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Anticipatory Strategy Training: Implications for the Postlingually Hearing-Impaired Adult

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Abstract

The present study was designed to determine if speech recognition performance will improve after subjects prepare for an unfamiliar communication situation as opposed to a familiar one. Forty-five normal-hearing subjects were divided into three groups: one trained using a well-known fairytale, one trained using an obscure fable, and one without training. Post-training, all groups performed similarly when tested on the familiar tale. When test material involved the unfamiliar fable, only the group trained on that material obtained significantly better scores than the other groups. Results support teaching clients that increasing their knowledge of upcoming unfamiliar events can improve subsequent speech recognition.

Key Words: Aural rehabilitation, speech recognition, strategies

Abbreviations: ANOVA = analysis of variance

A goal of communication training is to teach individuals with hearing impairments to use strategies that will enhance their communication interactions. One approach, anticipatory strategy training, focuses on preparing the client for upcoming conversational interactions. This method involves consideration of vocabulary and statements that may occur and/or perceptual practice in identifying the specific vocabulary and other predicted information. To review information, a workbook may be used in which clients are asked, for example, to write down what they expect to hear in a particular environment (Kaplan et al, 1985) or to record which words are most likely to be visible on the lips (Tye-Murray, 1992). Perceptual practice might take the form of instructing clients to observe their own movements in a mirror, observing another on a videotape monitor, or working directly with a clinician (Kaplan et al, 1985; Cherry and Rubinstein, 1988; Kaplan, 1997).

The value of these forms of training has yet to be proven empirically. Tye-Murray (1992) compared a control group to two treatment groups. One group trained using workbook activities about the anticipated events (e.g., a doctor's appointment) and perceptual practice using the mirror. The other group used only perceptual practice, training with a clinician as well as with a computerized videotape presentation simulating the anticipated events. The training materials were similar in content to the test sentences. Significant differences were not found between treatment and control groups before or following training for the two types of subjects studied: those with normal hearing and those with cochlear implants.

Tye-Murray (1992) suggested that although the differences were not significant, it may be premature to rule out the benefit of anticipatory strategy training. She noted that in her study, subjects were already familiar with the communication situations chosen. It may be useful to make a distinction between preparing for a situation that is novel and one with which an individual is already familiar. If clients automatically optimize their use of current knowledge, speech recognition performance will not improve until

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they are provided with and subsequently tested on additional, novel information. The purpose of the present study was to determine if significant gains from anticipatory training will occur only if the testing and training materials used are unfamiliar to the subject prior to training.

METHOD

Subjects

Subjects were 45 college student volunteers with English as their first language, hearing within normal limits (screening at 20 dB HL), and reported normal (or corrected normal) visual acuity. They were randomly assigned into three groups of 15: one group reviewed the familiar fairytale *Cinderella* during training, one group reviewed the obscure fable *The Tiger, the Brahman and the Four Judges,* and the third group received no additional information. All subjects reported at the onset of the study that they were familiar with the Cinderella story but had never heard of the Brahman fable.

Speech Recognition Test

Two videotaped tests were produced using vocabulary no more complex than sixth-grade level (Carroll et al, 1971). Each test consisted of 10 sentences containing 50 key words in each list. The content of one list pertained to the Cinderella fairytale and the content of the other pertained to the Brahman fable (Appendix). Test lists were recorded by the same female speaker in a sound-treated booth. The speaker monitored her voice using a Quest 155 sound level meter to maintain the same vocal output throughout both lists. The color recordings captured a frontal view of the head and shoulders of the speaker against a neutral background.

PROCEDURES

Each subject was seated in a sound-treated booth at a distance of 3 feet from a 19-inch Sony color monitor. During pretesting, the subject was asked to repeat each sentence verbatim. The speech recognition tests were calibrated and presented at a normal conversational level (75 dB SPL) at a –5-dB signal-to-multitalker babble ratio (Auditec of St. Louis), which came from two loudspeakers at 135- and 225-degree azimuths. Subjects were encouraged to guess on all tests to keep the effects of guessing constant (Van Tasell and Hawkins, 1981). Scoring was based on the number of key words correctly repeated.

Stories were presented to each subject, counterbalanced with half of the subjects in each training group receiving the Cinderella test before the Brahman test and the other half exposed to the reverse order. Before each test, the subjects were told the title of the story from which the content of the sentences was drawn. Test order was constant for each subject during pretraining and post-training conditions.

Prior to the speech recognition retest, relevant vocabulary and story content were reviewed. The familiar group was given a synopsis of the Cinderella story to read and the unfamiliar group read the Brahman fable, with both stories containing only simple vocabulary. The control group read a magazine unrelated to either story. The use of a control group allowed for the assessment of the effects of test practice. Immediately following review of the material, all three groups were retested on both stories using the same conditions and sentences as those presented during pretraining. The entire test procedure for each subject lasted no longer than 30 minutes.

RESULTS AND DISCUSSION

Table 1 shows the mean scores and standard deviations as a function of test period and training group for the Cinderella speech recognition test. The first hypothesis tested was that no significant differences would be found post-training for the Cinderella test among all groups, despite review of the Cinderella story by subjects in the familiar group. Before answering this question, a one-way analysis of variance (ANOVA) was performed on the pretraining scores to ensure that the three groups did not differ significantly on their speech recognition performance at the outset of the experiment. The analysis revealed no significant differences among groups ($F [2, 42] = .006$; $p > .05$). The first hypothesis was then confirmed in a second ANOVA in that no significant differences were found post-training among groups tested on the familiar material ($F [2, 42] = .269$; $p > .05$).

