The Impact of Speechreading Programs on Adults with Hearing Loss

Literature Review

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Introduction

This review was developed to provide the foundation of evidence-based practice currently available with regards to the efficacy of speechreading techniques in improving communication, social interaction and overall quality of life in adults with hearing loss. This review of research will inform the National Guidelines developed to structure the Canadian Hard of Hearing Association's National Speechreading Program (NSRP), and offer credible resources that provide validity to the methods and approaches included in NSRP.

Speechreading is here defined in general terms, as a method of oral communication in which one uses communication strategies to aid in dialogue when some of the auditory information is missing due to hearing loss or a noisy environment. This method makes use of the visual clues of the speaker's lip and facial movements, gestures, posture and body language, along with residual hearing to make use of the speaker's verbal communication, intonation and context to infer meaning (formerly known as lip reading). Other skills that are associated with speechreading include behaviors and coping mechanisms that reduce the deficits in communication and function posed by hearing loss, including social activity, interaction, participation, and overall quality of life through a multifaceted approach of sensory management, instruction, perceptual training and communication repair strategies. These coping skills can include communication and repair strategies to aid understanding. Speechreading is also used by people who have typical hearing, especially in situations that are noisy or the speech is unclear. Woodhouse et al (2009) published a review indicating five pieces of evidence that shows "speech-reading is an integral part of speech processing. Hearing people's perception of speech is influenced by speech-read cues, and those speech-read cues cannot be ignored."

The need for such a review of literature is borne out of the various research projects and academic reviews that exist, however; conflicting evidence and findings reveal a need for a comparison of viable skills and useful data that should be included in a comprehensive speechreading program. Additionally, there are a number of organizations and individuals that offer speechreading instruction individuals with hearing loss across Canada, and this number is growing every year as the need for such courses is increasing. People with hearing loss are requesting tools to cope with this problem, but the level of quality, the content and the tools that are available vary considerably from one service provider to the other. There is no regulation of informal speechreading courses, and currently there is no National Guideline in place to ensure the quality of these services.

This review endeavors to provide a general overview of some of the research that has taken place over the past 35 years regarding the effects of speechreading and aural rehabilitation on overall communication and quality of life in persons living with hearing loss (particularly adults).

Background Information

For some of the literature reviewed, there are different terms used to describe the set of skills included in speechreading. The terms "lipreading" and "aural rehabilitation" tend to be terms that encompass training of the similar skill sets, and regardless of the terminology used in the literature reviewed, for the purposes of this paper, the term *speechreading* will be used throughout for clarity. The term speechreading is preferred over lipreading, as speechreading encompasses more skills than reading lips alone.

The use of speechreading as a skill to aid in communication is not unusual and has been relied upon by people living with hearing loss for centuries. The earliest recorded reference to speechreading instruction refers to the Spanish Benedictine Monk, Pictro Ponce who was considered to be the first successful speechreading teacher for pupils with hearing loss (Hassanat, 2009). In 1787, Samuel Heinecke opened the first speechreading school for students with hearing loss in Leipzin, Germany. Speechreading was in practice in North America since the turn of the 19th century, with the inception of the first schools of the Deaf during the colonial period. Early Oral programs often put emphasis on speechreading skills as the primary method for learning a spoken language, before the acceptance of manual forms of communication in education for students with hearing loss (Crouch & Greenwald, 2007).

Speechreading became an interest in the field of Audiology for its rehabilitative potential in the 1940s, as a response to the rising need for such services from veterans returning from World War II. However, as noted by McCarthy and Schau (2008) the emphasis on rehabilitation in the profession of Audiology diminished over the ensuing decades, returning to focus on diagnostic procedures and the dispensation of Hearing Aids and other assistive devices. Erber (1988) observed that three tools were available during the 1940s and 50s, when servicemen and women were returning from WWII with significant hearing losses, including "Hearing aids, Auditory Training and lipreading instruction". However, the turn in focus from speechreading instruction to assistive technology is due in part by a loss in confidence in auditory training and speechreading, and improvements to technology to augment the use of residual hearing. Arnold (1997) argues, "Speechreading is still of value since it does not rely on technology, is a natural skill, and can also optimize the effectiveness of Hearing Aids and Cochlear Implants" (Pp. 199). Currently, speechreading is becoming more popular among consumer groups and non-profit organizations as a complimentary method of understanding spoken communication, for

persons living with hearing loss. The reason for this preference is because once a person has learned speechreading skills, it is cost-effective, can benefit people living with hearing loss at any age and any stage; it is a tool that can be implemented as needed and is flexible enough to be applied to meet a variety of needs, in a variety of situations.

