The Effect of an Audiologic Rehabilitation Program on Responses to Scenarios Depicting Communication Breakdown

L'effet d'un programme de réadaptation auditive sur les réactions aux scénarios montrant un échec de la communication

by • par

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ABSTRACT

A battery of outcome measures was developed and used to evaluate the effectiveness of an in-house audiologic rehabilitation program for residents of a home for the aged. In the present paper we report on changes observed using an outcome measure, The Scenarios, that was designed to determine if residents or staff acquired new knowledge about communication strategies that could be related to changes in the residents' communication experiences. Scenarios depicting typical communication problems of residents at the facility were presented, and participants generated problem sources and solutions pertaining to the scenarios. Comparing the results obtained at the first and final evaluations for residents and staff, we found that overall there was no increase in either the number of problems or solutions generated by the staff; however, there were increases in the total number of problems and solutions generated by the residents. There were also changes in the designation of the agent responsible for the suggested solutions. Importantly, for both residents and staff, changes in the frequency with which different agents implemented solutions suggest that the residents learned to assume greater control in dealing with everyday communication problems.

ABRÉGÉ

Une série de mesures des résultats a été mise au point et utilisée pour évaluer l'efficacité d'un programme maison de réadaptation auditive chez les résidents d'un foyer pour personnes âgées. Les auteurs exposent dans l'article les changements observés en se servant d'une mesure de résultats, The Scenarios, qui a été conçue pour déterminer si les résidents ou le personnel ont acquis, sur les stratégies de communication, de nouvelles connaissances qui pourraient être en corrélation avec la façon différente dont les résidents vivent des situations de communication. Ils présentent les scénarios dépeignant les problèmes de communication types des résidents du centre, ainsi que les sources de problèmes et les solutions, en rapport avec les scénarios, qui émanaient des participants. En comparant les résultats obtenus aux première et dernière évaluations des résidents et du personnel, les auteurs ont constaté que, dans l'ensemble, il n'y a pas eu augmentation du nombre de problèmes et de solutions attribuables au personnel. Cependant, le nombre global de problèmes et de solutions attribuables aux résidents a augmenté. De plus, la désignation de l'agent responsable des solutions suggérées s'est modifiée. Le plus important, en comparaison avec les résultats obtenus avant l'exécution du programme, c'est que la diffusion, par l'agent, des solutions proposées tant par les résidents que par le personnel à l'évaluation après-programme, donne à penser que les résidents ont appris à mieux maîtriser eux-mêmes des problèmes de communication quotidiens.

KEY WORDS

behavioural intent • communication strategies • program evaluation • audiologic rehabilitation • institutionalised elderly

A rehabilitation program was implemented at a model home for the aged, St. Joseph's Villa in Dundas, Ontario (see Head & Jennings, 1994; Jennings & Head, 1994, 1997). A battery of evaluation tools was developed and used to evaluate the program. Given spiralling health care costs and demands for accountability, we felt that it was necessary to evaluate the effectiveness of the program and not to take its merits for granted (for a discussion of the need for outcome measurement see Coyte, 1992; Frattali, 1994; Robards-Armstrong & Stone, 1994). The primary evaluation tool was a questionnaire designed to tap changes in the scope and quality of communication in 17 everyday situations at the Villa. As reported previously (Pichora-Fuller & Robertson, 1994a, 1994b), the program resulted in an increase in the number of activities attended by residents. Other outcome measures were designed to determine

what specific products of the rehabilitation program might underpin changes in the scope and quality of the residents' communication experiences. Using a test of skill and knowledge of prostheses, we found a dramatic increase in the familiarity of residents and staff with assistive listening devices (ALDs) and in their skill in using ALDs and hearing aids (Pichora-Fuller & Robertson, 1997). In the present article, we report the results obtained using The Scenarios, an outcome measure used to evaluate the acquisition by residents and staff of new knowledge about communication strategies that might account for some of the changes in the residents' communication experiences.

Consistent with the ecological approach (Noble & Hétu, 1994) that we adopted in designing the audiologic rehabilitation program, and using a simple model of communication, we assumed that effective communication involves the purposeful exchange of a message between a speaker and a listener within an environment (see Erber, 1988; Pichora-Fuller, 1992). We recognised that the interaction of individuals within a given situation may create a unique set of circumstances with associated problems and viewpoints. We were interested in developing measures that would capture changes that were important within the ecology at the Villa. In developing The Scenarios test (adapted from a test of behavioural intent developed by Koury & Lubinski, 1991), we set out to measure how residents and staff perceived communication problems and the kinds of solutions that might be implemented in situations that were generated to depict a range of messages, speakers, listeners, and environments typical of their everyday experiences. The scenarios depicted in the test were constructed based on observations of life at the Villa during an initial two-month period. The residents and staff generated an open-set of responses according to their own reactions to the scenarios that were presented to them.

Method

Overall Design

The rehabilitation program was delivered by the program audiologist (MJ). All of the evaluation data was collected by an evaluation audiologist (LR) who had no knowledge of the details of the treatments that were provided to specific residents or staff. In the preprogram phase, prior to the implementation of the program, the outcome measures, including The Scenarios, were administered to the residents twice at a 6-month interval, to establish a baseline against which the results of subsequent evaluations were compared. Subsequent evaluations administered to the residents were conducted six months and one year after the implementation of the program. The staff of the Villa were evaluated twice, once preprogram and then again one year after the program began. In this report, we will compare the results obtained for the residents and the staff on The Scenarios at their first and final evaluations.

The Program

The program focused on five major areas: (a) provision of personal hearing aids and assistive listening devices, (b) maximisation of accessibility to communication opportunities, (c) education of staff and residents, (d) training to promote compensatory strategies, and, (e) drop-in audiology clinic and residents' self-help group. The full description of the program is provided elsewhere (Head & Jennings, 1994; Jennings & Head, 1994). The Scenarios was developed in an attempt to measure the effectiveness of the third and fourth major areas of the program which are described in detail in a companion article (Jennings & Head, 1997).

Participants

A sample of residents and staff participated in the pre- and postprogram evaluations. Thirty residents took part in the first evaluation and 27 of them were also able to participate in the final administration of The Scenarios. The age range of the residents was 68 to 94 years (M = 85; SD = 6). There were 26 women and 4 men. Although a variety of health problems existed among the group, no other problems besides hearing loss were directly related to communication. Importantly, the residents who participated in the evaluation all performed well on a test to screen for cognitive deficits; specifically, all of the residents scored 23/30 or better on the Standardized Mini-mental State Exam (Molloy, Alemayehu, & Roberts, 1991) at the start of each evaluation period. Thirty staff members participated in both the pre- and postprogram evaluations. These staff members were asked to participate in the evaluation because they had been designated by the residents as regular communication partners. They came from a variety of occupational areas: 13 from nursing, five from dietary services, three from the recreation department, three from administration, two from housekeeping, two from pastoral care, one from the occupational/physiotherapy department, and one from social work. (For a more detailed description of the participants, including the criteria for their selection and factors related to drop-out rate, see Pichora-Fuller and Robertson, 1994a, 1994b, 1997).

