Word Training Programs for Aphasic Patients

Hiroshi Imagawa, Shigeru Kiritani and Yoko Watanabe

Introduction

We have been developing a personal computer-based word-learning system for the language therapy of aphasic patients. In the last Annual Bulletin we reported on the prototype of this word-learning system[1]. The present paper will present the further development of the system in the past year.

In the prototype system, the learning program is based on pointing responses to picture cards displayed by the computer. A set of picture cards is displayed on the monitor display of a personal computer. The speech sound corresponding to one of the displayed cards is output through a D/A converter, and the patient makes a response by pointing to a displayed picture card . All the response and program operations are performed through a touch panel attached to the surface of the monitor.

As of now, digitized data from the picture cards and the corresponding speech sounds for a basic set of 350 nouns and 100 verbs were compiled on the computer.

Based on the preliminary use of the prototype system with aphasic patients, the word-teaching procedures currently used in the clinical field were surveyed with reference to several textbooks on language therapy, and a set of teaching procedures were selected which could be implemented as computerized programs on our system. During the past year, several of these programs have been actually implemented on the computer. In the following, the characteristics of these programs will be described.

At the same time, a portable type system was constructed using a book-size computer with an aim to facilitate self-teaching by the patients, either at hospital or at home. The characteristics of the portable system will also be presented in the following.

Noun-learning Programs

1. Basic Naming/Writing Training Program

In this program, a picture or characters presenting a selected target word is presented on the computer display. The patient asks the program to output the speech sound of the target word and/or to display the characters of the target word. Thus, the program serves as a kind of simple computerized dictionary which assists the patient in recalling the pronunciation or the spelling of a target word.

2. Audio/Visual Recognition Training System

1) Pointing Program

A set of picture cards (2 to 6 images), or character cards, are presented at one time on the display. The program selects one of the pictures at random and outputs the corresponding speech

sound. The patient makes a response by pointing to a corresponding picture. The program tells the patient whether the response is correct or incorrect through a superposed display of either an O or an X mark on the selected picture. Then the program proceeds to the next trial, replacing the card used in the current trial with a new card. When the patient's response is wrong, the correct target is shown by a □ mark. Through one of the icons, the patient can ask the program to output the speech sound once again. The patient can listen to the speech sound as many times as he/she desires before making a response. He can also skip a current response using the icon [次](next) when he is uncertain about the correct answer.

2) Yes-No Answering Program

A picture card and/or character card of the target word is presented on the display. Then the program presents speech sounds or characters which may or may not correspond to the target word. The patient makes an answer as to whether or not the presented cue corresponds to the target word by pointing to the [はい](yes) or [いいえ](no) icon. For a given target word, several cues are presented in sequence until the correct cue is presented or the patient makes a wrong response. When a wrong response is given, the program presents the correct cue and proceeds to the presentation of the next target word.

3) Auditory Memory-Span Training Program

A set of target cards (either pictures or characters) are presented on the display and the speech sounds of selected cards (2 to 4) are output in sequence. The patient identifies and remember the corresponding target cards, and, then, points to these cards one by one in correct sequence. When the patient's response is wrong, the program presents the correct set of cards together with the output of the corresponding speech sounds. Then the target cards of the current trial are replaced with the new ones and the next trial is started.

3. Common Features of the Training Programs

In all of the above programs, a display of either a picture or characters --or a combination of these-- can be selected to represent the target word. Either the speech sound or the characters can be selected as a cue for the trial. An appropriate target word display and trial cue pair can be selected by the therapist depending on the type of the patient and the aim of the training. It is also possible for the therapist to construct a specific set of target words out of the total 350 words to be used for a given stage of an individual patient. Such a word set may be constructed considering familiarity, pronunciation/spelling difficulty, category type etc.

An almost identical set of icons is used throughout all of the programs. Basically, in the response phase of the program, the following four icons are presented.

[声] (sound)	output the speech sound.
[字] (character)	displays characters
[答] (correct answer)	presents the correct answer
[次] (next)	proceeds to the presentation of the target word

As for the character display, there are four choices; hiragana alone, katakana alone, kanji alone or a combination of kanji and hiragana.

Portable System

In view of the rapid progress in the power of small-size portable computers, the above system has been installed on a portable-type computer. Individual patients may rent such a system to use in hospital or at home.

