User Performance with Inductively coupled AmplifyingTelephones
Performance de l'utilisateur d'un téléphone avec couplage inductif et amplification

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Key Words: hearing aids, telephones, hearing loss

Abstract

Previous research has shown the benefit to hard of hearing people of using magnetic induction ('T'-switch) to couple their hearing aids to telephone receivers. Benefit provided by receiver amplification in the telephone handset has also been shown. Informal surveys of hard of hearing people indicate that many of them use telephones having a dual capability, namely, magnetic coupling and receiver amplification. The objective of this investigation was to study user performance with this dual capability. In particular, the effect of receiver amplification on the speech perception ability of hard of hearing subjects using inductive means to couple their hearing aid to a telephone receiver was investigated under both good and poor telephone line conditions. Results show that the use of receiver amplification in conjunction with inductive coupling significantly improves subjects' speech perception scores under all the conditions tested. Clinical implications and recommendations are discussed.

Résumé

Des recherches ont montré l'avantage qu'il y a, pour les malentendants, à utiliser l'induction magnétique (télécapteur) pour coupler leur prothèse auditive à un récepteur téléphonique. L'avantage de l'amplification dans le combiné a également été démontrée. Des sondages informels menés auprès des malentendants indiqient que bon nombre d'entre eux utilisent des téléphones à double capacité, à savoir le couplage magnétique et l'amplification. Cette recherche avait pour but d'étudier la performance de l'utilisateur avec cette double capacité. Plus particulièrement, on a étudié l'effet de l'amplification sur la capacité de perception de la parole chez les malentendants, en utilisant un couplage inductif pour coupler leur prothèse auditive à un récepteur téléphonique, et ce dans de bonnes conditions et dans de mauvaises conditions de ligne téléphonique. Les résultats montrent que l'utilisation de l'amplification, de concert avec le couplage inductif, améliore sensiblement la capacité de perception de la parole, des sujets, dans tout les conditions testées. On discute également les implications et les recommendations cliniques pertinentes.

Introduction

According to the 1986 Statistics Canada Post-Census Survey on Disability, almost one million Canadians have a hearing disability and at least half wear hearing aids. Most hard of hearing people who wear hearing aids for face-to-face communication also wish to use the telephone. But telephone use can be difficult because: (1) the hard of hearing individual must rely exclusively on his/her impaired auditory channel; (2) the telephone signal is only routed monaurally; (3) the telephone has limited fidelity (in particular, a response approximately limited to the range 300 - 3400 Hz) and its signal carries noise as well as distortion.

Some hard of hearing people have no reported difficulty perceiving speech over the telephone. For many people with mild-to-moderate hearing loss up to 40 or 50 dB HL, amplification is not always necessary for successful telephone use because the output of the telephone at the receiver averages 86 dB SPL (Stoker, 1981). This level is approximately 15 dB higher than the level of normal conversational speech, which is approximately 60 to 70 dB SPL at a distance of one meter (Cox & Moore, 1988).

Other hard of hearing people, depending on their need for amplification and on other clinical and personal factors, may utilize one of several strategies or telephone coupling modes available to improve their telephone listening ability. These strategies are shown in Table I. Acoustic coupling can mean either one of two things. First, it can simply refer to the coupling between a telephone receiver and an individual's ear. Thus, during normal telephone use, any user is acoustically coupled to the telephone receiver as a matter of course. Second, it can refer to the coupling between a telephone receiver and the microphone of the hearing aid. In the latter situation, a hard of hearing person, with his/her aid set to the M (for microphone) position, places the telephone receiver over the microphone port of the hearing aid.

Table 1. Strategies for telephone use available to hard of hearing individuals.

Type of handset	Aid used	Mic/Telecoil	Coupling	Strategy
Regular	No	Neither	Acoustic	1
	Yes	Microphone	Acoustic	3
		Telecoil	Inductive	5
Amplified	No	Neither	Acoustic	2
	Yes	Microphone	Acoustic	4
		Telecoil	Inductive	6

LEGEND:
1. Unaided with a regular handset
2. Unaided with an amplified receiver handset
3. Aided; microphone activated with a regular handset
4. Aided; microphone activated with an amplified receiver handset
5. Aided; telecoil activated with a regular handset
6. Aided; telecoil activated with an amplified receiver handset.

