Applications of Hearing-Loss Simulation in Education of Student Clinicians

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Electronic simulation of hearing loss has been used in many ways to inform the public, families, and professionals about the perceptual, communicative, and social effects of impaired auditory perception. This paper describes a new application in which student clinicians with normal hearing learned effective communication skills *by interacting with* the person who is simulating hearing loss. The student clinicians learned to produce clear speech and language by communicating words and sentences, by applying clarification strategies, and by rating the fluency of conversations under different conditions of simulated sensory loss. Connection of apparatus and training procedures are summarized.

Most friends, relatives, and clinicians who regularly converse with people who are hearing impaired want to understand the nature of hearing loss so that they can assist in the communication process. Researchers have used many different methods to help people with normal hearing appreciate the sound qualities that are heard by someone with a hearing loss. The various methods of simulation have been influenced partly by each researcher's theoretical view of the nature of hearing loss and partly by the technical equipment and expertise available to create the desired sound qualities. These methods have included ear plugs or earmuffs to reduce the intensity of incoming speech (Hebb, Heath, & Stuart, 1954), masking of speech by artificially generated noise (Chafin & Peipher, 1979; van der Lieth, 1972), modulation of a carrier signal by the speech-envelope pattern (Erber, 1972), tactile representations of speech (Erber & Zeiser, 1974), electronic filtering of speech frequencies (Schear, Skenes, & Larson, 1988; Wang, Reed, & Bilger, 1978), and complex modifications of the speech waveform (Baer & Moore, 1993; Gagné & Erber, 1987; Moore & Glasberg, 1993; Summers & Al-Dabbagh, 1985; Villchur, 1974, 1977).

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Hearing loss tends to be characterized by two main features: a loss of sensitivity (an inability to hear weak sounds) and a loss of clarity (an inability to hear small differences in intensity, time, and/or frequency between sounds) (Bergman, 1980; Willott, 1991). Other disruptive effects also may be experienced, such as different losses of sensitivity at different frequencies, rapid growth of loudness near threshold, or increased susceptibility to interference by background noise.

There are many reasons to develop accurate methods for simulating hearing impairment and to provide opportunities to hear speech that has been modified: to better understand the perceptual nature of specific hearing deficits, to assist in the design of listening devices for people who are hearing impaired, to appreciate the effects of hearing impairment on social interaction, and to increase empathy in caregivers. Developments in each area are briefly summarized below.

Numerous researchers have modified sound qualities with electronic filters to determine how ears with specific audiometric configurations might perceive speech (e.g., Fabry & van Tasell, 1986; Schear et al., 1988; Sher & Owens, 1974; Wang et al., 1978). In these studies, subjects with normal hearing attempted to identify syllables or words while they listened through filters adjusted to represent particular losses of hearing sensitivity. The investigators compared perceptual data from these subjects with similar perceptual data obtained from people with reduced hearing sensitivity. In general, when the filter cutoff and slope were selected to match a particular audiometric configuration, similar overall syllable- and word-identification scores, general error patterns, and specific phonemic confusions were obtained.

Other investigators have applied their simulations of hearing impairment to the design of hearing aids and other listening devices. For example, Baer and Moore (1993) created a system which "smeared" the spectrum and reduced frequency selectivity. Villchur (1974, 1977) and Moore and Glasberg (1993) devised multiband intensity expansion systems which simulated auditory threshold effects, loudness recruitment, and reduced dynamic range. With normally-hearing listeners, they demonstrated the potential benefits and limitations of linear amplification and amplitude compression strategies which could be applied to compensate for impaired speech perception. Blamey, Martin, and Clark (1985) used a computer to create acoustical simulations of a multiple-channel cochlear implant, with software written to mimic three different design strategies. They used speech-tracking results (DeFilippo, 1988; DeFilippo & Scott, 1978) and vowel/consonant confusions to demonstrate the potential benefits of encoding the voice fundamental by pulse rate, and encoding formants one and two by electrode position.

