How can you hear? Results from an Everyday Listening Questionnaire

B. Krueger[1], M. Brendel[1], C. Frohne-Buechner[1,2], A. Lesinski-Schiedat[1], A. Buechner[1], Th. Lenarz[1]

[1]Medical University of Hanover, Department of Otolaryngology, Hanover, Germany
[2]Advanced Bionics GmbH, Hanover, Germany

Introduction

For more than 20 years the performance of Cochlear Implant (CI) users continuously improved via technical advances [Buechner et al. 2005]. Routinely speech perception tests show a continuous improvement of speech perception. However, the test situation is not always representative of real life situations. In a previous survey subjective information were collected about the challenges of understanding in every day life situations like social activities, telephone use, music appreciation and work [Brendel et al. 2006]: The subjective rating of speech understanding and the use of technical accessories was addressed. This second study should gain further insight into hearing of CI users including all implant systems of Advanced Bionics with further details on the use of accessories.

Material and Method

Based on the experiences of the previous study a revised version of the questionnaire was created. The new one is shorter and has a consistent rating scale (1: understanding is impossible, 5: understanding is very well possible) for an easier and faster answering.

All implant systems of Advanced Bionics were included to look for a correlation between the systems and the subjective rating of performance as well as the use of accessories. Further on reason for not using technical equipment were addressed.

50 subjects were enrolled in the survey, all implanted with an Advanced Bionics implant systems (Clarion, Clarion CII, HiRes90K). 19 used a body worn processors (Clarion 1.2, S-Series, PSP) and 31 a behind the ear processors (Platinum BTE, CII BTE, Auria, Harmony).

The study group had a mean age of 54.1 years (25.4 to 78.2 years) and a mean duration of implant use of 4.6 years (0 to 37.9 years).

Results: Motivation for implantation:

In the first section subjects were asked to rate the motivation for implantation in all of the following four communication situations: the possibility of telephone use, music perception, understanding in professional interactions and understanding in social surroundings. For the majority of the subjects it was most important to improve understanding in social activities with the help of the implant followed by better understanding in work surroundings and improved understanding on the telephone. The possibility of music perception was less important than the other three communication situations.

Telephone use:

60% of the subjects subjectively rated the understanding on the telephone with known speaker as very well or well possible (Fig. 2). Much more difficulties were noticed while speaking to an unknown communication partner. No one rated it as well possible, but 56% had difficulties in understanding an unknown speaker.

