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Effect of presentation modality on predictions of children's communication ability in the classroom

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Effect of Presentation Modality on Predictions of Children's Communication Ability in the Classroom

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(ABSTRACT)

The modified Goodman scale, a hearing loss classification scale, is commonly used to describe audiometric findings for both children and adults (Haggard & Primus, 1999). This scale uses one or two word descriptors for hearing level categories and is based on a pure tone average (PTA), the average of hearing thresholds at 500, 1000, and 2000 Hz. Although these categories were developed from clinical and educational observations (Goodman, 1965), degree of hearing loss has not been shown to reliably predict the educational or language performance of children with hearing impairment (Martin & Clark, 1996).

This study was designed to evaluate how the presentation modality (hearing loss simulation vs. using a term to describe the hearing loss using the Goodman scale) affects predictions of children's communication difficulties in the classroom by graduate speech-language pathology students. The perceptions of graduate speech-language pathology students were of interest because this population had not been included in earlier investigations, despite the fact that they often work with hearing-impaired children in the school systems. Three levels of hearing loss (mild, moderate, and severe) were introduced using two different presentation conditions. In one condition, a descriptive term from the Goodman scale was used to describe the hearing loss. In the other presentation conditions, a simulated hearing loss was presented to the participants. Following each presentation of each hearing loss, the participants rated the potential communication difficulty a child with that loss may have in the classroom using a questionnaire composed of nine different communication-related tasks (Appendix A). In general, participants predicted significantly greater difficulty when presented with the simulated hearing loss, than when presented with the descriptive term for the same degree of hearing loss with a few exceptions. The results of this study indicated that the standard method of classifying hearing loss results in underestimation of the impact a hearing loss might have for a child.

Introduction

The modified Goodman scale, a hearing loss classification scale, is commonly used to describe audiometric findings for both children and adults (Haggard & Primus, 1999). This scale uses one or two word descriptors for hearing level categories and is based on a pure tone average (PTA), the average of hearing thresholds at 500, 1000, and 2000 Hz. Although these categories were developed from clinical and educational observations (Goodman, 1965), degree of hearing loss has not been shown to reliably predict the educational or language performance of children with hearing impairment (Martin & Clark, 1996).

Academics and Hearing Loss

Among hearing impaired children, a language deficit secondary to hearing loss often results in poor academic achievement. Although many factors contribute to academic problems, hearing loss is the primary influence in this population, and hearing loss and academic performance are inversely related. Children with hearing loss may demonstrate poorer than average performance in subjects that are language-based and those that require the ability to learn new information through reading (Martin & Clark, 1996). Bess (1998) recruited children from grades 3, 6, and 9 with a minimal sensorineural hearing loss (MSNHL) and assessed the relationship of MSNHL to educational performance. Minimal sensorineural hearing loss (MSNHL) was defined for three distinct groups of children which were as follows: unilateral SNHL with a pure tone average of 20 dB HL or greater in the impaired ear; bilateral SNHL with a pure tone average of 20 – 40 dB HL in both ears; and a high frequency SNHL with a pure tone average greater than 25 dB HL at two or more frequencies above 2000 Hz in one or both ears. The study revealed children with MSNHL performed more poorly on a comprehensive test of basic skills and displayed significantly more problems on all subtests of the Screening Instrumentation For Targeting Educational Risk (SIFTER) than their normal hearing schoolmates.

Oyler, Oyler, and Matkin (1988) examined the demographic distribution of unilateral hearing loss in a large school district and at the academic performance of these children. The misconception that a unilateral hearing loss would not affect a child’s academic performance was addressed. The results from this study showed that a child with a unilateral hearing loss is at a much greater risk for academic failure than his/her normal hearing counterpart. The failure rate among unilateral hearing impaired their subjects was 23.7%, approximately 10 times higher than for the general population. Another study reported that 37% of children with MSNHL repeated at least one grade compared to a district norm rate of only 3% (Bess, 1999).

