

# Investigation of Quantification of the Suitable Photos for Conversation Assistance for Elderly and Youth

Miyuki Iwamoto<sup>(✉)</sup>, Noriaki Kuwahara, and Kazunari Morimoto

Kyoto Institute of Technology, Kyoto, Japan  
cabotine.six.stars@gmail.com

**Abstract.** The aging of Japan is proceeding at an unprecedented rate in the world, and the aging rate is very high. As the aging society advances and the living environment changes, the environment surrounding the elderly is also changing. Along with then, various social problems are caused. For example, a syndrome of shut itself up of the elderly may be mentioned. “Housebound” is to spend most of the living space and the living time in the house, resulting in the disuse of cognitive functions and further the opportunities and motivation for activities such as going out and interpersonal contact decreasing. In addition, there are elderly who are shut itself do need various support and nursing care in many cases.

As for prevention, it is not only to increase the frequency of outings but also to revitalize all aspects of life of elderly by playing a role in society.

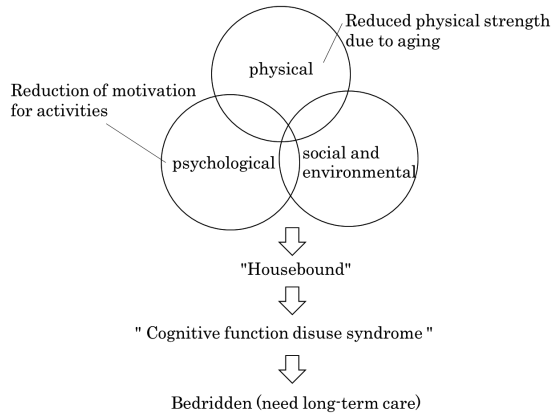
Thus, in order to prevent the decline of cognitive function, it is thought that the connection with society becomes increasingly important. While the younger generations are accordingly expected to be talking partners for aged people, there is a problem in that they are unfamiliar with how to communicate with the elderly because so many of them grew up in small families without grandfathers or grandmothers. We examined the differences in the mental burden and the quality of communication between patients and caregivers/volunteers when they used photos as communication support content in order to find the best medium for communication. We revealed that what category is the more ideal as the contents but we did not mention the photos in the category. We will investigate the differences in the mental states and communication quality of elderly people and their younger conversation partners when photos are used to support communication, and quantification the best medium for this purpose.

**Keywords:** Elderly · Reminiscence videos · Dementia · Conversation

## 1 Introduction

The aging of Japan is proceeding at an unprecedented rate in the world, and the aging rate is very high [1]. There are increased nuclear families, and the time spent by elderly and young people together is decreasing. As the aging society advances and the living environment changes, the environment surrounding the elderly is also changing. Along with then, various social problems are caused. For example, a syndrome of shut itself up of the elderly may be mentioned.

“Housebound” is to spend most of the living space and the living time in the house, resulting in the disuse of cognitive functions and further the opportunities and motivation for activities such as going out and interpersonal contact decreasing. A live tend to shut itself means that roles in the community and society decrease, and the frequency of going out is low. The factors that lead to a syndrome of shut itself can be cited three factors of physical, psychological, social and environmental. These three factors are considered to be related to each other (Fig. 1) [2].



**Fig. 1.** Factors and position of housebound

In addition, there are elderly who are shut itself do need various support and nursing care in many cases. For example, the elderly who are not trying to actively participate in social activities is thought to increase the risk of developing dementia. Therefore, syndrome of shut itself may risk of dementia. As for prevention, it is not only to increase the frequency of outings but also to revitalize all aspects of life of elderly by playing a role in society.

Cognitive function is to acquire information from the outside through the five senses, to understand the current situation, to recognize it, to cause some kind of reaction. For example, it is memorizing or talking. People are always in this state except when they are asleep. However, due to aging, visual and auditory functions generally degrade, so often it will incorrectly recognize information from the outside. For example, it is a mistake or a mistake.