The following section discusses the Theories and Approaches that developed during the 20th century to structure how speechreading as a skill was taught to people with hearing loss.

Theory

There are four general approaches used to impart speechreading skills: Analytic, Synthetic, Pragmatic and Holistic (Tye-Murray, 1998). Each approach had different models associated with them, and examples of each will be detailed.

The Analytic approach was considered a traditional method of instruction for teaching speechreading skills, and is generally defined as an approach that focused on the smallest units of speech to understand spoken communication. Hallmarks of this approach are rapid syllable drills emphasizing the practice of building smaller verbal units (the syllable or viseme) into words and then sentences (Hanavan, 2013).

Analytic approaches include instruction that concentrates on the details of the sounds - learning to recognize how they look on the lips and practicing their recognition in isolation and in single words e.g., the Mueller-Walle, Bruhn and Jena methods (Bruhn. 1949; Bunger, 1952). The underlying theory is that the speechreader, deprived of some of the acoustic information, must work to interpret as much information as possible from the visible movements. An underlying assumption is that speech

perception is, basically, a bottom-up process in which the first task is to analyze the incoming visual signal into its basic components before assembling those components into words and sentences (Kaplan, et al. 1985). Some of the practices include syllable discrimination exercises, where the speechreader would be presented with two syllables (e.g., "GA-BA" or "BA-BA") and would then determine whether the two syllables were the same or different. With practice and improved proficiency, similar exercises can be done using words selected based on the syllables intended for practice (Gelfand, 2009, pg 466).

While studies have reported from modest to significant improvements in speech recognition performance (Walden, et al. 1977; Gesi, et al. 1992; Thompson & Massaro, 1994; Massaro & Klitzke, 1977), there are limitations to this approach. On average, an English-speaking person will create about 13 to 15 specific speech movements per second in a comfortably paced conversation, but even the best-trained professional speechreaders can only register about 8 or 9 movements per second *at most* (Bauman, 2000). Even modern day speechreaders trained with conventional techniques (E.G.: extended training procedures that include video recordings that can be paused, slowed-down, rewound, enlarged and have in depth analysis to accompany) can only ascertain a maximum of about 30% to 35% of spoken English in real time conversations, even under optimal conditions (Bauman, 2000). With this in mind, it is very difficult to capture all of the necessary information to decode meaningful sentences, and building the message from the sum of its parts. Often, the processing time required to visually recognize and interpret recognizable speech movements, arrange them into words, and then arrange the words into sentences outlasts the speakers rate of speech and the sentence the speechreader was trying to follow would have long since passed. Although some of the skills incorporated into the Analytic Approach can be useful under certain circumstances, the use of this approach exclusively to aid in communication can

be a frustrating and cumbersome experience for persons with hearing loss, with lower chances for success in everyday situations.

The Synthetic Approach can be characterised as a top-down approach, where the perception of the whole, or the overall meaning of the message is emphasised more so than concentrating on smaller parts. Methods associated with this approach are the Nitchie and Kinzie methods, and common exercises for this method include speechreading sentence practice in a known context to aid in determination of overall meaning. The sentences used to practice this approach should be "definite, natural, interesting, pleasing, rhythmical and dignified" (Hanavan, 2013. pg 8). There are many exercises that can be used in this approach, most focusing on giving the speechreader some clues such as key words or a topic that will be discussed, presenting the message and having the speechreader respond in a variety of ways. For example, the speechreader could reply to a specific question, repeat a passage, or incorporate details from the presented message into subsequent discussion (Gelfand, 2009. pg 466).