Educators have produced video tapes incorporating various forms of simulation (e.g., frequency filtering, waveform modification) to provide observers with brief vicarious experiences of hearing loss (e.g., Australian Deafness Council – Queensland, 1991; Hearing Impairment Services, 1991; Power, 1991). In some videotaped demonstrations, lists of words or sentences are presented with reduced sound clarity to illustrate effects of hearing impairment on auditory or auditory-visual test performance. In others, a classroom or office environment is presented from the client's point of view to demonstrate effects on auditory-visual communication. In most cases, captions and/or a printed guide provide descriptive information and suggest topics for discussion. Many university students in the fields of audiology, speech-language pathology, and special education have been introduced to the nature and functional effects of hearing loss in this way.

Other education specialists have used *portable* simulation systems to provide temporary real-life experiences with impaired hearing. A participant with normal hearing wears a small behind-the-ear noise generator (a modified hearing aid) which acoustically masks incoming speech sounds. Although this method does not accurately simulate the perceptual characteristics of impaired hearing, the participant is mobile and is able to engage in daily activities. In several studies (Chafin & Peipher, 1979; Lang & Pocobello, 1991; Lieberth, 1982; van der Lieth, 1972), normally-hearing university students, educators, and clinicians have used portable speech maskers to personally experience the effects of reduced hearing on their ability to obtain information and interact socially. Participants typically report feeling self-conscious, insecure, and lonely. They also report an increase in their understanding of the social consequences of hearing impairment. When combined with directed follow-up discussion, the method has been useful for introducing people with normal hearing to the functional effects of impaired hearing.

In addition to introducing students to the nature of hearing loss, most audiologic rehabilitation courses are designed to teach students how to adapt their communication for successful interaction with clients. This may be accomplished by presenting a list of guidelines (e.g., "face the light"; "speak clearly") (Erber, 1993; Kaplan, 1982), and/or by providing students with numerous opportunities for interaction with people who are hearing impaired. Both methods have limitations, however, because awareness of communication strategies does not necessarily lead to their use, and many clients are not willing or able to provide the necessary direction and feedback to their student clinicians. Instead, student clinicians need to actively develop effective communication skills *before* contact with their clients.

In most of the studies summarized above, the aims were (a) to produce accurate representations of impaired hearing and/or (b) to provide an opportunity for listeners with normal hearing to gain insight into the nature of hearing impairment and its functional effects. That is, the learner usually was the person with the simulated hearing loss. The second part of this paper describes an application of hearing-loss simulation in which student clinicians learned effective communication skills *by interacting with* the person with the simulated hearing loss (Erber, 1987, 1988).

TEACHING STUDENT CLINICIANS TO PRODUCE CLEAR SPEECH AND LANGUAGE

Each speech-language pathology student at La Trobe University receives at least 3 hr of personal experience with a hearing-loss simulation system during the required one-semester aural rehabilitation course. Each student participates in classroom demonstrations, and also completes several out-of-class assignments. The training procedures are interactive, incorporating role-play by students and intensive communication practice with feedback provided to the learners. The aim is to teach student clinicians to communicate effectively with adults who are hearing impaired by using clear speech, simple language, and appropriate remedial strategies. The simulated clients are not actors trained in the disorder, but fellow students who play the role of clients while perceiving speech through an electronic hearing loss-simulator.

General Method

For this type of communication training, two acoustically-isolated rooms are used, connected by closed-circuit audio and video systems as shown in Figure 1. One student, playing the role of therapist, faces a video camera and speaks into a microphone/preamplifier. The "therapist's" speech is passed through an electronic hearing-loss simulator ("HELOS": Erber, 1988) which modifies its sound qualities (Gagné & Erber, 1987). Because acquired low vision is common in older adults (Karp, 1988), the video signal also is modified to simulate vision impairment. The distorted audio and video components of speech are conveyed by electrical cables to another room, where a second student, playing the role of client, listens through earphones and watches a television monitor. An intercom system conveys the "client's" clarification requests and instructional feedback to