In addition, the cognitive function of the elderly is characterized by large individual differences. This is considered to be influenced by socio-cultural factors (Education, occupation, hobby, exercise, etc.) in addition to the intrinsic factor (Genetic, stress, physical condition, mental state etc.). As one of methods for preventing dementia and cognitive decline, it is attention to activate physical activity in everyday life [3].

Thus, in order to prevent the decline of cognitive function, it is thought that the connection with society becomes increasingly important.

Aiming to realize a society where elderly people can live with peace of mind, a wide variety of watching services are provided. The watching service is a service that

watches everyday living for old couples and old singles, responds promptly if they have abnormal situation occurs, and provides peace of mind for families and the elderly. In addition, a mechanism to monitor the elderly by cooperation of private (local residents), administrative and medical is developed. It has expected them as neighbors to watch over the elderly people, that is, proximity and everyday life. The information gained through such a network between residents is conveyed to specialized agencies, so that prompt response can be made.

As we have said as was mentioned above, as a way to watch over the elderly, we believe that cooperation of local residents who are physically close to each other is indispensable. However, at present it is difficult to have ties and bonds because the mental distance with local residents is far away. Therefore, we propose a watching system with consideration for community and society by communicating with reference to the reminiscence method.

This is a style in which families, medical care staff, local people surround elderly people (Fig. 2).

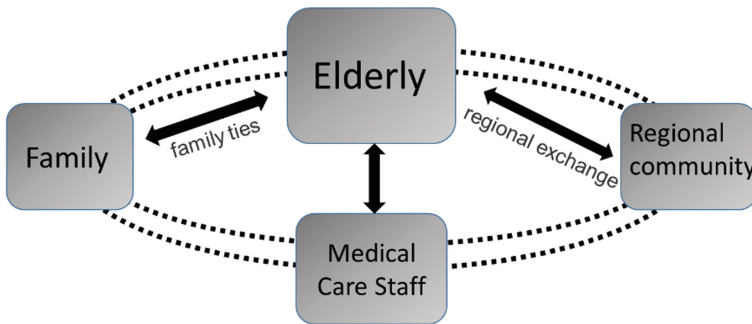


Fig. 2. Watching the elderly to suggest

In order to implement this watching system, cooperation of local residents is indispensable. In order to gain the cooperation of local residents, it efforts that they do not feel the burden of exchanges with the elderly become necessary. Their numbers are insufficient to meet the current needs. While the younger generations are accordingly expected to be talking partners for aged people, there is a problem in that they are unfamiliar with how to communicate with the elderly because so many of them grew up in small families without grandfathers or grandmothers. The 20th century is the era of change, and the era largely changes in the first half, the middle stage, the second half. Therefore, it is difficult to find common points of conversation with each other. Furthermore, it is difficult to find a common topic between the elderly born in the first half and the young born in the second half. Therefore, in order to provide topics and to have a smooth conversation, it is necessary to provide content that does not feel burdens or dissatisfactions for elderly people and young people.

We examined the differences in the mental burden and the quality of communication between patients and caregivers/volunteers when they used photos as communication support content in order to find the best medium for communication.

We revealed that what category is the more ideal as the contents but we did not mention the photos in the category.

We will investigate the differences in the mental states and communication quality of elderly people and their younger conversation partners when photos are used to support communication, and quantification the best medium for this purpose.

## 2 Experiment

### 2.1 Summary

In the face-to-face conversation between the elderly and the young adults, we examined the influence on the continuation of the conversation for each photographic image and whether the burden is felt during the conversation.

We have already done the evaluation for each category, and as a result. We conducted experiments in 5 categories [4]. The categories used for conversation were “Food” “Play” “Event” “Home Appearance”, “Lives during the Showa Era”.

We set a time limit of 10 min per category and did a conversation without limiting the time for each photograph. When I judged that the conversation was interrupted, I presented a new photo. The experiment is 10 min per category.

A camera (line-of-sight device) had used to capture the expressions of the elderly patients throughout the sessions. The expressions of the elderly were then analyzed from the video recordings.

Whether young people are accustomed to conversation with the elderly or not familiar with the degree of burden and whether there is a time difference for each photograph by not restricting the conversation time in one picture, Also, it was aimed to verify whether there is a relationship between time difference and emotion.