Materials

Prior to the first evaluation, and after two months of observing life at the Villa on a full-time daily basis, the evaluation audiologist generated short descriptions of fifty different scenarios typical of everyday life at the Villa in which there was potential for communication problems. In generating all of the scenarios, it was assumed that the listener/resident might or might not have a hearing loss, but that there would be no significant cognitive impairment or other health problem that would result in communication difficulty. A large number of scenarios were

prepared in an effort to create a sample that would represent the entire range of communication situations that might be encountered at the Villa. The following are examples of the scenarios that were generated: "A group of residents is playing cards. One resident loses interest in playing because it is hard to catch what is going on."; "A resident is lying in bed feeling rather washed out with pain from arthritis and calls to ask the nurse for a Tylenol. The nurse must explain that it is not yet time for the resident's medication, but the resident has trouble understanding.".

Procedure

At each evaluation, participants were asked by the evaluation audiologist to respond to six different scenarios by identifying possible sources of communication problems and then possible solutions. The scenarios were selected for each participant at random without replacement from the pool of 50 different scenarios. We decided to include six different scenarios at each evaluation because the scenarios would inevitably differ in how familiar they were to each participant. We wanted to sample as many as it was feasible to sample in a session, so that scenarios varying in degree of familiarity would be included. By the end of the fourth evaluation, each resident had been asked about a total of 24 different scenarios (almost half of those in the pool).

The participant was asked: "First, name all the things you can think of that might make it hard for the resident to understand what is being said. Next, name all the things that could be done to help overcome the problem understanding what was said." During a pilot study conducted at a neighbouring home for the aged[1], we had discovered that if residents were first asked to pinpoint the sources of problems, it was easier for them to generate possible solutions. The evaluation audiologist read the scenario aloud, and then gave the participant a typed description of the scenario which could be read or referred to at any time. The participant was given time to respond without any prompting. When the participant stopped responding spontaneously, the evaluation audiologist asked "Can you think of anything else? Anything you can think of about the resident? Anything you can think of about someone else? Anything about the situation?". When the participant had no further response, the next scenario was presented until six scenarios had been presented.

Each response was immediately categorised as either a problem or a solution, and was recorded in writing by the evaluation audiologist or a student assistant. During the pilot study, sessions were audio-recorded and the written records were later compared to the audio-recording to verify the accuracy of the written responses and intertester agreement. Because there were almost no discrepancies between the written records and the audio-recordings and because there were almost no differences between the records produced by different testers, audio-recording was discontinued during the program evaluation phase of the project.

Analysis

After the final evaluation, the responses, both problems and solutions, were categorised into one of four mutually exclusive categories according to the primary source of the problem: the speaker, the listener, the environment, or the message. For the solutions, the agent responsible for implementing the solution was also categorised into one of five categories: the speaker, the listener, a third party, a cooperative combination of speaker and listener, or an ambiguously stated agent. This two-way categorisation of the solutions into problem source and agent was necessary because a problem arising from any given source could be solved by various possible agents. For example, the unclear speech of a speaker could be solved if the listener used a repair strategy directing the speaker to speak more clearly; background noise in the environment could be solved by either the listener, the speaker, the listener and the speaker together, or a third party taking action. A rich variety of problems and solutions was offered by the participants, especially for the environmental problem source category. Therefore, the major categories were further subdivided into mutually exclusive subcategories and types within subcategories (see Appendix A for definitions of the major categories and Appendix B for a list of the subcategories and types within subcategories).

The definitions of categories and subdivisions within categories were developed initially by the two audiologists involved in the implementation and evaluation of the program (MJ and LR, respectively). Later, the assignment of all responses to categories, subcategories, and item types was reviewed and refined until there was agreement between two other independent raters (RK and KR) regarding the (sub)categorisation of all responses. RK had experience rating similar responses to scenarios in another study (Pichora-Fuller & Kirson, 1994), but neither RK nor KR had been directly involved in the project at the Villa. Two major refinements to the preliminary coding of the audiologists were introduced in later coding: (a) the use of a three-level system (major categories, subcategories, and item types) instead of a two-level system, and (b) a two-way categorisation of solutions according to problem source and agent instead of a categorisation only according to problem source. It was agreed that the refinements improved the description of the pattern of responses. Therefore, all five authors were in agreement regarding the final coding of all responses.

To allow comparison to earlier work, whenever possible, the categories and subcategories of problem sources were matched to those used in a similar study in which the attribution of problems to sources was investigated in three groups of active community-living adults: younger adults with good hearing, older

adults with good hearing, and older hard-of-hearing adults (Pichora-Fuller & Kirson, 1994). No changes were made in the major categories or subcategories; however, some changes to the list of item types were necessary to accommodate scenario-specific variants and differences in the populations tested. Eight of the items generated in the previous study were not observed in the present study, eight were expanded to accommodate scenario-specific variants in the present study, and nine new items were added (see Appendix B).

Some responses were judged to be irrelevant to a specific scenario and could not be coded (e.g., when a resident was depicted in a scenario as having difficulty hearing on the hall phone, one participant identified the fact that "others hog the public phones" as a problem). A total of 12 (less than 1%) uncodable problems and 29 (less than 2%) uncodable solutions were not included in the present analysis.

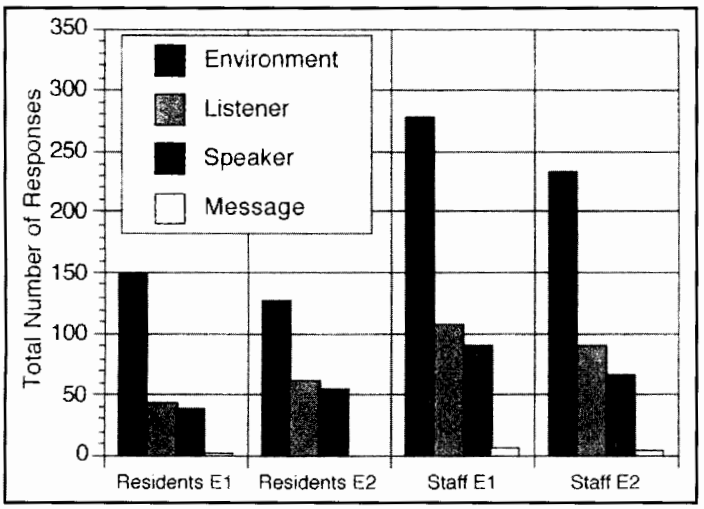
The number of problems and solutions in each category and subcategory was counted and the counts obtained by the residents and staff at the first and final evaluations were compared.