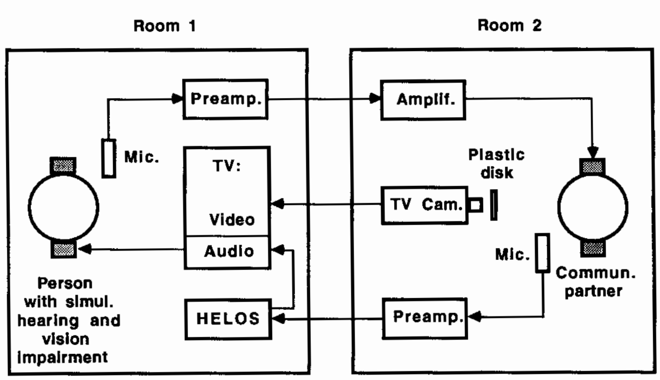

Figure 1. Block diagram showing connection of apparatus used to simulate the experience of hearing and vision impairment and to train student clinicians to produce clear speech and language.

the first student.

The hearing-loss simulation device used in this work (HELOS) is a simple, compact unit designed for use in counselling and communication therapy (Erber, 1987, 1988; Gagné & Erber, 1987). A *threshold* control operates an adjustable centre-clipping circuit which eliminates one's perception of weak sounds while permitting perception of strong sounds. A *distortion* control operates a random phase-shifting circuit which makes it difficult for one to distinguish neighboring audible frequencies. A switch permits one to select a flat or sloping audiogram. Speech intelligibility can be varied from 0 to 100% by adjusting these controls.

Vision impairment in older adults is characterized by reduced acuity, reduced contrast sensitivity, and reduced visual fields (Karp, 1988). The former two effects are simulated in this work by placing a translucent plastic disk in a small frame mounted in front of the lens of the video camera (see Erber, 1979). The disk, constructed from a thin sheet of stippled plastic, diffuses incoming light and blurs the video image. Visual acuity can be varied in steps from 20/40 to 20/800 by placing different calibrated disks in the frame.

Classroom Demonstrations

During a typical classroom demonstration, one student plays the role of therapist, and another student plays the role of the client who is hearing/vision impaired. The therapist practices administering various communication assessment and therapy procedures (e.g., word- and sentence-identification tests, the tracking procedure, QUEST?AR structured conversations, ASQUE question-answer sequences, TOPICON; see Appendix) (Erber, 1988). All such demonstrations are conducted in a glass-walled clinic room containing only the client and a television monitor on which the image of the therapist appears. The qualities of audio and video signals received by the client are modified to simulate hearing and vision impairments in the manner described above. Other students sitting outside the glass observe the spoken interaction, and later discuss diagnostic outcomes and successful therapeutic strategies with the participants.

Out-of-Class Assignments

In addition, several out-of-class assignments are provided as self-directed tutorials. Procedures and outcomes of several recent assignments are summarized below. In assignments A through D, hearing impairment was simulated by setting the HELOS threshold control to 4, the HELOS distortion control to 8, and selecting a sloping audiogram (-12 dB/octave above 500 Hz). This combination produced about 25% auditory identification of spoken monosyllabic words. In assignment E, HELOS controls were set in a random schedule as described below. Vision impairment in all cases was simulated by placing a translucent plastic disk in front of the camera lens which scattered light and blurred images. This particular calibrated disk produced visual acuity of about 20/360 for standard Snellen letters and greatly reduced perception of the speaker's lip and lists. Only sentences containing five to eight syllables from lists 9-12 were used. These lists contain items previously shown by their developers to be difficult to speechread. Each student's task was to communicate each of 12 sentences to a partner who simulated hearing and vision impairment as described above. The presenter was permitted to speak each sentence up to five times until it could be repeated verbatim. After each presentation, the client with (simulated) sensory loss repeated what she perceived (including fragments, nonsense, or gaps), and also wrote what she perceived on a prepared form (using phonetic transcription if necessary). She was not permitted to request specific clarification or to provide specific instructional feedback to the presenter. After speaking each sentence and receiving only an identification response from the client, the presenter was required to consider the client's receptive errors in devising a strategy for the next presentation.