Inductive coupling refers to the coupling between a telephone receiver emitting a magnetic field and the telecoil of the hearing aid. In this situation, the hard of hearing person switches his/her aid to the T (for telecoil) position and places the telephone receiver against the hearing aid case in order to listen. Usually, the telephone receiver must be moved around the hearing aid casing to find the optimal position, which varies from hearing aid to hearing aid. An amplifier built into the handset is the most practical and popular way to amplify the output of the telephone. In such a receiver-amplifier handset, the gain of the amplifier is controlled by a volume wheel or by a touch bar. Handsets of this kind increase the intensity of both the magnetic and the acoustic signals. They can be used with the unaided (without hearing aid) ear or in conjunction with a hearing aid coupled to the telephone, either acoustically or inductively, for added amplification. When the volume is set at its minimum, the telephone provides no amplification.

All Canadian telephones must meet the requirements of and be tested in accordance with CSA (Canadian Standards Association) Standard CAN3-T510-M84. They must also satisfy the magnetic output requirements of CSA Standard CAN3-T515-M85. In addition, all receiver amplified handset telephones intended for use by the hard of hearing (either by direct coupling to the ear or for acoustical and/or inductive coupling to the hearing aids) must also meet all the requirements of and be tested in accordance with CSA Standard CAN3-T515-M85. This standard requires that, with the volume control in the maximum gain position, the magnetic and acoustic outputs of the receiver be a minimum of 17 dB above the values measured with the volume control in the minimum gain position. The standard also requires that the total harmonic distortion in both the acoustic and the magnetic outputs be less than 10% (measured at 500 Hz and 1000 Hz) with the volume control in the maximum gain position.

The performance of hard of hearing people using some of these telephone coupling modes has been investigated (Nielsen & Gilberg, 1978; Stoker, 1981; Lowe & Goldstein, 1982; Cashman, Rossman, & Abel, 1982; Stoker, 1982; Tannahill, 1983; Holmes & Frank, 1984; Stoker, French-St. George, & Lyons, 1985) and is reviewed elsewhere (Hanusaik, 1991). Both direct magnetic coupling from the telephone receiver to the hearing aid and receiver amplification have been shown to provide benefits. It is also known from informal surveys of hard of hearing people that many of them use telephones with a dual capability: magnetic coupling and receiver amplification. While some studies have touched upon this subject, they have not investigated this dual capability directly.

The purpose of this study is therefore to answer two questions: (1) Does the addition of receiver amplification in the telephone handset significantly improve the speech perception ability of the hard of hearing person when using magnetic coupling to couple telephone and hearing aid and (2) will such improvement vary as a function of (a) changes in line condition (e.g., attenuation) and/or (b) the predictability of the speech material encountered (e.g., high versus low redundancy).

Materials and Methods

Subjects

Subjects included seven females and three males between 25 and 69 years, with a median age of 58 years. Four subjects had a moderate sensorineural hearing loss defined by Goodman (see Yantis, 1985, p. 164) as a pure tone air conduction loss averaged at 500, 1000, and 2000 Hz greater than 40 dB HL but less than 55 dB HL in their test ear. Five subjects had a moderately-severe sensorineural hearing loss defined as a pure tone air conduction loss averaged at 500, 1000, and 2000 Hz greater than 55 dB HL but less than 70 dB HL in their test ear (Goodman, 1965). One subject had a profound mixed hearing loss, a pure tone air conduction loss averaged at 500, 1000, and 2000 Hz greater than 90 dB HL in his test ear (Goodman, 1965). Etiologies of the hearing losses were diverse, including heredity, head trauma, congenital rubella, prolonged noise exposure, and otosclerosis. All potential volunteer subjects answered a questionnaire on their hearing loss, hearing aid(s), and telephone communication ability. The criteria for inclusion in the study were: (1) being a full-time hearing aid wearer; (2) using a behind the ear hearing aid with a T-switch ; and (3) using the phone on a regular basis.