Results

Problems

In response to the set of six scenarios presented at each evaluation, residents and staff seemed to have no difficulty identifying likely sources of communication difficulties. At both the first and final evaluation, staff generated more problem sources than did the residents. Comparing the number of problem sources generated at the final evaluation to the number generated at the first, the staff generated fewer problems whereas the residents generated more. Specifically, the residents generated a total of 232 problems (M = 1.3 per resident per scenario) at the first and 247 problems (M = 1.5 per resident per scenario) at the final evaluation; the staff generated a total of 491 problems (M = 2.7 per staff per scenario) at the first and 396 problems (M = 2.3 per staff per scenario) at the final evaluation. This description was supported by an analysis of variance that yielded a significant main effect [$F(1,58) = 26.52$, $p < .001$] of group (residents vs. staff), and a significant interaction [$F(1,55) = 6.18$, $p < .025$] of group by time of evaluation (first vs. final).

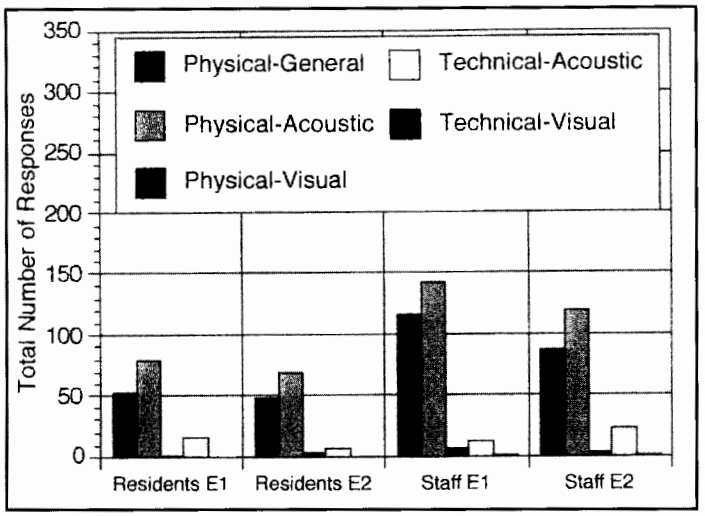
Figure 1. Total number of responses in the major categories of problem sources that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).



Next we considered the distribution of the problem sources generated by major category: environment, listener, speaker, and message (Figure 1). At each evaluation, both residents and staff identified environmental problem sources more often than any of the other categories of problem source. After environmental problem sources, listener problem sources and speaker problem sources were the next numerous. Far fewer responses were assigned to the message problem source category. This description was supported by an analysis of variance that yielded a significant main effect for problem source category (environment, listener, speaker, message) and a subsequent test of multiple comparisons [$F(3,174)=159.64$, $p < .001$; for associated Student-Newman-Keuls Test, $p < .01$]. Staff generated more environmental and listener problem sources than did residents, but both groups generated about the same number of speaker and message problem sources. This description was supported by a significant group by category interaction [$F(3,174) = 13.49$, $p < .001$); for associated Student-Newman-Keuls Test, $p < .01$]. For the staff, responses in all four categories declined from the first to the final evaluation. For the residents, responses identifying environmental problem sources declined, whereas responses identifying listener and speaker problem sources increased from the first to the final evaluation. However, the three-way interaction of group by category by time of evaluation failed to reach statistical significance.

The responses generated within the environmental, listener, and speaker categories were further examined. Within the environmental problem source category, the pattern of responses by subcategory was the same for both residents and staff at both evaluations (Figure 2). Problems with the physical environment were identified far more often than problems arising from difficulties with technology. With respect to problems with the physical environment, specific problems with the acoustical environment were identified most often, followed by more general problems with the physical environment. Examples of specific problems with the acoustical environment are "two to three people talking at once", "music interferes", and "echo in auditorium". Examples of general problems with the physical environment are "room too large", "TV in a bad spot", "sitting

Figure 2. Total number of responses in the environmental problem source category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).



too far back", "distractions from people serving", and "confusion in lobby". Common examples of acoustical technical problems are "mic not working well" and "hearing aid not good". Problems associated with the visual environment were rarely identified. An example of a problem concerning visual aspects of the physical environment is "can't see person leading group"; an example of a problem concerning a visual technical problem is "glasses don't help". From the first to the final evaluation, the only increase that was observed was a slight increase in the number of technical-acoustical problems identified by the staff.

Within the listener category, responses were subcategorised depending on the factor that was the focus of the problem: the relatively stable perceptual or cognitive status of the listener or more temporary states of the listener (Figure 3). A common example of a perceptual problem was "resident is hard of hearing"; common examples of cognitive problems are "memory problem", "too much to follow at once", or "resident doesn't know much about topic"; common examples of a state problem are "not paying attention" or "focused on pain". At both evaluations, perceptual problems of the listener were identified by both residents and staff more often than problems related to the listener's cognitive status or temporary state. Temporary state problems were identified slightly more often than cognitive problems, especially by the staff. From the first to the final evaluation, there was an increase in the number of perceptual problems that were identified, especially by the residents. In contrast, there was a slight decrease in the number of cognitive and temporary state problems that were identified, especially by the staff.

Figure 3. Total number of responses in the listener problem source category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).

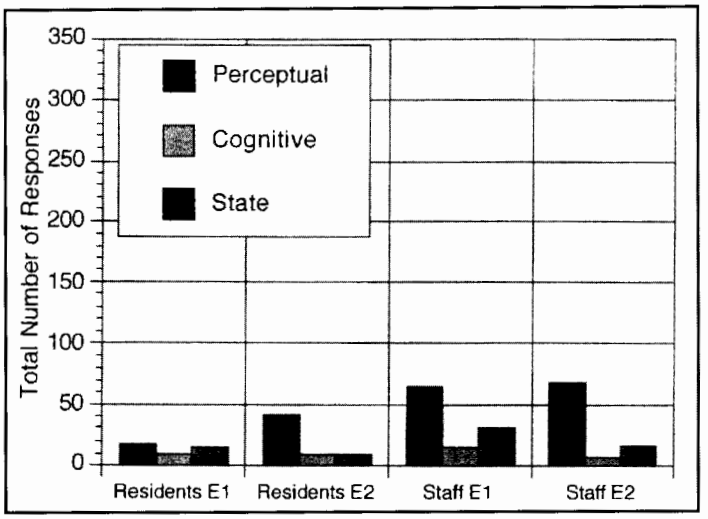
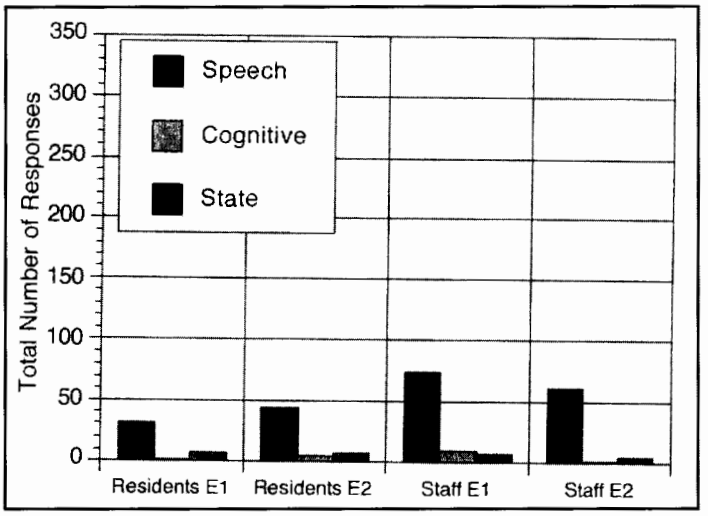


