to create a good ambience in the group. The elderly were interested in others and curious about what others were doing. They liked to talk about each others achievements during the cooking therapy session. Despite the differences in severity level of their illness, communication and level of attention towards to the activity, the residents made sure everyone is engaged. This by either cutting, peeling, small talking or eating together. For example, one senior with mild dementia cut fruits and shared it with his friend, who was handicapped and had severe dementia so he could eat it. The senior with severe dementia smiled throughout the session and was still able to enjoy the activity in this way. This indicates that people with a severe type of dementia seem to enjoy it as well. Enjoying food together keeps them together and creates shared memories within the group.

#### *Simple activity is enough*

The user study showed the importance of familiarity for the activity to the seniors with dementia as they are concerned with being able to understand the activity. We observed that cutting fruit is an activity they know, it felt familiar to them, whether they did it on their own or with others around them. However, when the purpose of the activity shifted to a shared one, in our case making a fruit salad, the elderly found it hard to understand. For example, one of the seniors with dementia could not follow our instructions completely and every fruit we gave her to cut or to peel, was eaten directly after she finished her task. That is why in order to create an activity that is meaningful for the elderly with dementia it needs to be simple and familiar.

#### **Additional insights**

Here we revisit our unexpected findings that might steer follow up research.

#### *The moderator*

Executing the user study shed light on the usefulness of a moderator in managing the seniors during the cooking therapy session. We noticed that it was very important to give attention, instructions and to provide assistance. It was important to give clear explanations on what to do. Repetition of task explanation depended on the elderly's severity level. Furthermore, the caregivers working in the living unit know the seniors, their behavioral characteristics and relationships best which makes them ideal for providing personalized assistance. As described by one of the caregivers in the living unit, *"I work here 2 to 3 times a week. Always with these people. I know their behavior quite well."* Research also states, *"As a caregiver, you know your loved one's daily rituals better than anyone else. And, you're in a unique position to customize and refine your loved one's routine so that it includes meaningful activities for as long as possible"* (Ferman, Smith, & Melom, 2018, p.2). Therefore, the importance of the moderator in guiding a

cooking therapy session with the use of KooKo could therefore be an interesting area for follow up research.

#### *Music as mood booster*

Observations of the elderly with dementia during lunch time showed us the power music has to create shared moods. When the elderly were having lunch the caregivers turned on the radio to bring the seniors in a more quiet and cheerful mood. Songs on the radio evoked laughter and singing. The caregiver described that music as a big thing within this specific living unit: *"You have to know the residents. So I know that one elderly woman who is always cheerful, likes music when she is down. From what I know, André Rieu works for this living unit. When you turn on an André Rieu DVD, a little bit hard, then they are going to sit in the living room together. It is a big thing."* Music is able to create a shared mood of calmness. As we noticed that mood is huge factor in deciding whether to join the cooking therapy session. Therefore, it could be interesting to research the effect of a combination of music and cooking therapy (using KooKo) on the elderly's level of social engagement.

#### **DISCUSSION**

Unorganised communication and interaction between the elderly with dementia often disrupts the mood in a community setting. This can result in a lack of connection with people in their social circle and can result in an increased feeling of loneliness (Alzheimer's Association, 2018). By introducing guided cooking tools, we created a group activity that every resident could be a part of. Cooking or preparing food together was something that the seniors liked to do. However, we found out that a cutting plate was too advanced for elderly with severe dementia. Therefore, we also explored cooking tools that could be used by elderly with less motoric skills.

Works of Fitzsimmons & Buettner (2003) showed that a therapeutic cooking program had a positive effect on the level of passivity and agitation of the elderly with dementia. However, we wanted to dive deeper into the effects on connecting with other elderly. Also, they did not introduce guided cooking tools to encourage seniors to participate. Our user studies showed that a participant did not want to use our guiding cooking tool and asked for an ordinary plate. However, the participant stayed at the table and was interacting with other participants. This shows that the cooking therapy did indeed stimulate some level of connection between the elderly.

A limitation could be that our study was executed at a small scale and within a limited time frame. This means that our findings do not speak for all cases and may differ for different profiles of seniors with dementia. However, the caregivers indicated that she thought cooking therapy could work as a type of bonding between the seniors.

For more accurate research, we feel that more time should be invested in refining the tools. For example, the pot-



stirring guide could possibly be outlined with colours for clearer usage so as to enable better understanding of the tool. More exploration of other tools could also be planned, to prevent the 'Cooking Therapy' to be limited to merely cutting food.

Overall, this study suggests that cutting fruit together motivates seniors to engage in a group activity and interact with each other. These findings can be influenced by the mood of the participants on the day of the user studies. Further research could also look into the effectiveness of cooking therapy that seeks to improve the mood of participants.

## CONCLUSION

In this paper we explored the engagement of seniors with dementia in a group activity. We have taken a qualitative method approach to understand the behavior of elderly in a group setting. It became clear that cutting fruits as a group activity made the group elderly sit together for a longer period. Instead of doing things on their own, they would stay at the table and talk. This study was conducted on a small scale, thus we cannot conclude that guided cooking would work with all groups in all situations. However, caregivers do think that guided cooking would help with bonding in groups where seniors are less close to each other.

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## APPENDICES

### Appendix A: Consent forms

In order to gather data in an ethical responsible way we made the family members of the residents sign consent forms and one caregiver, to get consent for a caregiver interview.

#### Caregiver

Naam: Xinhui Yang, Lynn Visser, Rani Skrabanta and Veerle van Wigen  
Titel: Gebruikers studie Pleyade & TU/e  
Tel: 06-  
email: l.visser.3@student.tue.nl

Technische Universiteit Eindhoven, 14 maart 2018

### Toestemmingsformulier

Voor ons onderzoeksproject aan de Technische Universiteit Eindhoven doen wij onderzoek naar de reactie van ouderen met dementie op het interactief bereiden van maaltijden. Onderdeel daarvan is het filmen van de interactie tussen de ouderen met dementie en hun activiteiten.

U bent uitgenodigd om deel te nemen aan een onderdeel van deze studie waarin onderzoek wordt gedaan naar de beleving en ervaring van ouderen met dementie omtrent het interactief bereiden van maaltijden. Onderdeel hiervan is een bezoek van studenten aan een woongroep in Pleyade waarin u vragen worden gesteld en uw activiteiten worden geobserveerd, daarvan zullen video opnames en foto's worden gemaakt.

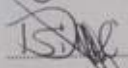
U bent niet verplicht de vragen van de student te beantwoorden. Indien u zich wilt terugtrekken van het onderzoek kunt u dit aangeven aan de onderzoekers. Alle informatie zal als vertrouwelijk worden behandeld tenzij u aangeeft dat het publiekelijk mag worden gemaakt.

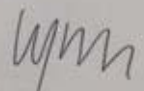
☒ Ik geef **wel** toestemming, mijn video's en foto's openbaar te publiceren op internet en sociale media daarnaast mag mijn data worden gebruikt ten behoeve van het onderzoek. Mijn data zal anoniem worden verwerkt.

☐ Ik geef **geen** toestemming, mijn video's en foto's openbaar te publiceren op internet of andere media, mijn data mag uitsluitend anoniem worden verwerkt ten behoeve van het onderzoek. Ik zal niet in enige video herkenbaar zijn. Mijn data zal anoniem worden verwerkt.

☐ Ik geef **wel** toestemming, mijn video's en foto's openbaar te publiceren op internet en sociale media daarnaast mag mijn data worden gebruikt ten behoeve van het onderzoek, maar ik mag niet herkenbaar zijn in deze beelden. Mijn data zal anoniem worden verwerkt.

Ik heb het 'toestemmingsformulier' begrepen, en neem vrijwillig deel aan dit gebruikersonderzoek. Ik begrijp dat mijn toestemming mijn wettelijke rechten niet beschadigt in geval van nalatigheid of andere wettelijke schuld van iedereen die betrokken is bij deze studie.

Datum: 03-05-2018  
Naam participant: Dya Giel  
Handtekening participant:  dya-giel@hotmail.com

Datum: 9-05-2018  
Naam student: Lynn Visser  


Naam: Xinhui Yang, Lynn Visser, Rani Škrabanja and Veerle van Wijlen  
Titel: Gebruikers studie Pleyade & TU/e  
Tel: 06-34263647  
email: l.visser.3@student.tue.nl

Technische Universiteit Eindhoven, 14 maart 2018

### Toestemmingsformulier

Voor ons onderzoeksproject aan de Technische Universiteit Eindhoven doen wij onderzoek naar de reactie van ouderen met dementie op het interactief bereiden van maaltijden. Onderdeel daarvan is het filmen van de interactie tussen de ouderen met dementie en hun activiteiten.