The prevalence of MSNHL in the school system is 5.4%, or 2.5 million children (Bess and Tharpel, 1988). The prevalence increases to 11.3% when you include all types and degrees of hearing loss in school-aged children.

Other investigations have demonstrated that poor classroom acoustics can also compromise the perceptual abilities of children with minimal or unilateral degrees of SNHL (Bess, 1985, Crandell, 1993, Crandell Smaldino, 1995). Crandell (1993) examined the speech perception of children with minimal degrees of SNHL at commonly reported classroom signal to noiserations (SNR) of (-6, -3, 0, +3, +6). Children with MSNHL exhibited pure tone averages (0.5 kHZ to 2kHz) from 15 to 25 dB HL. In a quiet listening situation, all the subjects achieved recognition scores of 90% or better. The investigation revealed that children with MSNHL had significantly poorer recognition scores than the normal hearing children at all SNRs except +6. The hearing impaired children exhibited marked variability in performance, evident by a large standard deviation. Trends from these results are similar to those reported in children with greater degrees of hearing loss.

As demonstrated by several investigations, the term “minimal” hearing loss is a gross underestimation of the academic problems children with this loss may experience. Minimal, to the general public, implies that no serious problems exist as a result of the loss, and this is not true when referring to the impact a hearing loss may have on the academic performance of children with even a minimal hearing loss (Bess, 1999).

<u>Others’ Perception of Hearing Loss</u>

The terminology used to identify a hearing loss is often misinterpreted and may mean different things to different people. Konkle (1995) conducted an informal survey of 25 audiologists and asked them, “What do you mean by a mild hearing loss compared to a moderate or severe problem?” Surprisingly, not one of the 25 audiologist referred to a hearing handicap scale or “hearing levels for speech” in their explanation. Instead most of the audiologists noted ranges of hearing levels into which pure tone thresholds must fall in order for the hearing loss to be classified as mild, moderate, severe, or profound. Also, the ranges of hearing loss varied among the audiologists to the extent that it was possible for the same hearing loss to be classified differently depending upon the specific audiologist making the classification. The results of this study indicated that audiologists were able to identify degrees of hearing loss, although there was some variability in their descriptions. However, as stated previously, none of the audiologists described the potential implications of a mild, moderate or severe hearing loss on a child's language and educational development. Since audiologists are trained professionals in the field of hearing disorders, one would expect that they should be aware of these implications. The results of Konkle's (1995) study did not support this expectation. Furthermore, if the audiologists surveyed did not include this information in their response when surveyed, one would expect that the lay person would be less likely to do so. Even though the descriptive classification terminology may be convenient, it results in an oversimplification of the potential academic and listening difficulties these children may face. This confusion may be averted by specifying expected difficulties of the hearing loss in the audiology reports that are sent to the parents, teachers, and others involved with the child (Konkle, 1995).

Haggard and Primus (1999) investigated parent impressions regarding commonly used terms (from the modified Goodman scale) and percentage values to classify hearing loss in children. Parents were given descriptive terms for the hearing loss (slight, mild, and moderate) and were also placed in a sound treated booth were they listened to a simulated hearing loss, without the descriptive term. The results revealed that the perceptions of the loss, and therefore, the rehabilitative implications were more conservative when the parents were given the terms and percentage values, than under the simulated hearing loss condition. Parents also estimated the degree of simulated hearing loss with percentage values. The parents estimated approximately 40% greater hearing loss for the three levels of simulated loss than estimated by the conventional American Academy of Otolaryngology-American Council of Otolaryngogloy (1979) percentage formula.