The subjects' experience with wearing hearing aids ranged from 1 to 31 years with a median of 14 years. Their unaided discrimination scores for the test ear ranged from 46 to 84% when measured with the Northwestern University Auditory Word List #3. For subject 4, the audiometer limits precluded presentation of the test words at an adequate sensation level. Consequently, no valid estimate of speech discrimination was possible for this subject. Eight subjects were native English speakers. Two subjects were native Hungarian speakers whose command of English was like that of a native. All subjects could utilize the handset amplifier.

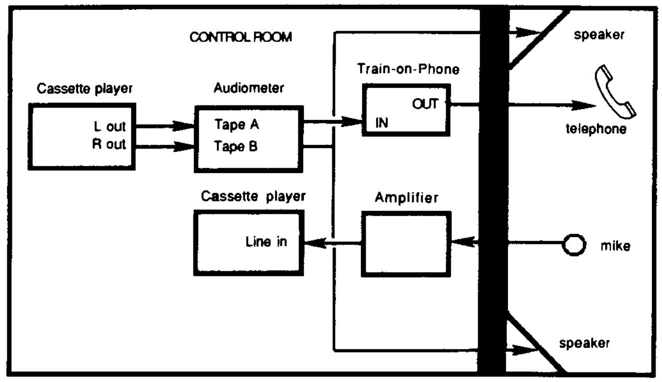
Stimuli

Speech recognition was assessed by utilizing parts of the Revised Speech Perception in Noise (R-SPIN) test (Bilger, 1984). This material was chosen because: (1) test items are embedded within frame sentences which give them either high or low predictability, representative of telephone conversations in which the user is confronted with both high predictability utterances (i.e., sentences on familiar topics, in conversation with familiar people) and low predictability utterances (i.e., sentences on unfamiliar topics, in conversation with unfamiliar people); (2) the test is presented with a multi-talker background noise representative of everyday situations; and (3) the forms are balanced for syllable, vowel, and consonant type.

Instrumentation

Tympanometric measurements were obtained for each subject using a Madsen GSI 33 (Version 2) middle-ear analyzer. In addition, each subject's hearing aid was tested to verify the adequate functioning of the telecoil. Adequate functioning required that the coupler sound pressure level be within ±6 dB of the value specified by the manufacturer for that particular model of hearing aid. All the tests were carried out in an IAC two-room sound-treated booth suitable for ears-uncovered testing as specified by ANSI S3.1-1977. Figure 1 shows the instrumentation used in the present study; it was similar to the one used in the studies of Stoker (1981), Holmes et al. (1983), and Holmes and Frank (1984). Speech materials, consisting of the R-SPIN Forms 1, 4, 6, 7,

Figure 1. Illustration of the instrumentation system employed in the four experimental conditions.



and the practice form were played from a high quality cassette player into one of the line inputs of a Grason-Stadler GSI-16 audiometer. They were routed from the audiometer to the input of an audiometer-telephone-interface, the *Train-on-Phone*™ by ALDS, Inc. *The Train-on-Phone* output was connected to a telephone with a standard amplified handset. The receiver-amplifier handset provided 21 dB of amplification with the volume control turned up to its maximum gain position (meeting the requirements of CAN3-T515-M85). The output of the telephone handset was calibrated before data collection using a B & K 4152 artificial ear with a B & K 4144 pressure microphone and a 6-cm^3 coupler. For calibration, the telephone receiver was placed into a custom made holder that maintained the receiver in the correct and repeatable position on top of the coupler. The 1000 Hz calibration tone at the beginning of each R-SPIN tape was used to adjust the output of the cassette deck-audiometer-*Train-on-Phone* combination to the appropriate level of 86 dB SPL as measured at the coupler (Holmes & Frank, 1984). For the poor line condition (70 dB SPL), the audiometer dial was adjusted so that it read 16 dB less than for the favorable line condition. The magnetic output of the telephone was measured using the Magnatel 110™ magnetic field strength meter (ALDS, Inc.). The comparison of acoustic and magnetic outputs is shown in Table 2.