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☐ Ik geef **geen** toestemming, mijn video's en foto's openbaar te publiceren op internet of andere media, mijn data mag uitsluitend anoniem worden verwerkt ten behoeve van het onderzoek. Ik zal niet in enige video herkenbaar zijn. Mijn data zal anoniem worden verwerkt.

☐ Ik geef **wel** toestemming, mijn video's en foto's openbaar te publiceren op internet en sociale media daarnaast mag mijn data worden gebruikt ten behoeve van het onderzoek, maar ik mag niet herkenbaar zijn in deze beelden. Mijn data zal anoniem worden verwerkt.

Ik heb het 'toestemmingsformulier' begrepen, en neem vrijwillig deel aan dit gebruikersonderzoek. Ik begrijp dat mijn toestemming mijn wettelijke rechten niet beschadigt in geval van nalatigheid of andere wettelijke schuld van iedereen die betrokken is bij deze studie.

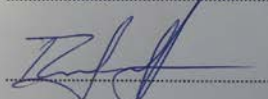
Datum:

24/05/18

Naam participant:

Hubertus C. Eshoff

Handtekening participant:



Datum:

.....

Naam student:

.....

Technische Universiteit Eindhoven, 11 oktober 2016

### Toestemmings Formulier

Voor het project 'Design for Dementia' van de Technische Universiteit Eindhoven, wordt onderzoek gedaan naar uw mening over de interactie en vorm van een product. Onderdeel daarvan is het filmen en praten met u.

U bent uitgenodigd om deel te nemen aan een onderdeel van deze studie waarin onderzoek wordt gedaan naar de beleving en ervaring van ouderen omtrent dagroutines en routines binnen een activiteit. Onderdeel hiervan is een bezoek van studenten aan de focusgroep waarin aan u vragen worden gesteld en activiteiten worden uitgevoerd, daarvan zullen video opnames en foto's worden gemaakt.

U bent niet verplicht de vragen van de studenten te beantwoorden. Indien u zich wilt terugtrekken van het onderzoek kunt u dit ten aller tijden aangeven aan de onderzoeker. Alle informatie zal als vertrouwelijk worden behandeld tenzij u aan geeft dat het publiekelijk mag worden gemaakt.

- ☒ Ik geef **wel** toestemming, mijn video's en foto's openbaar te publiceren op internet en sociale media daarnaast mag mijn data worden gebruikt ten behoeve van het onderzoek. Mijn data zal anoniem worden verwerkt.
- ☐ Ik geef **geen** toestemming, mijn video's en foto's openbaar te publiceren op internet of andere media mijn data mag uitsluitend anoniem worden verwerkt ten behoeve van het onderzoek. Ik zal niet in enige video te zien of te horen zijn.

Ik heb het 'toestemming formulier' begrepen, en neem vrijwillig deel aan dit interview. Ik begrijp dat mijn toestemming mijn wettelijke rechten niet beschadigt ingeval van nalatigheid of andere wettelijke schuld van iedereen die betrokken is bij deze studie.

Datum:

3-4-2018

Naam participant:

J. de Vries

Handtekening participant:

 (zoon van dhr. J. de Vries van  
woning nr. 42 Eldersstraat)

Datum:

.....

Naam student:

.....

Handtekening student:

.....

Technische Universiteit Eindhoven, 11 oktober 2016

## Toestemmings Formulier

Voor het project 'Design for Dementia' van de Technische Universiteit Eindhoven, wordt onderzoek gedaan naar uw mening over de interactie en vorm van een product. Onderdeel daarvan is het filmen en praten met u.

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U bent niet verplicht de vragen van de studenten te beantwoorden. Indien u zich wilt terugtrekken van het onderzoek kunt u dit ten allen tijden aangeven aan de onderzoeker. Alle informatie zal als vertrouwelijk worden behandeld tenzij u aan geeft dat het publiekelijk mag worden gemaakt.

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Ik heb het 'toestemming formulier' begrepen, en neem vrijwillig deel aan dit interview. Ik begrijp dat mijn toestemming mijn wettelijke rechten niet beschadigt in geval van nalatigheid of andere wettelijke schuld van iedereen die betrokken is bij deze studie.

Datum: 11-4-2018 .....

Naam participant: J.P. Gaffers .....

Handtekening participant:  .....

Datum: .....

Naam student: .....

Handtekening student: .....

## Appendix B: Transcriptions user study 1

### *General observational and caregiver interview notes*

4 seniors are eating at the table in the beginning, the amount depends on who is feeling good enough to eat together. Later on they are with 6.

5 caretakers per living. In the morning they have activities at “het pleintje”--> caretakers decide who can join which activity.

They like the “Tovertafel”. This activity is often done together with the “zorggezellen”.

Caregiver says that you see that the seniors decrease in cognitive abilities every day. In retirement villages (woonzorgcentra) seniors have good cognitive abilities and a little bit of supervision, mainly focussed on just the care they need and that's it. Seniors often feel lonely there but cheer up when they are transferred to Pleyade livings because they get more attention and have more people to talk to. The seniors themselves also see the other group mates decrease in cognitive abilities which can be hard. Often they don't notice themselves decreasing in cognitive abilities.

The caretakers often cook for the seniors. Some seniors do preparation work but the caretakers say that most seniors don't like to cook. They may but they just don't like it.

Pancakes are prepared for the seniors. Jo must be feeded by one of the caretakers, for some the pancakes are already fully prepared to eat and some seniors finish their pancakes (and cut) themselves.

They may always use a knife, but when it gets too dangerous for them (determined by caregiver) they may not use it anymore. One of the caregivers says that when they get instructions the seniors often cannot follow up on them, it is too hard.

...h breakfast

rest/ activities

12.00 lunch

rest, bed or living room (tv, newspaper)

14.00 coffee and something small and nice to eat

17.00 dinner

In the end of the afternoon the seniors start to feel restless.

Medication is sometimes put in food because they don't like the taste of it or they don't like swallowing it. At the request of family members or of the seniors themselves they could get extra vitamin pills. There is also a dietitian.

The seniors sing sometimes together with all of them and talk with each other but got irritated quite fast--> caretakers say that is humane behavior.

Elderly woman 1, sings and dances often which influences the mood of the other seniors in the room. Others start to sing along as well or say to her that she is a good singer (Johan often says that). Elderly woman 1 laughs a lot but also makes crying sounds sometimes. Elderly woman 1 is already in a further stage of dementia.

When the seniors have lots of excitement around them, for example lots of new people, a nice tv program or singing or eating good food, their mood is good. Elderly woman 1 often starts singing in these situations. TV: national geographic or André Rieu (music).

The seniors react on each other with sounds or short sentences at the dining table. They seem to enjoy eating together. They make jokes as “ha krullenbol”. When Elderly woman 1 starts making crying sounds the others say to her that she is not going to cry today, “we gaan niet huilen he vandaag” or “niet snotten hoor”. The seniors also talk quite a lot with the caregivers and make jokes with them. All the seniors seem willing to involve Jo (severe dementia) in their lunch experience and conversation as well by looking at him and encouraging him to eat his yogurt.

Lots of excitement, lots of talk, busy ambiance--> what if they are preparing food together and they get used to it and it isn't exciting anymore, would the connective degree decrease? -> potential for future daily activities that have the same format: doing something together to achieve a common goal

### *Personalized observations of behavior and prototype interactions and resident interviews*



**Elderly woman 1:** moderate to severe phase of dementia (rens mentioned that the dementia is in the front of the brain).

Elderly woman 1, sings and dances often which influences the mood of the other seniors in the room. Elderly woman 1 laughs a lot but also makes crying sounds sometimes and then starts laughing again. Elderly woman 1 is already in a further stage of dementia. Says she doesn't like it here at Pleyade and then starts laughing, is she serious?

Elderly woman 1 has been sad for a while because she lived in one of the other livings and one of her group mates with which she was a good friend died over there. But when they moved her to her current living she cheered up because of the good ambience and more people she could talk to. She often repeats what others say and then starts laughing, is it a kind of way to ask for attention?