In addition to the perceptions of parents, teachers' perceptions of and knowledge of hearing loss were also examined. Public Law 94-142 describes the provision of a least restrictive learning environment. With the large number of hearing impaired children placed in regular classrooms in the schools, it is the responsibility of the classroom teacher to assess, counsel, and educate these children. Therefore, classroom teachers are an important link in the mainstream. Lass, Tecca, and Woodford (1987) conducted a survey of teachers' knowledge of and attitudes towards hearing aids. A questionnaire was distributed to classroom teachers employed by county school systems in West Virginia, who were enrolled in on- and off-campus classes in the division of Education of the College of Human

Resources and Education at West Virginia University. The investigation revealed that the majority of respondents (80.5%) had never had a course that covered the topic of hearing aids and almost half of the respondents (49.9%) did not know that the medical professional who tests hearing and makes recommendations regarding the use of hearing aids is called an *audiologist*. Nearly one-fifth of the respondents (19.5%) indicated that they feel uncomfortable when talking to people who wear hearing aids. The survey suggested that continuing education programs may provide the teachers with a heightened awareness and understanding of hearing aids and their wearers; there by leading to an increase in the effectiveness and efficiency of the teachers' educational service to hearing impaired children (Lass, Tecca, & Woodford, 1987). This was proposed as a step forward in facilitation of the communication and academic progress of children with hearing loss. The perception and beliefs of speech-language pathology graduate students are also of interest because this population has not been included in earlier investigations despite the fact that they often work with hearing-impaired children in the school systems.

<u>Present Study</u>

Despite the fact that the classification of hearing loss has been used for many years, the terms are only loosely tied to the impact on the child's listening ability in a classroom. In addition, there is no data concerning the knowledge of students of speech-language pathology regarding these terms or the impact of hearing loss on their future patients. This study was designed to evaluate how the presentation modality (hearing loss simulation vs. description of the hearing loss using the Goodman scale) affects predictions of children's communication difficulties in the classroom by graduate speech-language pathology students. The findings may have implications for future graduate training of speech-language pathologists in the form of additional course work or workshops. Specifically, this study was designed to answer the following questions:

1. Does perception of a hearing loss differ depending on how it is presented, if so,
2. What is the difference in that perception?
3. Does the predicted difficulty in a certain presentation condition differ by the degree of hearing loss?

Method

Participants

Forty-six second semester graduate speech-language pathology students participated in this study: one male and 44 females (mean age = 23 years) and one female subject aged 56 years. All subjects were native speakers of English to control for comprehension of the terminology used in the study. The participants also had no previous significant knowledge or exposure to hearing loss. All participants passed a pure tone hearing screening at 500, 1000, 2000 and 4000 Hz at 20dB HL in each ear (American National Standards Institute, 1996; American Speech-Language-Hearing Association, 1985). Each subject was examined and completed the questionnaires in one session of approximately thirty minutes.

Instrumentation

A diagnostic audiometer (GSI 61) was used to perform the standard hearing screening for all potential subjects. Only the subjects who passed this screening participated in the study. An audio tape, *Sound Hearing Or…Hearing What You Miss*, was used to simulate mild, moderate, and severe hearing losses (Scott, 1989). The signal level was presented at 50dB HL and was routed through the output of the Sony Stereo cassette deck player (Sony Dolby, B-C NR) to the audiometer. Testing was performed under sound field conditions in a conventional audiometric sound treated booth.

A biologic calibration of all equipment was performed prior to testing each participant. The tape circuits were calibrated daily for signal intensity using a 1000Hz tone. Tape heads on both cassette recorders were cleaned following the 20th subject.

