Statement of Need

Ohio University’s project to develop a game to improve memory recall is intended to aid elderly patients with Alzheimer’s dementia in improving their ability to correctly recall the names of friends and loved ones. Patients who cannot remember their family and friends’ names often suffer frustration and embarrassment. Therefore, a speech pathologist at the university suggested that a way to improve memory recall is to repeatedly practice remembering names with pictures of important people in the patients’ lives. Therefore, the university’s request is for software to be designed which will act as a game for patients to play with pictures of people/places/things they want to remember, which will help to improve name recollection.

Introduction and Overview

There are several requirements that the sponsor requires the name game software to fulfill. First, it must be installed on a PC. The patients use mostly Microsoft Windows, but even for those who don’t, the software must still be able to be installed. The game must accept digital images and names specific for each user and must also supply a package of images of celebrities and political figures, relevant to elderly people. Also, the user or care-taker must be able to select different lists of names to be worked on in different sets, the game must prompt the user to say a name into a microphone once the image is presented, the game must keep score and time, and it must respond to correct or incorrect answers with auditory and visual feedback. Finally, the software used for voice recognition must be supplied, along with the microphone.

Other requirements that the sponsor has have to do with ease of use for people who have few computer skills and are cognitively impaired. The user interface must be simple and clear. Any written instructions must be made relatively large for users with visual impairments, and any audio feedback must be loud enough for people with hearing loss.

Realistic Constraints

In terms of costs, the only things that will need to be purchased are the voice-recognition software and the microphone to be spoken into by the users. Voice-recognition software, depending on the quality, can range in price from $50 to $200. Microphones can cost between $20 and $50.

In terms of manufacturability, as this project requires the design of software, there isn’t anything to be physically created, except for the CD-Rom, containing the data to be installed on computers to run the game. Depending on the type of operating system being used on the users’ computers, the creation of the installation software may differ.
It’s also good to consider how much memory the program will require, especially since voice-recognition software takes up a lot of memory. With this in mind, the software needs to be designed using a reasonable amount of memory, so that the users’ computers don’t crash, while trying to run the game.

**Other Data**

In order to better accommodate the patients, it’s important to review the symptoms of Alzheimer’s Disease. The following are the top 10 signs of the disease, as taken from the Alzheimer’s Association website at [www.alz.org](http://www.alz.org):

1) Memory changes that disrupt daily life—forgetting recently learned information, such as names, locations, and dates
2) Challenges in planning or solving problems—difficulty concentrating, following a plan, or working with numbers
3) Difficulty completing familiar tasks
4) Confusion with time and place—lose track of passage of time; disorientation
5) Trouble understanding visual images and spatial relationships—difficulty reading, judging distance, color or contrast; cannot recognize own reflection
6) Problems with words in speaking or writing—difficulty following a conversation, finding the correct words; repetitive
7) Misplacing things and losing ability to retrace steps—place things in unusual places; cannot recall where they placed things; accuse others of stealing
8) Decreased or poor judgment—bad decision-making; poor grooming
9) Withdrawal from work or social activities
10) Changes in mood or personality—confusion, depression, anxiety, suspicion, fear, irritability

When considering the design of the game, it may be helpful to review some studies done on name recollection, as a result of repetition with images, to observe if there are better ways than others to present the repetition of the images to the patients, so as to produce the best results. For example, in a study conducted on the improvement of picture recall by repetition in patients with dementia of Alzheimer type ( “Improvement of Picture Recall by Repetition in Patients with Dementia of Alzheimer Type” in the *International Journal of Geriatric Psychiatry*, volume 12), it was found that the recall of an individual varied with respect to exposure time, and the time of recall after being exposed to the pictures.

In the study, sets of pictures were presented on five consecutive days with predetermined presentation conditions. On day one, a single list presentation was shown, in which 12 pictures were presented for 10 seconds each. Day two consisted of prolonged presentation of 12 pictures in which the pictures were shown for 20 seconds each. On day
three, list repetition of single pictures was administered. One third of the pictures were presented once, four pictures twice, and four pictures three times in a random order for a 10 second exposure each. On day four, immediate list repetition was shown, where 12 pictures were presented for 10 seconds, each with the whole set being repeated once. On the final day, a delayed list repetition was administered, in which the 12 pictures from day one were presented again for ten seconds. After administering the picture sets, immediate recall was assessed. Delayed recall was assessed at 30 minutes, 1 h, 2 h, 4 h and 8 h after presentation. The eight-hour recall assessment was followed by a recognition task, where 12 previously shown and 36 new pictures were presented in random order, and the time to identify remembered pictures was unlimited. Results after analysis indicated that within picture sets that were shown, recall performance over 0 to 8 hours was slightly better for pictures presented 2-3 times as opposed to just once.

Questions

- What programming language will the software be written in?
- What will be the minimum performance specifications of a computer needed to run the software (e.g., memory needed)?
- What type of voice recognition software will be used?
- How will voice recognition and images be coordinated?
- What type of microphone will be bundled in the final package?
- How will the game keep score/operate?
- What statistics will be recorded for the user?
- What will be the default set of pictures the software ships uses?
- Will there be a limit to the number of user profiles/storage the game can have?
- How do you package your program to be installed as software on many computers?