

## The Sustained and Selective Effectiveness of a Videophone Conversation for Individuals with Dementia

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### Abstract

Studies reported that a videophone conversation allows individuals with dementia to be psychologically stable even after a 3 h conversation session. The individuals who exhibited difficulty in watching TV programs could still enjoy a conversation. This follow-up study investigated the effectiveness of a videophone conversation using five subjects with mild to moderate dementia. Two sessions were conducted during the study. In Session A, a subject converses with a talking partner through videophone for 30 min, and in Session B, a subject watches his/her favorite TV program. Sessions A and B were rotated on a day-by-day basis. Their psychological stability was evaluated by caregivers using the revised GBS scale (concomitant evaluation) and the overall psychological stability 3 h after each session (delayed evaluation) was also assessed. The significant psychological stability was obtained for two subjects in the concomitant evaluation, and one subject in the delayed evaluation. This indicates that a videophone conversation is a promising remote intervention for assisting individuals with dementia. Further investigation with the participation of more subjects must be conducted.

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## Introduction

Communication is a common and engaging activity for most people. However, for individuals with dementia, it becomes a burden due to their impaired capacity in remembering recent events and decreased language functions<sup>1</sup>. These individuals are also prone to being isolated and poorly informed, with few communication opportunities available to them due to the lack of human resources in the aging society.

A telephone is an essential commodity that is used to maintain social connections and obtain aid during emergencies. However, for individuals with dementia, a telephone conversation might be burdensome as they find it difficult to visualize the person talking on the other end as well as to interpret what is being said. Therefore, a videophone is a more appropriate tool than a telephone that allows these individuals to better understand what is being said as they can see the gestures and body language of the person they are conversing with<sup>2</sup>. Van der Ploeg et al.<sup>3</sup> made a comparison between a videophone and telephone call as a treatment for agitated behaviors of individuals with dementia in nursing homes. The results showed that conversations between the residents and family members through videophone lasted longer than those through telephone, and the mean agitation level of the individuals with dementia decreased more during conversations through videophone than those through telephone<sup>3</sup>.

Several studies assessed the effectiveness of a videophone conversation for individuals with dementia<sup>4,5,6,7,8</sup>. These studies suggest that a videophone is a feasible and acceptable tool that allows these individuals to converse and receive cognitive interventions and also provides caregivers with counseling, nursing home staff with education, etc. (see<sup>9,10</sup>, as reviews). Individuals with dementia can receive a broader daily life assistance by providing them with videophone interventions with multi-component stimuli, that is, not only verbal conversation/instructions but also photos, music, video, etc., at any time of the day<sup>11,12</sup>. For example, the talking partners conversed with individuals with dementia while showing them their reminiscent photos through the Internet<sup>13</sup>. This intervention also worked well for the individuals with

severe dementia<sup>13</sup>.

According to Kuwahara et al.<sup>14</sup> and Yasuda et al.<sup>15</sup>, most subjects were more psychologically stable while conversing with their partners through videophone than while watching TV programs. Further, some of these individuals also remained psychologically stable for more than 3 h after the conversation session ended in the studies<sup>14,15</sup>. The selective beneficial effectiveness was gained from individuals who exhibited difficulty watching TV programs but still enjoyed the conversation<sup>14,15</sup>.

Although the practical implications of these studies<sup>14,15</sup> seem quite positive, the sustained and selective effectiveness induced by a videophone conversation has not yet been reported in other studies. Meanwhile, the reminiscent photos were used in the above studies<sup>14,15</sup>. We need to know whether the psychological stability would be gained without using photos. In this follow-up study, we investigated whether the sustained and selective effectiveness was again observed in other individuals with dementia, even without using photos.

## Methods

### *Subjects and Talking Partners*

The subjects must meet the following inclusion criteria: must be diagnosed with dementia<sup>16</sup>; have the ability to sit and watch the screen of a personal computer (PC) for 30 min; agree with the use of devices and infrastructures, such as a PC, web camera, and Internet connection via fiber-optic cables in their homes; and permit the caregiver to evaluate their psychological stability by using the Gottfries–Brane–Steen (GBS) scale<sup>17</sup>. Five outpatients from the memory clinic of Chiba Rosai Hospital satisfied these criteria and participated in this study as subjects. Their mean age and “mini-mental state” examination (MMSE) score was 76.0 and 22.0, respectively<sup>18</sup>. Table 1 shows the profiles of the five subjects. Two males and three females of the same age participated as talking partners. All talking partners have several years’ experiences. Each talking partner had conversation with each subject four or five times prior to this study.

