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Development of an Aural Rehabilitation CD-ROM

By

Sierra MacDonald

A Professional Research Project submitted to the Faculty of the Department of
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Doctor of Audiology

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(ABSTRACT)

A need has been established for aural rehabilitation (AR) sessions throughout the years. The literature reviewed here demonstrates that new hearing aid users do benefit from a structured follow-up AR program. However, this need is often not met for a variety of patient and audiologist related factors. Therefore, an AR program that could be viewed at home has been suggested. I have developed a prototype for a CD-ROM based aural rehabilitation (AR) program. Included in the program are communication and speechreading strategies, which are the most prevalent materials in AR. The instructional and interaction portions of the prototype were created to be understood by the average person. The prototype includes the use of video, graphics, and audio to support the written information and to incorporate a sense of excitement into the CD-ROM based program.

This project entails the development of a prototype for a computer based aural rehabilitation (AR) program for new hearing aid users, particularly the elderly. Aural rehabilitation programs are typically designed to provide individuals with hearing loss several strategies for coping with their perceived hearing handicap. The design of this computerized AR program is important because there is a need for AR that is often not met. In developing a project of this magnitude, specific questions must be considered. First, what evidence exists to suggest the need for AR? Second, which aspects of an AR program provide the most benefit to individuals with hearing loss? Third, why is the need for AR not being met? Fourth, is a CD-ROM an appropriate tool to deliver an AR program? Lastly, will elderly individuals use this computer technology to access an AR program?

AR Support

The primary therapy for age-related hearing loss is the use of hearing aids; however, their use does not alleviate all of the associated consequences. Even with the use of hearing aids, some individuals continue experiencing difficulty with communication, especially in noise. A result of such difficulties is that individuals may experience negative reactions to communication breakdowns, such as shame and denial. They may also limit their social and/or other activities (Danermark, 1998). Often, individuals with hearing aids return for repeat visits due to unrealistic expectations and inadequate information from their hearing aid orientation. Finally, they may reject their hearing aids altogether. To alleviate these issues it has been suggested that a structured, post hearing aid fitting, information counseling AR program be provided (e.g., Brooks, 1989; Isratelite & Jennings, 1995; Abrams, Hnath-Chisolm, Guerreiro & Ritterman, 1992).

One of the first studies to demonstrate the efficacy of a structured post hearing aid fitting AR program was conducted by Brooks (1989), who evaluated the correlation between the attitude of an individual wearing the hearing aid and the actual hours of use. Findings suggested that individuals who attended group follow-up after receiving hearing aids had better attitudes and required fewer follow-up sessions. These results were corroborated by the work of Israelite and Jennings (1995), who observed and interviewed four adults regarding their hearing loss and the role of aural rehabilitation in assisting

them. The results intimated that individuals increased understanding of themselves and their hearing loss post AR sessions. In 1992, Abrams et al. performed a study that examined the effectiveness of AR. The design included four weeks of a group AR program, meeting once a week for therapy hours provided for veterans receiving hearing aids for the first time. Therapy efficacy was determined through changes in self perception of hearing handicap measured by the hearing handicap inventory for the elderly (HHIE) (Ventry & Weinstein, 1982). The HHIE scores for veterans that received AR and hearing aids were compared to those individuals receiving hearing aids only and those individuals that did not receive AR or hearing aids. Those AR sessions included: an educational section on hearing loss, a second section on speechreading skills and communication strategies, and the last section on assistive listening devices. Results indicated that both groups that received treatment perceived their impairment to be less handicapping than the group that received no treatment. The group that received the AR classes plus hearing aids had the best perception of their impairment. Successful AR programs are not limited only to the above AR counseling. Andersson, Melin, Scott, and Lindberg (1995) utilized different AR counseling. The study examined the use of hearing tactics, relaxation techniques, role playing, and participants viewing themselves videotaped as part of an AR program. The results demonstrated support for AR programs for individuals with hearing loss.

In summary, the studies reviewed here demonstrate that new hearing aid users do benefit from a structured follow-up AR program. Different types of AR counseling appear to be successful in assisting persons with hearing loss to cope. Communication strategies (repair strategies and anticipatory strategies) and speechreading strategies appear to be the most prevalent materials in AR programs. The next portion of this paper will outline studies that demonstrate the effects of communication strategy usage.

Communication Strategies

Repair Strategies

Repair strategies are a widely utilized type of communication strategy; employed by everyone when communication breaks down. They involve petitioning the speaker to repair what the listener misunderstood. This can be executed by using clearer speech, rephrasing the sentence, conveying only a keyword, providing a synonym, or splitting the

sentence in two parts. Researchers have ruminated over the effectiveness of individual and overall repair strategies (e.g., Gagne & Wyllie 1989; Tye-Murray, 1991). The study by Gagne and Wyllie (1989) utilized three repair strategies: repetitions, synonyms, and paraphrases to determine which strategy is most effective. Results indicated that paraphrasing was the most effective repair strategy and repetition was the least effective strategy. It has been documented, however, that repetition is the most utilized repair strategy (Erber & Greer, 1973). Tye-Murray's 1991 study implemented an AR program in attempt to modify repair strategy use to be more effective. This was in part to reduce the utilization of the repetition strategy. The researcher found five efficacious repair strategies: repeat, rephrase, simplify, keyword, and two sentences. Results indicated that although the experimental group modified their use of repairs, therapy did not assist in effective utilization.

In summary, the studies reviewed above suggest that repair strategies when used effectively are beneficial to the person with a hearing loss. However, it is difficult to teach people to effectively utilize repair strategies. Repair strategies that have been shown to be effective are rephrasing the sentence, repeating only the keyword, and using a synonym.