Following each presentation of hearing loss term or simulation, a questionnaire composed of nine different communication-related tasks (Appendix A) was used to measure the participant's perception of the difficulty a child with this loss would experience. This questionnaire constituted a portion of the larger questionnaire used by Haggard and Primus (1999). The nine communication-related tasks were as follows: 1) Speaking clearly to others, 2) Learning names of objects, 3) Learning to read, 4) Playing on a team sport, 5) Understanding friends or teachers in noisy environments, 6) Hearing on the telephone, 7) Understanding quiet speech, 8) Hearing a fire alarm, and 9) Playing a musical instrument. These nine tasks span a wide range of activities and situations, and at the same time are very typical of the environment of a school-aged child. Tasks 1-3 and 9 deal with having sufficient hearing to be able to correctly learn proper articulation of phonemes, being able to associate meaning to words and being able to incorporate visual stimulus (letters) to phonemic sounds. Tasks 5-7 deal with the ability to hear and understand what is being said in less than optimal listening conditions, such as in the presence of back ground noise or on the telephone were the listener has no visual input. Tasks 4 and 8 deal with sound localization and being aware of environmental sounds. For each task, the participants used a seven point scale (ranging from 1 "not difficult" to 7 "very difficult") to rate the potential difficulty a child with a particular loss would have in the classroom.

<u>Procedure 1: Simulation</u>

Participants were seated facing forward in a sound treated booth. Loudspeakers were at ear level, approximately 1.2 meters from the subject, at a 45˚ azimuth to the right ear. Each subject listened to the three degrees of simulated hearing loss (mild, moderate, severe). The order of presentation for the three degrees of hearing loss were counterbalanced across the participants.

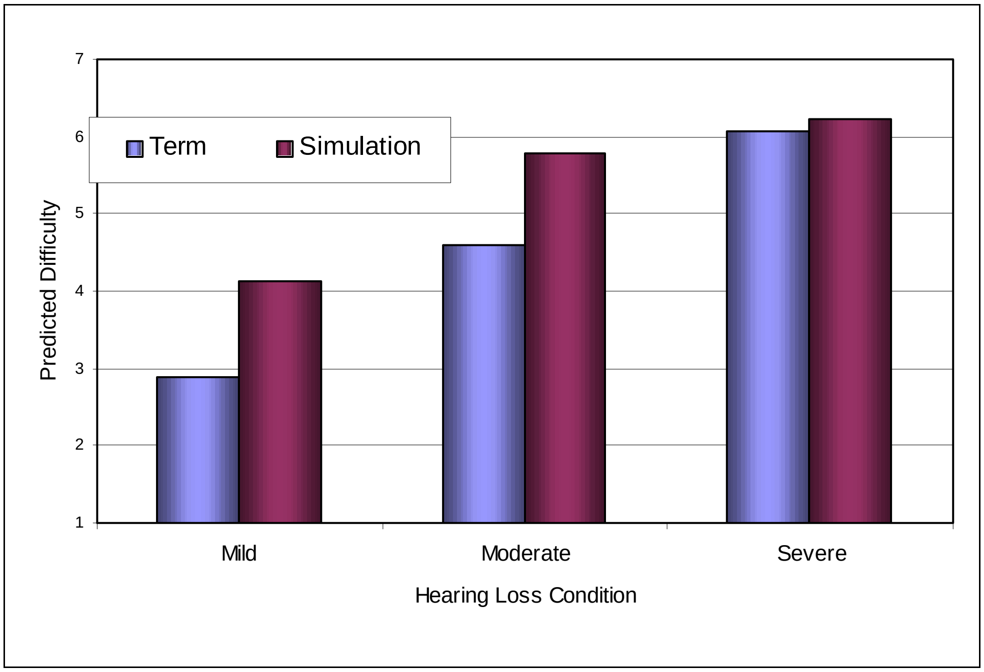
Following the presentation of each simulated hearing loss, the participant completed the questionnaire consisting of the nine communication related tasks (see Appendix A). They were asked to predict the communication difficulties a child with each loss may experience in a classroom, on a scale from 1 to 7 for each of the nine communication-related tasks for each of the three simulated hearing losses.