## Materials

A volunteer visited and set up devices, such as

Table 1. Profile of the Five Subjects

Sub	Sex, Age, Eti, MMSE	Daily behaviors observed by the caregivers
1	F 60 AD 15	She cannot clean the house, makes the same dishes frequently, does not see written memorandums.
2	F 72 AD 22	In order to maintain a record in a diary, she asks what she ate. She needs her husband's instructions to do the housekeeping.
3	F 77 AD 27	She appeals to the neighbors or the police that someone stays on the second floor of her house, mistakes her daughter for her sister, and does not wash her hair.
4	M 80 AD 26	He forgets to take medicines, and forgets that he has eaten meals. He returned home from Tokyo, forgetting the reason for his visit.
5	F 91 AD 20	She forgets what she has said and what she has just done. She recollects past memories inaccurately. She jumps from one topic to another during a conversation more frequently.

Abbreviations: Sub, subject; Eti, etiology; F, female; M, male; AD, Alzheimer's disease.

Note: Subject 3 and 4 were diagnosed as Alzheimer's disease due to the other memory tests such as WMS-R logical memory, paired-words learning, MRI brain imaging, and daily behaviors. All subjects were prescribed dementia drugs.

the PC and web camera, inside the home of each subject and talking partner. The volunteer connected the PCs to the Internet via fiber-optic cables. Skype™ was set to automatically launch when a talking partner clicks a subject's Skype name. The caregivers were asked not to turn off or unplug the cords.

#### Procedures

The subjects, caregivers, and talking partners collectively scheduled the 30-min conversation sessions. The modified ABAB design was used to investigate the effectiveness of a videophone conversation. In Session A, the talking partner remotely booted the subject's PC and asked the subject to sit in front of it so that they could have a 30-min conversation. In Session B, the subjects were requested to watch TV programs according to their preferences. Sessions A and B were changed on a day-by-day rotating basis. Although the time and number of days for sessions A and B were different among the five subjects, the average number of each session was five days (see Table 2). Sessions A and B lasted for a total of two or three weeks for each

subject, and each subject was paired with the same talking partner throughout the period.

#### Evaluations

The caregivers used the GBS scale<sup>17</sup> to evaluate the psychological stability of the subjects. However, the caregivers had difficulty checking all the 26 psychological variables of the GBS scale all the time. Therefore, 10 variables of the GBS scale were selected for the evaluation<sup>14,15</sup> (for the revised GBS scale, see Table 2). Each variable was graded on a scale of 0 (most stable) to 6 (least stable). Each scale was converted to scores, i.e., scale of 0 scored a 0, scale of 6 scored a 6, etc.<sup>14,15</sup>. Accordingly, the lower the scores, the more psychologically stable the subject is. The caregiver observed the subject while the subject was conversing with the talking partner (Session A) or watching TV programs (Session B). Then, the caregiver graded each of the 10 variables of the revised GBS scale in both sessions (concomitant evaluation).

The overall psychological stability was also evaluated 3 h after the subjects conversed with the

talking partner or watched TV programs<sup>14,15</sup>. The caregiver observed the subject's behavior comprehensively and graded the psychological stability of the revised GBS scale of 0–6 (delayed evaluation)<sup>14,15</sup>.

The five caregivers and talking partners provided the information regarding the subject's behaviors during the videophone conversation because the behaviors of the subjects cannot be directly observed.

## Results

The scores of the revised GBS scale of each subject were collected. The scores of the two sessions and the two evaluations for each subject were compared. The revised GBS scale shows that lower scores denoted more psychological stability (Table 2).

In the concomitant evaluation, the total average score of the five subjects in Session A (videophone conversation) was 0.26. The average score of Session B (watching TV programs) was 0.49, which suggests that the subjects were more psychologically stable while conversing through videophone than watching TV programs. However, in the paired *t*-test, no significant statistical differences were observed in both sessions [ $t(4) = 1.25, p > 0.05$ ].