Cooking mama: very smooth interaction, she understands what to do with the instructions of Lynn. She really likes it. "Wat gemeen he!". "Loopt te foppen he!" "foeifoei" "Ja was leuk!"

I think she knows very good it is fake.

Interview:

Doesn't like to cook, "niet zo gek op". She likes to do nothing, others may cook for her. Although she likes good food. "Ik heb ook van m'n moeder geleerd" (she states that she has learnt cooking from her mom). "Ik hou niet van spruitjes!" (she doesn't like sprouts).

While interviewing the others, Elderly woman 1 keeps on singing ta tada etc. and clapping with her hands or ticking on the table. "Oh nou weet ik het niet meer" (she forgot about what she sang). Everybody claps with her and sing Mien met de mandolien.

"En we gaan nog niet naar huis" (she sings a child song about not going home yet).

She enjoys the music coming from the radio and sings some words along with it, knows a lot of songs! She says she likes reading but the caregivers say she doesn't read at all.

Prototype:

When she got the banana she immediately wanted to break it in two. The other woman is back to see what's happening. She understands to cut the banana from past experience but that she has to do it in steps (by the lines), that's too new for her. Lynn set lines on the banana with the knife but that did not really help. The other half of the banana she doesn't want to cut anymore.

**Elderly woman 2, 93 years old:** mild to moderate phase of dementia, same phase as other woman and Johan. Very good able to talk to.

Cooking mama: creates interest for it by the rest of the seniors at the table. With Lynn's instructions it succeeds quite good, but it was harder for her than for Elderly woman 1. "Ja maar dat kan niet" (she thinks it is not possible to cut an onion on an Ipad) "Nou rollen de tranen me over de wangen" (makes a joke about the fact that the onion doesn't make her cry).

Interview: She likes and enjoys to live here but rather lives at home! She thinks she can talk well with the other seniors, have nice conversations. She used to live in Dieren. When the others hear that they make a joke about living with the wild animals "bij de Wilde Dieren".

"Als ze er allemaal zijn dan is het wel gezellig" (she states that if all seniors are there then she enjoys the most). She likes cooking but has stopped with it since she lived here at Pleyade, "Ja vind ik wel leuk". She likes cooking on her own, it is just nicer, can't explain why exactly, "Ik kook liever alleen, is gewoon fijner". She has always cooked by herself. Now, she lets the other people cook for her, "Laat ze dat maar alleen doen". Her favorite dish is white beans in sour sauce.

She says that if she has recipes she could cook everything and that she likes a lot kinds of food. "Hou je niet van spruitjes?" "Kan je aardappels koken?" "Kan jij koken?" (2x) (she asks Lynn if she is able to cook, twice, also to me but once and asks if she likes sprouts).

She likes to go shopping, buying things for herself "iets leuk kopen, voor mezelf".

"Parfum, hou ik ook wel van" (she also likes perfume).

"Tets leuks om aan te trekken, een truitje" (she likes to buy herself clothes).

"Ik kan het goed alleen hoor" (she states that she is very well able to go shopping on her own).

"Wat zou je kopen?" (she asks Elderly woman 1 what she would buy).

She laughs about the behavior of Elderly woman 1, the ta ta ta, and singing and clapping.

She doesn't like to do any activities that are organized, caregivers admit as well.

Prototype:

It was hard for her to see how to place the strawberry and where to cut. Finally with Lynn's help she got it and cut exactly on the line but the knife worked not that well. She was a bit upset there was no rewarding and didn't want to eat the strawberry.

After experiment she is going back to the living area to sit in a chair.



**Johan:** mild to moderate phase of dementia, same phase as Elderly woman 2 and other woman. Very good able to talk to but can be repetitive.

Cooking mama: for him it is really hard to do although he always peels potatoes in real-life. “Wat is dat? Uitje snijden?” (he doesn’t understand what to do) “Spannend he!” (he thinks it is very exciting to do) “Snijden? ja dan moet ik een mes hebben” (he thinks he needs a knife to cut the onion). “Ja leuk he? Spanning is eraf” (he liked it but he feels relieved).

Interview:

He likes it to live at Pleyade. “Als je maar leut hebt” (he says that it is good to live here as long you have something to talk about and to talk to).

“Ik kook ook thuis” (he also cooks at home, or maybe he meant that he used to cook at home). He says he can cook everything. He used to live in a family with 12 kids so he learnt to cook from his mother and his father could cook as well, everybody could cook at his home. He likes meat. “Gerre koken” He likes to cook, although nobody else is home to cook for. He says he is half a man, half a wife because he can cook. He keeps telling us that Brussel sprouts need to be cooked one by one, and that it takes time (more as a joke I think).

“Kan mooi zingen hoor” (he often says that Elderly woman 1 is a good singer).

“Lekker buitenspelen” (he jokes that he is going to play outside).

“Sunshine in the morning” (he suddenly starts to sing some English).

“Wilde emigreren naar Australië” (he wanted to move to Australia, he knows people that live there, has never been there but has seen beautiful pictures) He says there is more freedom in Australia.

Prototype:

It was really easy for him. We first peeled off the banana. He cut exactly on the lines and ate it all as a rewarding.

**Jo :** is in a very severe phase of dementia. His wife recently passed away but she used to call him daily or visit him. He liked her being around but he seemed to not know that it was his wife. Currently he doesn’t notice that his wife isn’t there to visit him anymore.

Interview:

They didn’t know his name. He always plays with his pants. He seems to enjoy sitting at the table and watch the rest having a conversation but also seems willing to really join. He smiles often and really looks you into the eyes. He can’t talk that well, actually not but tries to sing along with the cd in the cd-player.

**Elderly woman 3:** mild to moderate phase of dementia, same phase as Johan and Elderly woman 2. Very good able to talk to.

Interview:

She likes the banana, Elderly woman 1 cut for her. And she thinks it is nice at Pleyade and enjoys it being here, “jazeke”. She tries to follow the conversation between me, Xin and Lynn.

**Mister Elshoff:** he goes home alternately in days. When he isn’t home his wife or son is there to visit him and do things with him as having a walk.

Wasn’t there at the interview, had a walk with his wife. He sometimes goes with his son to shopping centre Kronenberg.

