The Influence of Aural Rehabilitation and Cognitive Style Disclosure on the Perception of Hearing Handicap

Sharon E. Smaldino and Joseph J. Smaldino
University of Northern Iowa

The purpose of this study was to investigate methods which might be effective in reducing the perception of hearing handicap by first-time hearing aid users. A control group was fitted with a hearing aid and provided with a simple orientation to use of the hearing aid. Experimental groups received a four-week aural rehabilitation program and/or information about individual cognitive style in addition to the orientation. The Hearing Performance Inventory was given to all four groups at the time the subjects received their hearing aids and again four weeks later. An analysis of variance was performed on the difference scores. The groups receiving the short-term aural rehabilitation program experienced a significantly greater reduction in self-perceived hearing handicap than did the other groups. Simple disclosure of cognitive style did not significantly reduce perception of handicap.

There is a continuing need to identify benefits derived from rehabilitative intervention with hearing-impaired adults. More individuals are being diagnosed and fitted with amplification as the population ages. Many of these people will be frustrated by lack of immediate success with amplification. Much of this frustration occurs in the first few weeks of the hearing aid fitting (McCarthy & Alpiner, 1982). These individuals need to be offered opportunities to help them adjust to amplification easily and efficiently.

The measurement of change that occurs in a hearing-impaired individual as the result of aural rehabilitative activities has been the topic of research (Hawkins, 1985; Newman & Weinstein, 1988; Walden, Erdman, Montgomery, Schwartz, & Prosek, 1981; Walden, Prosek, Montgomery, Scherr, & Jones, 1977). From these studies it appears that one of the most practical ways to measure this change involves the use of self-assessment hearing handicap scales

Sharon Smaldino, PhD, is an Assistant Professor of Educational Media, Department of Curriculum and Instruction for the University of Northern Iowa, Cedar Falls, IA 50614-0606. Joseph Smaldino, PhD, is a Professor of Audiology and Head of the Department of Communicative Disorders at the University of Northern Iowa.

in a pretest-posttest experimental design. In this design, the relative change in the hearing handicap score is used to index change in adjustment to amplification. Several investigators have used self-assessment scales in this manner and have demonstrated reduction in self-assessed handicap following the fitting of a hearing aid (Birk-Nielsen & Ewertsen, 1974; Brooks, 1979; Newman & Weinstein, 1988; Tannahill, 1979).

Individual differences have been cited as reasons why particular methods, or combinations of rehabilitative methods, are ineffective in decreasing the perception of hearing handicap. Walden et al. (1981) found large individual differences among adults taking part in a group aural rehabilitation study. They interpreted this to mean that not every candidate fitted with amplification will demonstrate significant improvement following participation in an aural rehabilitation program. Bode and Oyer (1970) identified differences in response patterns and suggested that these were related in some way to differences in levels of intelligence. They found that participants with high intelligence test scores showed greater improvement in development of compensatory skills than those with lower intelligence test scores.

It may be that differences among hearing-impaired adults are not the result of different levels of intelligence, but can be partly explained by differences in their learning styles. Cronbach and Snow (1977) have suggested that the manner in which individuals approach information processing situations generally takes the form of patterns established early in life. These patterns or strategies for organizing information are termed "cognitive style." Witkin (1976) and Witkin, More, Goodenough, and Cox (1977) suggested in their reviews of research in field dependent and field independent cognitive styles that knowledge of one's own cognitive style is important to a person when processing new information in both academic settings and in social situations. One way of providing this information to individuals is simply to inform them how they learn new information.

Focusing the learner on the manner in which he or she acquires information has been shown to enhance the efficiency of the learning process. The disclosure of cognitive style has been found to be an effective way in which to improve the success of students in an academic setting (Fourier, 1983; Niles & Mustachio, 1978). The effectiveness of this procedure was demonstrated in various community college and special training programs. The achievement of the students, when given advice about their own cognitive style and how to use that information within their coursework, indicated improvement over those who did not receive such advice.

It is known that a person using amplification for the first time needs to learn to process information using signals altered by the low fidelity circuitry and earmold acoustics in combination with the auditory distortions that are imposed by the hearing loss (Alpiner, 1982). The more these people know about their individual learning strategies, the easier they may be able to adapt to the new signals (James & Galbraith, 1985). This kind of information may help

persons adjust to amplification, maximize their use of available auditory signals, and thereby reduce their perception of hearing handicap. The purpose of this study was to investigate the effect of cognitive style disclosure alone and in conjunction with a short aural rehabilitation program on the perception of hearing handicap by first-time hearing aid users.