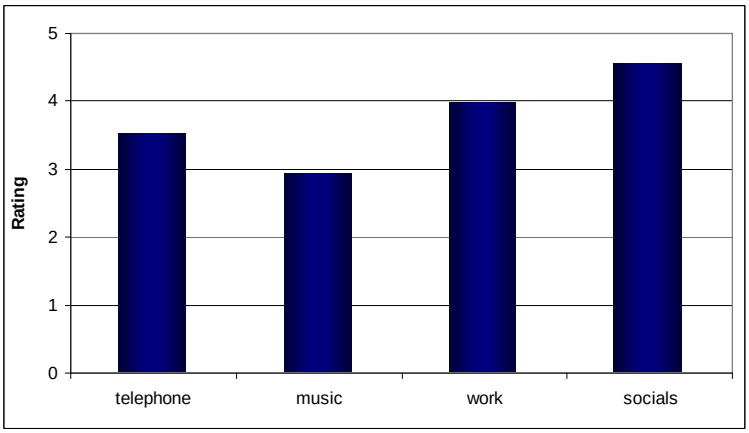

Figure 1: Rated motivation for implantation

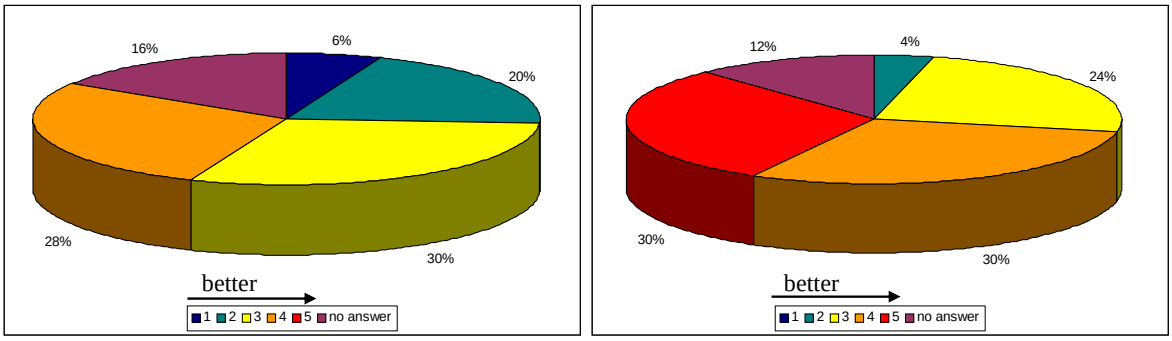

Figure 2: Subjective rating for understanding on the telephone with known (A) and unknown (B) speakers.

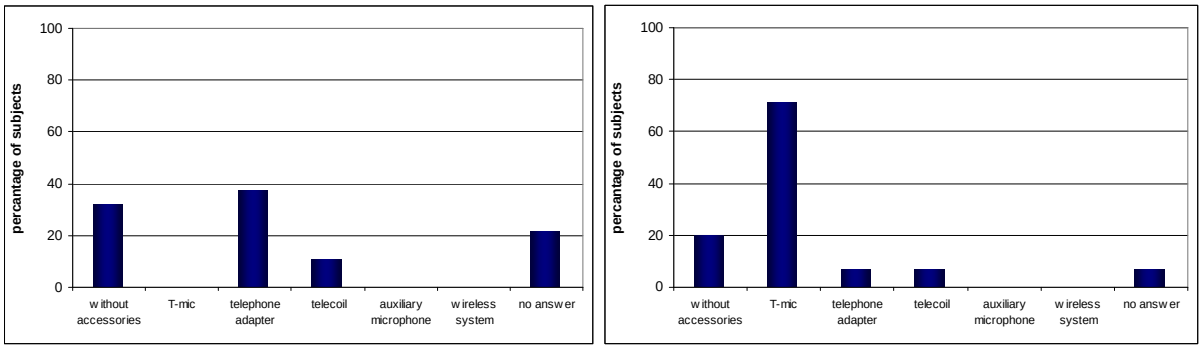

Figure 3: Applied accessories by body worn users (A) and BTE users (B) while talking on the telephone to familiar person.

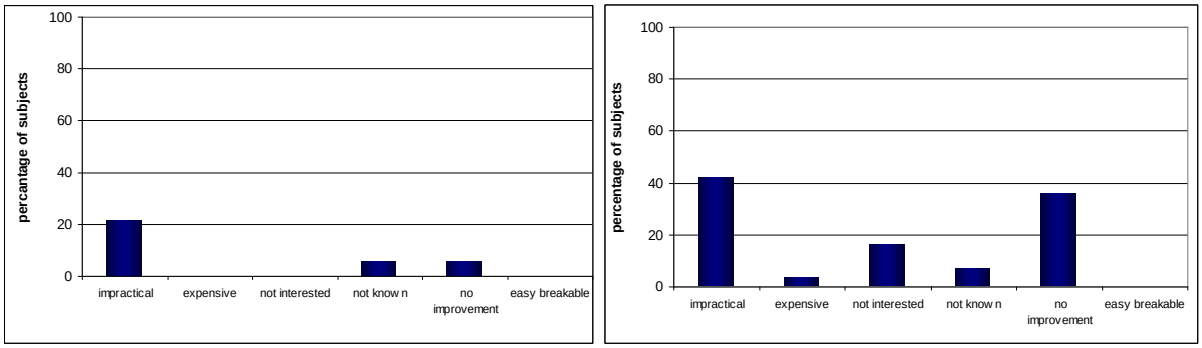

Figure 4: Reasons for not using assistive listening devices at the telephone by (A) body worn users and (B) BTE users.