## Data downloading

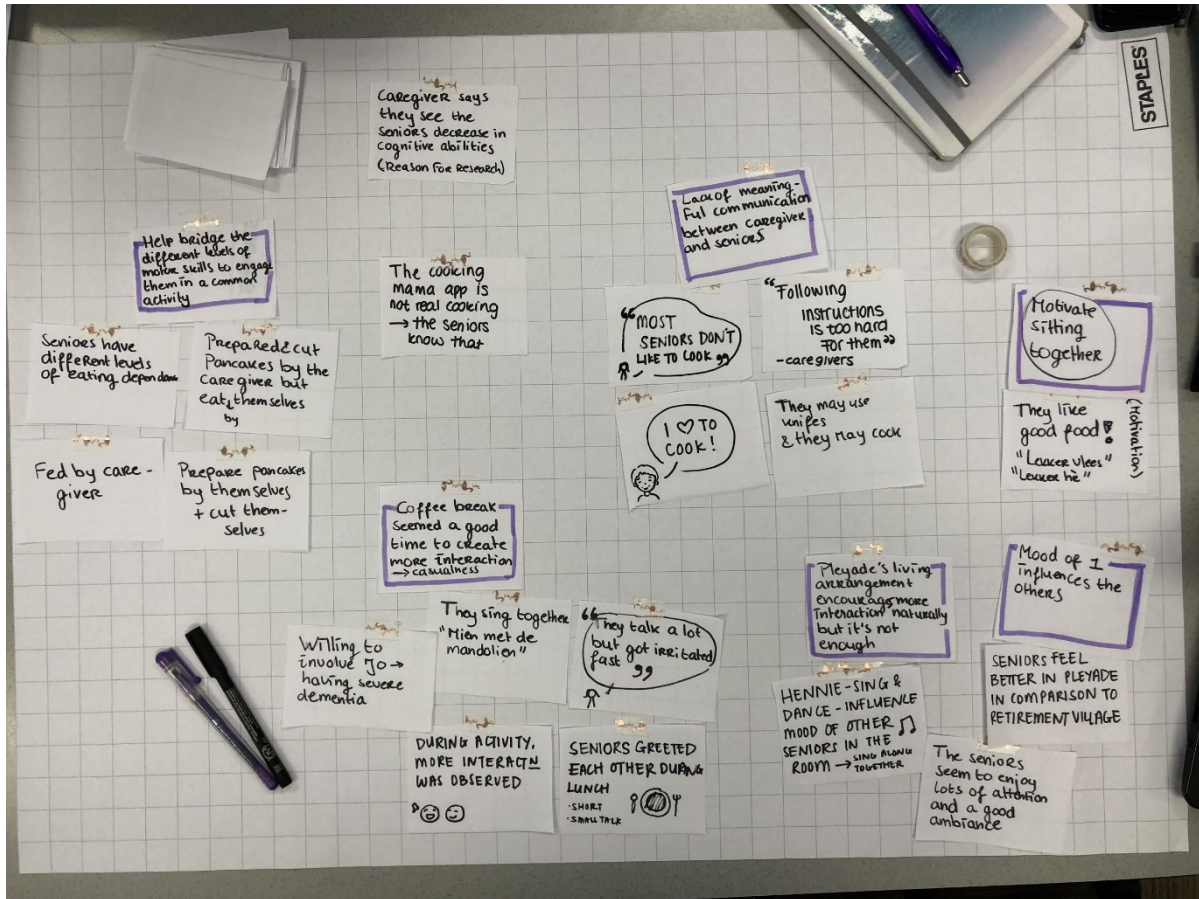


Figure A1. Data downloading containing marked insights out of user study 1 accompanied with quotes and arguments.

Appendix C: Evaluation forms user study 2

The observational evaluation forms used in user study 2 to note the residents' moods and social engagement.

mood.		Before the activity	During the activity	After the activity
Names of participant		😊😊😊😊	😊😊😊😊	😊😊😊😊

social engagement.	Level of Refusal	Duration	Level of Attention	Level of Attitude
Names of participant	whether or not the participant refused the stimulus	The amount of time the participant was involved in the activity	i.e. Not attentive, somewhat attentive, attentive, very attentive	i.e. Very negative, negative, somewhat negative, neutral, somewhat positive, positive, and very positive

Figure A2. Evaluation forms to note down mood and social engagement of the residents during user study 2.

## **Appendix D: Interview questions user study 2**

### *Interview Questions seniors*

After the cooking therapy session

#### Motivation

1. What was your experience after the cooking therapy session (making and eating fruit salad)?
2. How do you feel at the moment? (mood)
3. What did you expect from the cooking therapy session? Were these expectations met?
4. Would you like to do this cooking therapy session again?

#### Social engagement

5. How do you see/view yourself in this group?
6. How do you describe your role in the group?
7. What do you think of your house mates?
8. Do you feel connected to your house mates?

### *Interview Questions caregivers*

After the cooking therapy session

1. How would you describe the relationships between the seniors?
2. What are some methods you use to lighten the mood?
3. How different are the elderly behaving today compared to usual?
4. Do you think the cooking tools would help encourage conversations?
5. How effective do you think the cooking tools would be at bringing the elderly closer together?

## Appendix E: Transcriptions user study 2

### Evaluation forms

<b>mood.</b> <i>Names of participant</i>	<b>Before the activity</b> 😊😊😊😊	<b>During the activity</b> 😊😊😊😊	<b>After the activity</b> 😊😊😊😊
HENNY	😊 MIXED EMOTIONS	😊 VERY HAPPY! SINGING SONGS	😊 ENJOY EATING THE FRUITS
JOHAN	😊 VERY HAPPY! A VERY CHEERFUL MAN	😡 VERY FOCUSED ON THE TASK	😊 HAPPY CHATTING WITH EVERYONE
GERDA	😊 NEUTRAL	😡 REJECTED THE ACTIVITY	😊 JOINED THE CONVER- SATION AFTERWARDS
JOE	😊 NEUTRAL	COULD NOT PARTICIPATE, BUT SAT AT THE TABLE	😊 HAPPY EATING THE FRUITS JOHAN CUT
N.A.	N.A.	N.A.	N.A.
N.A.	N.A.	N.A.	N.A.

<b>social engagement.</b> <i>Names of participant</i>	<b>Level of Refusal</b> <small>(whether or not the participant refused the stimulus)</small>	<b>Duration</b> <small>(The amount of time the participant was involved in the activity)</small>	<b>Level of Attention</b> <small>(in that attentive, somewhat attentive, attentive, very attentive)</small>	<b>Level of Attitude</b> <small>(i.e. very negative, negative, somewhat negative, neutral, somewhat positive, positive, and very positive)</small>
HENNY	✓ ACCEPTED	COMPLETED THE TASK FAST	ATTENTIVE	<b>POSITIVE</b> COULD NOT CARRY OUT SOME TASKS, BUT ENGAGEMENT WAS GOOD THROUGHOUT
JOHAN	✓ ACCEPTED	COMPLETED THE TASK VERY FAST!	VERY ATTENTIVE	<b>VERY POSITIVE</b> WAS VERY PARTICIPATIVE THROUGHOUT THE ACTIVITY, HAPPY CUTTING FRUITS FOR HIS FRIEND
GERDA	✗ REJECTED SHE SAT AT THE TABLE	N.A.	N.A.	<b>VERY NEGATIVE</b> GAVE SHARP REMARKS ABOUT THE ACTIVITY, BUT REQUESTED FOR AN ACTUAL CUTTING BOARD TO CUT FRUITS HER WAY
JOE	✗ COULD NOT PARTICIPATE, BUT SAT AT THE TABLE	N.A.	N.A.	HAS HAPPY EATING FRUITS THAT HIS FRIENDS CUT, AND ENJOYED THE CONVERSATIONS
N.A.	N.A.	N.A.	N.A.	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.

Figure A3. Evaluation forms filled out after user study 2.

#### Observational notes

##### Elderly woman 1

- Was in a mixed mood initially (during lunch) - Happy and neutral
- Accepted and participated in the activity
- During the activity:
  - She was given a bunch of grapes to remove from the branches and put into another bowl
  - Did it relatively fast, and was very attentive to the activity
  - She was very focused doing it and did complete the task successfully
  - Since she was done faster than Johan, who was still cutting the fruits, she was watching Johan attentively
  - Given an orange to peel after that, and she started eating the orange on her own
- After the activity:
  - She was still very happy, singing songs but not as much as previously
  - We tried to ask her to try the soup stirring guide, but she couldn't follow the direction and instead did it her own way

Johan

- Was very happy before we even started, was talking to Lynn and initiating conversations
- Accepted and participated in the activity
- During the activity:
  - Given strawberries and bananas to cut
  - Did it VERY FAST and was very attentive to the activity
  - He was very focused on completing the task
  - He was just sitting and waiting for next instructions for a period of time, as there was only 1 moderator (Lynn), and could not pay attention to all of them at all times
- After the activity:
  - He was still happy, and enjoying the company
  - He was cutting fruits for Jo to enjoy
  - We gave him the soup stirring guide, and he could successfully stir the soup perfectly

#### Elderly woman 2

- Completely refused the activity and did not want to participate despite asking her a couple of times
- She wasn't in a very good mood to begin with, and this activity felt absurd to her
- She instead wanted to eat fruit, cut in her own style
- However she stayed throughout the activity at the table with a neutral mood throughout, compared to the previous time when she walked away and slept on the sofa chair
- Towards the end of the session, when the group was still talking about fruits, she joined in the conversation saying that she likes tomatoes
- She did make small talk with us, pointing out that ripped jeans are ugly

#### Jo

- Joined in the activity halfway, did not say much but we gave him fruit that Johan cut to eat
- He was happily enjoying the strawberries that Johan cut, poking us to feed him more
- He is adored by his housemates, all asking him if he enjoys the fruits and making small talk with him

#### Elderly woman 3

- Did not participate in the activity at all, was resting in her room

#### Videos

##### Side notes:

- Radio is playing while doing the preparation session
- Not all seniors were sitting around the table
- Not all seniors were taped, but voices are recognizable

##### Johan:

- At first he does not understand he has to cut the banana
- He thinks he has to peel the banana even though it is already peeled off
- Lynn has to clearly tell him what to do, repetitive
- When Lynn says he has to cut on the lines he understands it immediately and does it
- No refusal, seems to like it
- Responds to Lynn when she says: "goedzo"! He says: "huppa!" very enthusiastically
- Not much explanation is needed when cutting a strawberry
- He cuts the strawberry using one hand
- Seems very focused on cutting strawberry: cuts precisely, looks directly at the cutting board and is bend forward, puts strawberry in place when shoven away
- Asks for feedback on how well he cut the strawberry: "nou?" (multiple times, also when he cuts an apple) and "kijk eens?"
- Asks for feedback on how to cut the strawberry: "gewoon doormidden of niet?"
- Jo sits next to him in his wheel chair, quitly
- Enjoys eating his cut fruit in silence
- After cutting his strawberry exactly in halves he puts back the knife on the cutting plate and that's it
- "Zo mevrouw", he asks for feedback on the strawberry he cut
- He needs to use quite a lot of force to cut the apple but is very much concentrated on it, uses both hands
- He thinks it is quite tough to cut the apple "valt niet mee hoor om dat ding te schillen" but he says he is peeling instead of cutting
- He responds on Lynn's question if Elderly woman 1 knows a song about fruit
- Responds to Elderly woman 1 when she says "voor fruit kom ik eruit" by saying yes! ("ja!") and repeats this

- Peels the apple skillfully
- Reacts on Elderly woman 1 when she starts a “ratata” melody by doing the same
- Does not immediately understand how to use the steering tool on top of the pan
- Very focused while steering: looks at what he is doing (pan), stays in the track
- Steering in the pan without the tool goes very easily!