### 2.2 Evaluation Item

The participants in the study answered a series of questions in the form of a 5-stage subjective evaluation after each conversation. For the questionnaire, in addition to the questions we asked in the experiments we have conducted up to now, we asked whether a sense of burden was felt during the 10 min of conversation. The experiment’s results show these subjective evaluations (the questionnaires, and also the young adults’ degree of burden from the “stress check sheet”). The proportion of the conversation during which they were smiling was measured for the elderly patients.

As for the subjects, one young adult interviewed five elderly and estimated an average of the mental load he or she felt, excluding personal compatibilities. The young adult indicated the degree of mental load felt on the stress check sheet (Fig. 3) every minute.

The stress check sheet represented facial expressions on a 1-7-scale, with the face corresponding to “1” meaning that there was an absence of any burden (stress) to continue the conversation, and the face corresponding to “7” meaning that the person felt a great deal of burden. A camera was used to capture the resident’s expressions and actions throughout the sessions. We compared these to see which photographs brought

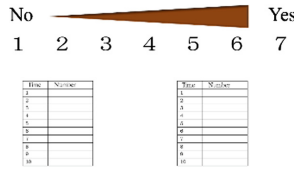


Fig. 3. Stress check sheet

him or her pleasure or joy. Facial expressions were correlated with emotions analyzed in a previous study [5].

### 2.3 Subject

The partners were 8 students of 23–25 years old. They grew up in a family of nuclear families and is not used to conversation with the elderly.

The elderly were 5 senior ladies and 1 senior man of ages from 84 to 96 suffering mild dementia.

### 2.4 Experiment Environment

The layout of the experiment is shown in Figs. 4 and 5 below.

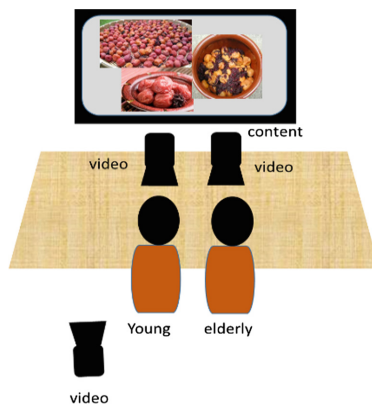


Fig. 4. The layout of the experimental environment

We borrowed a room in the nursing home, in which we placed chairs side by side.

We used a laptop PC in which photos categorized as explained above were up-loaded to support a 10 min conversation.

We carried out checks on the degree of burden felt through the conversation by the students.



**Fig. 5.** Experimental environment.

## 2.5 Expression Analysis

The expressions of the elderly were analyzed from the video recordings. Analysis of facial expressions of older people analyzed images of facial expressions that had been caught in 1 min for each photograph in the previous experiments but in this experiment the expression images of one category for ten minutes are framed every second, Frame images for the number of conversation hours for each piece of content photograph were classified by their respective pictures and analyzed using the frame images. By making it into a frame, it is possible to delete facial expressions of parts other than conversation in the video, and it can be thought that picture and emotion can be related more.

In this expression analysis, we evaluated the “degree of smile” on a frame-by-frame basis. We defined 0% as an expressionless state in which there was no smiling at all, and 100% as a state of the highest laughter. We used the highest degree of smile expressed as the result for each photograph displayed.

## 2.6 Experimental Methods

The experiment was carried out as follows.

- ① Young people and elderly people sit next to each other in front of the television screen.
- ② Shoot the face of young people and elderly people with video camera.
- ③ Display the photo image on the TV monitor.
- ④ Start conversation.
- ⑤ The conversation will automatically change 1 min for each photo. Maximum 10 photos (10 photos per category)
- ⑥ Young people change the picture and simultaneously measure the stress of the conversation every minute.
- ⑦ Fill out the stress check sheet.
- ⑧ Perform 1 to 6 in each category.

The above was done for young people for five elderly people.  
We talked two categories to one elderly person.

We prepared 10 photos for each of the categories of “Food,” “Event,” “Play,” “lives during the Showa Era,” and “Home appearance,” which were shown during the flow of the conversation.