Anticipatory Strategies

The other communication strategy commonly used is anticipatory strategies. Anticipatory strategies are simple strategies that incorporate anticipation of an event with the use of speechreading and practice. The use and effectiveness of anticipatory strategies has been studied by several researchers (Tye-Murray, 1992; Rubinstein, Cherry, Hecht, & Idler, 2000). Tye-Murray (1992) performed two experiments with anticipatory strategies. The first experiment compared two types of therapy (situation-specific and workbook) using two experimental groups and a control group. The procedure involved speechreading one list of bank-related items and one list of doctor's office-related items. Results indicated that all groups improved after training with no significant differences in the amount of improvement. In the second experiment, the subjects utilized cochlear implants and the training (same as the first experiment) continued all day. The results demonstrated that all groups improved with no significant difference between improvement scores of both groups on any of the word tests. The

researchers offered that one reason the control group improved without training is due to a learning effect from the pretest to the posttest.

Another explanation for the lack of improvement between the groups in the above study is that the situations used were familiar to the subjects. Rubinstein et al. (2000) compared the improvement seen when novel stimuli is used versus familiar stimuli. The familiar story speechread was *Cinderella* and the unfamiliar story was *Brahman*. Results indicated that the group who trained with the novel story produced significantly better scores than the other groups. This finding indicates that anticipatory strategies can help in a novel situation. The researchers suggest that during aural rehabilitation sessions, demonstrating to the patients how increasing knowledge of upcoming unfamiliar conversations is able to assist communication. As has been shown by the above study and others, speechreading sentences has become the determining factor to demonstrate how different communication strategies function.

Speechreading Strategies

Speechreading is “speech recognition using both auditory and visual cues” (Tye-Murray, 1998). All individuals utilize speechreading. Individuals with normal hearing use speechreading when they are exposed to background noise. This requires visual cues to assist in understanding speech. Individuals with hearing loss use varying degrees of speechreading depending on the amount of visual support required. Before the invention of sensory aids, the primary method of understanding speech with a hearing loss was speechreading. Several methods of speechreading training have occurred over the years. Currently, there are two paramount training techniques involved with speechreading: analytic and synthetic.

Analytic training entails an individual speechreading different viseme groups (sounds that appear identical on the lips) to associate sounds with their corresponding visual information. Several studies have observed the effects of analytic training (Lesner, Sandridge, and Kricos, 1987; Walden, Prosek, Montgomery, Scherr, and Jones, 1977). The study by Walden et al. (1977) attempted to determine if analytic training increased the amount of visemes (groups of sounds that look similar on the lips) recognized. The researchers also looked at the ability of an individual to make distinctions between homophenes; words that look similar on the lips. Findings indicated that analytic training

improved the identification of visemes and homophones. Although this study demonstrated improvement in recognizing sounds on the lips, it failed to observe the effects of analytic training on improving sentence recognition. This is supported by a study Lesner et al.(1987) performed that found no improvement in sentence recognition when utilizing analytic training. Based on the above articles, the use of analytic training lies in the awareness of different viseme groups, not sentence recognition. Therefore, analytic training might be used as an introduction and then built upon by synthetic training to focus on sentences.

Synthetic training entails an individual speechreading sentences and ongoing speech to receive and process the main idea. De Fillippo and Scott (1978) developed a method for evaluating synthetic training called “tracking.” This procedure involves breaking a story into parts and having an individual speechread those sentences, with words per minute as the criteria for improvement. The two participants’ training involved lipreading ongoing speech that was broken into segments. The participants would repeat what they saw and if they were incorrect, they could use repair strategies until they were correct. Results indicated that there was improvement in the words per minute tracking score over the course of training, seen especially when aided with a tactile device.

Current Practices

One commonality amongst AR programs is that most are conducted in a group setting (Abrams et al., 1992; Andersson et al., 1995; Brickley, Cleaver & Bailey, 1996; Brooks, 1989; Israelite & Jennings, 1995). A group setting, however, may not be appropriate for all individuals. For instance, one study by Brickley et al. (1996) compared group follow-up to individual follow-up. The researchers measured success by cost effectiveness and attendance rates of the AR, and the participants’ self-rated performance, hours of use, and satisfaction with their hearing aids. The researchers found both forms of follow-up to be successful, with group follow-up providing participants’ better self-rated performance with their hearing aids. There was, however, less attendance with the group follow-up sessions. This was not analyzed in the results; however, it provides evidence that people may feel more comfortable with individual follow-up.

Although there is a place for group AR sessions, there are problems with this setting. These problems involve patient and audiologist factors. One patient factor is poor retention of information. A patient may appear to receive the information during the sessions but then cannot retain that information afterwards. There are also concerns of not having enough individual attention and busy schedules of the patients and audiologists. Due to these difficulties, audiologists might consider altering the delivery mode of post hearing aid fitting, structured AR programs. Some researchers have chosen computer models for AR training (Dempsey, Levitt, Josephson, & Porrazzo 1992; Tye-Murray et al., 1994).

Technology and AR Programs

In Tye-Murray's (1991) aforementioned study, the researcher implemented an AR program that required each subject to view a speaker shown with a laser videodisk player on a touchscreen monitor. The speaker would recite a sentence and the listener would touch a picture on the screen that depicted the sentence. If the choice was incorrect one repair strategy was enacted, followed by the primary sentence spoken again. This procedure continued until a correct response occurred. Another study by Dempsey et al. (1992) described a computer-assisted tracking simulation. The researchers used a laser videodisk player to store the images of the speakers who were utilizing ongoing speech broken into segments. Those images would then appear on a computer monitor. The individual speechreading would repeat what was spoken and an observer would record the response on the computer. The computer would then choose the next sentence or correction strategy based on the prior response. The computer would also record the score based on "tracking." The researchers tested this system and found it to be successful. One difficulty with this type of training is that an observer must be present to record the information. One way to resolve this is to develop an AR program delivered via a technologically superior format that can be viewed in an individual's home environment (Tye-Murray et al., 1994).

The majority of persons with hearing loss are elderly and there is question of elderly individuals embracing new technology. The evidence provided here indicates that elderly individuals will use a multimedia teaching tool. For instance, older individuals who participated in an introductory computer course demonstrated positive attitudes

toward computer technology (Morris, 1994). These individuals also showed interest in pursuing more courses involving computers. A study conducted by Mercer, Chiriboga, and Sweeney (1997) demonstrated the effectiveness of a CD-ROM in teaching older adults about advanced directives. Potential advantages include multimodal learning and processing, learning at their own pace, and learning information in any order. Thus, it does appear that the elderly can effectively utilize interactive computer technology. Based on the above research the design of an interactive CD-ROM that teaches aural rehabilitation could be successful. The intent of this CD-ROM is to present an interactive AR program that incorporates learning information at any pace, in any home; while reducing self-perceived hearing handicap.