The goal of the synthetic approach is for speechreaders to use context and any known information to allow for educated guessing, when some sounds or parts of the sentence is missing from auditory perception. In other words, the meaning of a given sentence, if the context is known but some of the words are ambiguous, can be inferred. In this way, stress can be reduced when the speechreader knows that, firstly; not all speech sounds can be 'read' and be able to keep tracking the conversation at a natural pace of speech. Some limitations associated with the Synthetic Approach include situations when a speechreader is unable to determine the context of the message, or is unable to determine the overall meaning of a message or unknowingly misinterprets the information, leading to misunderstanding. While repair strategies can help in such situations, it is largely the responsibility of the speechreader to recognize when this is happening and to take the needed steps to mitigate any

confusion. However, it is important to note that not all methods associated with the Synthetic Approach offer such techniques to address these situations.

While there are some studies and research projects evaluating Synthetic Approaches that have yielded promising results, only a few meet evidence-based criteria (e.g., Miller, et al. 2008; Sweetow, Sabes, 2006). Many studies that are supportive of this approach and associated methods, cite qualitative impacts, such as comments and personal reports from end users or self-evaluations as a main source of information, and are not considered empirically valid for the purposes of research (Binnie, 1977; Abrams, et al. 1992). Although there is useful information to be found in self-reported results, it is more difficult to use this form of evidence to evaluate the efficacy of speechreading and communication strategy instruction.

The Pragmatic Approach focuses primarily on creating the ideal environment and context for the person with hearing loss in dialogue, where they employ communication strategies to ensure that residual hearing is maximized to increase comprehension of the speaker. The aim of this approach is for the individual to concentrate on interaction more than the reception of specific cues or sounds, to ask for modification of the speakers message, the context in which dialogue takes place, and develop specific strategies that they can employ in particular situations that are found to be most difficult to communicate (Lind, 2009).

There are specific therapeutic methods that use some of the tenants of this approach such as QUEST?AR (Erber, 1996, 2002) Sent-Ident, and Topicon (Lind, 2009). The methods listed above incorporate conversation therapy, with discussion between the hearing health professional/speechreading instructor and the consumer with hearing loss on the topic of communication and repair strategies. The focus of this approach is based on how language is used in

social situations and how the use of language can affect those communicating; as a result, most of the exercises are framed from the perspective of interaction. Practices and exercises used in the Pragmatic Approach tend to incorporate dialogue between pairs or groups of speechreaders, or the speechreader and the instructor/clinician. For example, during dialogue between speechreader and instructor/clinician, the speechreader will have to reply appropriately and if they do not, then the instructor would provide prompts and cues to help the person get back on track. With practice, the speechreader will employ communication strategies to ensure they are fully engaged and correctly understanding the conversation. Other exercises can include narratives, question/answer, discussion, and role-playing. Cues such as word order and sequencing, tense and word endings, matching language to the situation and context, among others are important considerations when using this approach (Ellesef, 2013).

While there is value in this approach in terms of the shared responsibility between speaker and listener, the focus on 'real life' situations, and the avoided concepts of 'blame' and 'error', the Pragmatic Approach does have some limitations. The most notable is that it is the speechreader's existing skills that are maximized, with little emphasis on developing new skills, aside from finding specific repair strategies for difficult situations.   There is no effort made to incorporate a bimodal approach (two sensory inputs including both auditory and visual cues) to overcoming conversation difficulties. Another serious limitation, is that there is currently no evidenced-based research to be found on the efficacy of this approach (Lind, 2009; Blamey, Alcantara, 1994).

The Holistic Approach (also known as an Eclectic approach) incorporated aspects from the Analytic, Synthetic and Pragmatic approaches. The main objectives of a Holistic Approach included "the evaluation and management of overall communication skills, the psychosocial aspects of hearing loss,