Later examination of each client's written transcription for each stimulus sentence illustrated the order in which fragments of the sentence were perceived by a person with (simulated) hearing and vision impairments. From this type of personal experience, the participants learned that under difficult perceptual conditions spread and rounded vowels (e.g., /I, U/) can become indistinguishable, some consonants (e.g., /k, t, f/) can become both inaudible and invisible, and that many consonant blends (e.g., /nd, nt, rt/) become unclear. To compensate, the student presenters learned to maintain voice level, to articulate clearly, and to apply simple semantic strategies (e.g., provide synonyms or related words). Some examples of typical response sequences are shown in Table 1.

4. Application of communication strategies in conversation. In this assignment, students learned to apply a variety of communication strategies during an extended conversation under difficult perceptual conditions. Eighty-one pairs of female students, age range 21-34 years, each conducted a 15-min conversation on a subject randomly selected from a deck of topic cards (e.g., *camping, restaurants, car repair*). One person played the role of communication partner, while the other played the role of a client with hearing and vision impairments as described above. Each pair resolved their communication difficulties by applying a wide range of strategies previously learned during class discussion and in other assignments. Afterward, each participant wrote a brief report describing the strategies that she found to be effective during the conversation. Table 2 lists (a) the range of communication techniques which students reported they had used spontaneously to achieve conversational fluency and (b) the proportion of students who noted application of each strategy. Commonly used techniques included slowed speech, clearly articulated speech, repetition, and use of short simple sentences containing familiar words.

5. Rating conversational fluency under different conditions of sensory loss. In this assignment, students rated the fluency of their own brief conversations under a wide range of perceptual conditions. Five pairs of female students set thresh-

Table 1

Examples of Responses to Kopra et al. (1986) Sentences After Each of Five Attempts by Student Clinicians to Communicate Them to Clients (Other Students Simulating Hearing and Vision Impairment). After Each Presentation, the Clients Repeated Verbatim What They Perceived, but Did Not Request Specific Clarification or Give Instruction. Clinicians Then Devised Clarification Strategies in Response to Client Errors.

Pair EH>AM

1. The na fine number.
2. There the snake is very hot.
3. Your namontel looks nice.
4. Your . . . is a monkey.
5. Your appointment is on Monday.

Pair HZ>NA

1. This is the queen of England.
2. This is a safe haven.
3. Take out the . . . of the oven.
4. . . . the cake out of the oven.
5. She took the cake out of the oven.

Pair AW>GA

1. . . . (8 syllables)
2. . . . uh eh . . . aye . . . ing . . .
3. . . . girl doesn't eat a three.
4. That . . . doesn't fit very well.
5. That shirt doesn't fit very well.

Pair SW>CB

1. My nephew . . .
2. I miss you . . .
3. I . . . you . . . at hardware . . .
4. . . . meet you at the hardware store.
5. I'll meet you at the hardware store.

Pair CG>MO

1. The deepest were a big . . .
2. The . . . my . . .
3. The . . . is my eat.
4. The toothbrush cleans my teeth.
5. The dentist cleaned my teeth.

Pair MO>CG

1. Beth rode . . .
2. What road . . .
3. Beth rode in . . .
4. The road in been resurfaced.
5. The road is being resurfaced.

Table 2

Strategies Spontaneously Used by 81 Speech-Language Pathology Students for Achieving Successful Communication During a 15-Min Conversation With a Client Who Simulated Hearing and Vision Impairment. Percentages of Students Who Reported Effective Use of Specific Strategies Are Shown.