Methods

Planning

The first phase in developing the prototype for the CD-ROM based aural rehabilitation program was assessing the needs of the target audience; elderly individuals with hearing loss. Elderly individuals carry with them special problems such as: poor visual acuity, auditory acuity, and retention of information. The needs of this group had to be addressed within the constraints of the program. Therefore, the prototype calls for a large font, the use of auditory and visual information, and patient driven technology. The authoring software that was recommended for the making of the CD is Authorware (Macromedia, 1997a). It provides interactive capabilities, narration, and video.

Design

The design phase of this program included: “assembling the content and deciding on how it is to be treated from both an instructional and interactive perspective” (Alessi & Trollip, 2001). The content was developed by first starting a comprehensive search through different AR programs to determine which information to utilize (Boothroyd, 1988; Tye-Murray, 1997; Tye-Murray, 1998; Wayner & Abrahamson, 1996). Then, I assembled articles that suggested which parts of these programs were the most successful. Communication strategies and speechreading strategies appear to be the most prevalent materials in AR programs. The different subcategories of communication strategies include: repair strategies, anticipatory strategies, situation management, and conversational tips. The subcategories of speechreading training include analytic training

and synthetic training. The instructional and interaction portions of the prototype were arranged to be easily utilized by the average person. The instructional screens are designed with simple, straightforward language. Many of the topics begin with a question that is immediately answered within the program. The topic usually ends with an example. The CD will include video, graphics (Jansen, 2000), and audio to support the written information and to incorporate a sense of excitement. Each interaction screen has a written or narrated prompt that tells the user which icon to click to navigate to the correct destination.

The prototype for the CD-ROM of aural rehabilitation program was created from storyboards. Storyboards are the visual representation of each screen of the computer program. The storyboards utilized in the proposed CD have three main parts: the content of the CD, the power point presentation, and a flowchart.

The content of the CD contains all of the information, graphics, narration, and navigation. The power point is the visual representation of each screen that will be on the CD. The power point will not have the interactive components, like video, but it provides the programmer with the look and feel of the CD. The flowchart is provided to demonstrate the navigation through the AR program.

Discussion

The prototype has been created for the CD-ROM based AR program. The next step is to develop the CD-ROM. Development will entail preparing the computer program code, producing the video and audio, and performing alpha and beta tests. The alpha testing requires that knowledgeable persons on the creative staff run through the program to ensure validity. Beta testing requires persons who are in the target audience to run through the program. After the development of the CD-ROM, research should be conducted to determine if the program successfully reduces self-perceived hearing handicap for elderly persons with hearing loss.

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APPENDIX I

The CD will have a minimum of a 28 font and the style will be Comic Sans. Each instructional screen will have action buttons: right arrow (next) located on the right bottom, left arrow (previous) located on the left bottom, home (main menu) located on the bottom middle. The main menu will also have an exit button. The interaction screens will have objects that are hyperlinked to the feedback screens. The remainder of this appendix is the prototype.

HEARING HELP

ARE YOU HAVING TROUBLE HEARING, EVEN WITH HEARING AIDS?

Well, this program is designed to train your brain and your eyes to help you hear!

Content by: Sierra MacDonald

1. Communication Strategies
2. Speechreading Strategies

COMMUNICATION STRATEGIES

When you miss important information in a conversation, what skills do you utilize to obtain that information?

If you answered, “ask the person to repeat the keyword that was missed” or “stay calm, and attempt to get the information from the rest of the conversation”; you are correct.

Those skills are known as communication strategies. Communication strategies are designed to assist “listeners’ and “speakers” when communication breaks down. A communication breakdown is when a “listener” misses words or sentences presented by a “speaker”.

In this section of the CD you will learn the different types of communication strategies.

These strategies can be general, like how to better communicate, and setting up an optimal environment for communication. There are also more specific communication strategies; listeners can request speakers to do specific things with a sentence when communication breaks down, and listeners can become prepared for communication situations. The following is a list of these strategies.

1. Conversational tips
2. Situation management

3. Anticipatory strategies
4. Repair strategies

CONVERSATIONAL TIPS

Here are the 3A's to guide you through conversations:

ATTENTION, ASSERTION, ACCEPTANCE

Press one of the above bold words to continue

ATTENTION

Having this CD implies that you have had the experience of being caught not paying attention while “listening” to what someone was saying. The importance of paying attention seems obvious, but paying attention requires effort. To pay attention does not just mean to concentrate with your ears. If that were true, there would not be problems listening in a restaurant or with a group of friends. In fact, you have to concentrate on your speaking partner's whole person. This includes body language, facial expression and lip movements.

ASSERTION

If you have missed part or all of a conversation – assert yourself!

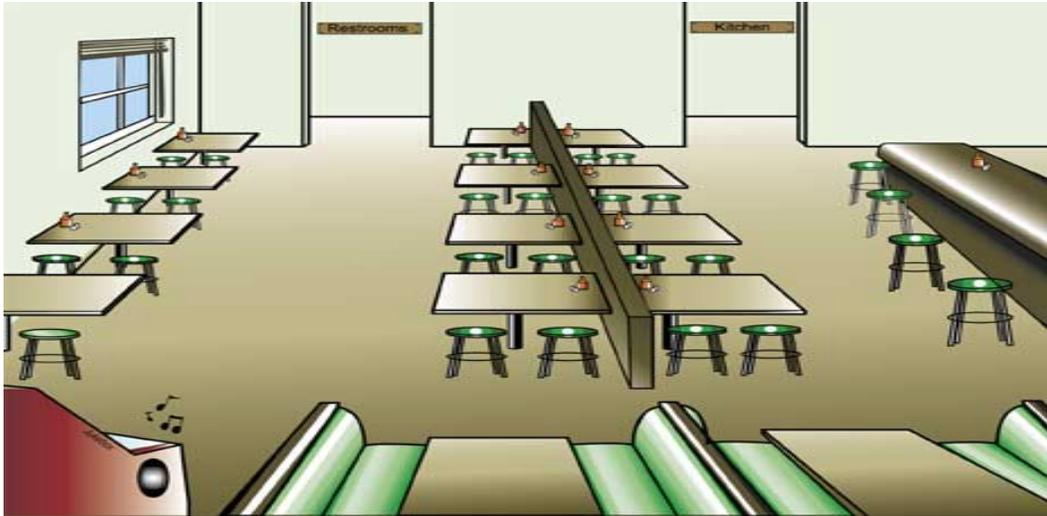
Tell the “speaker” that you did not understand. Then you should utilize as many of the strategies on this CD, until you have understood the conversation. You must not be afraid to ask for things that will improve your ability to understand conversations. You could even admit that you have a hearing loss; by doing so you unravel the mystery. Most likely, everyone will be more understanding of the problems you encounter everyday.