#### Elderly woman 1:

- Makes side notes when others (Johan) are cutting, “lekker”
- “Ik lust wel he”
- Eats the grapes she peeled off
- Laughs a lot
- Peels the grapes off easily
- Starts laughing about what Johan says and does
- Focused on peeling grapes but aware of her surroundings and very reactive
- Peels the skin of the orange very easily, good motor skills
- Lynn says: “hallo” to a new senior and Elderly woman 1 immediately starts a kind of melody on it: “hallo, hallo, hallo, mannetje van de radio”
- Responds on Johan’s question to Lynn: “doormidden”
- Makes some sounds: “bapapapap”, “ratata”
- Lynn asks if she doesn’t know a nice song about fruit but she does not really get that, she only repeats the word fruit and starts laughing
- When Johan responds on Lynn’s question: “van fruit komt kruid” responds Elderly woman 1 with another version (which she likes doing): “voor fruit kom ik eruit”
- She is able to ask things: “kijk eens even?”

#### Jo:

- Sits next to Johan in his wheel chair
- Lynn says: “hallo!” and he/she responds with “heeej”
- Seems to like it when Lynn talks to him
- Keeps very quiet while Johan is steering in the pan of water
- Repeats Lynn: “super goed”

#### Elderly woman 2

- Enjoys the banana cut for her

#### Caregiver interview (voice recordings) Dutch

- Sta je hier vaak? Is dit jouw vaste woning  
Ja, deze twee woningen wel ja.
- Ik weet niet hoe vaak je in de week hier staat?  
Wel 2-3 keer in de week, sowieso.
- Altijd bij deze mensen ook?  
Ja
- Dus je kun deze mensen qua gedrag best wel goed.  
Ja
- Zit die meneer al de hele tijd daar?  
Meneer Kaferata
- Nee, die meneer daarachter. Of zit hij op een ander balkon?  
Ja, die zit ook wel eens op het andere balkon. Dat is meneer Koekoek.
- Oke. Zijn vrouw komt hem wel eens ophalen. Of is hij dat niet? Er is een man en zijn vrouw komt hem wel eens ophalen.  
Nee, dat is een andere man. Die zit ook op het balkon te roken.
- Hoe zou je de relaties tussen de mensen beschrijven? De mensen hier, de bewoners in deze woning.  
Heel hecht met mekaar, ze kennen mekaar ook. Ze vragen naar mekaar. Als er eentje op bed ligt, of eentje is er niet. Van hé, waar is die lange man? Of waar is die meneer met die dikke buik? Heel hecht met elkaar. Als er iemand ziek is, is het van gaat het wel goed met diegene? Ook al kunnen ze niet altijd goed communiceren met mekaar, ze geven wel om mekaar. Het is wel een hele hechte groep, vergeleken met andere woningen.
- Je probeert ze wel eens op te vrolijken, als ze zich minder voelen, of down voelen. Wat voor een methodes gebruik je ervoor?  
Je moet een beetje de mensen kennen. Dus ik weet dat Elderly woman 1, die is altijd wel vrolijk, maar als ze down is, vindt ze muziek altijd wel leuk. Van wat ik nu weet, van deze woning hier: André Rieu.



Als je een DVDtje aan zet van Andrié Rieu, een beetje hard. Dan gaan ze hier met zijn allen zitten. Muziek is wel in deze groep een big thing.

- Dus niet alleen voor Elderly woman 1, maar gewoon voor iedereen?  
Gewoon voor iedereen, dat vinden ze allemaal leuk. Ik zat net ook met de stagiaire een karaoke middag te organiseren. Ik denk dat ze het hartstikke leuk vinden.
- Ja, ik denk dat dat wel past ja.  
En anders met goed eten, lekker, gebak, ijsjes, slagroom. Ja, dat vrolijk ze wel altijd op.
- Net als net met de slagroom.  
Ja dan is het zo van ooooh.
- En gedragen de mensen die wij vandaag hebben gezien, dus Johan, Jo, Elderly woman 1 en ik weet niet hoe die andere mevrouw heet.  
Mevrouw Holleman (Elderly woman 2)
- Gedragen die zich anders, dan dat ze normaal doen? Of is het hoe ze altijd zijn?  
Dit is eigenlijk hoe ze altijd zijn. Meneer Kaferata is wel een beetje van het laconieke Rotterdamse, dat kan je ook wel horen. Elderly woman 1 is altijd vrolijk, ze wordt vrolijk wakker, ze gaat vrolijk naar bed. Jo die is, zoals hij nu is, want Jo heeft ook wel eens momenten gehad dat hij geen zin heeft in niks en dan reageert hij nergens op. Maar dit is Jo, wanneer hij echt goed wakker is, goed bij is. Hij kan dan op prikkels reageren, lachen, neurien. Dat is Jo. En mevrouw Holleman is gewoon zij is. Gewoon een beetje rustig, verstandiger, wat volwassener.
- Ze wil niet betutteld worden.  
Nee, dat vind ze helemaal niks.
- Met dat snijplankje en zo, dat ze accepteert niet.  
Nee, ze is echt van de afstand. Een beetje het goed is.
- Stel dat Jo zo'n dag dat hij down is heeft, wat probeer je dan te doen?  
Nou meestal als Jo een down dag heeft, dan is hij ook heel vaak heel moe en slap. Dan heeft hij dan een bed dag. Dus dan blijft hij op bed en dan probeer je hem eigenlijk met lekkers, zoals vla. Want Jo, die heeft niet zo veel tanden. Dus hij kan niet zo veel eten. Dus wat hij krijgt is pap, dat is standaard. Vla en al die dingen. Maar ik probeer dan wel gewoon andere dingen wat hij niet standaard krijgt te geven, dus iets van fruit smoothies. Ik had hem net vanille vla met stukjes peer erin. Dat vindt hij lekkere dingen, in bed vindt hij dat altijd wel vrolijk. Ik probeer va alles, ik draai zijn bed om zodat hij naar buiten kan kijken, zulke dingen, muziek. Het lukt bijna wel altijd dat ik hem opvrolijk. Maar hij heeft ook wel momenten gehad dat hij nog geen zin heeft.
- Mag ook wel.  
Ja toch.
- Denk je dat het koken of het snijden van fruit in groepsverband dat dat de sfeer zou kunnen bepalen voor mensen?  
Ja eigenlijk wel, want het is wel iets wat ze samen doen. Op deze woning heb je best wel veel zelfstandige mensen en die gaan ook zelfstandig hun eigen ding doen. Dus dit brengt ze wel bij mekaar. Zoals mevrouw Holleman, die leest een krantje of gaat naar haar kamer tv kijken of doet puzzelen. En meneer Kaferata zit buiten. Weet je, dit brengt ze wel bij mekaar om iets leuks te doen. En dat wordt ook niet altijd gedaan.
- Nee? Mis je dat hier?  
Ja. Er worden wel vaak activiteiten gedaan. Zoals vanochtend, is meneer Kaferata, mevrouw Huisman worden ze opgehaald en gaan ze wandelen. Maar dat is toch iets apart van de groep hier. Dus ik vind dat dit wel een invloed heeft, een goede sfeer heeft, op de groep, met het fruit snijden.
- Denk je dat het ook samen koken dat het mensen helpt meer met elkaar te communiceren?  
Ja toch wel, want ze willen elkaar verbeteren of ze willen elkaar bewijzen dat ze het goed kunnen. En dan is het van: "Kijk, en dit, nee dat moet je zo doen, en dit en dat". Misschien die mekaar niet liggen, dat ze toch bij mekaar. Hier liggen ze mekaar wel. Ik denk gewoon dat als je dit op een andere groep zou doen, dat dit denk ik ook wel zal helpen dat dit invloed zal hebben voor goede communicatie. Vind ik wel.
- Is er een groep waarvan je weet dat het niet zo lekker loopt?  
Woning 140
- De groep hiernaast? Vinden de mensen elkaar niet zo?  
Niet altijd.
- Hoe merk je dat dan?  
Gewoon "He die weer, oh". Ja je merkt het wel ze zeggen het wel. "He die is gek" of "huuhuh". Beetje zo. Hier is wel anders dan daar. En ik sta daar ook heel vaak, dus ik ken die mensen ook door en door. Het is toch, maar ik denk dat het daar dan wel weer op zal werken. Als je bijvoorbeeld fruit gaat