The 12 talker babble on Track 2 of the R-SPIN recordings was played back from the cassette deck to the second line input of the audiometer and from the speaker output to two wall mounted Grason-Stadler loudspeakers on the subject's side of the sound treated booth. The loudspeakers were oriented at +45° and -45° azimuth with respect to the subject. In all conditions, the babble noise was presented at 76 dB SPL (Stoker, 1981) as measured in the undisturbed field at the presumed position of the subject's head. In turn, the babble noise was presented to the listener via telephone sidetone. The sidetone is that portion of the signal at the

Table 2. Comparison of the acoustic and magnetic outputs of the telephone receiver.

Amplifier Volume Setting	Acoustic Output SPL (dB)	Magnetic Reading (mA/meter)
0	86	62
1	88	74
2	95	168
3	99	274
4	101	327
5	103	416
6	104	488
7	106	612
8	107	678
9	108	751

handset's microphone that is heard in the receiver. Thus the babble generated a level of 76 dB SPL in the telephone receiver when there was no amplification. In other cases, the incoming speech signal and sidetone signal were amplified equally, maintaining the same signal-to-noise ratio throughout the experiment.

Procedures

Subjects were scheduled for a single three hour experimental session held at the School of Audiology and Speech Sciences UBC. Measures were taken of each subject's speech perception ability when listening to the telephone using his/her hearing aid inductively coupled to the telephone receiver, both with and without the option of using receiver amplification. All measures were taken in a background of multi-talker noise in order to simulate a typical listening situation[1].

The ear under test was the one habitually used by the subject for telephone communication. Before starting the experimental session, a four-step preparatory procedure was performed: (1) the subject's ears were otoscopically examined, for cerumen in particular; (2) a tympanometric screening was performed; (3) a new battery was inserted in the hearing aid of the test ear; and (4) the subject's hearing aid was run through the test box and a print-out was obtained. The following four experimental conditions were selected for investigation: (1) inductive coupling alone with a *good telephone line* condition (C1); (2) inductive coupling alone with a *poor telephone line* condition (C2); (3) inductive coupling plus receiver *amplification with a good telephone line* condition (C3); (4) inductive coupling plus receiver *amplification with a poor telephone line* condition (C4).

Subjects were presented with test items through a telephone receiver at four levels; two levels were predetermined by the examiner (conditions C1 and C2) and two were selected by the subject (conditions C3 and C4). The average SPL for telephone transmission of speech was reported by Stoker (1981) to be 86 dB SPL . This presentation level was used for condition C1. A presentation level of 70 dB SPL corresponds to the minimum line level allowable within the area serviced by a central telephone office (i.e., 16 dB below the average level of 86 dB). The 70 dB presentation level was used for condition C2. Two subject determined presentation levels were examined and used. In condition C3, the output of the telephone was set initially to 86 dB SPL but the subject could adjust it to a maximum of 107 dB SPL by manipulating the control of the receiver-amplifier. In C4, the output of the telephone was set initially to 70 dB SPL but the subject could adjust it to a maximum of 91 dB SPL again by manipulating the control of the receiver-amplifier.

Because experimental conditions C1 and C2 on the one hand and C3 and C4 on the other hand involve similar tasks, they were presented together in either order to avoid confusing the subjects. With this constraint, eight condition orders are thus possible. Four of these were selected. Each subject within a given condition order was presented the four R-SPIN forms in the same presentation order. An experimental schedule was generated for each subject listing a randomization of each experimental condition and R-SPIN form.