ACCEPTANCE

When people acquire a hearing loss, it often comes with psychological issues. These issues include embarrassment, denial and depression. In fact, there is research that explores the stages dealing with hearing loss. The first stage is denial; how often have you complained that people mumble? Putting the blame elsewhere instead of accepting your hearing loss. Other stages include bargaining and depression until reaching the final stage of acceptance. When your hearing is gone; just like any other sense, it is like losing a part of yourself. This is not something that you recover from overnight. Indeed, it may take weeks, months or even years to get from denial to acceptance. Acceptance doesn't

mean that you are happy that your hearing is gone. It does mean that you are ready to deal with you hearing loss in a positive way. Acceptance occurs by doing things for yourself such as: viewing this CD, exploring the possibility of hearing aids or other devices, and by being honest with yourself about your hearing loss. “Consider you conversation needs before the needs of others!”

SITUATION MANAGEMENT



Narration (maximum volume): This is a noisy restaurant. This is a simple demonstration of how to set up your environment to be appropriate for hearing. Clicking on one hot spot (each “hot spot” will light up in fluorescent, one after the other: the seats near the kitchen, restroom, jukebox, and bar) will provide you with auditory and visual information about why that area creates more or less communication breakdowns. Now you may click on a hotspot to continue.

[When clicking on the chairs near the kitchen area a text box will appear saying “this is not a good area to sit in because of the kitchen noise”. There will also be some “kitchen noise” heard in the background. When clicking on the bar area “this is not a good area to be near due to the amount of people coming to that area creating background noise”. “Bar noise” will be in the background. When clicking on a table against the wall “sitting in the chair against the wall is a good idea because there is less background noise”. There will be a limited amount of background noise. There will also be the added information

of “make sure the lighting is good, so you can visualize your partner’s face to speechread”.

ANTICIPATORY STRATEGIES

(Begin playing the chorus of Carly Simon’s “Anticipation” – with words to the versus played flowing in a wavelike motion across the top of the screen)

Have you ever walked into a situation and missed vital information?

If the answer is “yes” then here are some anticipatory strategies to assist you!

Research has suggested that people who use anticipatory strategies in new situations versus familiar situations receive the most benefit. Therefore, we will first discuss anticipatory strategies for new situations.

1. Keep current! Read newspapers, magazines, or look on the Internet; whatever is necessary to keep up with current information. People frequently talk about information they have recently heard on the radio, television, or from friends. This information will allow you to formulate ideas and opinions that will better prepare you to discuss those topics in new situations.

2. Practice! After you read about current events, practice speechreading the vocabulary (words, phrases, and sentences) in front of the mirror, and if possible, with a partner. This will assist you to do the real thing. Before meeting with a friend; identify what is happening in your friend’s life, through email or other reliable sources. Practice speechreading those words to increase your conversational fluency.

As stated earlier, a person may receive some benefit from anticipatory strategies in familiar situations.

When entering a familiar situation:

1. Research the vocabulary you may encounter.

For example, <u>Doctor’s office</u>	<u>Bank</u>
Insurance	deposit
Problem	account
Pharmacy	checkbook
Medicine	loan
Examination	credit

2. Write down vocabulary in sentences.

3. Practice speechreading those sentences in front of the mirror, and possibly with a partner.

REPAIR STRATEGIES

(First scene is video clip of 2 people speaking on a sidewalk and person 1 asks person 2 if they want to go to dinner. Person 2 says “huh”).)

(After the video clip is over, the normal screen appears)

What is wrong with the scene that was just shown?

First, notice that the listener did not understand what the speaker said. This is known as a communication breakdown. A communication breakdown occurs in a conversation when a listener has misunderstood part or all of what the speaker has said. Second, notice that the listener used the word “huh” to express confusion. This is known as a repair strategy. Repair strategies are enacted when part or all of a conversation is misunderstood. They involve having the listener who misunderstood the conversation asking a specific question that would enable the speaker to say the words in a way that is understandable. The words “huh”, “what”, and “excuse me” are known as non-specific repair strategies. A non-specific repair strategy is very general and inevitably has the speaker repeat the entire sentence again. Repetition is a repair strategy that is often used, and while it helps under certain circumstances, research has shown that its use does not significantly improve understanding.

Instead, this CD recommends the use of three other repair strategies:

CLICK ON THE WORD “VIDEO” TO SEE AN EXAMPLE

1. **Rephrase:** request that the speaker rephrases the sentence. **Video** (show a video of two people talking. The speaker says, “I like to play tennis”. The listener says, “I did not understand you, could you rephrase that sentence?” The speaker says, “Tennis is fun”).
2. **Keyword:** request that the speaker repeats only the keyword that was misunderstood. **Video** (show a video of two people talking. The speaker says, “I like to play tennis”. The listener says, “I did not understand you, could you repeat the last word?” The speaker says, “Tennis”).
3. **Synonym:** request that the speaker uses a different word that has similar meaning to the misunderstood word. **Video** (show a video of two people talking. The speaker says, “I like to play tennis”. The listener says, “I did not understand you, could you say a

different last word with similar meaning?” The speaker says, “The game with a ball and racket”).