the education of significant others (e.g. parents, siblings and close friends), hearing aid orientation, an emphasis on improving conversational and interactive skills, and the use of assistive listening devices" (Kricos, Lesner, 1996. As cited in: Falkenberg, E.S. 2007. pg. 5). The holistic approach is not a novel concept; Tye-Murray (1998) for example, defines the goals of a holistic adult aural rehabilitation program as an alleviation of "…the difficulties related to hearing loss and minimize its consequences" (p 2). She further describes the processes as including ". . . diagnosis and quantification of the hearing loss and the provision of appropriate listening devices [plus] communication-strategies training, counseling related to hearing loss, vocational counseling, noise protection, . . . counseling and instruction for family members . . . [and] less commonly, . . . speech perception training, such as speechreading training"(Tye-Murray. 1998, pg 8). Yoshinaga-Itano (1988) also described a holistic approach to instructing speechreading techniques to children. The training goals included: increasing the child's knowledge of the speechreading process, their ability to generalize strategies to facilitate more successful communication, their tolerance for difficult/frustrating communicative situations, their role in generating personal goals, and their motivation to improve their speechreading abilities (Yoshinaga-Itano, 1988. As cited by Tye-Murray, 1998. pg 231). Due to the integrative and multifaceted nature of a Holistic Approach to speechreading instruction, there is a clear need for cross-professional and multi-disciplinary work with the help of the hearing healthcare professionals, consumer organizations and social/educational services, where both generalists and specialists are needed (Larsby, et al. 2000. As cited in: Falkenberg, E.S. 2007. pg 12).

The rationale behind a Holistic Approach is twofold; firstly Analytic, Synthetic and Pragmatic approaches each train specific aspects of speech perception and communication strategies that are useful, and the starting point in determining which strategies could be applied is the individual living with hearing loss. Secondly, while there are both benefits and detriments to the Analytic, Synthetic and

Pragmatic approaches, an approach that incorporates aspects of each is flexible and can be adapted to specific situations when called for. Blamey and Alcantara (1994) agreed that a Holistic or Eclectic Approach would have applications "…in the absence of clear information about which type of training is best suited to a particular situation, it may be best to incorporate all of them (the Analytic, Synthetic and Pragmatic approaches) into an auditory training program" (pg 171). The benefit to using a Holistic paradigm is the client-oriented approach, which is much more empowering to the person seeking help in coping with their hearing loss, and ensures a program that is tailored to the individual or groups' unique needs. Thirdly, the psychosocial aspects of rehabilitation are better addressed and are actively sought to be improved with this approach, as opposed to the Analytic, Synthetic and Pragmatic methods.

Unfortunately, despite the promising nature of the Holistic approach, there is a lack of evidence-based research to provide any validity to this particular method, and an obvious need for this remains. It could be argued however, that the research that upholds the value of the Analytic, Synthetic and Pragmatic Approaches could be transferred to the Holistic Approach as it incorporates aspects of all three of the preceding methods, and the skills imparted are not new inventions without prior precedent.

Summary

As each individual with hearing loss has unique needs, concerns and goals in adjusting their communication, the methods used to learn to cope require a flexible and individualized plan that can be adapted over time. Hull (2007) recommends that speechreading services "should be tailored to (consumers') needs in their individualized communicative environments, with their specific communication partners, or in specific situations in which they are required to communicate."

Speechreading is not necessarily a formalized, specific set of skills that are "taught" in the classic sense (like learning how to read music notation, or interpret the measurements of an oscilloscope). Instead, they are a range of behaviours and adaptations best presented in a structured but comfortable setting where people with hearing loss can experiment and experience communication in a new way. Each of the approaches and methods detailed in the previous section outline the various behaviours and techniques that can be applied in situations where they are best suited, and comprise a 'toolkit' that the person with hearing loss can choose from as they see fit. Put simply, learning speechreading and communication strategies is not a science with a set number of steps required to attain the skills, but rather the product of experiential learning and practice. As a result, the methods and approaches to coping with hearing loss and learning to speechread must also be an experiential process and incorporate ample time for practice and experimentation for the person developing these behaviors and techniques. As each of the approaches include useful skills that can be incorporated into an effective speechreading and communication strategy course, a Holistic or Eclectic approach may be best suited to the wide variety of needs and goals identified by consumers with hearing loss, and have a greater impact on improving communication, social interaction and overall quality of life. This can be done in a one-on-one or group format, with the help of an experienced Speechreading Instructor, Audiologist or Speech-Language Pathologist.

Consumers with hearing loss who have undertaken some form of speechreading instruction have either personally reported benefits from having received this training, or in cases where empirical studies have observed both pre- and post-intervention scores for a particular method or approach; the results typically show some statistically viable improvements. While there is a paucity of evidence-based research in this field, there is value in providing speechreading training to people who live with hearing loss and a compliment to services that hearing healthcare professionals provide to this group.

