Supporting Conversation for People with Dementia by Introducing a Computer-Based Third Element to the Interaction

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Abstract. The principle of introducing a third element to a stressful communicational encounter, to which both participants can direct their attention, and which can provide prompts for communication, has a wide potential applicability. We have developed a system to support the communication of older people with dementia, which uses this principle. The approach has uses in many settings in which there is a cognitive or emotional blockage to communicational flow, several of which are described.

Keywords: assistive technology, cognitive prostheses, dementia, autism, cognitive impairment.

1   Computer-Based support for dementia

Dementia is the loss of cognitive abilities, particularly the use of working (short-term) memory, usually as a result of Alzheimer's disease or stroke. Dementia occurs primarily in older people, and while it does not affect all of them, its rate of occurrence rises steeply from about 1 in 10 over 60 to 1 in 2 of those over 90 [1,2]. As our population balance shifts towards the older end of the spectrum, the incidence of dementia will increase dramatically. Because of the high level of human effort currently required in caring for people with dementia, designing assistive technology will be a growing priority until a way of reversing this debilitating condition can be found.

Among the skills which dementia degrades is the ability to communicate. Finding ways to promote communication in people with dementia is vitally important. Communication is such a fundamental part of being human that when people are no longer able to interact successfully they are treated as somehow less than human. This dehumanization is, sadly, commonly seen in the treatment of people with dementia.

We have developed a computer-based communication support system which can assist older people with dementia to interact more successfully with relatives and

carers. The system, called CIRCA, consists of two parts. A conversation support system prompts the user's long term memories by means of touchscreen access to reminiscence material drawn from public archives [3]. Also included is a set of interactive games, playable via the touchscreen, which have been developed specifically to be useable and enjoyable for people with dementia [4].

The system was developed a multidisciplinary team of software engineers, psychologists, and designers. Potential users and their families and professional carers were involved throughout the design process. User-Centred Design was particularly important in this case because of the complexity of the problem being addressed [5].

2   Conversation Support through Reminiscence Materials

Without an operating working memory, interaction becomes very difficult. Long-term memory, however, can remain relatively well-preserved with dementia, so conversations based on reminiscence are possible, if long term memories can be prompted. Our system can stimulate long term memories by providing the person with dementia and a carer with a touchscreen based hypermedia presentation of material from the past : photos, music, video clips, graphics and text, all accessible in a flexible and engaging manner. Using this system allows people with dementia to once again have a conversation with relatives and carers.

In comparing this system with using traditional reminiscence aids, we found that the person with dementia was offered a choice of reminiscence materials more often when using our system. We also found that the person with dementia chose reminiscence materials more often when prompted when using the system. The traditional sessions were characteristically a series of one question from the carer followed by one response from the person with dementia. The sessions with the prototype system were more of a conversation, with each person contributing an equal amount, and control of the direction of the conversation being shared [6].

3   Interactive Games Playable by People with Dementia

The system also includes a set of interactive games and activities, accessible through the touchscreen display, which were specifically designed to engage and entertain people without the need for an intact working memory. A great deal of thought and experimentation went into identifying effective activities and prompting methods. The aim of the project was to design a touchscreen system which would engage the attention of a person with dementia for a significant period of time. At the start of the project there was little or no knowledge in the field about how a person with dementia would interact with a touchscreen system. We therefore adopted a rapid prototyping and testing method to derive the design requirements.

Our initial assumptions about the requirements were as follows:

1. Require little working memory to use
2. Activities to be familiar for the user

3. Should prompt the user using either animation, text or voice
4. Behave predictably
5. Be enjoyable
6. Require little or no skill

The activities all used 3D graphics to create a visual approximation of the actual activity. We tried to design these activities to suit a wide range of abilities. The 3D objects generated on the touchscreen behaved in a similar way to physical objects. To help keep users engaged the activities rewarded the users' interactions with animation and sound effects. The activities could be enjoyed as shared or as individual activities, depending on the level of severity of the dementia.