METHOD

Subjects

Forty adults, including 19 females and 21 males, served as subjects for this study. The subjects ranged in age from 30 to 90 years. The mean age of the subjects was 69 years, with a standard deviation of 12.8 years. The median age was 68. The subjects had a variety of audiometric configurations of sensorineural hearing loss, but all were considered hearing aid candidates and had about the same hearing handicap as measured by the Hearing Handicap Inventory for the Elderly described by Ventry and Weinstein (1982). All hearing aids were selected and fit using a standard prescriptive protocol. None of the subjects had worn a hearing aid prior to participation in this study.

Materials: Cognitive Style

Cognitive style information was obtained by using the revised version of the Albany Learning Style Instrument (Bosco, 1983). This instrument was selected for use in this study because it was designed to assess adult cognitive learning styles and was quick to administer. The instrument is a 20-item forced choice questionnaire requiring the individual to respond to one of five response foils, ranging from *always* to *never.* There are four subscales, each containing five single-statement items. The subscales indicate modalities of inference, that is, how an individual relates to perceived information. The four categories are difference, magnitude, relationship, and deduction, and reflect the manner in which an individual may organize information before acting upon it (Fourier, 1983). Table 1 lists the characteristics associated with each cognitive style.

Materials: Hearing Handicap

The Hearing Performance Inventory (HPI) (Lamb, Owens, Schubert, & Giolas, 1979) was selected to assess perception of hearing handicap in this study. This instrument was considered appropriate for the study because the 75-item forced choice questionnaire is constructed to assess the communication ability of adults in an array of listening conditions and is appropriate for a wide range of ages. Individuals are required to select one of five options, ranging from *nearly always* to *almost never,* or the option of *does not apply,* in response to descriptions of situations or feelings that might be affected by the presence of a hearing loss. Responses are assigned a numerical value and summed to produce an overall score. A low score on the HPI indicates that individuals have the perception that their hearing loss is a definite handicap, while a high

Table 1
Characteristics of Individuals Exhibiting Certain Cognitive Styles

Cognitive Style	Characteristics
Difference	Often uses 1:1 contrasts Alert to different points of view May be argumentative Tends to analyze rather than synthesize Tends to ask "What if . . ."
Magnitude	Organizer and list maker Sets and operates by standards Uses rules and traditions as standards Uses definitions to evaluate Likes organized types of activities
Relationship	Looks for similarities and generalizations May analyze whole to discover parts Likes examples when getting information Looks for "why" in situations
Deduction	Produces conclusions based on logic Looks for predictability and rules Prefers solutions obtained following rules Uses logical patterns in problem solving

Note. Adapted from "Academic Achievement of Students Who Receive Disclosure of Cognitive Style Map Information" by M. Fourier, 1983, *Journal of Experimental Education, 51,* pp. 122-130.

score indicates that the hearing loss is less of a handicap.

Group Design

The pretest-posttest control group experimental design was composed of four groups, each with 10 randomly assigned subjects. Within each of the experimental groups, subjects were evenly distributed in the four cognitive style categories as shown in Table 2. Prior to participation in the study individuals had complete audiological evaluations by a certified audiologist. The four subject groups were treated as follows:

1. Subjects in the Control Group completed both the Albany Cognitive Style Inventory (ACSI) and the HPI and received a basic orientation to the care/use of hearing aids on the day of the fitting. After four weeks, they completed the HPI again.
2. Cognitive Style Group participants received the same treatment as the Control Group, plus they were informed individually about their particular cognitive learning styles at the time they received their hearing aids.
3. Subjects in the Cognitive Style/Aural Rehabilitation Group received the same treatment as the Cognitive Style Group, plus they were en-

Table 2
Distribution of Individual Cognitive Style Types Across the Treatment Groups

Treatment	Cognitive Style			
	Difference	Magnitude	Relationship	Deduction
Control	7	1	1	1
Cognitive Style Disclosure	2	2	3	3
Aural Rehabilitation	1	2	4	3
Aural Rehabilitation & Cognitive Style Disclosure	2	2	3	3

rolled in an aural rehabilitation program for four weeks. The Computerized Adult Aural Rehabilitation Program developed by Traynor and Smaldino (1986) was used as a model for the aural rehabilitation program. (See Appendix for program outline.)

4. Participants in the Aural Rehabilitation Group received the same treatment as the Cognitive Style/Aural Rehabilitation Group, minus the cognitive style disclosure.