<u>Procedure 2: Term</u>

Procedure 2 was presented as a task independent from that performed in Procedure 1. The participants were asked to imagine that they had a child in their classroom who had been diagnosed with each of the three degrees of hearing loss (mild, moderate, and severe). The order of presentation of the three terms were counterbalanced across subjects, and no participant was addressed the terms in the same order that they heard the corresponding simulated hearing losses in Procedure 1. Participants completed the questionnaire (Appendix A) following the presentation of each term. Procedures 1 and 2 were counterbalanced (25 terminology presentation first, and 21 simulation presentation first) across the subjects.

Results

Each participant rated the potential difficulty a child with a particular hearing loss would experience following presentation of the terms and simulations for the mild, moderate, and severe hearing loss conditions. The participants rated potential difficulty on nine communication-related tasks using a seven point scale, with 7 indicating very difficult and 1 indicating not difficult. Figure 1 depicts the average degree of difficulty predicted by the participants for each hearing loss condition in the two presentation conditions (term and simulation).



<u>Figure 1</u>. Predicted difficulty for the two presentation conditions (term and simulation) across each hearing loss conditions.

Predicted difficulty increased with degree of hearing loss for both presentation conditions. For each hearing loss condition, participants predicted greater difficulty when presented with the simulation than when presented with the term. However, the difference in predicted difficulty between the two presentations narrowed as the degree of hearing loss increased. This may have been the result of a ceiling effect as the rating scale for each communication task was limited to the range of 1-7. This pattern was similar for each of the nine communication tasks, with some differences in the severe hearing loss condition. Figures 2a-2i depict the predicted difficulty for each presentation condition and each task across the three hearing loss conditions.