The average score of the five subjects is shown in the concomitant evaluation (Fig. 1). As shown in the figure, a significant difference in the psychological stability between conversing through videophone and watching TV is apparent in Subjects 3 and 5. A paired *t*-test revealed a significant difference between sessions A and B, that is, [ $t(9) = 5.46, p < 0.01$ ] for Subject 3 and [ $t(9) = 4.49, p < 0.01$ ] for Subject 5, which shows that conversing through videophone yields a better psychological stability than watching TV. No significant differences were obtained from the other subjects.

In the delayed evaluation, the total average score of Sessions A and B is 0.41 and 0.85, respectively. In addition, the subjects appeared to be more psychologically stable 3 h after conversing through videophone than watching TV. However, no significant statistical differences were obtained from the two sessions [ $t(4) = 1.53, p > 0.05$ ].

The average score of the five subjects is shown in the delayed evaluation (Fig. 2). The average scores of

Subjects 3 and 5 in Session A (conversing through videophone) were low compared to those observed in Session B (watching TV). A paired *t*-test for subject 5 revealed a significant difference between the two sessions [ $t(4) = 2.138, p < 0.05$ ]. However, no significant differences were obtained from Subject 3 [ $t(3) = 1.73, p > 0.05$ ]. In addition, the evaluation shows that Subjects 1, 2, and 4 were completely psychologically stable during both sessions, with a score of 0.

### *Caregiver and Talking Partner's Observation of the Subjects' Responses*

#### **Subject 1**

##### *Caregiver*

She seemed to have enjoyed the videophone conversation. She watched her favorite TV programs but fell asleep while watching those that did not suit her interests.

##### *Talking Partner*

She always politely answered the questions with a smile. However, we sometimes encountered difficulties while talking about certain topics.

#### **Subject 2**

##### *Caregiver*

She conversed with the talking partner as if they were talking face to face. Three or four hours after the conversation ended, she still seemed to appear motivated.

##### *Talking Partner*

She likes to talk. Therefore, we almost did not encounter any problems carrying out the conversation. However, her topics reverted back to her childhood memories and the sports she played during her marriage.

#### **Subject 3**

##### *Caregiver*

After the videophone conversation ended, she was able to smoothly perform the household tasks that I asked. This may be due to the satisfaction she felt after having the conversation.

##### *Talking Partner*

I decided to prepare topics beforehand with the

Table 2. The scores of the revised GBS scale

Subjects	Sub.1		Sub.2		Sub.3		Sub.4		Sub.5	
Sessions	A§	B¶	A	B	A	B	A	B	A	B
Numbers of sessions (Days)	5#)	4	5	5	4	6	5	5	5	5
The concomitant evaluation; the average scores of the revised GBS scale										
GBS:B* Impaired wakefulness	0	0	0	0	0.3	0.8	0	0	0	1.6
Impaired concentration	0	0	0	0.6	0.3	0.3	1.2	0.2	1.2	2.8
Absent-mindedness	0	0	0	0	0	0.7	0	0.2	0.8	1.2
Long-windedness	0	0	0.8	0.6	0.3	0.7	1.4	0	1.2	1.6
DBS:D† Confusion	0	0	0.4	0.4	0	0.3	0	0.2	1.2	2.6
Irritability	0	0	0	0	0	0.2	0	0	0.8	1.4
Anxiety	0	0	0	0	0	0.8	0	0	0.8	1.2
Agony	0	0	0	0	0.3	0.7	0	0	0.2	0.8
Reduced mood	0	0	0	0	0	0.3	0	0	0.8	0.8
Restlessness	0	0	0	0.2	0.3	1.2	0	0	1.2	2.4
<i>Average</i>	<i>0</i>	<i>0</i>	<i>0.12</i>	<i>0.18</i>	<i>0.15</i>	<i>0.6</i>	<i>0.26</i>	<i>0.06</i>	<i>0.82</i>	<i>1.64</i>
The delayed evaluation; Overall psychological stability										
<i>Average of 3 h after sessions‡</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0.3</i>	<i>1.7</i>	<i>0</i>	<i>0</i>	<i>1.8</i>	<i>2.6</i>

