



MULTI-TALK,
A NEW PORTABLE MULTI-LINGUAL SPEECH OUTPUT COMMUNICATION AID

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ABSTRACT

Multi-Talk is a new multi-lingual, multi-mode communication aid with high quality synthetic speech and built-in print capacity. The user has access to an unlimited vocabulary and special functions can increase the rate of communication. The user can easily store phrases and whole sentences which can be quickly recalled by one or two keystrokes. Pronunciation of words which do not follow normal rules can be programmed in phonetic notation. Multi-Talk can be equipped with up to five different languages from a choice of nine. The user can select from four different voice types and change the intonation and the speed of talking. It is possible even to whisper. Special software allows coded Bliss symbol input. Pedagogical programs are available to train reading and writing. Multi-Talk was developed in collaboration with AB Fonema, Stockholm. It is built into an attaché case with an EPSON HX-20 micro-computer and an Infovox SA 201 synthesizer board.

INTRODUCTION

Ever since synthetic speech was produced with acceptable quality, hopes have run high that it would become a useful aid for the non-vocal. The spoken word is the primary mode of communication between human beings, and although there are alternatives, speech is superior in most situations. That is why aids with spoken output are of great importance. The first experiments were carried out in the USA with the VOTRAX synthesizer in the mid-seventies, and a few years later several commercial systems became available on the market. Many users benefited from this new category of aids although the low quality of the speech and other factors limited their usefulness. Speech synthesis technology is developing rapidly, however, and aids with high quality speech and other features have entered the market.

If a communication aid is to compensate fully for a missing ability to speak, it should allow its user to express anything he wants, anywhere, at an adequate speed, and it should be understood by anybody. These requirements imply that the aid be portable, battery operated and have text-to-speech capability.

A text-to-speech system is not in itself a complete communication aid. It has to be packaged in a practical way with an input keyboard, and should have several features to speed the rate of communication. This was found at an early stage of the experi-

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ments with the system developed at our department. It was based on a minicomputer which could be placed outside the laboratory: in our case a special school for motorically handicapped children in Gothenburg. The first user was a boy of 15 years, suffering from cerebral palsy. He could not produce any speech, but had learned to read and write and could communicate by pointing to letters on a letter board with a mouth-stick. He could operate the computer terminal keyboard with his mouth-stick and learned quickly the special features of the system. During his sessions he developed his own abbreviation system to speed his communication. There were several other children who could benefit from training with the system as well. A small speech synthesizer, the SA 101, became available in 1982. Experiments could be started in several other places and a Swedish evaluation study showed the usefulness of synthetic speech for non-vocal people. The main obstacle was that the system was not portable; it consisted of three separate parts and needed mains power for its operation.

THE SYNTHESIZER

The speech synthesizer, developed at the Royal Institute of Technology in Stockholm, is a text-to-speech system accepting any text input, and is described in Carlson et al., 1982. Based on this development, several products are being marketed by INFOVOX AB: a stand-alone synthesizer SA 201 (successor of SA 101) and two circuit boards. One of these is an OEM unit filling a first prerequisite for building a portable and battery operated communication aid.

THE MULTI-TALK

In most experiments and in practical use, the SA 101 synthesizer was supplemented with an EPSON HX-20 microcomputer serving as an intelligent terminal. This computer was also selected when the development of a portable VOCA began because of its small size, its nonvolatile memory, microcassette module and built-in printer. Before a suitable case was found, one prototype was built into the case in which the HX-20 is delivered. However, the space was found insufficient and we decided to use different one, the size of an attaché case. The mechanical design of the device and the communication program is the result of a joint effort between the project group at our department and AB FONEMA, the company which now manufactures the Multi-Talk, Fig 1.

An ON/OFF lever is on the lower right side. The synthesizer board is mounted under the computer and a module to the left holds the loudspeaker, the batteries, and some controls. Two knobs are provided for adjusting sound volume and speaking rate. There are three LED indicators: two to the left indicate when the separate batteries for the computer and for the synthesizer are being charged. A third indicator is lit when the power to the synthesizer board is switched on. This switching is controlled by the program in the computer and is normally off when the unit stands

by or text is being keyed in. A battery charger fits into a cavity behind this module. There is some space behind the computer large enough to keep a spare roll of printer paper, microcassettes, and the cable of the charger. The battery capacity is adequate for a whole day of normal use of the Multi-Talk. A key-guard is available for those with motor impairment.

There have been two major applications of the Multi-Talk so far, as a communication aid and as an educational aid. The function of the device is determined by the computer program in the HX-20.

The communication program has several features that facilitate the user interaction and increases the rate of communication. On a base level, it performs as a talking typewriter. With the two arrow keys the user can move to any of two other levels and have access to pre-stored sentences and phrases using single key-strokes. Any text can be stored by the user with an easy-to-learn procedure. He has a choice between complete sentences and phrases that can be edited into sentences on the base level. Additionally, semipermanent preprogrammed abbreviations can be defined by the user. With function keys the user can repeat a sentence as a whole, word-by-word, by spelling, and by printing on paper. From setting-up menus, the user can select language and voice, or change the operating mode. For instance, Multi-Talk can give a beep each time a key is pressed or it can pronounce each word as it is being typed in.

The flexibility of the Multi-Talk allows inputs other than text. Persons who communicate with Bliss symbols can use codes for their symbols in a different communication program. One example is a person who prefers digits: her standard chart with 504 symbols was marked with a three digit code on each square. Her Multi-Talk is equipped with a special version of Swedish including grammatical rules for creating correct sentences. Bliss versions of English, French and Spanish are also available.

Children on pre-reading level or who are mentally retarded can start using simplified communication programs and as they develop, more of the special features can be introduced to them.

Another Multi-Talk application is in teaching reading and writing. There is a range of educational programs developed to train phonological awareness and other skills necessary for reading and writing. The educational application of the Multi-Talk is described in a companion paper (Dahl and Galyas, 1987).

EXPERIENCES

The Multi-Talk has become a useful aid for several non-vocal persons. The users can interact with people better than before, use the telephone and participate more independently in the classroom and in group discussions. The Swedish Institute for the Handicapped has initiated an evaluation project involving about ten persons. The study is not finished yet, but has already shown the usefulness of the aid. The majority of the users in the pro-

ject have difficulties in reading and writing. Several of them have needed and benefited from a special text editing program with spoken feedback in different ways, e. g., with phoneme feedback for each keystroke. Such a program can allow a user to work independently when preparing messages which can be used in the communication program.

REFERENCES

1. R. Carlson, B. Granstrom & S. Hunnicutt (1982): "A multi-lingual text-to-speech module". Proc. ICASSP 82, Vol. 3, Paris pp 1604-1607.
2. I. Dahl, K. Galyas (1987): "Experiences with the use of computer programs with speech output in teaching reading and writing." These proceedings.



Figure 1. The Multi-Talk.