The partner student indicated the degree of mental load he or she felt on the stress check board every minute. The stress check sheet was hidden from the patient’s eyes. Our purpose was to check the mental load of the partner in the conversation, not to expose their complaints to the elderly. Thus, the partner could point at a value without worrying about offending the elderly patient, enabling them to judge honestly. The sheet was sometimes shown in the middle of their conversation but they continued to talk while pointing at the applicable value on a minutely basis. They then answered the questions on the questionnaire through the 5-stage subjective evaluation each time after the experiment. A camera (Positive/negative) was used to capture the expressions of the elderly patients throughout the sessions. The expressions of the elderly were finally analyzed from the video recordings.

### 3 Results

The results of the experiment described in Sect. 2.6 are shown below. Figure 6 shows the amount of stress accumulated for each photo image category.

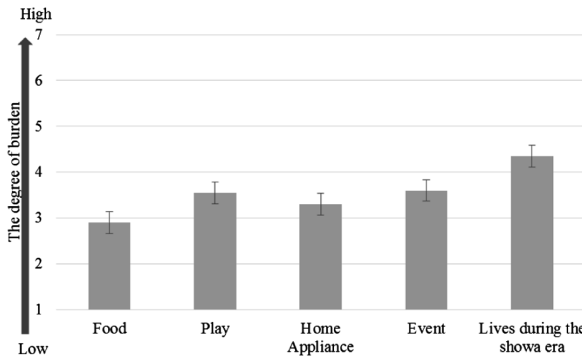


Fig. 6. Stress levels based on image type

The horizontal axis represents each category, and the vertical axis represents the accumulation on the numerical stress check sheet. This is a comparison of the young adults stress levels in case for each category of photos which is a comparison of the burden felt to continue the conversation as the conversation support content. Only the younger subjects’ mental stress levels are shown.

The most stress was experienced when images depicting “Lives during the Showa Era” were shown. In the “Events” “Play” we found that there was almost the same degree of burden (stress). We found that food is the least stressful category.

Figure 7 shows an average of the degree of smile of elderly people by category, and is classified into cases of subject A and subject B. The horizontal axis represents each

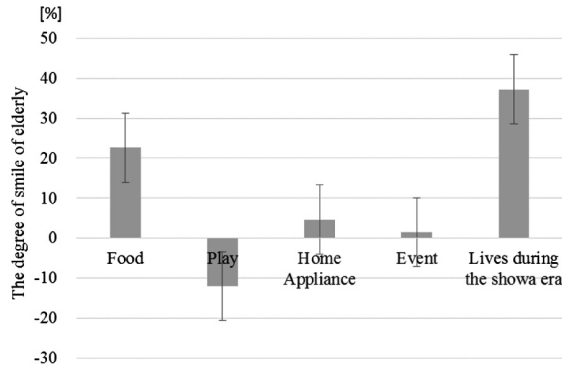


Fig. 7. The results of the expression analysis

category, and the vertical axis represents the degree of smile of the elderly. The degree of smile represents the negative area from 0 to  $-100$ , and the positive area is expressed from 0 to 100.

“Food” “Lives during the showa era” category has higher smile degrees of elderly people than other categories. On the other hand, in the category of “Play”, “Home Appliance”, “Event”, it was found that the degree of smile was about the same.

Figures 8, 9, 10, 11 and 12 show the relationship between the degree of smile of elderly people per photograph and the degree of burden of young people for each category. The horizontal axis shows each picture, and the vertical axis shows that the bar graph shows the degree of smile of elderly people, and the line graph shows the degree of burden of young people. The degree of smile of elderly people represents negative areas by 0 to  $-100$ , and positive areas are represented by 0 to 100. In addition, the degree of burden of young people represents the score of the stress check sheet (1: feel no stress  $\Leftrightarrow$  7: feel the stress).