SPEECHREADING SECTION

What is involved in speechreading? Is it simply looking at a speaker’s lips to understand what is spoken?

The answer is no, there is more involved in speechreading than “meets the eye”.

In this section of the CD we discuss the different factors involved in speechreading.

1. Be assertive – You must tell your communication partner that you are speechreading.
2. Look at the whole person – Observe not only the lips, but also the facial expressions and body gestures. At first this may seem difficult, but it might help to think of speechreading like watching a foreign film. In the beginning of a foreign film you are only viewing the subtitles, but as the film progresses your eyes take in the whole picture. This is similar to speechreading. First, you are trying to look only at the lips. Then, you begin looking at the eyebrows. For instance, when the eyebrows are raised the sentence is a question. Next, you observe the body language to obtain information about the mood of the conversation. Each of these visuals when put together adds to your speechreading ability.

Factors to consider:

1. Wear your hearing aid. Hearing aids provide you with speech sounds, which assist in the “speechreading process”. The use of multiple senses (vision, hearing, and touch) enhances your ability to understand conversations. So, when you are speechreading, “always wear your hearing aid”.
2. Stay motivated. Your motivation to learn and practice is a key element in speechreading ability.
3. Control your environment. Environmental improvements for speechreading include limiting visual distractions and maintaining good lighting. Speechreading adequately also requires maintaining a small distance, no greater than six feet, between yourself and the speaker. So, when you are speechreading, “control your environment”!

CLICK **HERE** TO LEARN DIFFERENT SPEECHREADING TECHNIQUES

SPEECHREADING SOUNDS

Is it possible to look at a person speaking one word and know exactly what that word is?
Possibly!

Is it possible to look at a person speaking words and know every time what that word is?
Probably not!

The reason that we cannot speechread every word is that much of how a word is produced is hidden inside the speaker's mouth.

Speech sounds are produced by the movement of the lips, the breath stream, the tongue, and jaw movement. As you might guess, the lips are the most visible indicators of what sound is produced. Therefore, sounds produced with a change in lip position are the easiest to speechread. The sounds that are produced inside of the mouth are more difficult to speechread. Due to the nature of speech sound production, it is not possible to determine every sound in a word or every word in a sentence. Therefore, this program is not designed to perfect your ability to speechread every sound or word.

The goals of this section are:

1. Help you distinguish between viseme groups. A viseme is a group of speech sounds that appear similar on the lips (such as "p" and "b"). It is more difficult to distinguish speech sounds that belong to one viseme group than between different viseme groups (such as "p" and "s").
2. Help you distinguish between different homophones. A homophone is a group of words (such as "tip" and "dip") that look similar on the lips. It is more difficult to distinguish words within a homophone group than between two different homophone groups (such as "tip" and "wip").

The following is a list of viseme groups:

Press the word "video" to see the viseme group

Lesner, Sandridge & Kricos (1987)

/p, b, m/	lips pressed together (video – close up of person's lips during "p")
/f, v/	teeth touch lower lip (video – close up of person's lips during "f")
/th/	tongue between teeth (video – close up of person's lips during "th")
/zh, dsh, sh, j, ch/	lips rounded and pushed out (video – close up of lips during "j")
/w, r/	lips rounded (video – close up of person's lips during "w")

/l/ tongue touches upper teeth(video – “l”)

/t, d, s, z, n, k, g, y/ lips slightly apart and tongue in various positions (video – “t”)

You may have noticed that all the vowels are missing! Vowels can be distinguished by the shape of the mouth, and the position of the tongue. Like consonant sounds the vowel sounds produced by changes in the shape of the mouth are more easily speechread than deciphering where the tongue is positioned in the mouth.

/oo, o, u/ as in “boot”, “boat”, “cute” lips round & pushed out (video – person speaks the 3 words)

/a, au/ as in “bat”, “dot” open mouth (video – 2 words)

/ee, i/ as in “bead”, “sit” lips spread horizontally (video – 2 words)

Now that you are aware of sound categories you should practice these in front of the mirror or even with a partner. When you have these categories memorized, then complete the following training.

First you will see a person on a video speak one word.

Second, you will click on the word that you speechread from a two word set.

Third, if you are correct then you will receive feedback and move on; if you are incorrect the video will be shown again with feedback before you can move on.

Press **START** to begin

1. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. sap

B. map

(video of a person from shoulder’s up speaking the word “map”, they will say that word 2x)

(if they choose B, the video fades and the correct message appears in it’s place)

CORRECT! As you saw the two words differed only by the initial consonant sound.

The word “map” has a lips pressed together initial consonant. The sound “m” also is known as a “nasal” sound, because the sound comes out of the nose. On the other hand the word “sap” has a mouth open initial consonant sound with the tongue close to the roof of the mouth. There is an inability to see the tongue in the mouth, and the “s” sound is

produced by air and not the voice box. Due to the strong differences between these initial consonant sounds, it is easier to discriminate between these words.

(if they choose A, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)

(after video is finished verbiage appears below the video screen). As you saw the two words differed only by the initial consonant sound. The word “map” has a lips pressed together initial consonant. The sound “m” also is known as a “nasal” sound, because the sound comes out of the nose. On the other hand the word “sap” has a mouth open initial consonant sound with the tongue close to the roof of the mouth. There is an inability to see the tongue in the mouth, and the “s” sound is produced by air and not the voice box. Due to the strong differences between these initial consonant sounds, it is easier to discriminate between these words.

2. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. not

B. dot

(video of a person from shoulder’s up speaking the word “not”, they will say that word 2x)

(if they choose A, the video fades and the correct message appears in it’s place)

CORRECT! As you saw the two words differed only by the initial consonant sound. The word “not” has an open mouthed initial consonant sound with tongue hidden in mouth. The sound “n” also is known as a “nasal” sound, because the sound comes out of the nose. On the other hand the word “dot” has a mouth open initial consonant sound with the tongue touching the front of the roof of the mouth. There is an inability to see the tongue in the mouth, and the “d” sound is produced by the voice box. Due to the strong similarities between these initial consonant sounds, it is more difficult to discriminate between these words. This makes these words, homophones. As it has been mentioned, the difficult nature of discriminating between these words creates the need for context. In fact, training with sounds should provide awareness of sound groups followed by training with sentences that should enable you to speechread with more accuracy.