At the start of the experimental session, subjects were instructed to switch the hearing aid of the test ear to the T position and to turn off the hearing aid of the non-test ear in order to reduce the deleterious effects of the background babble. They were informed that they would be hearing several sets of sentences through the telephone handset accompanied by speech babble through the loudspeakers. They were instructed to repeat the last word of each sentence even if they had to guess. Prior to each condition, the subjects were presented with several practice sentences (as many as required) at the same level as the ensuing test sentences. The subjects were instructed both verbally and in written form to perform the following during the presentation of the practice sentences: (1) move the receiver around the hearing aid casing to locate optimum placement (strongest signal); and (2) adjust the volume control on their hearing aid. In the receiv-

[1]Holmes, Frank, and Stoker (1983) have found that telephone listening ability is influenced by both the type and level of background noise and that regardless of level, multi-talker noise was significantly more deleterious to telephone listening than white noise.

er amplified conditions only (C3 and C4), they were instructed to adjust the level of the telephone amplifier to the level they felt the most comfortable with. They were also asked to maintain the optimal receiver position throughout each condition. The duration of each condition was approximately ten minutes. Subjects were encouraged to take a 10 minute break between conditions as needed.

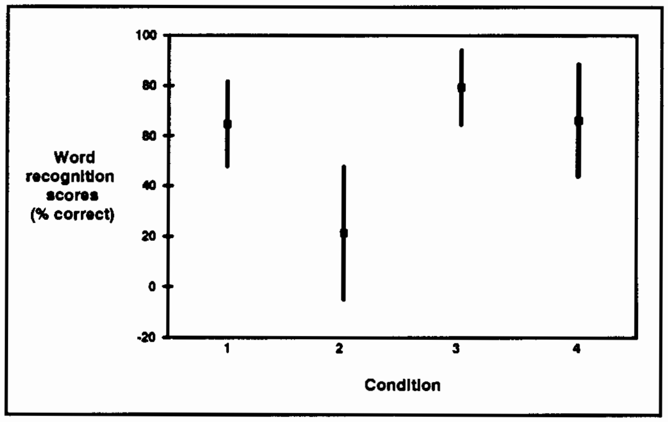
The subjects' responses were recorded on forms similar to those provided in the R-SPIN test manual. Whenever a subject failed to respond the tape was stopped and he/she was instructed to guess. Whenever the experimenter was unsure of a response, the tape was stopped and the subject was asked to repeat and, in some instances, to spell out his/her answer. All responses were also tape recorded for later verification. As a measure of test-retest variability, the experimental condition and form presented second for each subject was re-administered at the end of the four conditions. Each subject's pure tone air and bone conduction thresholds were also obtained. For the sake of convenience, this was performed after the experimental portion of the session had been completed. A speech discrimination score for the test ear was obtained at the subject's MCL using the Northwestern University Auditory Test #6 Form D List 3 in the version recorded by Auditec of St. Louis.

Results

The effects of amplification, telephone line condition, and predictability of the speech material on the speech perception ability of the subjects using the inductive method to couple their hearing aids to the telephone receiver were examined. Speech perception ability was evaluated by determining the R-SPIN scores averaged over high probability (HP) and low probability (LP) items as well as separate R-SPIN scores for HP and LP items. The results pertaining to the amplification and telephone line condition variables will be reported first.

The study had originally been conceived as a balanced design in which an equal number of subjects (three) would experience each of the four condition presentation orders. Because only 10 subjects were available, two of the presentation orders were used for three subjects and the other two were used for two subjects. One solution to this unbalance (for statistical purposes) was to remove at random two subjects such that each presentation order was experienced by two subjects. Prior to doing this, the experimenters ascertained that removing any combination of such subjects would not alter the mean group results significantly. This in fact was found to be the case. Removing any of the pairs of subjects led to roughly the same results in terms of group means. Thus, although the data were analyzed in two ways: (1) with subjects 9 and 10 (arbitrarily chosen) removed, and

Figure 2. Group mean scores, in percent correct (solid boxes), with ± 1 standard deviation intervals shown (vertical bars) as a function of the four experimental conditions (N=8).