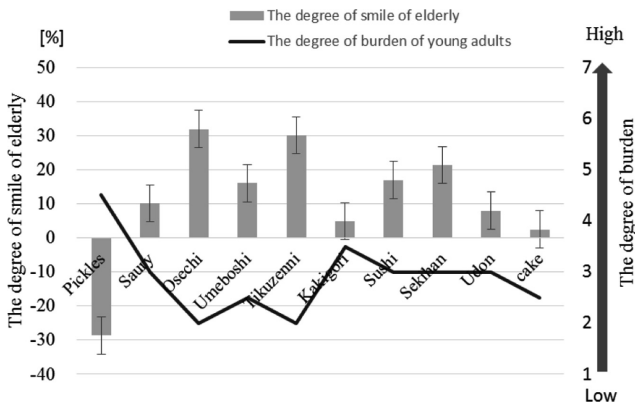
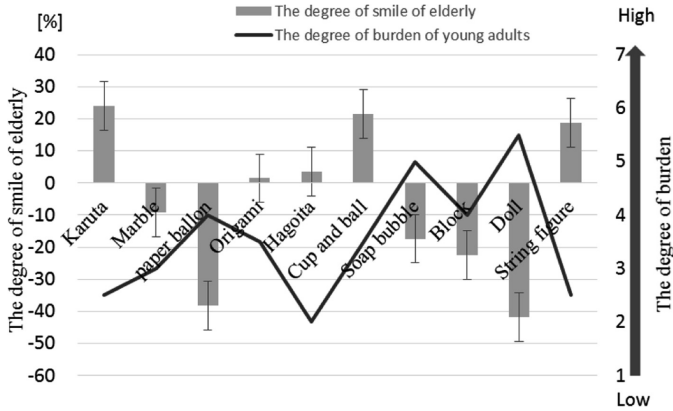
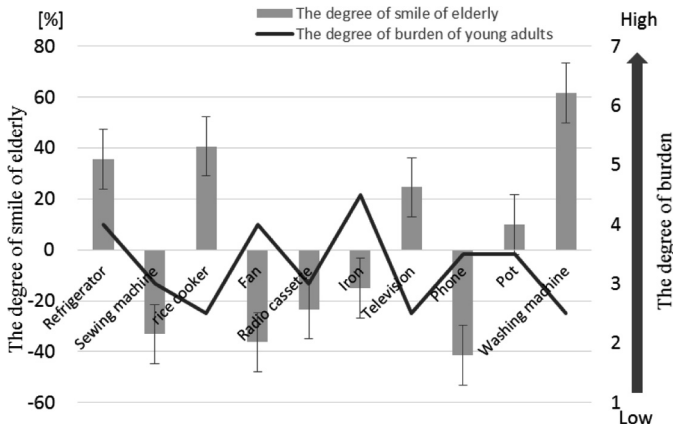


Fig. 8. Relationship between the degree of smile of elderly and the degree of burden of young adults (Food)





**Fig. 9.** Relationship between the degree of smile of elderly and the degree of burden of young adults (Play)

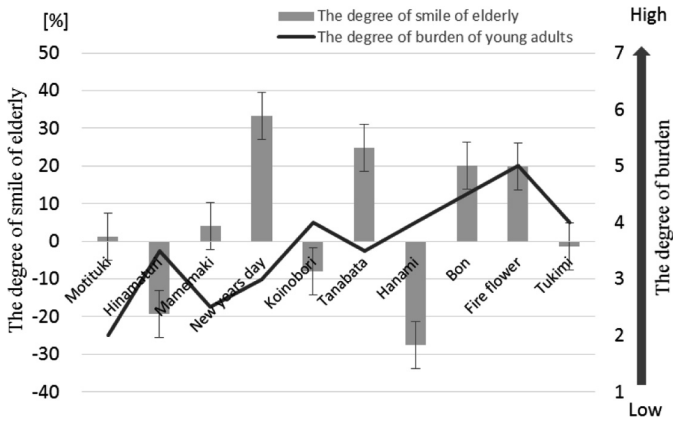


**Fig. 10.** Relationship between the degree of smile of elderly and the degree of burden of young adults (Home Appliance)