RESULTS AND DISCUSSION

Table 3 displays the means and standard deviations of the pretest and posttest difference scores for each group of subjects on the HPI. It can be seen that the groups involving the short aural rehabilitation program showed a larger difference score than the groups in which there was no formal aural rehabilitative intervention. This is interpreted to mean that there was a greater reduction in perceived handicap under these conditions. The difference scores for the control group are similar to those of the cognitive style disclosure group.

Table 3
Reduction in Perceived Handicap as Measured by Difference Between Scores Before Versus After Intervention on the Hearing Performance Inventory

Group	*M*	*SD*
Control	30.20	72.13
Cognitive Style Disclosure Only	41.40	57.44
Aural Rehabilitation Only	104.90	59.60
Aural Rehabilitation & Cognitive Style Disclosure	100.00	43.69

Note. High score indicates less handicap.

A two-way Analysis of Variance confirmed there was significant change in perceived hearing handicap score as a result of some of the treatment procedures or combination of procedures. Table 4 shows the summary table for the analysis. The data indicate that those subjects who had participated in an aural rehabilitation program showed a significant change in their perception of their hearing handicap ($F = 20.999$; $df = 1$; $p < .05$). Those subjects who received the cognitive style information did not show significant change and there was no significant interaction component.

Table 4

Summary Table for the Two-Way ANOVA

	Row Variable = Cognitive Style Column Variable = Aural Rehabilitation			
Row Variable:	ss = 99.225	$DF = 1$	$MS = 99.225$	$F = .047$
Column Variable:	ss = 44422.225	$DF = 1$	$MS = 44422.225$	$F = 20.999$*
Interaction:	ss = 648.025	$DF = 1$	$MS = 648.025$	$F = .306$
Error-W:	ss = 76156.900	$DF = 36$	$MS = 2115.469$	
Total:	ss = 121326.375	$DF = 39$		

*$p < .05$

SUMMARY AND CONCLUSIONS

The results of this study indicate that participation in a relatively short aural rehabilitation program can be an effective tool in reducing first-time hearing aid user's perception of hearing handicap. Because the usual brief hearing aid orientation did not produce significant changes in perception of hearing handicap, we can conclude that an orientation by itself may not be enough if we wish to maximize the benefit that adult individuals derive from their new hearing aid.

Simply informing subjects about their individual cognitive learning style did not produce significant changes in perception of hearing handicap. It is possible that cognitive style information is so new and novel to adults that, for them to best utilize the information, they may first need to be trained how to apply the information to situations that are familiar to them. This was not done in this study but would be the next logical experimental step.

Further research is needed to investigate (a) the application of cognitive learning style information in the rehabilitation process, (b) the effectiveness of the individual components of the aural rehabilitation program, and (c) application of alternative approaches to traditional aural rehabilitation programs. Of additional research interest is the potential effects of age and degree of hearing loss on the effectiveness of cognitive learning style information in the rehabilitation process.

REFERENCES

Alpiner, J. (1982). Adult rehabilitative audiology: An overview. In J. Alpiner (Ed.), *Handbook of adult rehabilitative audiology* (2nd ed., pp. 1-17). Baltimore, MD: Williams and Wilkins.

Birk-Nielsen, H., & Ewertsen, H. (1974). Effect of hearing aid treatment. *Scandinavian Audiology, 3,* 35-38.

Bode, D., & Oyer, H. (1970). Auditory training and speech discrimination. *Journal of Speech and Hearing Research, 13,* 839-855.

Bosco, J. (1983). *Albany Learning Style Instrument.* New York: Cambridge Publishing Company.

Brooks, S. (1979). Counseling and its effect on hearing aid use. *Scandinavian Audiology, 8,* 101-107.

Cronbach, L., & Snow, R. (1977). *Aptitudes and instructional methods: A handbook for research on interactions.* New York: Irvington Publishers.

Fourier, M. (1983). Academic achievement of students who receive disclosure of cognitive style map information. *Journal of Experimental Education, 51,* 122-130.

Hawkins, D. (1985). Reflections on amplification: Validation of performance. *Journal of the Academy of Rehabilitative Audiology, 18,* 42-54.

James, W., & Galbraith, M. (1985). Perceptual learning styles: Implications and techniques for the practitioner. *Lifelong Learning, 8,* 20-23.

Lamb, S., Owens, E., Schubert, E., & Giolas, T. (1979, July). *Hearing Performance Inventory.* San Francisco: San Francisco State University.