(if they choose A, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)
(after video is finished verbiage appears below the video screen). As you saw the two words differed only by the initial consonant sound. The word “not” has an open mouthed initial consonant sound with tongue hidden in mouth. The sound “n” also is known as a “nasal” sound, because the sound comes out of the nose. On the other hand the word “dot” has a mouth open initial consonant sound with the tongue touching the front of the roof of the mouth. There is strong similarities between the initial consonant sounds and the word, makes them homophenes. As it has been mentioned, the difficult nature of discriminating between these words creates the need for context. In fact, training with sounds should provide awareness of sound groups followed by training with sentences that should enable you to speechread with more accuracy.

3. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. pin

B. pawn

(video of a person from shoulder’s up speaking the word “pin”, they will say that word 2x)

(if they choose A, the video fades and the correct message appears in it’s place)

CORRECT! You have made the correct choice. As you saw the only difference between the two-word set was the middle vowel. The word “pin” has a lips spread vowel sound. The word “pawn” has an open-mouthed vowel sound.

(if they choose B, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)
(after video is finished verbiage appears below the video screen) As you saw the only difference between the two-word set was the middle vowel. The word “Pin” has a lips spread vowel sound. The word “pawn”, however, has an open-mouthed vowel sound.

4. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. sheep**B. shop**

(video of a person from shoulder's up speaking the word "shop", they will say that word 2x)

(if they choose B, the video fades and the correct message appears in it's place)

CORRECT! As you can see the only difference between the two word choices is the middle vowel sound. The word "sheep" has a lips spread vowel sound. The word "shop", however, has an opened mouth vowel sound.

(if they choose A, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)

(after video is finished verbiage appears below the video screen). As you can see the only difference between the two word choices is the middle vowel sound. The word "sheep" has a lips spread vowel sound. The word "shop", however, has an opened mouth vowel sound.]

5. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. pal**B. pull**

(video of a person from shoulder's up speaking the word "pull", they will say that word 2x)

(if they choose B, the video fades and the correct message appears in it's place)

CORRECT! As you can see the only difference between the two word choices is the middle vowel sound. The word "pull" has a lips rounded and pushed out vowel sound. The word "pal", however, has an opened mouth vowel sound.

(if they choose A, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)

(after video is finished verbage appears below the video screen). As you can see the only difference between the two word choices is the middle vowel sound. The word "pull" has a lips rounded and pushed out vowel sound. The word "pal", however, has an opened mouth vowel sound.

6. (A screen appears with the two word choice)

Review the following word set, then click **here** to speechread the correct word

A. ten

B. tan

(video of a person from shoulder's up speaking the word "ten", they will say that word 2x)

(if they choose A, the video fades and the correct message appears in it's place)

CORRECT! As you can see the only difference between the two word choices is the middle vowel sound. The words "ten" and "tan" have open-mouthed vowel sounds.

Because these words look very similar on the lips, they are referred to as homophones.

Due to the difficult nature of discriminating between these words, the use of context is vital. In fact, training with sounds should be used to provide awareness and training with sentences should enable you to speechread with more accuracy.

(if they choose B, the incorrect message appears under the video)

YOU ARE INCORRECT! The video will now be viewed again. (in 3 sec video appears)

(after video is finished verbiage appears below the video screen). As you can see the only difference between the two word choices is the middle vowel sound. The words "ten" and "tan" have open-mouthed vowel sounds. Because these words look very similar on the lips, they are referred to as homophones. Due to the difficult nature of discriminating between these words, the use of context is vital. In fact, training with sounds should be used to provide awareness of sound groups and training with sentences should enable you to speechread with more accuracy.

SPEECHREADING SENTENCES

Do you feel it is more important to catch every word than to understand the meaning behind the sentences?

If you answered "yes", then you probably have run into many difficulties when speechreading. If you answered "no", and believe that understanding the "gist" of the sentence is important, then this training will be beneficial!

In this section of the CD we discuss the different factors involved in speechreading sentences:

1. Focus on the whole person! You will receive important secondary information from

each sentence by doing this. For instance, when the speaker's eyebrows are raised, you know that the sentence is a question and not a statement.

2. Focus on keywords! Do not attempt to listen for every word. You do not receive important information from the words "the" and "and". Instead, focus on the keywords of the sentence.

3. Do not upset yourself! When you do miss words, continue concentrating on the remainder of the sentence. You will only disturb your concentration by upsetting yourself over a couple of missed words.

3. Use repair strategies! If you cannot obtain the meaning of the sentence from the keywords then you must utilize a repair strategy.

The following is a series of sentences for you to speechread.

First, you will see a person speaking a sentence.

Second, you will click on an icon at the bottom of the page that depicts the correct sentence.

Third, if you are correct then you will move on; if you are incorrect you will have to choose a repair strategy to continue.

CLICK START TO VIEW THE FIRST VIDEO SENTENCE.

1) (Video will appear in the top of the screen with a speaker from shoulder's and up saying the sentence "I like that song", underneath the video a prompt in bold letters says "CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE")

(icon of a sailboat
in the ocean)

(icon of a person
sitting at a piano
and you see music
notes coming out)

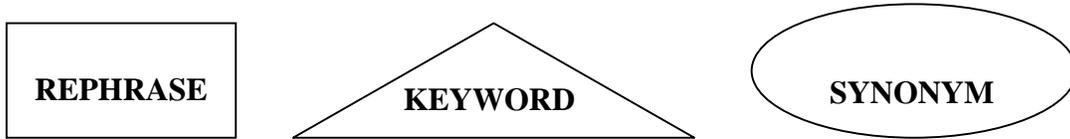
(icon of a woman
wearing a red
sweater)

A.

B.

C.

(If the user is correct-choiceB, they are moved to the next sentence. If they are incorrect then a prompt appears "YOU ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT". To the right there will appear three repair strategy choices.)



(when a repair strategy is chosen a video enacting the repair strategy appears).