snijden. Net ook hoor, de woonassistent kwam ook langs: “Waarom gaan ze alleen daar fruit snijden, hier zouden ze dat ook...” Ik zei ja, maar het is hun opdracht.

- Ook interessant voor ons.  
Ja dat jullie dat ook weten, altijd wel handig.
- Dankjewel  
Geen dank

*Caregiver interview (voice recordings) English*

- Do you work here often? Is this your ... home  
Yes, these two homes.
- How often in the week are you in this home?  
At least 2-3 days
- Always with these people?  
Yes
- So you know the people quite well in terms of behavior?  
Yes
- Is that man sitting there already the whole time?  
Mister Kaferata?
- No, the man behind him. Or is he sitting on another balcony?  
Oh yes, he sometimes sits on the other balcony. That's mister Koekoek.
- Okay. His wife sometimes comes to pick him up. Or isn't that him? There is a man and sometimes his wife comes to pick him up.  
No that is another man. He is smocking on the balcony.
- How would you describe the relationship between the people? The people here, the residents of this home.  
Very close to each other, they also know each other. They ask about each other. When someone is lying in bed, or someone isn't there. Like: hey, where is that tall man? Or where's the man with the fat belly?  
Very close to each other. When someone is ill, it will be like: is he okay? It is a very close group in comparison to other homes here.
- You try to cheer them up sometimes, when they feel a bit less happy, or when they feel down. What for methods do use for it?  
You have to know the people a bit. I know that Elderly woman 1, she is always happy, but when she is down, then she always likes music. What I know now, from this group: André Rieu. When you put on a DVD of André Rieu, a little loud. Then everyone will sit here. Music is a big thing in this group.
- So not only for Elderly woman 1, but for everyone?  
Yeah for everyone, they all like it. I was also planning a karaoke afternoon with the intern. I think they will love it.
- Yes, I think it will fit.  
And otherwise with good food, delicious, cake, ice cream, whipped cream. Yes, that will always cheer them up.
- Just like the whipped cream.  
Yes, then they will be like: “ooooooh”.
- And do the people we saw to today behave, so Johan, Jo, Elderly woman 1 and I don't know the name of the last lady.  
Madam Holleman (Elderly woman 2)
- Do they behave differently than normal? Or is this how they always are?  
This is what how they are. Mister Kaferata is a bit of the laconic Rotterdam's, you can hear that. Elderly woman 1 is always happy, she wakes up happy, she goes happy to bed. Jo is, like he is now, because Jo had his moments that he doesn't feel like anything and then won't respond to anything. But this is Jo, when he is really good awake, good aware. He can respond to stimuli, laugh, hum. That's Jo. And madam Holleman is just who she is. A little calm, more wise, more adult like.
- She doesn't want to be patronized.  
No, she doesn't like that at all.
- With the cutting board, she just doesn't accept it.  
No, she is someone who likes distance. A little like it's good.
- In case Jo has a day that he is down, what do you try to do?  
Well, in most cases that Jo has a bad day, he is really tired and weak. He will have a bed day then. He will stay in bed and then you try him with something sweet, like custard... Because, Jo hasn't got so many teeth. He can't eat that much. So what he gets is porridge, that's the standard. Custard and things like that. I try to give him other things he won't get standardly, so something like fruit smoothies. I just

gave him some vanilla custard with pieces of pear in it. He thinks that are nice things, in bed he always finds that good. I try a lot, I turn around his bed so he can look out the window, things like that, music. It almost always works to get him happy. But sometimes he had his moments that he still doesn't feel like doing anything.

- That's allowed.

Yes, right.

- Do you think the cooking or the cutting fruit in a group could define the atmosphere for people?

Yes, I do, because it's something they do together. In this home, there are quite a lot independent people and they will do their things independently. So this will bring them together. For example, madam Holleman, she reads the paper or goes to her room to watch TV, or will start puzzling. And mister Kaferata will sit outside. You know, this brings them together to do something fun. And that doesn't always happen.

- No? Do you miss that here?

Yes. There are some activities. Like this morning, when mister Kaferata and madam Huisman get picked up and go for a walk. But it's still something apart from the group here. So I think it has an influence, a good atmosphere, on the group, with cutting the fruit.

- Do you think that coking together helps the people to communicate more with each other?

Yes, I do, because they want to improve each other or prove to each other that they can do it well. It will be like: "Look, and this, no, you have to do it like this, and this and that." Maybe, when they don't really like each other, that they will (help) each other. Here, they like each other. I think if you would do this with another group, that this would help and have an influence for good communication. I think so.

- Do you know a home, where they don't always like each other?

Home 140

- The group next to this one? Do the people not like each other?

Not always.

- How do you recognize that?

Just like: "Hey, that one again? Ohh." Yeah you notice it, they say it. "Hey, that one's crazy" or "huuuuhhuuh." A little like that. Here is something different than there. I also work there often, so I know those people quite well as well. It is like that, but I think it would work there as well. When you will cut fruit for example. Just before, the living assistant came by: "Why are they only cutting fruit there, here they would also..." I said yes, but it's their assignment.

- So this is quite interesting for us as well.

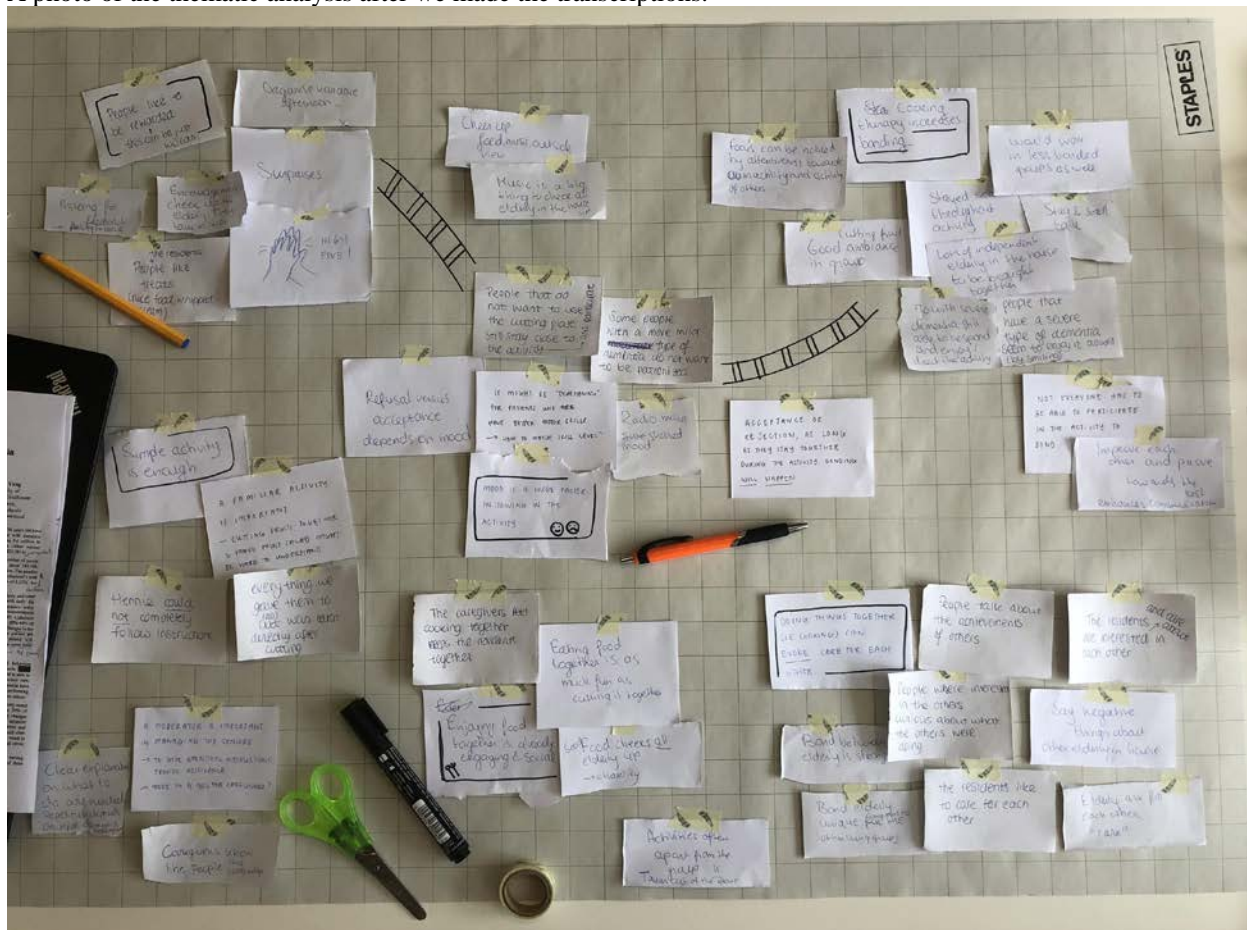
Yes, that you know it, always can be handy.