37% of subjects using a body worn processor applied a telephone adapter for a better understanding of a known speaker on the telephone, while 32% didn't use accessories. 71% of the BTE users applied to the TMic while talking on the telephone to a known person.

More than 20% of the body worn users and more than 40% of the BTE users regarded assistive listening devices as impractical, while 35% of BTE users didn't achieve any improvement

Social activity:

Subjects perceived that the best understanding is achieved in a 1:1 conversation in a familiar environment (Fig. 5). Much more difficulties were seen when talking in a group at a restaurant.

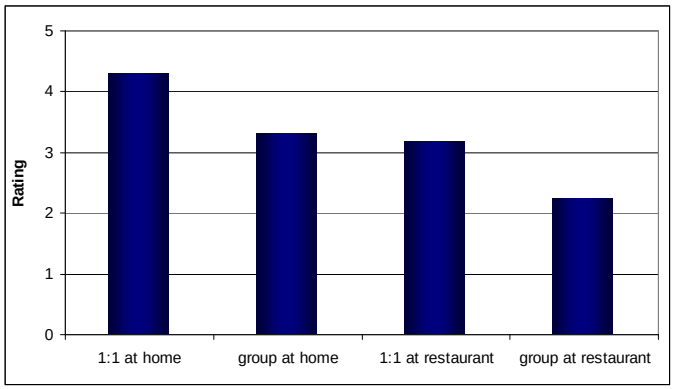

Figure 5: Subjectively rated understanding in social activities.

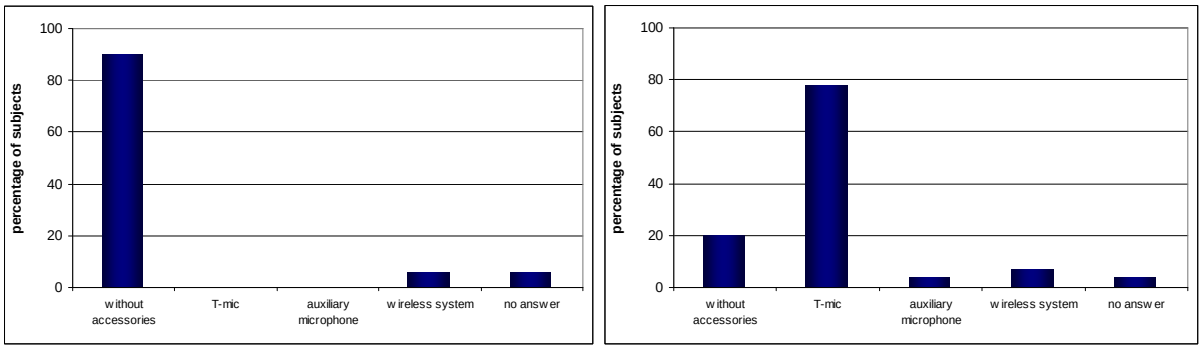

Figure 6: Applied accessories during a group conversation in a restaurant by body worn users (A) and BTE users (B).