Figure 4. Total number of responses in the speaker problem source category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).



Within the speaker category, responses were subcategorised depending on whether the speaker's speech, cognitive, or temporary state played the primary role in the problem (Figure 4). Examples of speech problems are "unclear voice", "speaker has a cold", or "peculiar accent"; common examples of cognitive problems are "doctor not explaining clearly" or "speaker not realising listener cannot hear"; common examples of temporary state

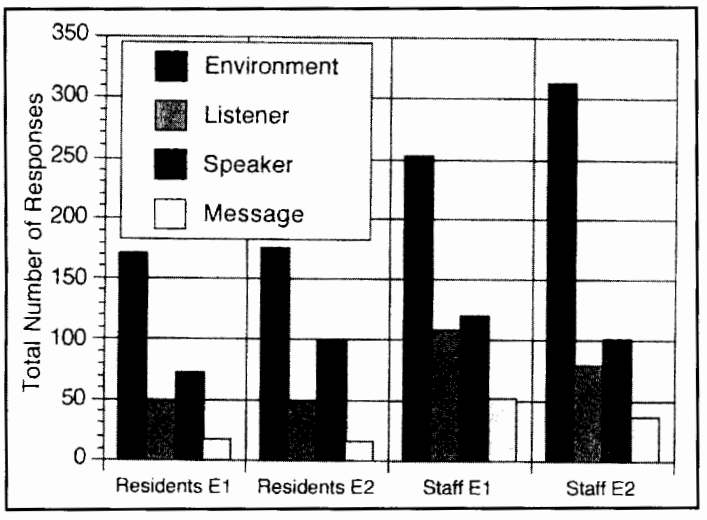
problems are "staff is in a hurry" or "staff are preoccupied". At both evaluations, speech problems of the speaker were identified by both residents and staff more often than problems related to the speakers' cognitive status or temporary state. From the first to the final evaluation, there was a slight decrease in the number of speaker problem sources generated by the staff across all subcategories. In contrast, there was a slight increase in the number of speech and cognitive speaker problems that are identified by the residents.

Overall, from the first to the final evaluation, the slight increases in the number of problem sources identified seem to reflect primarily a greater awareness of acoustical-technical difficulties concerning environmental problem sources, and the physical (perceptual and speech) nature of the problems attributable to the listener and the speaker.

Solutions

After generating the list of problem sources suggested by each scenario, the participants then generated a list of all of the solutions that they could think of that would alleviate the problems. Overall, the staff generated more solutions at both evaluations [there was a significant main effect of group; $F(1,58) = 18.89$, $p < .001$]. Compared to the number of solutions generated at the first evaluation, the staff generated the same number of solutions but the residents generated more at the final evaluation. Specifically, the residents generated a total of 324 solutions (M = 1.8 per resident per scenario) at the first, and 349 solutions (M = 2.2 per resident per scenario) at the final evaluation; the staff generated a total of 539 solutions (M = 3.0 per staff per scenario) at the first, and 534 solutions (M = 3.0 per staff per scenario) at the final evaluation. Therefore, the residents not only became more proficient at identifying problems, but also more proficient at identifying solutions; no such change was observed for the staff.

Figure 5. Total number of responses in the major categories of solutions that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).

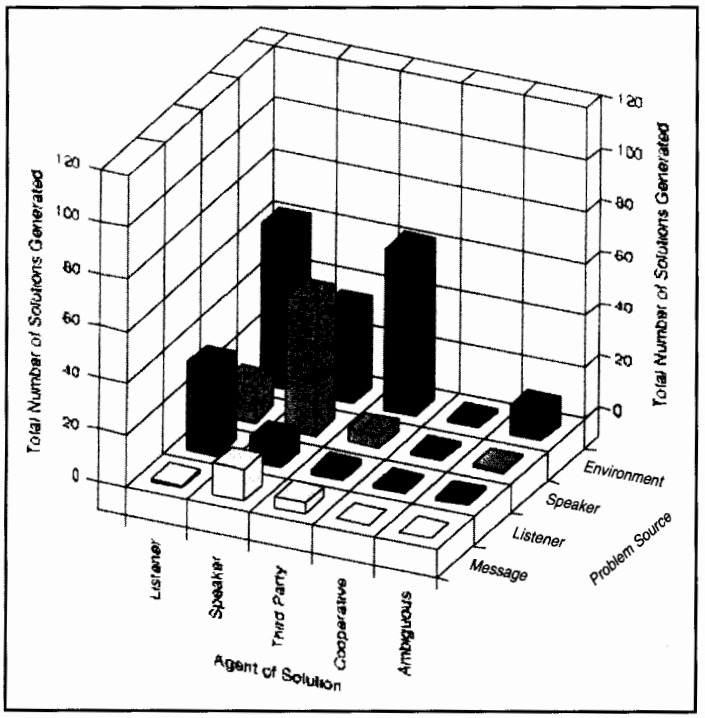


The solutions were categorised according to the major category of problem that they addressed. Considering the distribution of solutions by major category, the overall pattern of solutions was the same for both residents and staff at both evaluations (Figure 5). Specifically, both groups generated the most solutions for the environmental category. The next largest number of solutions was generated for the speaker category, followed by the listener category, with the difference between these categories being significant for the residents but not for the staff. The smallest number of solutions was generated for the message category, with the staff generating significantly fewer solutions in this category than in any other, and with the residents generating about the same number of responses in this category as in the listener category. This description was supported by an analysis of variance that yielded a significant main effect of category [$F(3,174) = 133.59$, $p < .001$; associated Student-Newman-Keuls test, $p < .01$] and a significant interaction of group by category [$F(3,174) = 6.46$, $p < .01$; associated Student-Newman-Keuls test, $p < .01$)].