The keyword of the sentence is: “song” (video appears at the top of the screen with a person from the shoulders and up saying the word “song”. After three seconds the original video sentence will play again. Then, the person can choose a picture again. If the person is correct they will go to the next sentence, if incorrect they can choose another repair strategy. They can choose any of the three repair strategies one time. If they meet their limit they are cued to move to the next sentence)

The rephrase of this sentence is: “I like music on the piano” (same procedure for all repair strategies applies)

The synonym is: “ music”

2. (Video will appear in the top of the screen with a speaker from shoulder’s and up saying the sentence “ Put these lights on the tree”, underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

A.

B.

C.

(icon of a christmas tree with lights strung around)

(icon of a woman wearing a red sweater)

(icon of a person sitting at a piano and you see music notes coming out)

(If the user is correct-choiceA, they are moved to the next sentence. If they are incorrect then a prompt appears “YOU ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.)

The keyword is “tree”

The rephrase is “The lights go on the tree”

The synonym is “ evergreen”

3). (Video will appear in the top of the screen after 3 sec with a speaker from shoulders and up saying the sentence “ I like going to the mountains in the fall”, with both audio and visual capabilities; underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

(computer iconography of cat chasing a bird in a yard)

(computer iconography of christmas tree with lights around it)

(computer icon of mountains with two people on the top)

A.

B.

C.

(If the user is correct –choice C, they are moved to the next sentence. If they are incorrect then a prompt appears “YOUR ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.

(when a repair strategy is chosen a video enacting the repair strategy appears).

The keyword of the sentence is: “mountain”

The rephrase of this sentence is: “I like the mountains”

The synonym is: “large hills”

4) (video will appear in the top of the screen with a speaker from shoulders and up saying the sentence “ Do you play the guitar?”. This time when the sentence is spoken there will be speech babble in the background. Then underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

(icon of a christmas tree with lights strung around)

(icon of a man sitting in a chair playing a guitar)

(icon of 2 people sitting on park bench feeding ducks in a pond)

A.

B.

C.

(If the user is correct-choiceB, they are moved to the next sentence. If they are incorrect then a prompt appears “YOUR ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.)

The keyword is: “guitar”

The rephrase is “Do you enjoy guitars?”

The synonym is “musical instrument”

5) (video will appear in the top of the screen with a speaker from shoulder’s and up saying the sentence “ My cat was chasing the bird all around the yard” with speech babble in the background. Then underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

(icon of a deer standing in front of a large country home)

A.

(icon of cat chasing a bird in a yard)

B.

(icon of a christmas tree with lights strung around)

C.

(If the user is correct-choiceB, they are moved to the next sentence. If they are incorrect then a prompt appears “YOU ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.)

The keyword is “chasing”

The rephrase is “The cat was chasing the bird”

The synonym is “running after”

6) (video will appear in the top of the screen with a speaker from shoulder’s and up saying the sentence “ Give the ducks some bread from your sandwich” with speech babble in the background. Then underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

A.

(icon of 2 people sitting on park bench feeding ducks in a pond)

B.

(icon of a deer standing in front of a large country home)

C.

(icon of a person sitting at a piano and you see music notes coming out)

(If the user is correct-choice A, they are moved to the next sentence. If they are incorrect then a prompt appears “YOU ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.)

The keyword is “ducks”

The rephrase is “Give your bread to the ducks”

The synonym is “birds”

7) (video will appear in the top of the screen with a speaker from shoulders and up saying the sentence “ You can see deer near my country house” with speech babble in the background.

Then underneath the video a prompt in bold letters says “CLICK ON THE PICTURE BELOW THAT DEPICTS THE SENTENCE”)

(icon of a person sitting at a piano and you see music notes coming out)

A.

(icon of a christmas tree with lights strung around)

B.

(icon of a deer standing in front of a large country home)

C.

(If the user is correct-choice C, they are moved to the next sentence. If they are incorrect then a prompt appears “YOU ARE INCORRECT! PLEASE CLICK ON ONE OF THE REPAIR STRATEGIES LISTED TO YOUR RIGHT”. To the right there will appear three repair strategy choices.)

The keyword is “deer”

The rephrase is “The deer is by the house”

The synonym is “stag”

You have completed the program.