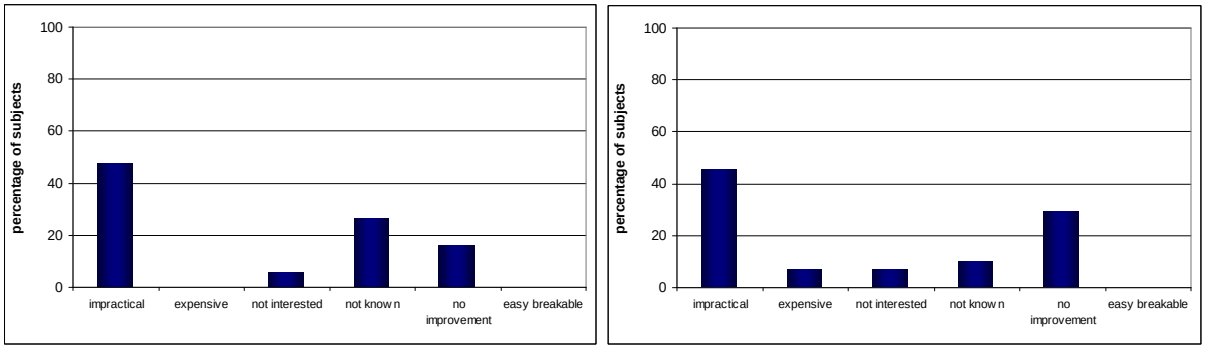

Figure 7: Reason for not using technical supply during a group conversation at a restaurant by body worn users (A) and BTE users (B).

89% of subjects with body worn processors didn't use any accessory to improve understanding in adverse listening situations (Figure 6). 77% of the BTE users took advantage of the TMic and rarely used other accessories. The next section addressed reasons for not using assistive listening devices at a group conversation in environments like a restaurant (Figure 7). 47% of body worn users and 45% of the BTE users regarded them as impractical. 29% of BTE users also said they didn't achieve any improvement by using any.

Discussion

In comparison to a previous study [Brendel et al 2006] the used questionnaire was easier to answer for the involved subjects and the required time for answering could be reduced from about one hour to 20 min. Therefore it was easier to integrate it into the clinical routine and more subjects could be enrolled. .

It was interesting to see that subjects set a much higher priority in better understanding in social interactions than in the pleasure of music perception. From this it can be learned that it is more important to address the difficulties in understanding of conversations in a group rather than the appreciation of music in further developments. This response may also reflect the candidate counselling and reported experience of other users about the limitations of today's cochlear implant systems to enjoy music.

As expected from the clinical speech perception results subjects rate the understanding with background interference much more difficult than in quiet. The low

usage of assistive listening devices in such situations is somehow in contrasted to the perceived difficulties. However, subjects responded that either the benefit or the improvement was not satisfactory. As reported by Tyler at al. [2004] some users select even the processor based on convenience or cosmetics and compromise their speech perception. One may also consider the stigma when using an accessory which highlights the hearing impairment to the whole group. Apparently the improvement perceived by accessories cannot compensate for the negative factors such as laborious handling, stigma and cosmetics.

The study clearly showed that the TMic was the only accessory used widely from BTE users, as already found in the previous study [Brendel et al. 2006]. Usually it was applied all day in all different communication situations and rarely switched to an alternative ear hook. Therefore the TMic is not actually comparable to other assistive listening devices which are designed to be used in certain situations only. In addition to the easy handling the TMic does not highlight the hearing impairment as pronounced as e. g. an auxiliary microphone. With the BTE the miniaturization of processors increases the difficulties of connecting accessories. This is clearly reflected by the higher percentage of BTE users compared to body worn users who regard assistive listening devices as impractical.

The results of this evaluation are important in the contribution for the development of cochlear implant systems and technical accessories. New assistive listening devices need to be easy to connect and improve speech understanding significantly.

Summary

The results of the questionnaire showed a clear difference in the subjective rating for hearing in different situations depending on interfering noise. Understanding in quiet environments was mainly possible for all CI users. Many difficulties were seen in group conversations or in noisy backgrounds. Concerning the use of technical accessories a difference between body worn users and BTE users was obvious: body worn users rarely applied to an auxiliary microphone or a wireless system to improve understanding or neglect assistive listening devices completely, while BTE user preferred the TMic as an optimal solution in various communication situations.

Body worn users mainly regarded accessories as impractical or they did not know that it existed. BTE users also felt that accessories were impractical but often they achieved no improvement when using them.

It is important to highlight that assistive listening devices need to be useful, practical and easy to connect.

References

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