The order of solution categories is not the same as the order found for the number of problem sources generated. Environmental problems and solutions were the most numerous while message problems and solutions were the least numerous; however, there was an asymmetry insofar as listener problems outnumbered speaker problems, but speaker solutions out number listener solutions. From the first to the final evaluation, the staff generated significantly more environmental solutions; the number of solutions they generated in other categories decreased to a degree that did not reach statistical significance. The number of solutions generated by the residents in all categories increased to a degree that did not reach statistical significance. This description was supported by an analysis of variance that yielded a significant two-way interaction of category by time [$F(3,165) = 7.454$, $p < .001$; associated Student-Newman-Keuls, $p < .01$] and a significant three-way interaction of group by category by time [$F(3,165) = 2.15$, $p < .05$; associated Student-Newman-Keuls, $p < .01$].

As well as considering the solutions according to problem category, it is also necessary to consider the agent of the solution. For example, an environmental solution and an associated solution might be identified, but the agent who implemented the solution and who was, therefore, in control of the problem was of interest. Accordingly, each of the solutions associated with the major problem sources was also categorised according to the agent designated as the problem solver. Clear designations of

Figure 6. Total number of responses generated by residents preprogram for the major categories of solutions and according to the agent of the solution.



the agent were categorised in one of the four following categories: (a) the listener, (b) the speaker, (c) a third party, and (d) a cooperative combination of listener and speaker. When there was no clear designation of the agent (listener or speaker) who was to implement the suggested solution, then the response was coded in a fifth category as 'ambiguous' with respect to agent.

The solutions generated by the residents at the first evaluation are shown in Figure 6 and their solutions at the final evaluation are shown in Figure 7. Not surprisingly, most solutions are attributed to either the speaker or the listener, followed by a third party agent. Cooperative agents and ambiguously designated agents were generated least often. This description was supported by an analysis of variance that yielded a significant main effect of category of agent [$F(4,232) = 89.05$, $p < .001$, associated Student-Newman-Keuls test, $p < .01$].

Although the general pattern is the same pre- and postprogram, some differences emerge. Importantly, from the first to the final evaluation, there was a significant decrease in the number of times the speaker was designated as agent but there was a significant increase in the number of times the listener was designated as agent. There is no corresponding change over time in the number of times that the other agents are designated as the problem solvers. This description was supported by an analysis of variance that yielded a significant two-way interaction of agent by time of evaluation [$F(4,220) = 8.60$, $p < .001$; associated

Figure 7. Total number of responses generated by residents postprogram for the major categories of solutions and according to the agent of the solution.

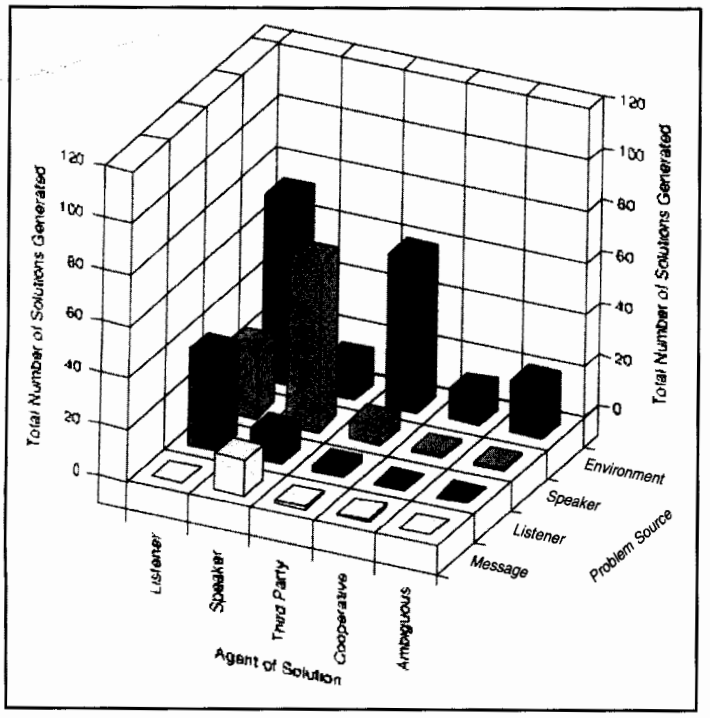


Figure 8. Total number of responses generated by staff preprogram for the major categories of solutions and according to the agent of the solution.

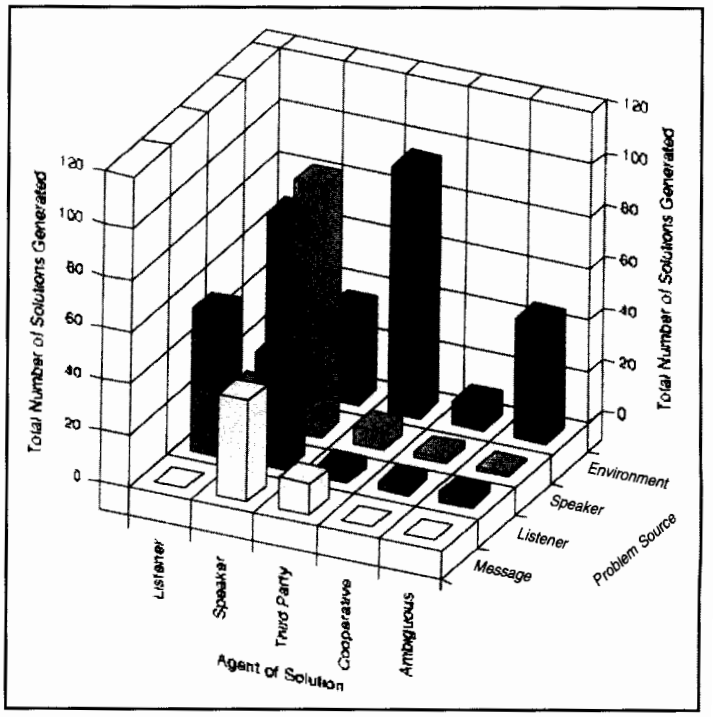
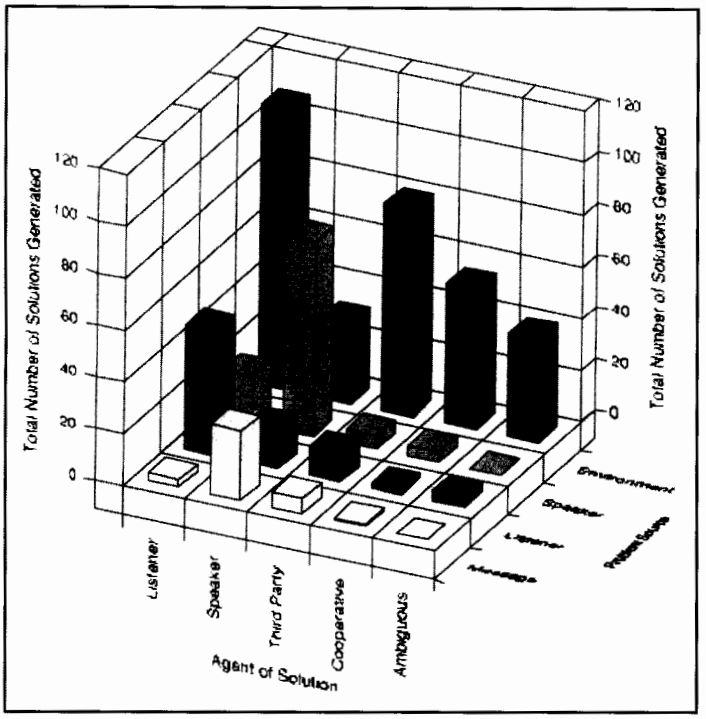


Figure 9. Total number of responses generated by staff postprogram for the major categories of solutions and according to the agent of the solution.