Recently, Hawkins (2005) used an evidence-based practice approach to review the efficacy of counselling based speechreading training programs. He searched for studies where adults with hearing loss were involved in group classes that included communication strategies, personal adjustment counseling, information about hearing and hearing devices and speechreading training. Hawkins found 12 studies that met these criteria and used a randomized controlled trial, and concluded that there were potential benefits from speechreading training. These benefits included reduced self perception of hearing handicap, improved self-perceived quality of life and increased use of communication strategies (pg 485-493). Kricos, et al. (1996) found that "negative psychosocial effects of hearing impairment were reduced following a communication training program" (pg. 71). In addition, there were also reports of increased assertiveness, more fluent communication, increased use of appropriate repair strategies (Tye-Murray, 1998), and higher perception of quality of life overall, resulting in a decreased perception of disability over time (Backenroth & Ahlner, 2000; Thibodeau & Cokely, 2003). When family members and significant others are included in the process, there is increased awareness and acceptance, or acknowledgement, of the impact of hearing loss (Preminger, 2003). Abrahamson and Wayner (1998) cited potential benefits of offering group audiologic programs beyond the reduction of hearing handicap. These include peer interaction, realistic expectations, spousal involvement, increased contact with the audiologist during the trial period, opportunity to practice skills, quality service, and cost effectiveness.

There are also benefits for hearing healthcare providers when their patients receive speechreading training as well, Thibodeau and Alford (2011) noted that only 3.5% of their patients returned their hearing aids after Aural Rehabilitation, as compared to 13.1% for those who did not, in addition to a greater satisfaction with services received from their hearing healthcare provider overall.

Conclusion

As research evaluating the effectiveness of speechreading instruction is lacking in some areas of practice, the evidence that is currently available provides some support that speechreading can aid persons with hearing loss in improving communication, social interaction and overall quality of life.

In the presence of conflicting and limited research evidence, it cannot be stated that one approach is overwhelmingly superior to the others. It would be advisable that a variety of skills incorporated from each approach be included in a comprehensive speechreading program to create a "toolkit" for individuals with hearing loss to have in their repertoire as different situations call for flexible approaches in communication style.

The components that received the most support from research evidence include:

- Some Analytic instruction to help speechreaders interpret ambiguous sounds (including specific visemes that are visible during speech),

- Some Synthetic training that focuses on the overall meaning of the message and make use of contextual cues as an additional skill to "fill in the blanks" when visemes are not visible,

- Skills from the Pragmatic Approach, such as the implementation of communication strategies, changing the environment or lighting conditions to create a better environment for communication, assertiveness training, repair strategies, and the use of communication based training in groups or one-on-one for practice.

- The inclusion of spouses or key family members to help increase their awareness and involvement in the communication process, as well as for additional support and understanding,

- Stress reduction techniques to help speechreaders during difficult communication scenarios and ensure more successful interactions,

- A focus on bimodal communication that is flexible for the speechreaders level of hearing loss (those with a more pronounced hearing loss may require a more visual focus, those with mild hearing loss my rely more on auditory cues. As group speechreading courses often have students with a mix of hearing levels, this flexibility is important for accessibility as well as personal preference in the training course.)

- Training on the use of assistive devices, how to get the most from Hearing Aids/Cochlear Implants, and how to access additional services related to hearing health.

- Inclusion of a variety of professionals and stakeholders in the training process to help in specific areas of training, including Audiologists (to diagnose the type of hearing loss and provide training on the use of the Hearing Aid/Assistive Device before training). Ear-Nose-Throat Specialists or Otolaryngologists (when Cochlear implants are prescribed, and to provide additional information on what to expect from this device as well as auditory rehabilitation). Trained Speechreading Instructors that can provide a variety of coping skills and communication strategies, in addition to basic information on Assistive Devices, community resources and group based services. Another valuable resource includes experienced Stakeholders/Consumers from related Service Groups that can bring additional perspectives on daily living, family issues, and trouble-shooting for those living with hearing loss. These stakeholders may have a hearing loss themselves, and can serve as role models in addition to being a source of information. These professionals can be involved before introduction of speechreading skills, and also during training as guest speakers at workshops.

