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journal: STL-QPSR
volume: 30
number: 1
year: 1989
pages: 155-157

http://www.speech.kth.se/qpsr
EXPERIENCES FROM TWO SIMPLE TACTILE AIDS AS SUPPORT DURING SPEECHREADING

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Abstract

In this study, a comparison between two simple tactile devices, Minivib3 and Tactaid II, was made. Two normal hearing persons alternated as test leader and subject in a speechreading test, with and without support from tactile aids. The results show a limited benefit from both aids for one of the subjects but very little difference in contribution between the aids.

INTRODUCTION

Speechreading in combination with the use of ordinary hearing aids does not give sufficient information in speech communication for many profoundly hard of hearing persons. Alternative aids are cochlear implants or tactile aids. Work on the development of tactile aids has been going on for many years, but most aids only exist as cumbersome, research prototypes. During the past five years, however, some simple and small aids have been developed and are now commercially available. In this study, the effect as support during speechreading from two such aids was compared. The two aids are the single-channel device Minivib 3 (M) (Spens & Plant, 1983) and the two-channel device Tactaid II (T) (Franklin, 1984). The Minivib 3 extracts energy in the frequencies between 700 and 1500 Hz giving out an amplitude-modulated signal with the frequency of 220 Hz to the vibrator. Tactaid II extracts energy in the frequency range between 100 Hz and approximately 6000 Hz, divided into two spectral bands, one below 1500 Hz and one above. The two parts are processed, and amplitude-modulated signals with a frequency around 375 Hz are fed to separate vibrators. The vibrators of both aids are held in the hand or placed on the wrist with help of a wristband. In this study, the vibrators were held between the thumb and the index finger of the right hand. When two vibrators were used, they were separated by a piece of soft polyester.

SUBJECTS AND TEST PROCEDURE

Two middle-aged normal hearing persons, a man and a woman, participated in the study. Subject 1 had no experience in speechreading but was familiar with tactile devices; Subject 2 had good knowledge of speechreading training methods. The subject was placed in an audiometric testing booth wearing headphones in which white noise was presented that completely masked the speech signal. The two subjects alternated as test-leader and as subject. A third speaker (the reference speaker) served as test-leader in three of the totally 18 test sessions (session 1, 9, and 18). The aim was to see if the expected learning to use the tactile aids as support during speechreading could be transferred to an unfamiliar person. The test method used was speech tracking, introduced by De Filippo & Scott (1978). The speaker read sentence by sentence from a book, and the speech-reader should repeat the exact words. If the sentence read by the speaker was not properly repeated, the sentence was read again divided into smaller parts with an answer after each part. The test period was 10 minutes. The result of the test is the number of words correctly repeated in the text during the test period divided by 10, giving the re-
sult as words/minute (wpm). The tracking rate in a situation with a normal hearing person was for the two test-leader/subject pairs 59 wpm (mean).

RESULTS

Fig. 1 shows the results from the speech tracking and also some comparable speech tracking results from three profoundly hard of hearing persons who have been using the device Minivib 3 (M) for 75 weeks in an evaluation study made at the Sahlgrenska hospital in Gothenburg (Axelsson, Berenstaaf, Hansson, & Spens, 1987). The training was, in that study, part of a rehabilitation period, with training and tests in speech reading with and without aid and discrimination of different environmental sounds. In the figure, "L" means unaided speechreading. The results from aided speech tracking in the present study and both aided and unaided results from Axelsson & al. study are presented as the mean values of the first 5 sessions (session 2-6 in the present study), indicated by "f" and the last five sessions (session 13-17 in the present study), indicated by "l". The emphasis of the present study was to compare the results from the two aids. Therefore, unaided speech tracking was measured during only a few of the sessions. For Subjects 1 and 2, "Lf" is the result from only one unaided speech tracking measurement made during session 5 and "Li" is the mean value of four unaided speech tracking tests made after the actual test with the two aids. The square dots within the bars are the results from the reference speaker at the first session, "f", and the last session, "l".

\[
\begin{align*}
Tf & \quad - \quad \text{Tactaid II, first sessions} \\
Tl & \quad - \quad \text{Tactaid II, last sessions} \\
Mf & \quad - \quad \text{Minivib 3, first sessions} \\
Mi & \quad - \quad \text{Minivib 3, last sessions} \\
Lf & \quad - \quad \text{Unaided speechreading, first sessions} \\
Li & \quad - \quad \text{Unaided speechreading, last sessions}
\end{align*}
\]

![Speech tracking results](image)

Fig. 1. Speech tracking performance for the two subjects in the study and the mean values of three subjects from study made by Axelsson & al. (1986).
DISCUSSION
The result of this study shows a limited contribution from the two tactile aids during speechreading. Subject 1 gets the largest improvement using the Minivib 3 (M) for both speakers. Subject 1's speech tracking speed increases more for the reference speaker than for the normal speaker, which probably is due to the fact that the normal speaker is a teacher of the deaf and has a well-articulated speech. She was, therefore, easier to speechread from the beginning, while neither the reference speaker nor Subject 1 did articulate so well. Subject 2's results show a small training effect but there is no contribution from any of the aids. The results from Axelsson & al. show a higher degree of training effect probably due to a longer training period.

Results from several studies similar to the one described here or results from evaluations with deaf subjects have been reported in the literature (Axelsson & al.; Cholewiak & Sherrik, 1986; Plant & Spens, 1986; Spens & Plant, 1983). In all of these, a small but positive effect as support during speechreading from simple tactile aids has been found, usually of the same magnitude as shown in Fig 1. The best results have been reported from the evaluation of subjects with a long training (Cholewiak & Sherrik, 1986; Plant & Spens, 1986). The question is, however, if simple single- or two-channel tactile aids, for the majority of the deaf persons, can give enough support to overcome the inconvenience from wearing the aids. Subjective reports of benefit from such aids have been given by many patients. As this type of aids has been sold in substantial quantities, it seems to be of interest to investigate how frequently they are used and for which purpose. Some users have reported that the main benefit from simple tactile aids is that they facilitate the contacts with the sounds in the environment. Is this help of such magnitude that the deaf person continues to use them also after the initial positive experiences?

To get substantial support during speechreading, it may be necessary to use multi-channel aids. Promising results from the use of such aids have recently been reported (Cowan, Alcantara, Blamey, & Clark, 1988). The problem with multi-channel tactile aids is to make them cosmetically acceptable to the user. Our work on tactile aids will concentrate on finding a solution of this problem.

References