Table 2 shows the mean scores and standard deviations as a function of test period and training group for the Brahman speech recognition test. The second hypothesis tested was that following training, the Brahman training group would score significantly better on the Brahman test than the other two groups. A one-way ANOVA confirmed equivalency of the groups

Table 1 Mean Scores and SDs as a Function of Test Period and Training Group for the Cinderella Speech Recognition Test

	Test Period			
	Pretest		Post-test	
Training Group	Mean	SD	Mean	SD
Cinderella	71.47	15.61	84.00	10.06
Brahman	71.07	21.25	86.93	12.46
Control	71.73	13.87	85.87	10.60

prior to training on this test as well. No significant differences were found ($F [2, 42] = .08$; $p > .05$). Overall, the pretest scores for the Brahman test were poorer than those for the Cinderella test. These results are not surprising in view of the hypothesis that the Cinderella test would be easier because it is familiar. It may be recalled that both tests used simple vocabulary and were administered to college students with English as their first language.

A final ANOVA on the Brahman post-training data did, however, reveal significant differences ($F [2, 42] = 5.205$; $p < .01$) among groups. A Tukey test determined that the source of the significant findings was only the score from the Brahman training group, which was better than the scores from the other two groups ($p < .05$). Thus, improvement in scores for the Brahman training group was greater than those that could be explained by test practice effects. In summary, these findings confirm the general hypothesis that significant gains from anticipatory strategy training will occur if the testing and training materials used are unfamiliar to the client prior to training.

The present results suggest that the value of anticipatory strategy training lies in teaching clients to increase their own knowledge about upcoming unfamiliar communication contexts.

Table 2 Mean Scores and SDs as a Function of Test Period and Training Group for the Brahman Speech Recognition Test

	Test Period			
	Pretest		Post-test	
Training Group	Mean	SD	Mean	SD
Cinderella	48.27	15.47	62.00	15.06
Brahman	45.73	15.80	76.13	15.63
Control	47.33	20.71	58.67	16.50

The findings from the Tye-Murray (1992) study might have been different had the anticipated events been novel to the subjects. Results of the present study are supported by evidence from studies on other aspects of aural rehabilitation and speech perception in general, studies showing that speech recognition performance improves when the opportunity for message prediction increases. A classic example is the study by Miller et al (1951), who demonstrated that reducing the number of choices increases predictability and thus improves speech recognition performance. They varied the number of multiple-choice alternatives progressively from 256 to 2 words and found that a 50 percent speech recognition score could be obtained at progressively more challenging signal-to-noise ratios. The intelligibility of a word in isolation versus in a sentence was found to be comparable to the effect of restricting the vocabulary because in both cases, predictability is increased. Another example is the research of Garstecki and O'Neill (1980), who compared speechreading performance on sentences associated with relevant versus unrelated situational cues. Results demonstrated the advantage of relevant situational cues to speechreading where scores were significantly better due to the increase in message prediction.

Although the current study was performed using listeners with normal hearing, it is expected that increasing familiarity should improve speech recognition performance of postlingually hearing-impaired adults as well. Evidence of improvement in speech recognition when increasing the opportunity for message prediction in the hearing impaired has already been demonstrated in the literature (Rubinstein and Boothroyd, 1987) and forms the basis of some tests designed for use with the hearing impaired, which are constructed to make use of linguistic cues (Bilger et al, 1984; Boothroyd et al, 1985).

We are not suggesting that the goal of anticipatory strategy training is to teach clients the vocabulary of obscure communication situations. We propose that during therapy, clients should be offered some examples that demonstrate how increasing their familiarity with a topic improves subsequent speech recognition performance. The clinician may perform speech recognition evaluations before and after familiarization with a specific novel topic to demonstrate to the client the value of preparing for an upcoming event. Once the client is convinced of the benefit of such an approach, recommenda-

tions as to how to apply this concept to real-life situations can be offered. Examples have already been cited in the literature, such as reading about current events and movies, obtaining agendas of meetings in advance, asking someone the topic when entering a conversation, reading the text before a subject is discussed in class, or obtaining the synopsis of a play before going to see it (Rubinstein and Boothroyd, 1987; Erber, 1992; Tye-Murray, 1994; Cherry, 1997). During subsequent sessions, the clinician may ask clients to describe preparatory actions taken during the week and to note impressions regarding the impact of these actions on their communication performance. In fact, these are techniques presently being used for which the current research provides some validation.

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APPENDIX

Speech Recognition Tests with 50 Key Words

Cinderella Test

1. Cinderella lived with her two ugly stepsisters.
2. The stepmother forced her to work day and night.
3. One day the King and Queen sent an invitation.
4. A ball was being held in honor of the prince.
5. The fairy godmother waved her magic wand.
6. The pumpkin was turned into a golden coach.
7. She wore a beautiful white gown.
8. When the clock struck twelve, the spell ended.
9. Her glass slipper was lost on the stairs of the palace.
10. The servants searched for the girl who could fit into the shoe.

Brahman Test

1. A Brahman met a tiger in an iron cage.
2. The beast begged the man to free him.
3. The animal promised that he'd only take a drink.
4. He wanted to eat the man who freed him.
5. They went to four judges to settle the argument.
6. The tree was upset because men had broken his branches.
7. The bull was angry since his master had treated him badly.
8. The alligator also found the man guilty.
9. The last hope was a jackal drinking by the river.
10. The tiger was locked back where he belonged.