(2) with all 10 subjects included, results will be reported only for case (1), unless otherwise noted. The elimination of data for subjects 9 and 10 never meant the elimination of the tail ends of the distribution of scores (i.e., there were always scores higher or lower than those of these two subjects, or equal, in the cases where their scores were 0% or 100%). Thus, the elimination of these subjects did not cause a decrease in variance of the scores because the extreme scores always remained.

Figure 2 shows the group mean scores (N=8) and ±one standard deviation intervals for the four experimental conditions. To determine if amplification and telephone line condition significantly affected speech perception ability while using the inductive coupling mode, a two-way ANOVA with repeated measures was performed (Winer, 1962, pp. 289-290). Amplification did have a significant ($p < 0.01$) effect on R-SPIN scores ($F = 40.47$, $d.f. = 1$, $p < 0.001$). The main effect of line condition on R-SPIN scores was also significant ($F = 50.50$, $d.f. = 1$, $p < 0.001$). There was no significant interaction between the two variables of amplification and line condition ($F = 4.17$, $d.f. = 1$, $p > 0.1$). The effects of amplification and line condition were independent of each other. It cannot be claimed, for instance, that one needs to encounter poor telephone line conditions in order for amplification to be of significant benefit.

For each subject, intra-subject test-retest reliability was assessed. For this purpose the second condition performed by each subject (and this varied from subject to subject) was repeated, and the Pearson product-moment correlation coefficient was calculated for the two sets of scores. The correlation coefficient between these two sets of scores was $r = 0.90$. This correlation was tested (Adler & Roessler, 1972, pp. 211-218) and was found to be significant ($p < 0.01$) thus indicating a very high retest reliability.

The individual and group mean scores for HP items were obtained for each of the experimental conditions by calculating the percent correct of the 25 HP sentences found in each of the R-SPIN forms. Individual and group mean scores for LP items for each of the experimental conditions tested were obtained in a similar fashion. To examine the interaction between amplification and telephone line condition (independent variables) and the predictability of the speech material encountered by the subject, a two-way ANOVA with repeated measures was performed. Either the HP or the LP R-SPIN scores were used as the dependent variable in this analysis. The results indicated that, first, amplification did have a significant main effect on both LP scores (F = 78.38, $d.f.$ = 1, $p < 0.001$) and HP scores (F = 18.10, $d.f.$ = 1, $p<0.005$). Second, line condition had a significant effect on both LP scores (F = 26.83, $d.f.$ = 1, $p<0.005$) and HP scores (F = 30.63, $d.f.$ = 1, $p<0.001$). Finally, the interaction of the two independent variables, amplification and line condition, was nonsignificant for either LP or HP data.

The test-retest correlation coefficient was 0.83 for the LP material and 0.91 for the HP material. The latter correlation was significant ($p < 0.01$), while the former was not. Thus, when the scores were broken down into HP and LP subscores, it was found that the HP speech stimuli yielded scores that were repeatable to a significant degree whereas the LP speech stimuli did not.

Discussion

Results show that receiver amplification with inductive coupling significantly improved the speech perception scores of the hard of hearing subjects. As well, these scores significantly improved from the poor line conditions to the good line conditions. These results seem logical in view of the greater magnetic flux available to the subjects' hearing aids under both types of conditions (amplified signal and improved line condition). In two cases (for subjects 1 and 5), a slight decrease in speech perception scores was noted with amplification under a good line condition (C3). This may have resulted from the telecoil being overdriven by the greater magnetic flux which suggests that there is a point up to which a greater magnetic flux is beneficial but beyond which any further magnetic flux increase may have a deleterious effect on perception. Both amplification and line condition had a significant effect on LP and HP scores. Because both LP and HP scores improved with good line conditions regardless of whether or not amplification was used, the implications are that, when listening to utterances either in or out of context, amplification will be of benefit to those using inductive coupling. One might have suspected that amplification would not be of benefit for HP sentences in which contextual cues abound, but of benefit when those cues are absent as in LP sentences. This was not the case, however, as the extra magnetic flux was beneficial in both instances. In fact, under the poor line condition, amplification provided a greater benefit for the HP items than for the LP items. This suggests that amplification may have been able to increase the telephone receiver output to a level in which more contextual cues were audible thus aiding in the interpretation of the stimulus words in the HP sentences. In the LP sentences however, the added signal strength still may have left the subjects using a random guessing strategy.