Strategy	Percentage of students
Speak slowly	65
Discuss aspects of topic familiar to both participants	57
Articulate clearly	52
Repeat word, phrase, or sentence[a]	48
Use uncomplicated syntax	46
Speak predictable words, phrases, and sentences[b]	46
Comply with partner's specific requests	42
Speak short sentences	40
Present associated word(s)[c]	32
Rephrase sentences	31
Maintain topic	31
Use common words	25
Avoid use of voiceless stops and fricatives	16
Exaggerate intonation	14
Use multisyllabic words	14
Speak with increased voice intensity	12
Use meaningful facial expressions	6
Provide relevant and cohesive narrative	5
Spell words	2

[a]Repetition of a word, phrase, or sentence by the student, either spontaneously or when requested by the client, when a message was not received correctly. [b]Includes the use of automatic responses, provision of contextual information, and placement of key words in redundant sentences. [c]Includes the use of synonyms, definition of key words, and placement of key words in a list of related words.

old and distortion control conditions on the hearing loss simulator according to a random schedule, conversed for 1 min on a subject randomly selected from a deck of topic cards (e.g., *swimming, chocolate, cats*), rated the fluency of the conversation on a 5-point scale from *poor* (1) to *good* (5) (Erber, 1988, 1994), and then repeated the process with another listening condition and topic. Within each pair, one student played the role of communication therapist, while the other played the role of client. Figure 4 shows how 6 different threshold and 10 different distortion settings influenced conversational fluency under the condition of simulated vision impairment as described above. With this method, the students were able to experience the communicative effects of 60 different sound qualities in approximately 60 min.

The participants reported that under moderate perceptual conditions, simple repetition and slowing of speech (intuitive strategies) were usually adequate to achieve successful communication, but that rephrasing and use of semantic re-

Distortion control setting	1 (Normal)	2	3	4	5	6 (Abnormal)
High 10	3.4	3.2	2.6	1.4	1.0	1.0
9	3.6	3.2	2.6	2.0	1.4	1.0
8	4.0	3.8	3.2	2.0	1.0	1.0
7	3.8	4.0	3.2	1.8	1.4	1.0
6	4.2	3.8	3.2	2.6	1.4	1.0
5	4.2	4.0	3.4	2.2	1.6	1.0
4	4.6	4.0	3.4	2.2	2.0	1.0
3	4.6	3.8	3.8	2.4	1.6	1.0
2	5.0	4.2	3.4	2.6	1.4	1.0
Low 1	5.0	4.6	3.8	2.8	1.8	1.0

Threshold control setting

Figure 4. Mean rated fluency of 60 conversations between five pairs of student clinicians (rating 1 = poor; rating 5 = good). Impaired hearing was simulated with a HELOS electronic hearing loss simulator set to *sloping audiogram* and to 60 different combinations of threshold and distortion control positions. Impaired vision (20/200 acuity) was simulated by placing a calibrated translucent plastic disk in front of the video camera lens.

dundancy (creative strategies) were necessary under severe perceptual conditions. The students also learned that a wide range of sound qualities can produce the same poor conversational fluency (e.g., a low rating of 1). They agreed that amplification of the partner's speech (e.g., through hearing aids) probably would enhance communication for one whose ears did not detect weak sounds, but might not resolve communication difficulties for one whose ears distorted audible sounds. The clients also reported that they generally ignored visible cues when experiencing minor hearing losses, carefully watched the (blurred image of the) partner when experiencing intermediate hearing losses, and could not fully interpret the minimal visible cues when experiencing extreme hearing losses. Considerable cooperation by the partner was required under the poorest acoustic conditions.

Conclusion

This paper has described how simulation of hearing and vision impairment can be used to provide interactive pre-professional experience for student communication therapists. In general, the method requires each of two participants to play a role: (a) as a clinician and (b) as a person with impaired hearing and vision. In the procedures described here, the main emphasis was on training student clinicians to be successful *communication partners.* Participants have learned a variety of effective interactive techniques through brief classroom demonstrations and practical out-of-class assignments.

In general, as the result of communicating with another person who simulated impaired hearing and vision, the students:

learned to speak clearly;
learned to apply clarification strategies with/without prompting;
learned to employ semantic contexts to make words easier to understand;
experienced communication and its remediation under a wide range of difficult conditions; and
experienced success in the role of effective communication partner.

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REFERENCES

Australian Deafness Council – Queensland. (1991). *Hearing loss – How does it feel?* [Video tape: PAL format]. South Brisbane, Queensland, Australia: Queensland Government Media and Information Services, TSN 11, Education/Training Satellite Network.