NOTE. \*: GBS scale, Section B; intellectual functions, †: GBS scale, Section D; different symptoms common in dementia, ‡: Sessions A and B, §): Videophone conversation, ¶): watching TV programs, #: number of sessions (days)

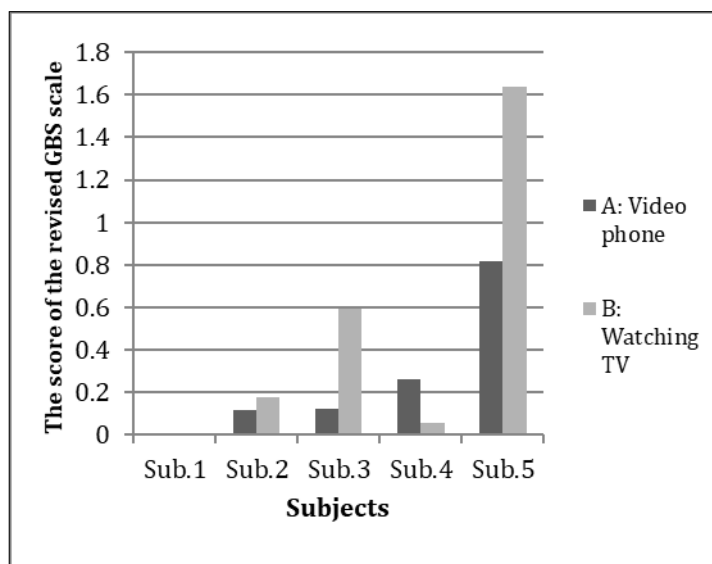


Figure 1. The average scores of the revised GBS scale of the five subjects in the concomitant evaluation.

Abbreviations: Sub, Subjects; A, Session A; B, Session B.

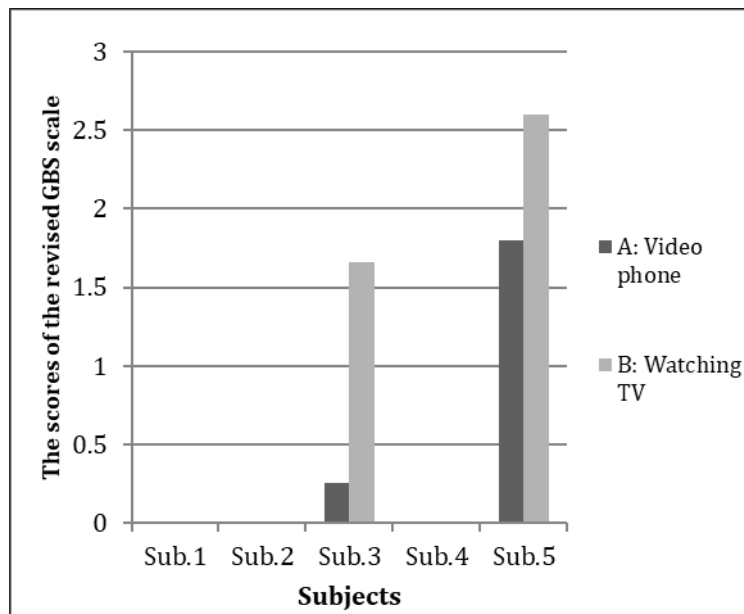


Figure 2. The average scores of the revised GBS scale for five subjects in the delayed evaluation.

Abbreviations: Sub, Subjects; A, Session A; B, Session B.

aid of the Internet, for example, the river in her hometown and the names of mountains. She enjoyed talking about them.

#### Subject 4

##### Caregiver

Before starting the conversation, he would say that he did not want to talk. However, after starting the conversation, he enjoyed and continued talking, and some sessions would last over 30 min. Although he has good concentration, he would sometimes repeatedly talk about the same topics.

##### Talking Partner

At first, he was reluctant about having remote conversations. Then, I asked him to share his profession and favorite fields. He explained them in detail, such as his overseas job assignments. We could continue the conversation using this "lecture style."

#### Subject 5

##### Caregiver

While watching TV programs, she would stand up (she might have thought of something) or touch items on the desk. She forgot the conversation immediately after it ended.

##### Talking Partner

During the conversation, she would sometimes joke, saying "I wonder why I am talking about these stories."