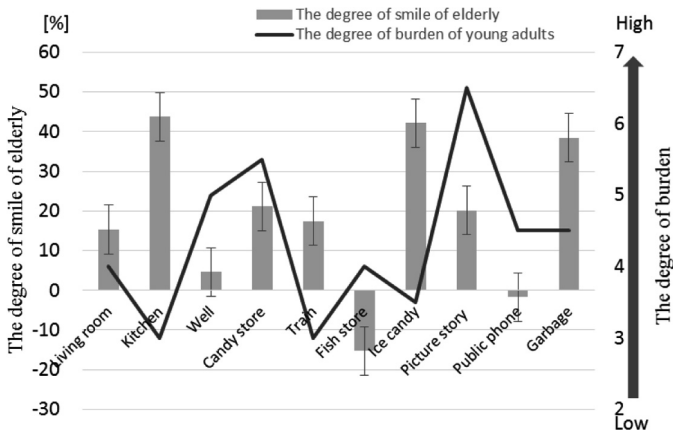
In the category of “Food”, the elderly show negative smile degree only with picture of “pickles”. In addition, young adults show the highest degree of burden in the photo of “pickle”, showing the lowest burden degree in the photos of “Osechi” “Chikuzenni”.

In the category of “play”, the elderly shows a relatively high degree of smile in photos of “Karuta” “Kendama” “Ayatori”, and shows a relatively low degree of smile in the photos of “Paper balloon” “Doll”. In addition, young adults show a high degree of burden in photos of “Soap bubbles” and “Doll”, showing a low burden degree in pictures of “Karuta” “Hagoita” “Ayatori”.

In the category of “Home Appliance”, the elderly shows the highest degree of smile in the photo of “washing machine” and shows the lowest degree of smile in the photo of “Phone”. In addition, young adults show the highest degree of burden in the photo of



**Fig. 11.** Relationship between the degree of smile of elderly and the degree of burden of young adults (Event)



**Fig. 12.** Relationship between the degree of smile of elderly and the degree of burden of young adults (Lives during of Showa Era)

“Iron”, showing the lowest burden degree in the photo of “rice cooker”, “Television” and “washing machine”.

In the category of “event”, the elderly shows the highest degree of smile in the photo of “New Year day” and shows the lowest degree of smile in the photo of “Hanami”. In addition, young adults show the highest degree of burden in the photo of “Fire flower”, and show the lowest burden degree in the photo “Mochituki”.

In the category of “Lives during of Showa Era”, the elderly show a relatively high degree of smile in photos of “Kitchen” “Ice candy” and “Garbage”, showing only a low degree of smile in the photo of “Fish store”. In addition, young adults show the highest degree of burden in the photo of “picture story” and show the lowest burden degree in the photos of “Kitchen” “Train”.

## 4 Conclusion and Future Topics

### 4.1 Conclusion

The category of “Food” that the young adults have the lowest burden shows the second highest percentage of the degree of smile of the elderly, but “Lives of during Showa Era” that young adults have the most highest burden category, and the elderly have the highest smiles category. This shows that the degree of smile of elderly people and the burden degree of young people are not necessarily related to each other.

Although it can not be said unconditionally, looking at the relationship between the degree of smile of elderly for each photo and the degree of burden of young adults, the degree of burden of young adults tends to be relatively low when the degree of smile of elderly is high.

“Osechi” “Chikuzenni” “Karuta” “Kendama” “Ayatori” “Rice cooker” “Washing machine” “New Year day” “Kitchen” “Ice candy”, the burden of young adults is low, the degree of smile of the elderly was high, it is considered to be a photograph which is comparatively suitable as content. In all evaluation, it was found that when the conversation occurred with a category where there was less commonality between the young people and the elderly, the burden of the young people increases. Regardless of age, it was found that with things that are familiar in the present environment that can be a category of mutual interest between the young adults and the elderly. Therefore, it is considered that discussing topics from categories that are familiar to both groups regardless of age reduces the mental burden on young adults.

### 4.2 Future Topics

It will be necessary to verify that the same can be said in more categories. Furthermore, we believe that it is necessary to reduce the burden of silence on conversation and change of conversation during excitement by talking without setting a time limit.

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