Baer, T., & Moore, B.C.J. (1993). Effects of spectral smearing on the intelligibility of sentences in noise. *Journal of the Acoustical Society of America, 94,* 1229-1241.

Bergman, M. (1980). *Aging and the perception of speech.* Baltimore, MD: University Park Press.

Blamey, P.J., Martin, L.F.A., & Clark, G.M. (1985). A comparison of three speech coding strategies using an acoustic model of a cochlear implant. *Journal of the Acoustical Society of America, 77,* 209-217.

Chafin, P., & Peipher, R.A. (1979). Simulated hearing loss: An aid to in-service education. *American Annals of the Deaf, 124,* 468-471.

DeFilippo, C.L. (1988). Tracking for speechreading training. In C.L. DeFilippo & D.G. Sims (Eds.), *New reflections on speechreading* [Monograph]. *The Volta Review, 90,* 215-239.

DeFilippo, C.L., & Scott, B.L. (1978). A method for training and evaluating the reception of ongoing speech. *Journal of the Acoustical Society of America, 63,* 1186-1192.

Erber, N.P. (1972). Speech-envelope cues as an acoustic aid to lipreading for profoundly deaf children. *Journal of the Acoustical Society of America, 51,* 1224-1227.

Erber, N.P. (1979). Auditory-visual perception of speech with reduced optical clarity. *Journal of Speech and Hearing Research, 22,* 212-223.

Erber, N.P. (1987). Electronic simulation of hearing loss: Developing speech communication skills in family and friends. In J.G. Kyle (Ed.), *Adjustment to acquired hearing loss* (pp. 55-63). Bristol, United Kingdom: University of Bristol, Centre for Deaf Studies.

Erber, N.P. (1988). *Communication therapy for hearing-impaired adults.* Melbourne, Australia: Clavis.

Erber, N.P. (1993). *Communication and adult hearing loss.* Melbourne, Australia: Clavis.

Erber, N.P. (1994). Communicating with elders: Effects of amplification. *Journal of Gerontological Nursing, 20,* 6-10.

Erber, N.P., & Zeiser, M.L. (1974). Classroom observation under conditions of simulated profound deafness. *The Volta Review, 76,* 352-360.

Fabry, D.A., & Van Tasell, D.J. (1986). Masked and filtered simulation of hearing loss: Effects on consonant recognition. *Journal of Speech and Hearing Research, 29,* 170-178.

Gagné, J-P., & Erber, N.P. (1987). Simulation of sensorineural impairment. *Ear and Hearing, 8,* 232-243.

Hearing Impairment Services. (1991). *HELOS: An introduction* [Video tape: PAL format]. South Brisbane, Queensland, Australia: Special Education Resource and Development Centre.

Hebb, D.O., Heath, E.S., & Stuart, E.A. (1954). Experimental deafness. *Canadian Journal of Psychology, 8,* 152-156.

Kaplan, H.F. (1982). Facilitating adjustment. In R.H. Hull (Ed.), *Rehabilitative audiology* (pp. 81-100). New York: Grune and Stratton.

Karp, A. (1988). Reduced vision and speechreading. In C.L. DeFilippo & D.G. Sims (Eds.), *New reflections on speechreading* [Monograph]. *The Volta Review, 90,* 61-74.

Kopra, L.L., Kopra, M.A., Abrahamson, J.E., & Dunlop, R.J. (1986). Development of sentences graded in difficulty for lipreading practice. *Journal of the Academy of Rehabilitative Audiology, 19,* 71-86.

Lang, H.G., & Pocobello, D.E. (1991). Deafness simulation via speech-masking: An experiential learning strategy. *Journal of the Academy of Rehabilitative Audiology, 24,* 133-141.

Lieberth, A.K. (1982). Simulated hearing impairment: A training technique for professionals. *The Volta Review, 84,* 291-295.

Moore, B.C.J., & Glasberg, B.R. (1993). Simulation of the effects of loudness recruitment and threshold elevation on the intelligibility of speech in quiet and in a background of speech. *Journal of the Acoustical Society of America, 94,* 2050-2062.