- Incorporate data collection into speechreading training (such as questionnaires and clinical research tools) to assess the impact of intervention on those accessing services and training, to provide results on the impact. This can also provide some evidence as to whether this practice should be supported or further refined.

In conclusion, it is difficult to assess from research currently available whether speechreading training is truly effective, although there are many sources of anecdotal evidence suggesting that it has benefits for persons with hearing loss. While there are some recommendations brought forward through this review, there is still clearly a need for more clinical research to support evidence-based practice.

Glossary

- **Analytic Approach:** *a 'bottom-up' approach to speechreading, where the visual cues for individual sounds or phonemes are perceived, words are constructed by placing these phonemes in sequential order, and sentences are formed by placing words in sequential order.*
- **Aural Rehabilitation:** *a form of therapy in which hearing-impaired individuals are taught to improve their ability to communicate. Methods taught include, but are not limited to, speech-reading, auditory training, use of hearing aids, and use of assistive listening devices such as telephone amplifiers.*
- **Cochlear Implants:** *(CI) is a surgically implanted electronic device that provides a sense of sound to a person who is profoundly deaf or severely hard of hearing.*
- **Communication Strategies:** *include a range of behaviors that optimize dialogue, such as: altering the lighting, position/proximity of the speaker, leaving noisy environments or rooms with poor acoustics, using repair strategies when speech is not understood, etc…*
- **Conversation Therapy:** *speechreading and communication strategy training conveyed in the context of group or one-on-one communication, typically with a casual set-up and an emphasis on re-creating 'real-life' situations to practice skills and behaviors.*
- **deaf:** *a medical term indicating a person's level of hearing loss, often severe or profound but still uses spoken/written forms of communication (also known as "Oral deaf").*
- **Deaf:** *a cultural term for a person that affiliates with the Deaf Community, uses a form of sign language, and may or may not use spoken/written forms of communication.*
- **Hard of Hearing:** *a person with any level of hearing loss, from mild to profound, whose primary method of communication is the spoken language.*
- **Hearing Aids:** *an electro-acoustic device which is designed to amplify sound for the wearer, usually with the aim of making speech more intelligible, and to mitigate hearing loss as measured by audiometry.*
- **Hearing Health Professional:** *a qualified person who has received training to become a Hearing Instrument Practitioner, an Audiologist, a Speech Language Pathologist, an Ear Nose and Throat specialist, or an Otolaryngologist.*
- **Holistic Approach:** *incorporates aspects from the Analytic, Synthetic and Pragmatic approaches to create a variety of tools that the individual with hearing loss can choose from depending on the situation.*
- **Oral programs:** *programs developed primarily for an educational setting for students with hearing loss that emphasize the use of audition (hearing) and speech to teach major subjects, including language acquisition.*
- **Pragmatic Approach:** *focuses primarily on creating the ideal environment and context for the person with hearing loss in dialogue, where they employ communication strategies to ensure that residual hearing is maximized to increase comprehension of the speaker.*
- **Repair Strategies:** *include a range of behaviors that help ensure understanding of communication, such as asking the person to clearly enunciate, to slow down or to increase the*

volume or of their speech (without shouting or exaggerating, as this can distort the shape of the mouth), repeating the last part of the phrase that was clearly understood, asking for confirmation, requesting that the speaking partner rephrase their message, ask the person to write out their message, etc…

- **Residual Hearing:** *the amount of hearing a person has that is usable. The ability to understand speech varies with the individual.*
- **Speechreading:** a *method of oral communication in which one uses communication strategies to aid in dialogue when some of the auditory information is missing due to hearing loss or a noisy environment. This method makes use of the visual clues of the speaker's lip and facial movements, gestures, posture, and body language, along with residual hearing to make use of the speaker's verbal communication, intonation and context to infer meaning (formerly known as lip reading).*
- **Synthetic Approach:** *a 'top-down' approach to speechreading, where the overall meaning of the message is the focus of interpreting ambiguous speech.*
- **Viseme:** *the distinguishable visual characteristics of speech sounds, classified by the place of articulation or shape of mouth.*

References

- Abrams, H.B., Hnath-Chisolm, T., Guerrieiro, S.M., Ritterman, S. (1992) "The effects of intervention Strategy on self-perception of hearing handicap." *Ear and Hearing*. Vol 13. pp 43-53.