The system was constructed by reforming a commercially available note-type personal computer attaching an especially designed small-sized D/A board, an output speaker unit and a thin-film touch panel. The system consists of a 386SX CPU, a 40Mbyte hard disk for storing the data base and a floppy disk drive for the program disk. The entire unit is contained in a carrying case of 328x284x110mm and the weight is 4.4Kg. Although the display in the present system is monochrome, a color system of nearly the same size is expected to become available within a few years.

References

1) Kiritani, S., H. Imagawa, T. Suzuki and Yoko Fukusako : A personal Computer-based Word Learning System for Aphasic Patients, Ann. Bull. RILP, 209-212, 1990.

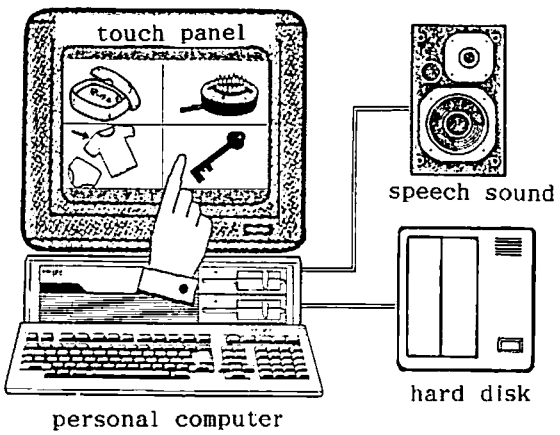

Fig.1 Hardware configuration of the personal computer-based word learning system.

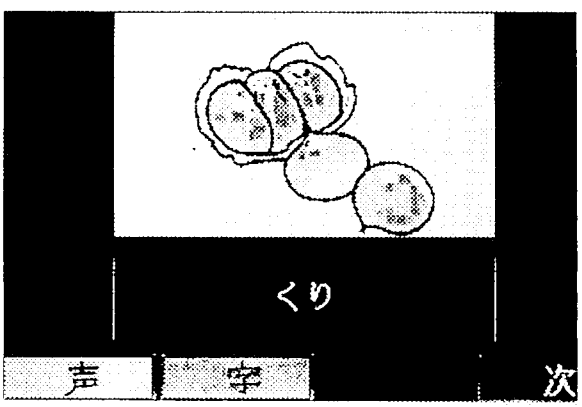

Fig.2 An example of the monitor display of the basic naming/writing training program.

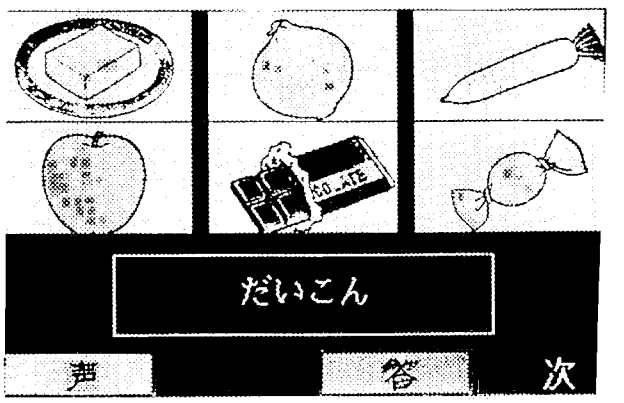

Fig.3 An example of the monitor display of the pointing program

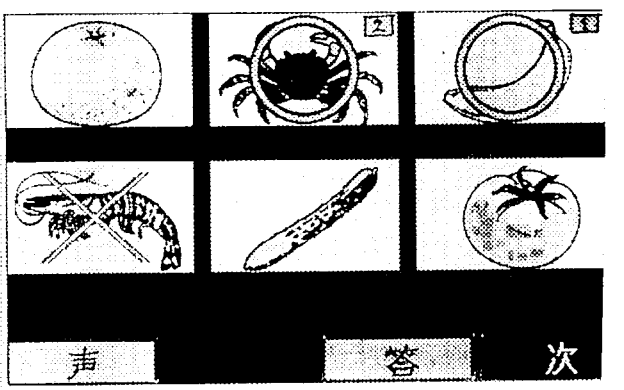

Fig.4 An example of the monitor display of the auditory memory-span training program.