To give the system the most challenging evaluation, activities were tested by people with dementia using the touchscreen on their own with no-one else present in the room. A video camera was used to observe them from an adjacent room.

In the testing sessions, the activities which had a clear goal and required some level of skill proved to be most popular. From users' comments they seem to realise that there is a skill required and then got a sense of achievement when they mastered it. One surprising and welcome observation was that the performance of the users with dementia appeared to improve with use. This may have been because procedural memory - the memory of how to perform a task - was being used.

4   A Helpful Third Element in an Interaction

As a result of widespread demand from participants in the project for a version of the system which they could keep, a company was set up by the inventors to make the system available to care homes and day-care centres in the UK. A number of care homes and day care centres in the UK have now had the experience of CIRCA, in some cases for three years.

The reminiscence system and the set of interactive games in fact grew out of two separate research projects, with different aims for people with dementia: communication in the first project and entertainment in the second. Feedback from the users of the two systems show us that in addition to their individual functions, both the reminiscence support and the games can be seen as part of one system, which enables interaction where communication is problematic. The reminiscence system provides touchscreen access to material which both partners in the interaction can enjoy exploring and commenting on together. The games provide touchscreen access to activity which, as well as being used individually, can be used by two people taking part in together, communicating with each other throughout.

Both systems have been carefully designed to achieve separate effects. However, we have found that a session with the reminiscence material, as well as prompting conversation, involves mutual enjoyment of the material presented. On the other hand, a games session, as well as providing enjoyment, triggers a great deal of communication.

One feature which is in operation here is that a third element has been introduced into the face-to-face encounter that draws the attention of the interactants to itself and

alters the interaction from a direct one to one which it mediates. This has proved helpful in assisting the interaction to be more relaxed and enjoyable.

There is a theoretical background for this effect. When two people interact face-to-face, a certain amount of psychological effort is required for both parties. This has been termed 'face-work' by Goffman [7]. In any interaction, the individual wishes to establish and then to maintain a positive impression of themselves. If they are inconsistent with how they project themselves to others, they risk being embarrassed or discredited. There is always a certain amount of work required to maintain this equilibrium. This effort naturally increases hugely with a problematical communication situation such as interacting when dementia is present.

The simple expedient of providing a focus of attention for the interactants external to themselves can be of great assistance in making the encounter more relaxing. In this new situation the task becomes, not the difficult one of managing the face-to-face interaction, but the relatively easier one of jointly attending to and reacting to something of interest. The mutual attention and reacting provide a more relaxing and enjoyable basis for interaction than a direct face-to-face encounter which must be negotiated. If what is being attended to is itself an active participant, such as a computer generated interactive display, so much the better: achieving engagement and a sense of conversational flow is significantly enhanced. Interacting with a person who has dementia is aided by making use of a scrapbook of photos, but it is considerably easier if the artefact you are using is itself interactive and inventively engaging.

What is lost with dementia and what can be partially regained here is a sense of conversational momentum. This has a connection with the work on the experience of 'flow' [8]. Research on this phenomenon has highlighted the fact that it is often possible to achieve a state of flow— a state of concentration or complete absorption with the activity at hand and the situation. It is a state in which people are so involved in an activity that nothing else seems to matter. They lose track of themselves and completely indentify with what is going on. The experience is associated with a very happy state of mind.

When a conversation or an interaction 'flows' it moves along without any apparent effort by the participants [9]. The opposite situation occurs when it constantly falls on participants to decide deliberately on what the next move in the conversation or interaction might be. In the case of a relative or carer interacting with someone who has dementia, this is more or less the case for every conversational or interactional move - an effortful and often tiring and stressful experience for them.

5   Other Applications of This Principle

This principle of introducing a third element to a problematic communicational encounter, to which both participants can direct their attention, which both can control, but which can also provide prompts for communication, has a wide potential applicability.

5.1   Communication Support for People with Autism

Work to help people with autism has shown that they often experience an 'emotional overload' when spoken to directly. An indirect approach, through for instance a mutual activity, can establish a bond that would be impossible to make by direct interaction [see, for example 10, 11]. The person with autism seems to be experiencing a magnified form of the effort which we all need to put into interacting with others [12].