Power, D. (1991). *Understanding hearing loss* [Video tape: PAL format]. Brisbane, Queensland, Australia: Griffith University, Centre for Deafness Studies and Research.

Schear, J.M., Skenes, L.L., & Larson, V.D. (1988). Effect of simulated hearing loss on speech sound perception. *Journal of Clinical and Experimental Neuropsychology, 10,* 597-602.

Sher, A., & Owens, E. (1974). Consonant confusions associated with hearing loss above 2000 Hz. *Journal of Speech and Hearing Research, 17,* 669-681.

Summers, I.R., & Al-Dabbagh, A.D. (1985). Electronically simulated loss of frequency resolution. *British Journal of Audiology, 19,* 49-52.

van der Lieth, L. (1972). Experimental social deafness. *Scandinavian Audiology, 1,* 81-87.

Villchur, E. (1974). Simulation of the effect of recruitment on loudness relationships in speech. *Journal of the Acoustical Society of America, 56,* 1601-1611.

Villchur, E. (1977). Electronic models to simulate the effect of sensory distortions on speech perception by the deaf. *Journal of the Acoustical Society of America, 62,* 665-674.

Wang, M.D., Reed, C.M., & Bilger, R.C. (1978). A comparison of the effects of filtering and sensorineural hearing loss on patterns of consonant confusions. *Journal of Speech and Hearing Research, 21,* 5-36.

Willott, J.F. (1991). *Aging and the auditory system.* San Diego, CA: Singular.

APPENDIX

Some of the clinical/training procedures mentioned in the text are briefly summarized below. In each case, the partner with simulated hearing and vision loss is called the client; the partner with normal hearing and vision is called the therapist.

Tracking (DeFilippo, 1988; DeFilippo & Scott, 1978)

The therapist reads printed text (e.g., a short story or newspaper article), sentence by sentence. The client attempts to repeat verbatim what is received. The therapist provides sentence fragments, repetition, or clarification as needed to help the client understand. After the client has repeated every word correctly, the participants are permitted to progress to the next sentence Communicative efficiency is described in terms of "Tracking rate" calculated as number of words communicated per minute. The procedure is useful for demonstrating effects of sensory loss and teaching students how to apply clarification strategies.

QUEST?AR (Erber, 1988)

The therapist selects a topic (a place recently visited). The client asks 30 prescribed questions printed in a conversational order, and the therapist spontaneously answers each one. The client attempts to identify sources of difficulty in receiving the message (e.g., too fast, too long, too complex, etc.) and requests appropriate clarification when necessary. The therapist repeats or clarifies as needed to help the client understand. After the client has identified every word in an answer correctly, the participants are permitted to progress to the next question in the sequence. The procedure is useful for demonstrating conversational effects of sensory loss and teaching students how to request help and apply clarification strategies.

ASQUE>>> (Erber, 1988)

The client asks the therapist questions selected from a list. The questions include the following types: yes/no ("Do you smoke?"), choice ("Do you prefer tea or coffee?"), information-eliciting ("What size shoes do you wear?"), opinion-eliciting ("How can they make cars safer?"). The therapist spontaneously answers each one in turn, and the client attempts to understand the therapist's answers. The procedure demonstrates the power of response-limiting questions in promoting potentially intelligible answers: yes/no, choice, and information-eliciting questions tend to limit response alternatives; responses to opinion-eliciting questions are less predictable. The procedure also illustrates the contribution of speaker cooperation.

TOPICON (Erber, 1988, 1994)

The client and the therapist conduct a brief conversation (e.g., 2-5 min) on a topic selected from a list (e.g., "hardware store"). Student observers rate the fluency of the conversation on a 5-point scale from *poor* (1) to *good* (5), and also consider factors that contributed to their rating: for example, effects of topic familiarity on conversational structure, the client's attempts to guide conversation with response-limiting questions, and the partner's clarification strategies. The activity provides students with experience in rating conversational fluency and in identifying factors that contribute to conversational breakdown and repair.