- Abrahamson, J., Wayner, D. (1998). Group hearing aid orientation promotes patient satisfaction—Part 1. *ADA Feedback.* Vol 9:2. pp 7–9.

- Arnold, P. (1997) "The Structure and Optimization of Speechreading" *Journal of Deaf Studies and Deaf Education* 2:4 pg: 199,

- Backenroth, G.A., Ahlner, B.H. (2000). Quality of life of hearing-impaired persons who have participated in audiological rehabilitation counseling. *International Journal for the Advancement of Counseling.* Vol 22. pp 225-240.

- Bauman, N. Ph.D. (2000) *Speechreading (Lip-reading).* Viewed: September 8, 2012. Retrieved from: http://www.hearinglosshelp.com/articles/speechreading.htm

- Binnie, C. (1977) "Attitude Changes following Speechreading Training." *Scandinavian Audiology.* Vol 6. pp 13-19.

- Blamey, P.J., Alcantara, J.I. (1994) *Research in Auditory Therapy: Chapter 8.* Viewed: January 20, 2014. Retrieved: http://www.audrehab.org/jara/1994SI/Blamey%20Alcantara,%20%20JARA,%20%201994.pdf

- Bruhn, M.E. (1949) *Mueller-Walle method of lipreading (7th Ed).* Washington, DC. Volta Bureau.

- Bunger. A.M. (1952) *Speech reading – Jena method (2nd Rev.).* Danville, IL. Interstate Co.

- Crouch, B.A., Greenwald, B.H. (2007). "Hearing with the Eye: The Rise of Deaf Education in the United States". As cited in Van Cleve, J.V. (1993) *The Deaf History Reader* (Anthology). Washington, D.C.: Gallaudet University Press.

- Elleseff, T. MA CCC-SLP (2013) *Social Pragmatic Assessment : Guest Post.* Crazy Speech World. Viewed: February 27, 2013. Retrieved: http://crazyspeechworld.com/2013/04/social-pragmatic-assessment-guest-post.html

- Erber, N. P. (1988). *Communication therapy for hearing-impaired adults.* Abbotsford, Australia. Clavis Publishing. As cited in Arnold, P. (1997) "The Structure and Optimization of Speechreading" *Journal of Deaf Studies and Deaf Education* 2:4 pp 199- 211.

- Erber, N. P. (1996). *Communication therapy for adults with sensory loss (2nd ed.).* Clifton Hill, Australia. Clavis Publishing.

- Erber, N. P. (2002). *Hearing, vision, communication and older people.* Melbourne, Australia. Clavis Publishing.

- Gelfand, S.A. (2009) Essentials of Audiology. 3rd Edition. New York, NY. Thieme Medical Publishers Inc. pp. 466.

- Gesi, A.T., Massaro, D.W.,& Cohen, M.M. (1992). "Discovery and Expository Methods in Teaching Visual Consonants and Word Identification." *Journal of Speech and Hearing Research,* 35, pp 1180-1188

- Hanavan, P.C. Au.D. (2013) Speechreading Training: Chapter 10. Power Point Presentation. Augustana College. Viewed: December 2, 2013. Retrieved: http://faculty.augie.edu/~pchanavan/ar/AR_Chapter10.ppt.

- Hassanat, A.B.A. (2009) *Visual Speech Recognition*, Research Project, University of Buckingham, UK. Viewed: December 10, 2013. Retrieved from: http://www.ee.uwa.edu.au/~roberto/research/projectsbiblio/InTech-Visual_speech_recognition.pdf

- Hawkins, D. B. (2005). Effectiveness of counseling-based adult group aural rehabilitation programs: A systematic review of the evidence. *Journal of the American Academy of Audiology*, 16, pp: 485–493.