McCarthy, P., & Alpiner, J. (1982). The remediation process. In J.G. Alpiner (Ed.), *Handbook of adult rehabilitative audiology* (2nd ed., pp. 99-136). Baltimore, MD: Williams and Wilkins.

Newman, C., & Weinstein, B. (1988). The Hearing Handicap Inventory for the Elderly as a measure of hearing aid benefit. *Ear and Hearing, 9,* 81-85.

Niles, T., & Mustachio, J. (1978). Self-concept, learning styles, and grade achievement. *Community College Frontiers, 7,* 44-47.

Tannahill, J. (1979). The hearing handicap scale as a measure of hearing aid benefit. *Journal of Speech and Hearing Disorders, 44,* 91-99.

Traynor, R., & Smaldino, J. (1986). *Computerized adult aural rehabilitation program* [Computer program]. Boston: Little, Brown.

Ventry, I., & Weinstein, B. (1982). The Hearing Handicap Inventory for the Elderly: A new tool. *Ear and Hearing, 3,* 128-134.

Walden, B. (1982). Validating measures for hearing aid success. In G. Studebaker & F. Bess (Eds.), *The Vanderbilt hearing aid report: State of the art-research needs.* Upper Darby, PA: Monographs in Contemporary Audiology.

Walden, B., Erdman, S., Montgomery, A., Schwartz, D., & Prosek, R. (1981). Some effects of training on speech recognition by hearing impaired adults. *Journal of Speech and Hearing Research, 24,* 207-216.

Walden, B., Prosek, R., Montgomery, A., Scherr, C., & Jones, C. (1977). Effects of training on the visual recognition of consonants. *Journal of Speech and Hearing Research, 20,* 130-145.

Witkin, H. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick (Ed.), *Individuality in learning* (pp. 38-72). San Francisco: Jossey-Bass Publishers.

Witkin, H., More, C., Goodenough, D., & Cox, P. (1977). Field-dependent and field-independent cognitive styles and their educational implications. *Review of Educational Research, 47,* 1-64.

APPENDIX

GOALS AND OBJECTIVES OF THE COMPUTERIZED ADULT AURAL REHABILITATION PROGRAM

Session 1 — The Auditory System and How It Works

Goals:

To acquaint the client with the auditory mechanism, how it operates, and specific disorders that can cause hearing loss.

To inform the client about the operation of and the difficulties encountered utilizing a hearing aid. Further to acquaint the client with assistive devices that may be beneficial.

Objectives:

1. Present and make sure each client understands anatomy of the ear.
2. Present and make sure each client understands the physiology of the ear.
3. Determine specific diagnosis for each client and explain the pathology in detail.
4. Describe the modifications often conducted on the hearing instruments to facilitate better communication.
5. Determine the situations in which the client may have difficulty.

Session 2 — Auditory Training

Goal:

To simulate various types of progressively worse listening situations and teach the client coping strategies.

Objectives:

1. Listen and repeat word stimuli correctly when noise is progressively introduced in the background.
2. Listen and repeat phrase stimuli correctly when noise is progressively introduced in the background.
3. Listen and repeat sentence stimuli correctly when noise is progressively introduced in the background.
4. Listen to stories, in quiet and in noise, and correctly answer questions related to each.

Session 3 — Speechreading

Goal:

To utilize visual cues to augment communication.

Objectives:

1. Present and insure an understanding of basic rules for speechreading.
2. Present and insure an understanding of tips for effective communication.
3. Describe the structure of language.
4. Describe the predictability of language.
5. Demonstrate how the most obvious speech sounds look on the face.
6. Give assignment to turn down TV and watch newscaster's face to determine the message presented.
7. Present specific lessons when client needs to watch for specific lip movements.
8. Describe and practice homophenous words.
9. Describe and practice sentences that can be predicted by certain lip movements and structure of language.
10. Describe and practice sentences that can be predicted by context and situational cues.

Session 4 — Environmental Situations

Goal:

To utilize the auditory and visual skills obtained in the previous sessions to communicate in a realistic situation.

Objectives:

1. Simulate numerous situations and conduct role play with client in quiet.
2. Simulate numerous situations and conduct role play with client in noise.
3. Instruct client on use of telephone with hearing aid if client is having difficulty.
4. Assist client in developing strategies for coping with meeting new people.
5. Assist client in developing strategies for coping with large group situations.
6. Assist client in developing strategies for coping with difficult communication setting.