Student-Newman-Keuls Test, $p < .01$] and a significant three-way interaction of group by agent by time [$F(4,220) = 2.45$, $p < .05$; associated Student-Newman-Keuls Test, $p < .01$].

Consistent with the interesting overall finding that there was a decrease in the perceived problem-solving responsibility of the speaker and a corresponding increase in the perceived responsibility of the listener, in Figures 6 and 7, it can readily be seen that the perceived responsibility for environmental problems shifted for the residents, with a decrease in the number of solutions being controlled by the speaker, and an increase in the number of solutions being controlled by the listener, either alone or in cooperation with the speaker. Likewise, the perceived responsibility for both speaker and listener problem sources also shifted, such that the listener assumes greater control.

The solutions generated by the staff at the first evaluation are shown in Figure 8 and their solutions at the final evaluation are shown in Figure 9. Again, some interesting differences in perceived control over solutions emerge. From the first to the final evaluation, the perceived responsibility for environmental problems shifted, with a decrease in the number of solutions being controlled by the speaker, and a decrease in ambiguous assignment of control. There was, however, a noteworthy increase in the number of solutions being controlled by the listener, either alone or in cooperation with the speaker, as well as an increase in the number of solutions where a third party agent was specified. Note that the shift of control to the listener is similar to that found in the responses of the residents. The perceived responsibility for speaker problems also shifted again such that the listener assumed greater control. Overall, even though the staff did not generate more solutions postprogram than preprogram, like the residents, the staff also assigned the listener more control in dealing with a variety of problem sources, including environmental, speaker, and listener problem sources.

The responses generated within the environmental, listener, speaker, and message categories were further examined. Within the category of solutions to environmental problems, the pattern of responses by subcategory was the same for both residents and staff at both evaluations (Figure 10). Solutions addressed general problems and specific acoustical problems with the physical environment and also acoustical problems arising from difficulties with technology. Common examples of solutions to general problems with the physical environment were "divide the group" (third party agent), "request to sit near" (listener agent), "get close to ear" (speaker agent), "try to all get closer together" (cooperative agents), and "reduce distractions" (ambiguous agent). Common examples of solutions to specific acoustical environmental problems were "staff could turn TV down" (third party agent), "suggest going to a quieter place" (listener agent), "take resident aside, away from noise" (speaker agent), "move to quiet area" (cooperative agents), and "close window" (ambiguous agent). Common examples of solutions to technical acousti-

Figure 10. Total number of responses in the environmental solution category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).

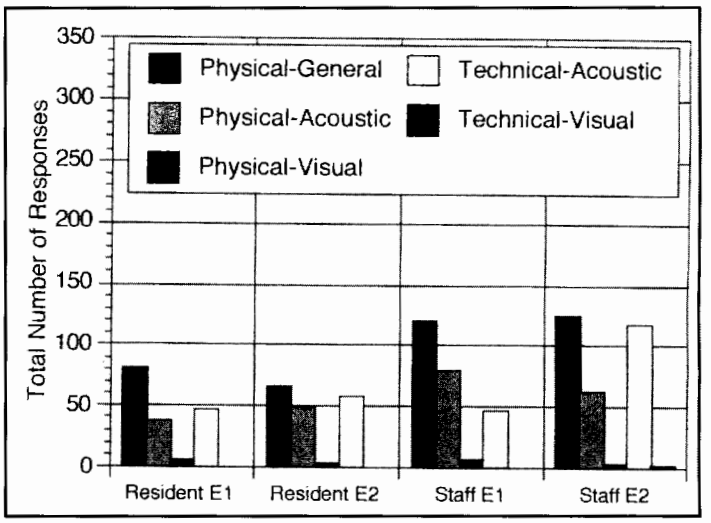


Figure 11. Total number of responses in the listener solution category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).

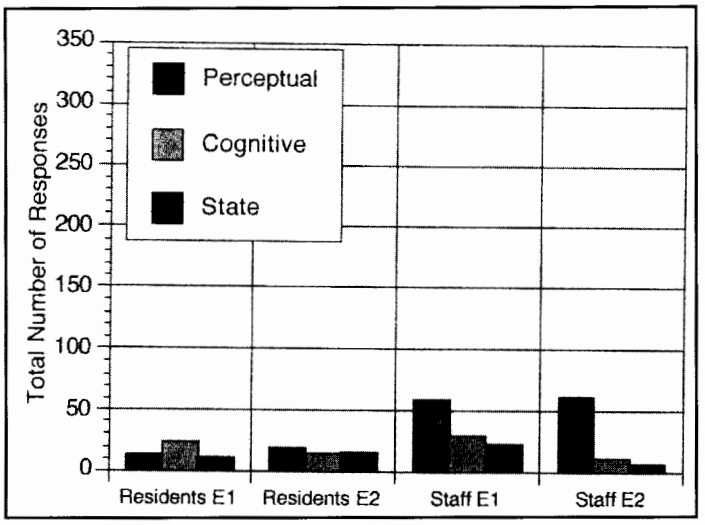
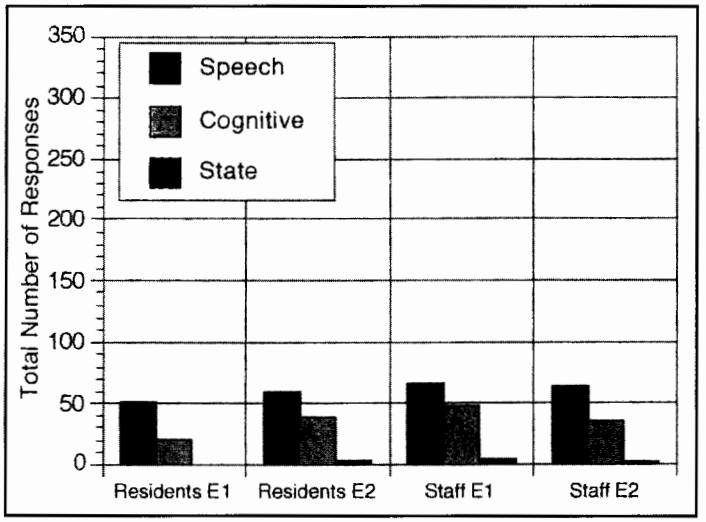