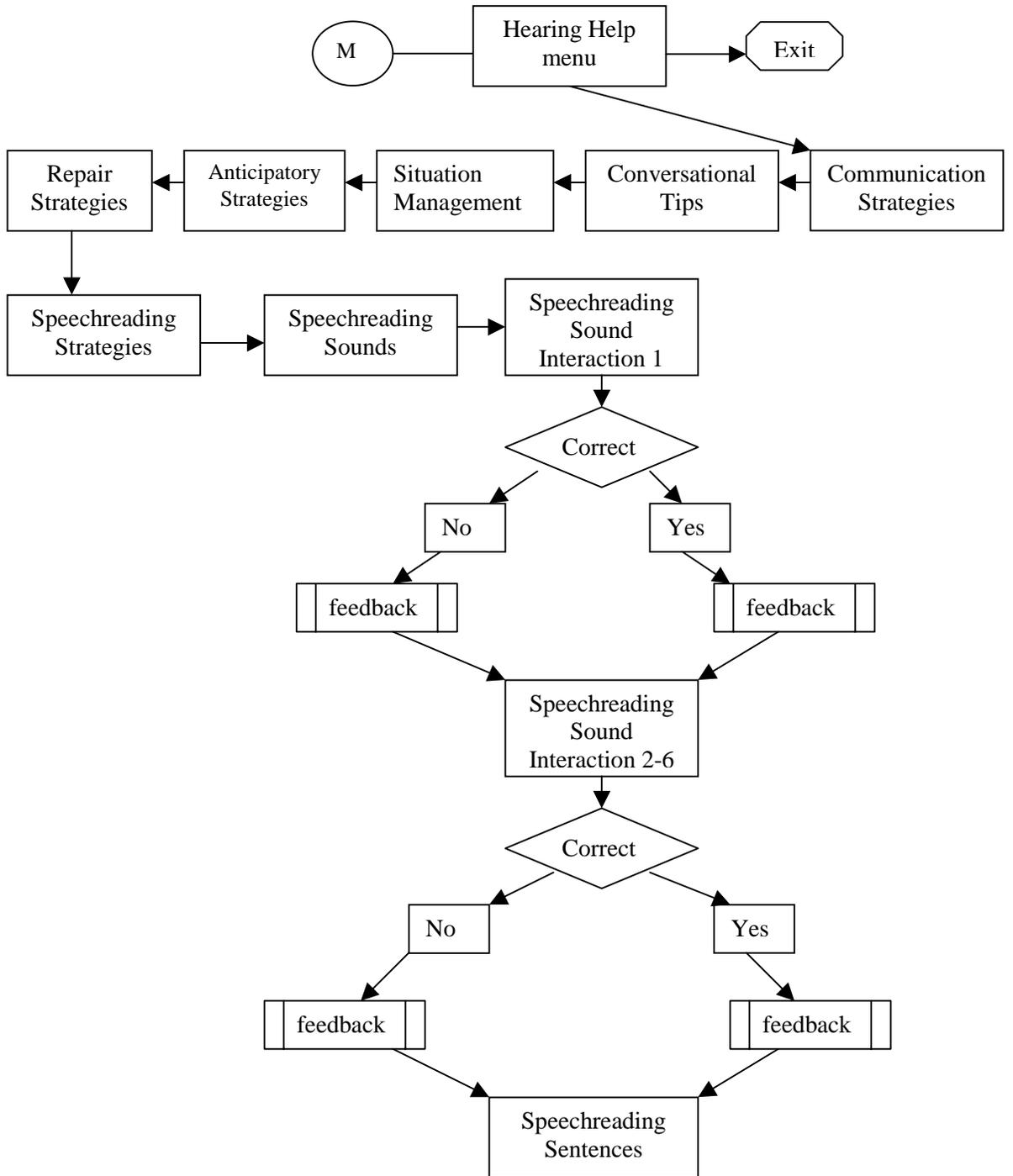
Congratulations!

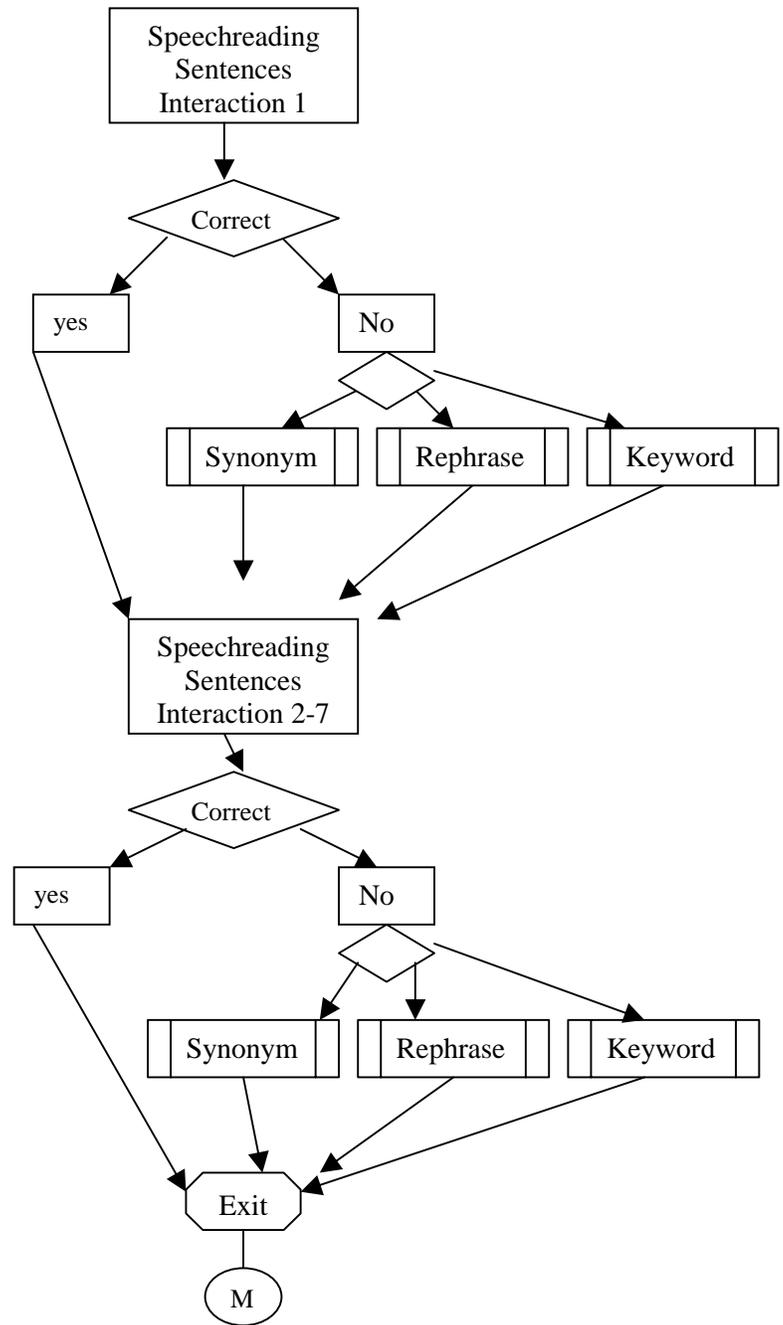
If you want to return to the main menu, click [here](#).

If you want to exit the program, click [here](#).

APPENDIX II

Flowchart of the prototype aural rehabilitation CD-ROM





Graduate School
University of South Florida
Tampa, Florida

CERTIFICATE OF APPROVAL

Professional Research Project

This is to certify that the Professional Research Project of

Sierra MacDonald

with a major in Audiology has been approved by
the Examining Committee on January 23, 2002
as satisfactory for the professional research
requirement of the Doctor of Audiology degree

Examining Committee:

Chair: Nancy Patterson, Au.D.

Chair: Theresa Hnath-Chisolm, Ph.D.

Member: Robert Zelski, Au.D.

Member: William Kealy, Ph.D.