#### Discussion

Kuwahara et al.<sup>14</sup> and Yasuda et al.<sup>15</sup> reported that some of the subjects remained psychologically stable for more than 3 h after the conversation session ended. Further, the selective beneficial effectiveness was observed in subjects with dementia who exhibited difficulty in watching TV programs but who were still able to enjoy the conversation. In this follow-up study, we investigated whether such sustained and selective effectiveness was again observed in the other subjects. As the results, the significant psychological stability was obtained for two subjects in the concomitant evaluation. One of the two subjects also showed the significant psychological stability in the delayed evaluation. The practical implications of these findings seem to be important.

In the concomitant evaluation of this study, the total average of the GBS score was better while conversing through videophone than while watching TV programs, although these differences did not meet the



statistical significance due to the small number of subjects. As for each average score, Subjects 3 and 5 displayed a significant psychological stability while conversing through videophone. These results are consistent with the previous studies<sup>14,15</sup>, and supported Van der Ploeg et al.'s hypothesis that the mean agitation level of individuals with dementia decreased more while conversing through videophone than through telephone<sup>3</sup>. Combining visual with auditory sensory inputs may capture the attention of individuals with dementia and reduce their agitated behaviors<sup>3</sup>. In this study, subject's old photos were not used in the videophone conversation. However, the almost same results were gained<sup>14,15</sup>. This implies that the videophone conversation itself is the important factor for the psychological stabilization.

In the delayed evaluation, two subjects remained psychologically stable 3 h after the videophone conversation session ended. However, a statistical significance was only observed in Subject 5. These results also supported the hypotheses of the previous studies<sup>14,15</sup>. Further, music<sup>19</sup> and video biographies<sup>20</sup> can also aid individuals with dementia due to their sustained psychological effectiveness. Hori et al.<sup>8</sup> also reported that the hours of sleep of individuals with dementia significantly improved after having the videophone conversation. Aside from the previous studies, the sustained psychological effectiveness of therapeutic interventions has not been reported.

Individuals with dementia are prone to isolation that results in few opportunities for them to communicate<sup>15</sup>. However, the conversation they had through videophone may have decreased the stress or anxiety caused by this insufficient communication these individuals experienced. This stress-reduced state may have persisted for 3 h after the conversation, although the subjects often forgot that they had conversed 3 h earlier. This result supports the hypotheses that behavioral disturbances may arise from inactivity, discomfort, and the lack of social contact<sup>21</sup>.

The selective beneficial effectiveness of a videophone was also suggested in Subjects 3. As for Subjects 1, 2, and 4, they both enjoyed conversing with their talking partners and watching TV programs. As results, they all scored 0 in the revised GBS scale (Figure

2). This study is consistent with the assumption that the beneficial effectiveness of a videophone conversation is primarily observed in individuals with dementia who exhibited difficulty in watching TV programs but still enjoyed the conversation<sup>14,15</sup>. Therefore, this study suggests that conversation itself can prevent individuals with dementia from showing anticipated behavioral disturbances, such as "evening syndrome"<sup>15</sup>.

However, caregivers may find it difficult to assist individuals with dementia in engaging in a conversation all the time when behavioral disturbances occur. Therefore, a daily remote assisting service between individuals with dementia and talking partners was developed by the NPO Corporation IppoIppo in 2016. Yasuda et al.<sup>22</sup> proposed the group videophone call and invited talking partners from foreign countries and individuals with mild dementia as talking partners for those with moderate and severe dementia. The talking partners can play as "communication therapists"<sup>3</sup>. A videophone is considered as one of the best remote assistive communication tools that counter communication barriers that result in isolation.

In this home-based study, collecting objective data of the subjects was difficult. Therefore, the caregivers' observatory evaluation was used to gather the data. In future studies, objective indexes, such as automatic facial recognition and laugh counts, will be used to validate the effectiveness of videophone conversations for individuals with dementia, with the participation of more subjects. Although, the results must be interpreted carefully due to the procedural limitation and the small number of subjects in this study, the videophone conversation is a promising remote intervention for assisting individuals with dementia.

## Conclusion

Some subjects showed the sustained and selective effectiveness of the videophone conversation in this study. We were able to suggest that the homogeneous groups who cannot enjoy TV programs but still enjoy conversation may have most effectiveness for this remote intervention. In the next study, this group will be the main target.

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