Figure 12. Total number of responses in the speaker solution category that were generated by residents and staff at the preprogram evaluation (E1) and at the postprogram evaluation (E2).



cal problems were "put loudspeakers in the auditorium" (third party), "use earphones" (listener agent), "use a mic" (speaker agent), "use FM" (cooperative agents), and "put pocket-talker in middle of table" (ambiguous agent). From the first to the final evaluation, the residents generated fewer solutions to general physical problems with the environment, but they generated more solutions to address specific acoustical problems related to the physical environment and solutions related to the use of technology, including hearing aids and assistive listening devices. The staff generated fewer solutions concerned with the physical environment but more than twice as many solutions involving acoustical aspects of technology postprogram than they did preprogram.

Within the category of solutions addressing listener problems, the patterns of solutions generated by the residents and the staff differ somewhat (Figure 11). Recall that the problem sources identified by both residents and staff mostly concerned the perceptual problems of the listener. Both pre- and postprogram, the staff-generated solutions focused mainly on the perceptual problems of the listener, with there even being some shift from the first to the final evaluation such that solutions to perceptual problems were slightly more emphasised and solutions to cognitive problems de-emphasised. Preprogram, the residents provided more solutions to the cognitive aspects of listener problems, with the focus postprogram shifting away from cognitive problems and towards the perceptual and temporary state problems of the listener. An example of a solution to a perceptual problem is "wear hearing aid" (listener agent); an example of a solution to a cognitive problem is "get listener's attention" (speaker agent).

Within the category of solutions pertaining to speaker problems, the patterns of solutions generated by subcategory are similar for both staff and residents at both evaluations (Figure 12). Specifically, solutions are most often focused on the speech of the speaker, followed by cognitive factors, and with very few solutions related to the temporary state of the speaker. From the first to the final evaluation, the number of solutions generated by the staff decreased for all three subcategories. For the residents, increases in the number of solutions are seen for responses in both the speech and cognitive subcategories. Examples of solutions to speaker problems related to speech are "ask speaker to be louder" (listener agent) and "slow down" (speaker agent).

Discussion

Overall, it seems that the changes in the solutions generated are characterised mostly by qualitative changes in the responses of the staff, and both quantitative and qualitative changes in the responses of the residents. The lack of overall quantitative change on the part of the staff may be due to their initial high level of performance. The staff who participated in the evaluation were identified by the residents as their frequent communication partners. The staff members who were nominated as frequent communication partners may have had communication skills that were superior to other staff members who were not nominated. It seems reasonable that those with superior communication skills would be selected by residents as desirable frequent communication partners and that these skilled communicators would also be more likely than those with less skill to seek out and be comfortable with frequent social interactions with the residents (Erber, 1994).

Both the residents and staff generated more environmental problems and solutions postprogram than preprogram, with the emphasis being on solutions concerning specific acoustical problems related to the physical environment or to technology. The preprogram emphasis on environmental problems is consistent with previous findings for young adults with good hearing and presbycusics (Pichora-Fuller & Kirson, 1994). The increase in acoustical environmental solutions no doubt resulted from training in the use of assistive technology and communication strategies such as strategies concerning seating, moving closer to the speaker, and reducing or avoiding background noise. These results are consistent with other indicators of program effectiveness that were concerned with use of technology (Pichora-Fuller & Robertson, 1997).

For the staff, while there was no increase in the number of problems or solutions generated either overall or in any of the major categories other than the environmental category, there were changes in the distributions of solutions by problem source and agent that reflect a shift towards perceiving the listener to be in greater control. For the residents, in addition to increases in the environmental category, there were also increases in both the number of problems and solutions that were generated in the listener and speaker categories. Within both the listener and speaker categories, most problems generated by the residents were perceptual problems on the part of the listener and speech problems on the part of the speaker. The predominance of perceptual over cognitive problems generated by the residents and staff is contrary to the pattern of findings obtained previously from young and old adults living in the community, where hearing loss is less common and not so automatically assumed to be a factor in communication problems. However, the predominance of speech over cognitive problems in speakers is the same in the present study as in the previous study (Pichora-Fuller & Kirson, 1994). Residents' preprogram awareness of these physical bases for problems was high and was heightened from the first to the final evaluation. Furthermore, the solutions of the residents, like the solutions of the staff, also reflect a shift towards more control of these problem sources on the part of the listener/resident, either alone or in cooperation with the speaker.

Given that listener problems were identified more often than speaker problems but speaker solutions were identified more often than listener solutions, it is interesting to consider the significance of the shift in control of problem solving that was observed. A striking change from the first to the final evaluation is that the residents and staff alike see the listener/resident more often as the agent in solving environmental, speaker, and listener problems. This shift may reflect two levels of effect of the rehabilitation program. On the first level, it is likely that the program clarified the nature of problem sources and their solutions for both staff and residents. On the second level, a clearer understanding of the problems and solutions may have increased the belief by both staff and residents that the resident/listeners were in fact able to manage many of the problems that they face in everyday life. For the listener to manage a problem arising from a physical characteristic of the speaker, such as unclear articulation, the listener would need to employ conversational repair strategies such as those that were practised in therapy sessions. The fact that this shift of control to the listener was observed in both staff and resident participants further underlines the empowering effect of the program. An important implication is that hard-of-hearing seniors, even institutionalised seniors, should participate as fully as possible in the rehabilitation process. It is not the case that simply training staff could have resulted in the kind of shift in control of problem-solving that we observed.

It is important to note that The Scenarios measures the knowledge and behavioural intent of the participants. The knowledge and problem-identifying abilities of the residents increased from the first to the final evaluation. The behavioural intents of both the staff and residents are consistent with the empowerment of the residents to take more control for implementing solutions to commonly experienced problems. However, we still do not know exactly how a staff member or resident would actually behave in a real situation. Residents did respond more easily when they were familiar with the scenario that was depicted, suggesting that direct experience with the situation might reveal more breadth of problem-solving by the residents. One suggestion is to conduct this type of test as a role-playing exercise that could be videotaped as a sample of behaviour closer to actual behaviour (Koury & Lubinski, 1991). Specific target problems and behaviours might even be purposefully contrived and systematically evaluated; however, such an approach assumes that there is an existing, well-defined, and ecologically valid inventory of target compensatory behaviours. The challenge is always to achieve test precision while not sacrificing ecological validity. The development of The Scenarios was one of our attempts to evaluate outcomes in a fashion that was compatible with the ecological approach that we adopted in designing the program and setting goals for the participants. We tried to assess not just the elderly individuals who were hard of hearing, but the whole dynamic of their relationships to others and to their everyday environment. It is often hard to define this dynamic (see also Garcia & Orange, 1996), but because we are aware of its importance, we were compelled to try to find ways to measure it.