- Thank you

You're welcome.

### Data downloading

A photo of the thematic analysis after we made the transcriptions.



**Figure A4. Data downloading after user study 2 showing the marked insights accompanied by quotes and arguments.**

## Appendix F: Technical sketches

The illustrator files of the cutting plates.

### *User study 1*

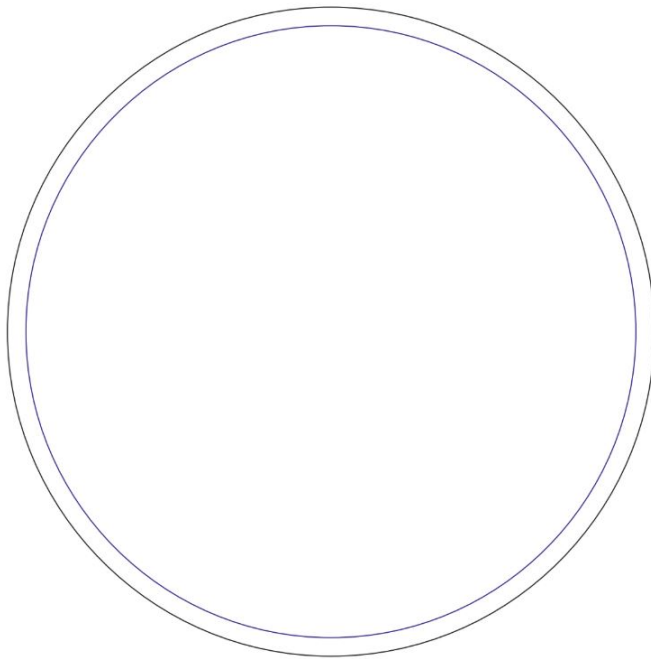
Illustrator sketch to lasercut the cutting plate for our first prototype, out of Vivak material.

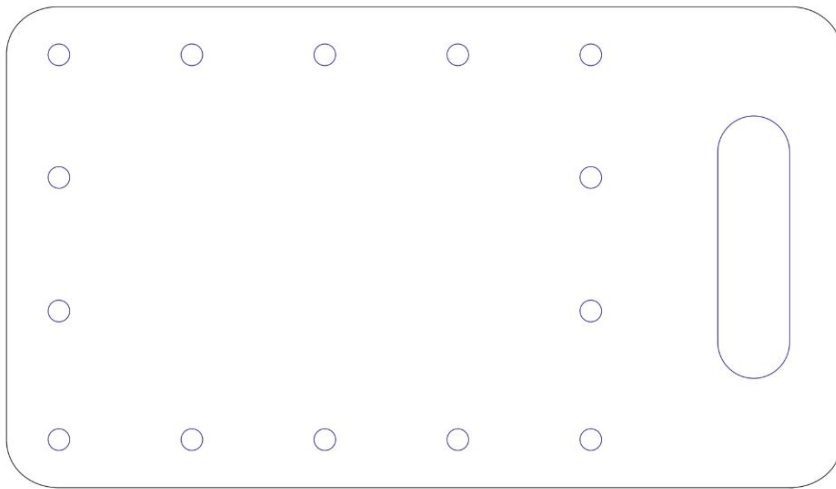
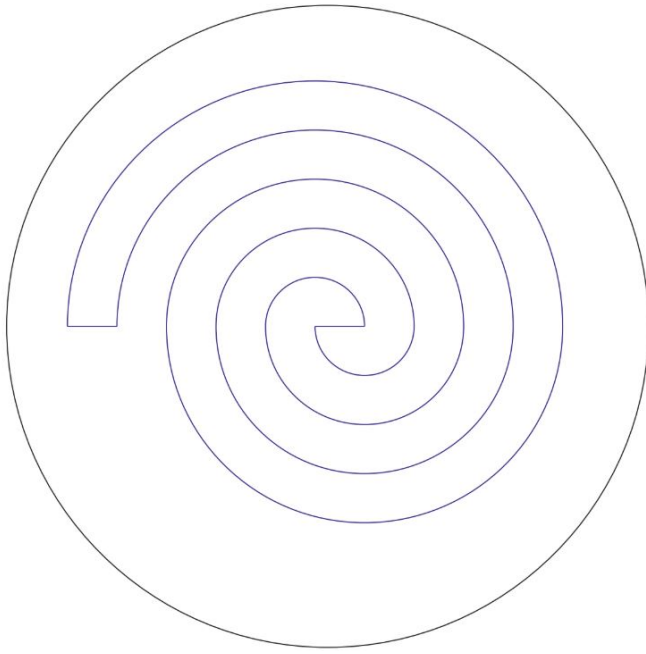


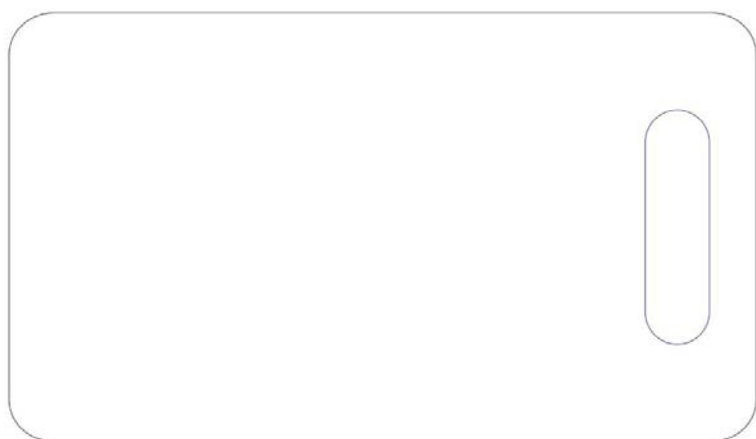
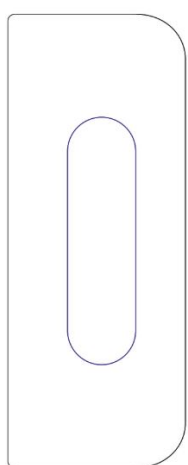
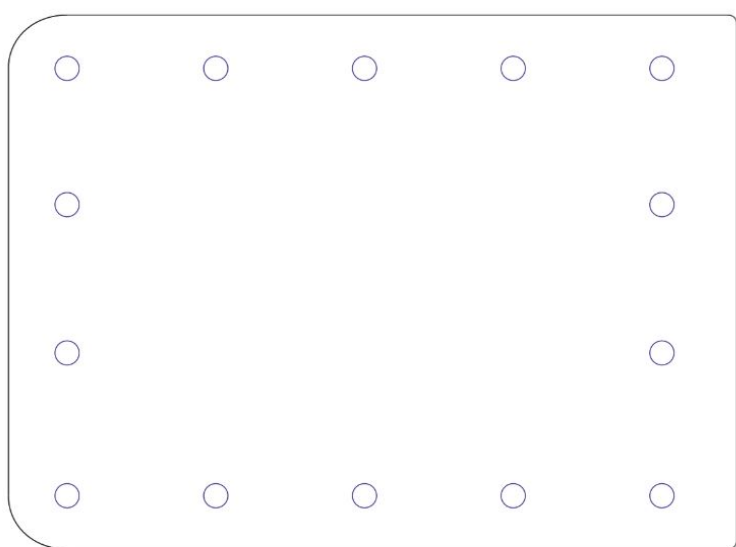
**Figure A5. Illustrator file cutting plate user study 1.**

### *User study 2*

Illustrator sketches to lasercut the pot stirring guide and the final cutting plate prototype, out of Vivak and wood.