Implications of the Research

The results of this study as well as observations made throughout the testing have led to the following recommendations and conclusions:

Recommendations to clients. It is important that audiologists be aware of the magnetic coupling plus amplification telephone usage strategy and recommend it as a possibility to their clients who are having difficulty with inductive coupling alone.

Increased availability of receiver-amplifiers. The addition of amplification to pay telephones in high traffic areas should be increased. It would be of use not only to those who use inductive coupling, but also to those hard of hearing persons who use the amplified receiver without a hearing aid, and to those with minimal or no hearing loss in situations where the background noise is high. There is no inconvenience to the telephone user with normal hearing because the telephone operates normally when the volume control is on its minimum setting.

Standardization of telecoils. National standards should be developed that define the magnetic coupling requirements of hearing aids for their use with telephone sets; the access to telecommunication services would have to be considered when designing hearing aids to be sold in Canada. The Canadian Association of Speech-Language Pathologists and Audiologists (CASLPA) has requested that the 3-dimensional specifications of field strength as well as the orientation of the telecoil (at least for BTE hearing aids) be made available on hearing aid specification sheets. In this way, audiologists will have more information with which to select a hearing aid based on the probable needs of the individual. The standard will also specify that a change of at most 10 dB would be considered acceptable when a hearing aid output is switched from acoustic to inductive input, or vice versa.

Prescription of hearing aids with telecoils. Although such a standard would improve the situation, audiologists should take measurements to assure that the telecoil strength meets the manufacturers specifications. Townsend and Wavrek (1983) found that only 7% of clinics surveyed routinely measured sound level at the coupler with telecoil input and that, overall, the least important measures were consistently considered to be battery current drainage and coupler SPL with telecoil input.

Instruction in hearing aid-telephone use. It was observed in the course of this study that many subjects did not realize that inductive coupling requires them to hold the receiver to the hearing aid casing and not up to the earmold. The only explanation for this confusion is a lack of adequate instruction and follow-up by hearing health care professionals. Instructions, demonstrations, and repeated follow-up appointments must be provided to assure successful use of the hearing aid telecoil. When combinations of amplifiers and telecoils are considered, there is an increase in user difficulty and thus an increase in the importance of adequate instruction (Pichora-Fuller, 1981).

Evaluation of telephone use and telephone rehabilitation. As mentioned in Cashman et al. (1982) and in Stoker et al. (1982), the audiometer telephone interface has the potential to be a powerful diagnostic tool in evaluating the performance of hard of hearing individuals over the telephone both in research and in clinical settings. This device makes it possible to use standardized speech tests such as the R-SPIN test to evaluate the performance of an individual with a given telephone coupling mode so that objective comparisons and recommendations can be made. It could be used to evaluate the performance of patients when choosing among hearing aids when telephone performance is an important consideration. It could also be used to train and counsel clients on the proper positioning of the telephone for most efficient communication. In cases in which more extensive telephone rehabilitation is undertaken, such as instruction in listening and/or 'conversational repair' strategies, it would permit teaching of the above.

Conclusions

The results of this study have shown that adding amplification to the telephone receiver can improve telephone speech perception significantly for hard-of-hearing individuals who use inductive coupling. This finding confirms the reports of many experienced hearing aid users. It should also be stressed that it is up to hearing health care professionals to make the various telephone communication options known to their clients and to adequately instruct them in their use. Sufficient follow up services need to be provided in order to make sure that these methods are being used to their greatest advantage.

Acknowledgements

The authors thank Joe Somow and Tim Beard of the Clinical Engineering Program and the Department of Electrical Engineering of the University of British Columbia for their time and technical expertise, and Dr. Kathy Pichora-Fuller for reviewing this work. The authors are indebted to the Vancouver Oral Center for allowing them to use their hearing aid test equipment.

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