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Endnote

1. All outcome measures were piloted on residents and staff at a neighbouring facility, St. Peter's Hospital in Hamilton, Ontario. Although the facilities were by no means identical, the populations were considered to be similar enough to allow for preliminary testing of the outcome measures when they were in the development stage.

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References

Coyte, P. C. (1992). Outcome measurement in speech pathology and audiology. *Journal of Speech-Language Pathology and Audiology, 16,* 275-286.

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

Erber, N. P. (1994). Conversation as therapy for older adults in residential care: The case for intervention. *European Journal of Disorders of Communication, 29,* 269-278.

Frattali, C. M. (1992). Functional assessment of communication: Merging public policy with clinical views. *Aphasiology,* 6, 63-83.

Garcia, L., & Orange, J. B. (1996). The analysis of conversation skills of older adults: Current research and clinical approaches. *Journal of Speech-Language Pathology and Audiology, 20,* 123-135.

Head, B., & Jennings, M. B. (1994). *Final report on rehabilitation of hearing-impaired residents in a home for the aged: The program* (Project Report #6606-4612-57E). Vancouver: National Health Research Development Program.

Jennings, M. B., & Head, B. (1994). Development of an ecological audiologic rehabilitation program in a home for the aged. *Journal of the Academy of Rehabilitative Audiology, 27,* 73-88.

Jennings, M. B., & Head, B. (1997). Resident and staff education within an ecological audiologic rehabilitation program in a home for the aged. *Journal of Speech-Language Pathology and Audiology, 21,* 167-173.

Koury, L. N., & Lubinski, R. (1991). Effective in-service training for staff working with communication-impaired patients. In R. Lubinski (Ed.), *Dementia and communication* (pp. 279-289). Hamilton, ON: B. C. Decker.

Molloy, D. W., Alemayehu, E., & Roberts, R. (1991). A Standardized Mini-mental State Examination (SMMSE): Its reliability compared to the traditional mini-mental state examination (MMSE). *The American Journal of Psychiatry, 148,* 102-105.

Noble, W., & Hétu, R. (1994). An ecological approach to disability and handicap in relation to impaired hearing. *Audiology, 33,* 117-126.

Pichora-Fuller, M. K. (1992). Commentary on "Outcome measurement in speech pathology and audiology" by P. C. Coyte. *Journal of Speech-Language Pathology and Audiology, 16,* 287-289.

Pichora-Fuller, M. K., & Kirson, R. (1994). How allocation of cognitive resources may alter handicap. *Journal of Speech-Language Pathology and Audiology, 18,* 223-234.

Pichora-Fuller, M. K., & Robertson, L. F. (1994a). *Final report on rehabilitation of hearing-impaired residents in a home for the aged: The evaluation* (Report #6606-4607-57E). Vancouver: Development Program National Health Research.

Pichora-Fuller, M. K., & Robertson, L. (1994b). Hard-of-hearing residents in a home for the aged. *Journal of Speech-Language Pathology and Audiology, 18,* 278-288.

Pichora-Fuller, M. K., & Robertson, L. F. (1997). Planning and evaluation of a rehabilitation program in a home for the aged: Use of hearing aids and assistive listening devices. *Journal of Speech-Language Pathology and Audiology, 21,* 174-186.

Robards-Armstrong, C., & Stone, H. E. (1994). The consumers perspective. *Journal of the Academy of Rehabilitative Audiology, 27* (Suppl.), 25-44.

Appendix A

Definitions of Major Categories

Speaker. The person sending the message (counted if explicitly mentioned or if strongly implied; i.e., "have a mic" was not counted, whereas "get closer to the mic" was counted).

Listener. The person receiving the message (counted if explicitly mentioned or if strongly implied; i.e., "get a loudspeaker" was not counted, whereas "can't hear much without a loudspeaker" was counted).

Environment. A person, place, condition existing apart from the speaker, listener, and message.

Message. The linguistically or nonlinguistically expressed content or meaning of the message without reference to consequences for the particular listener and/or speaker.

Appendix B

Taxonomy of Problem Sources

Environment: Physical-General
- distance and/or obscurity of speaker
- distractions (other than "people talking" but including "people moving about")
- many people (or people talking in background)
- features of room (includes group size, privacy)
- intermediary required to help carry out solution+
- institutional-level planning or organisational logistics+

Environment: Physical-Acoustical
- multiple speakers (competing speakers)
- background noise (in listener's immediate environment)
- noise outside the immediate environment
- general noise level mentioned (but no specific source)
- room acoustics (includes mention of drapes, carpet)

Environment: Physical-Visual
- speaker/source not visible

Environmental: Technical
- broken or faulty equipment (not hearing aid or assistive technology)

Environmental: Technical-Auditory
- missing hearing aid or assistive listening device+
- broken or faulty hearing aid+
- broken or faulty assistive listening device+
- sound quality of equipment

Environmental: Technical-Visual
- visual cues impeded by technology

Listener-Perceptual
- hearing loss
- hearing aid not in+
- glasses not on+
- bad ear towards speaker+
- dialect or language^
- miscellaneous, nonpermanent obstruction (e.g., head on pillow)^
- not looking at face of speaker

Listener-Cognitive
- difficulty understanding (need to clarify meaning)^
- difficulty with topic or task
- difficulty with ethnic or cultural influences*
- planning, anticipation, or expectation

Listener-State
- not attending
- topic or task not interesting
- divided attention (concentrating on something else)
- fatigue or sleepiness
- emotional state (including disorientation, anxiety)^
- motivation or desire to communicate*
- drunk*

Speaker-Speech
- clarity and/or speed of speech^
- permanent characteristic of speech or voice (including accent, female voice)^
- loudness
- speaker turning away from listener
- annoying mannerisms*

Speaker-Cognitive
- ability of speaker to explain or clarify
- poor knowledge of subject
- poor awareness of listener's knowledge or hearing status^
- style or strategy (including cultural factors, planning, anticipation or expectation)^

Speaker-State
- lack of or divided attention
- eating while talking*
- drunk*
- emotional state (including patience)^
- fatigue*

Message-Content
- message not clear
- language used hard to understand (e.g., unfamiliar or technical)
- dry information*
- need visual information to support/supplement spoken message (including writing, gestures)+

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* item from Pichora-Fuller and Kirson (1994) study but no occurrence in present study
+ item from present study but no occurrence in Pichora-Fuller and Kirson (1994) study
^ item from Pichora-Fuller and Kirson (1994) expanded to accommodate scenario-specific variations in present study