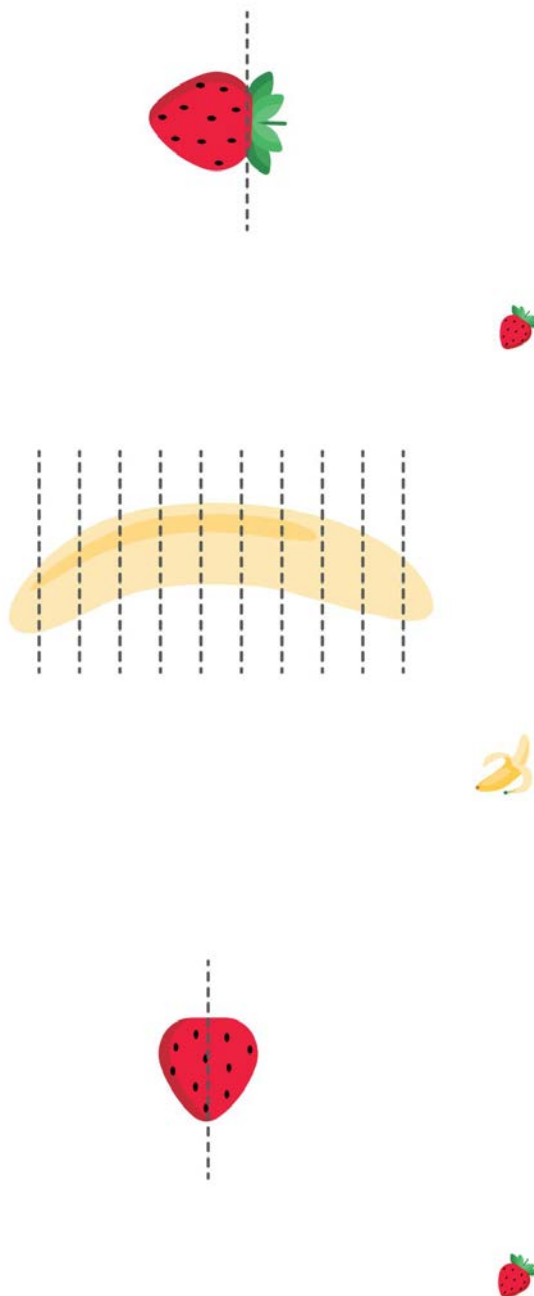


**Figure A6. Illustrator files final cutting plate prototype and pot stirring guide exploration.**  
**Appendix G: Visualizations (fruit sheets)**



The fruit sheets made for the prototype iterations and the 2 user studies.

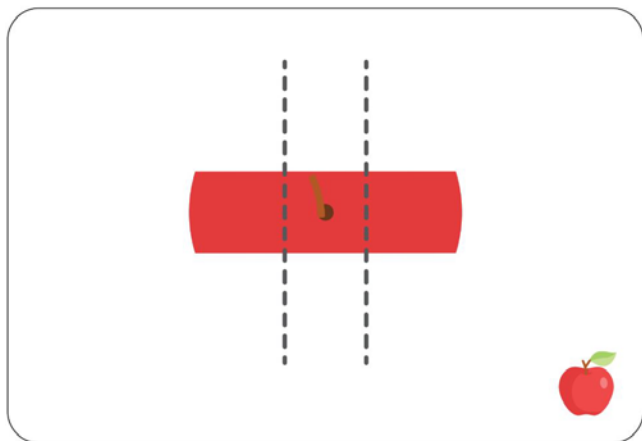
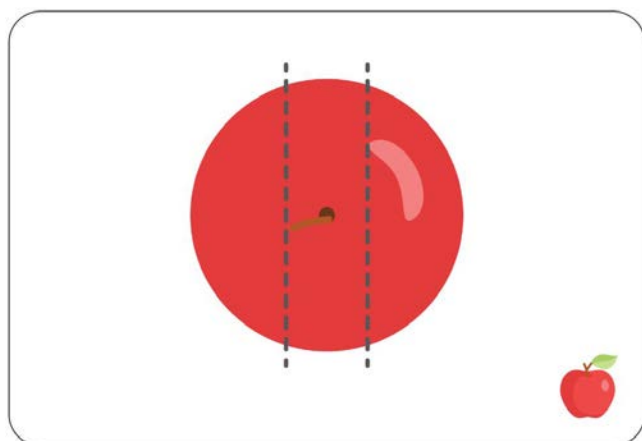
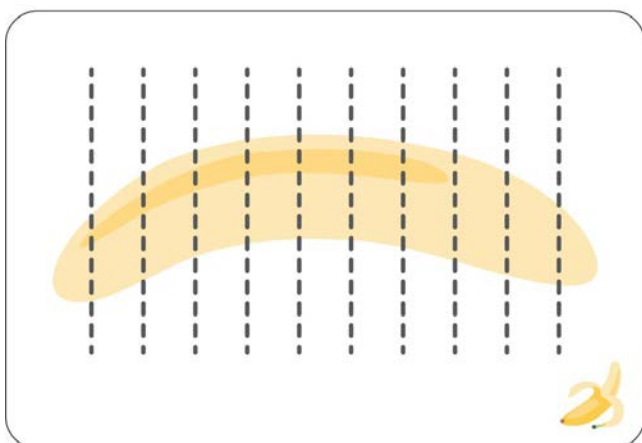
#### *User study 1*

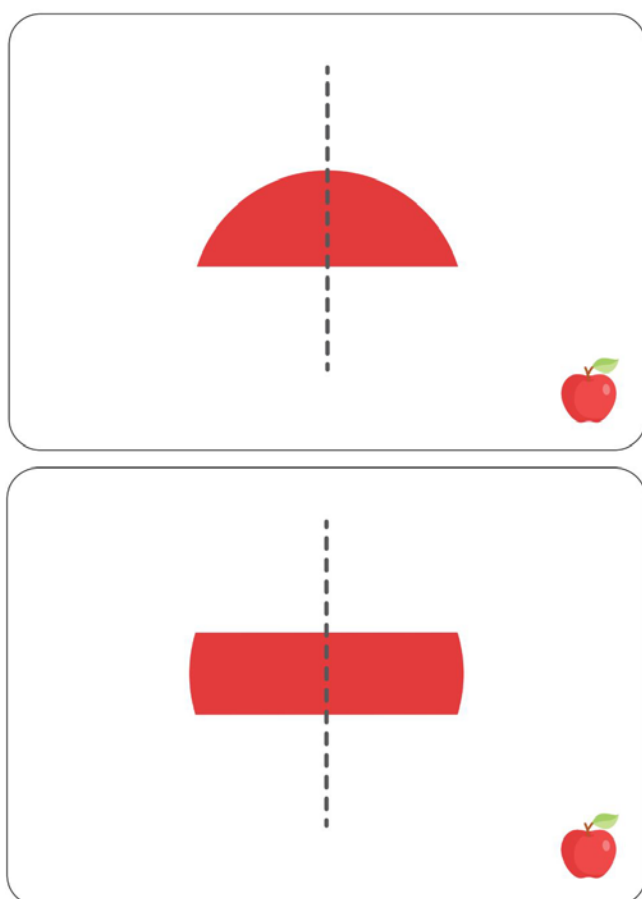


**Figure A7. Visualizations on how to cut the fruits used in user study 1.**

#### *User study 2*

The main difference with the visualizations used in user study 1 is that we gave them rounded edges which fitted with the aesthetics of the final prototype, and they have a smaller size (change size from A4 to A5) to be able to insert them. Furthermore, we visualized more types of fruit besides bananas and strawberries, namely apples. Because the apple needs to be cut in steps, those steps were visualized as well.





**Figure A8. Visualizations on how to cut the fruits used in user study 2.**