- Hull, R. H. (2007). 15 Principles of Consumer-Oriented Audiologic/Aural Rehabilitation. *The ASHA Leader.*Viewed: February 19, 2014. Retrieved: http://www.asha.org/Publications/leader/2007/070306/f070306a/
- Kaplan, H., Bally, S.J., Garretson, C. (1985) *Speechreading: A Way to Improve Understanding. 2nd Ed.* Washington, D.C., Gallaudet University Press.
- Kricos, P. B., Lesner, S. A. (1996) *Hearing care for the older adult: Audiologic rehabilitation.* Boston, MA. Butterworth-Heinemann. As cited in: Falkenberg, E.S. (2007) Holistic Aural Rehabilitation - a Challenge. *Scandinavian Journal of Disability Research.* Vol 9, No 2. pp 78-90.
- Larsby, B., Andersson, L., Hallgren, E., Lundblad, A., Nyman, P., Carlsson, P.-I. (2000). *Den vinstrika horapparaten* [The profitable hearing aid]. *AudioNytt* [Audio News] Vol 3. pp 15-21. As cited in: Falkenberg, E.S. (2007) Holistic Aural Rehabilitation - a Challenge. *Scandinavian Journal of Disability Research* Vol 9:2. pp 78-90.
- Lesner, S.A., Krikos, P.B. (1995) Audiologic rehabilitation: a holistic approach. In: Krikos PB, Lesner SA (eds). *Hearing Care for the Older Adult*. Boston, MA., Butterworth-Heinemann. pp 21-58.
- Lind, C. (2009) *Conversation Therapy: Interaction as Intervention.* Viewed: January 20, 2014. Retireved: http://www.phonakpro.com/content/dam/phonak/b2b/Events/conference_proceedings/chicago_2009/proceedings/18_P69344_Pho_Kapitel_9_S103_110.pdf
- Massaro, D.W.,& Klitzke, D. (1977). "Letters are Functional in Word Identification." *Memory and Cognition, 5,* pp 292-298.
- McCarthy,P., Schau, N. (2008) "Adult Audiologic Rehabilitation: A Review of Contemporary Practices" *Contemporary Issues in Communication Science and Disorders.* National Student Speech Language Hearing Association. Vol 35, pp 168–177.
- Miller, J.D., Watson, C.S., Kistler, D. J., Wightman, F.L., and Preminger, J.L. (2008) *Proceedings of Meetings on Acoustics*, Vol. 2, pp. 9 Viewed: December 17, 2013. Retrieved: http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=PMARCW000002000001050004000001&idtype=cvips
- Sweetow, R.W., Sabes, J.H. (2006) "The Need for and Development of an Adaptive Listening and Communication Enhancement (LACE TM) Program." *Journal of the American Academy of Audiology.* Vol: 17. pp 538–558
- Thibodeau, L., Alford, J. A. (2011). Group Audiologic Rehabilitation for Adults: Ten Reasons to Add This Service to Private Practice. *The ASHA Leader.* Viewed: December 11, 2013 Retrieved: http://www.asha.org/Publications/leader/2011/111122/Group-Audiologic-Rehabilitation-for-Adults.htm
- Thibodeau, L., Cokely, C. (2003). Maximizing auditory rehabilitation for clients, students, and faculty through an intensive training program. *Journal of the Academy of Rehabilitative Audiology.* Vol 36. p*p* 67-79.
- Thompson, L.A., Massaro, D.W. (1994). "Before you see it, you see its parts: Evidence for feature encoding and integration in preschool children and adults." *Cognitive Psychology.* 21*,* pp 334-362.
- Tye-Murray, N. (1998) *Foundations of Aural Rehabilitation*. San Diego, CA. Singular Publishing Group.
- Walden, B.E., Prosek, R.A., Montgomery, A.A., Scherr, C.K., Jones, C.J. (1977) "Erratum: Effects of Training on the Visual Recognition of Consonants." *Journal of Speech Language, and Hearing Research.* June 1977, Vol.20, pp 408-421.
- Woodhouse, L., Hickson, L., & Dodd, B. (2009). Review of visual speech perception by hearing and hearing-impaired people: clinical implications. International Journal of Language & Communication Disorders. May-Jun. Vol: 44(3) pp 253-70.
- Yoshinaga-Itano, C. (1988) Speechreading instruction for children. *Volta Review,* Vol. 90. pp 241-259. As cited by: Tye-Murray, N. (1998) *Foundations of Aural Rehabilitation*. San Diego, CA. Singular Publishing Group. pg 231.