The Picture Exchange Communication System (PECS) was developed to help children with autism communicate more effectively [13]. The user learns to exchange single pictures for items or activities they want. Eventually the communication can be expanded to include multiple pictures making up a 'sentence'. The system was designed as an application of operant conditioning, but is interesting to note that it also makes use of the 'third element' principle in that the user does not need to communicate verbally but can make use of a picture card handed to the other person. As noted, people with autism can be overwhelmed by the emotions involved in direct interaction with others. In addition to its other features, the PECS system seems to provide a way of making an interaction less direct and thus less threatening.

5.2   A Low-Technology Communication Framework

Another communication support system that has made use of this third element principle to make communication possible where it was difficult or impossible before is the Talking Mats system. Talking Mats is a low-technology communication framework to help people with communication difficulties to express their views and opinions more effectively [14, 15].

The system uses a mat, such as a doormat or carpet tile, to which symbols and pictures can be attached by hook and loop tape. Symbols representing emotions are placed along the top to form a visual rating scale. The emotions can be as simple as 'positive', 'neutral' and 'negative' or more detailed, depending on the user. A relevant topic is discussed and a symbol representing it is placed at the bottom of the mat. As the session progresses the user expresses their view by placing pictures representing various aspects of the topic on the mat, grouping them underneath the rating symbols.

Talking Mats have been used with a number of different sorts of people: people with dementia, with a learning disability, with autism and with communication difficulties due to physical impairment. Even if the person can communicate, the system can often still be helpful as a support for discussions to clarify and confirm, and often increases the person's confidence to put forward their point of view. It has been proved useful for example in working with children who are in care to help them express their views.

5.3   The Role of Activities in Dementia Care

In the field of dementia care there has been a growing realisation that providing engaging activities in care homes is not a matter of an added extra, but is an essential part of good care. Training programmes offer staff help in devising continuous

activities that are suitable for residents who are focused on 'living in the moment' [16, 17]. Residential home regimes have been created which require having a number of activities going on at any one time, all the time, with varying levels of ability catered for [18,19].

It might be argued that to have this degree of activity in what is in fact someone's home is not appropriate. However, the key point here is that we are dealing with dementia, which makes the person's subjective experience of their home quite different from a person who is cognitively intact. The reason having the continuous presence of activities is vital should be clear from the analysis above: they provide a valuable 'third element' that allows participants to interact with others without any effort needing to be applied to managing the interaction explicitly.

A possible inhibitor to the widespread adoption of this approach is the staff time and effort involved. Residential and day care staff working with people who have dementia are often fully occupied with the basic daily tasks to ensure that the people in their care are safe and healthy. Here technology may be able to play a role, by providing support for staff in creating activities which people with dementia can successfully take part in and enjoy. As with the CIRCA system, such technology must require a minimal effort for staff to learn to use and employ successfully. Their design must incorporate the latest hardware and software advances to increase ease of use and engaging power. Their development should include input from people with dementia and their carers, even though this is difficult in practice, in order to ensure that any systems developed meet real needs.

6   Conclusion

The development of a communication support system for people with dementia has shown that there are a number of ways to provide a 'scaffolding' structure that assists a person with cognitive impairments to regain the ability to communicate. Observing the use of a set of interactive games which were later developed specifically for people with dementia showed the researchers that, for the person with dementia, sharing the experience of these games with a carer was also a form of communication support, and a great deal of communication and enjoyable interaction took place alongside the playing of the game. Looking at the two systems, it was clear that the procedure of introducing a third element into a problematic interaction could in itself sometimes be useful in turning the attention of the interactants away from the stressful job of managing a difficult encounter and directing them to the third element in the interaction, engaging both in a form of mediated interaction. Other examples of this phenomenon in operation have been given. The third element need not involve technology, as demonstrated by the examples of PEC symbols, Talking Mats, and activities based environments for people with dementia. However, where the third element provided is a computer based system there is the potential through careful design to significantly magnify and enhance this effect.

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