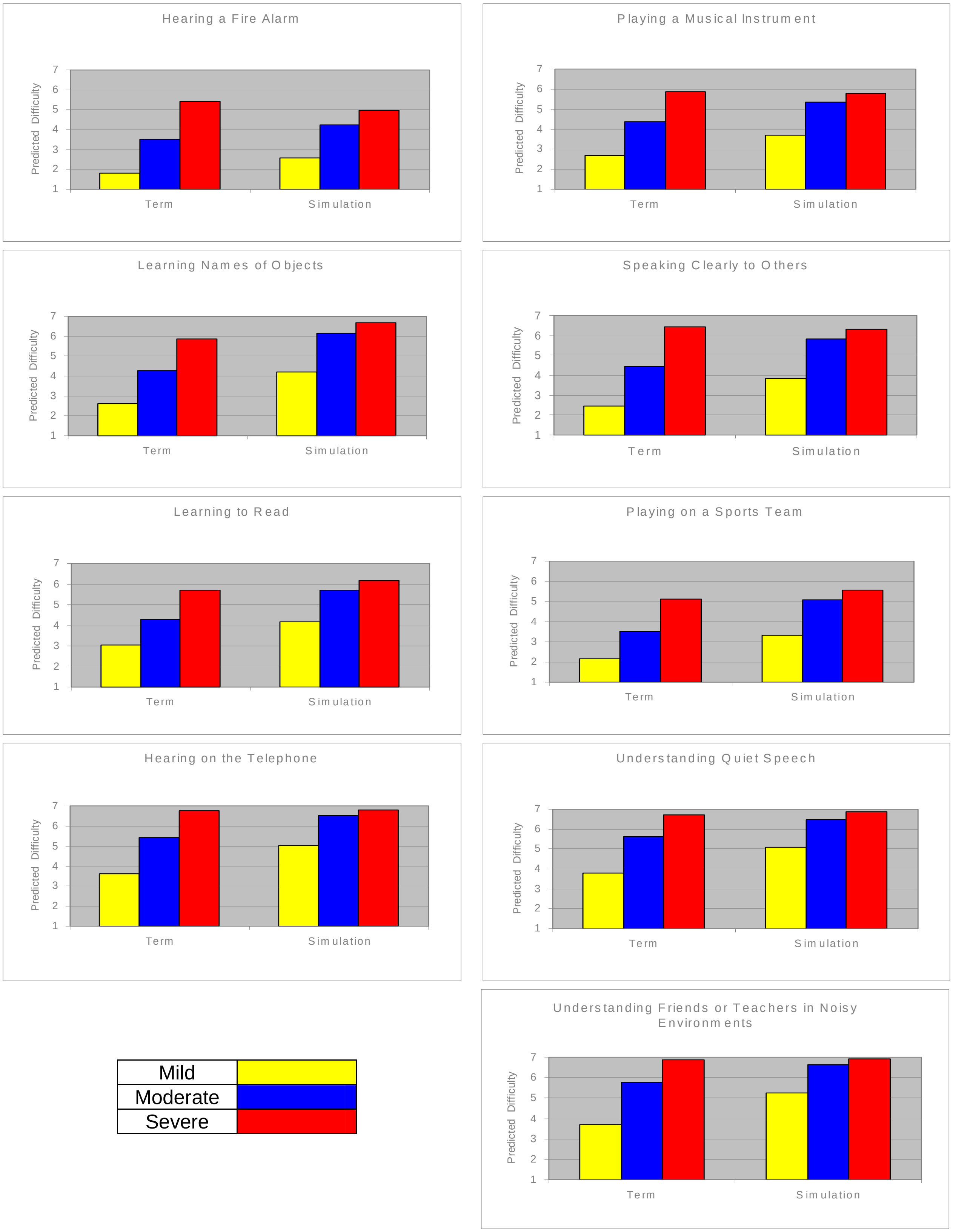


Figure 2. Predicted communication difficulty for each of the nine communication tasks for each hearing loss condition and presentation condition.

For all nine communication tasks, in the mild and moderate hearing loss conditions, the simulation condition was consistently judged as more difficult than the term condition. For the severe hearing loss condition, communication task 2 (learning names of objects), 3 (learning to read), 4 (playing a team sport), 5 (understanding friends or teachers in noisy environments), 6 (hearing on the telephone), and 7 (understanding quiet speech) were judged as being more difficult in the simulation versus the term condition. A reversal of this pattern of predicted difficulty between the two presentation conditions was revealed for communication task 1 (speaking clearly to others), 8 (hearing a fire alarm), and 9(playing a musical instrument) in the severe hearing loss condition.

A three-way repeated measures Analysis of Variance (ANOVA) revealed significant differences in predicted difficulty among three hearing loss conditions (mild, moderate, severe) [$F(2,90)=268.91$; $p<0.000$], between the two presentation conditions (simulation vs. term) [$F(1,45)=61.18$; $p<0.000$], and among the nine communication tasks [$F(8,360)=55.35$; $p<0.000$]. For the interactions among the three variables, the three-way repeated measures ANOVA revealed significant interactions, presentation condition and hearing loss condition [$F(2,90)=21.036$; $p<0.000$], communication task and hearing loss condition [$F(16,720)=6.265$; $p<0.000$], and between communication task and presentation condition [$F(8,360)=9.767$; $p<0.000$]. The ANOVA also revealed a significant interaction for all three variables [$F(16,720)=2.676$; $p<0.000$].

An ANOVA with one between-subject factor (order) and three within-subject factors (hearing loss condition, presentation condition, and communication task) was performed. The ANOVA revealed that presentation order did not affect the participants' responses for any of the nine communication tasks ($p > .05$).

Tukey post hoc analyses revealed that the participants predicted significantly greater difficulty for the severe hearing loss condition ($p < 0.0001$) than for the moderate and mild hearing loss conditions ($p < 0.0001$), collapsed across presentation condition. Also, the predictions for the mild and moderate loss were significantly different from each other ($p < .0001$), collapsed across presentation condition.

Predicted difficulties for the two presentation conditions (terminology and simulation) are shown in Figure 3, collapsed across hearing loss. A Tukey post-hoc analysis revealed participants predicted significantly greater difficulty in the simulated condition, than in the term condition.

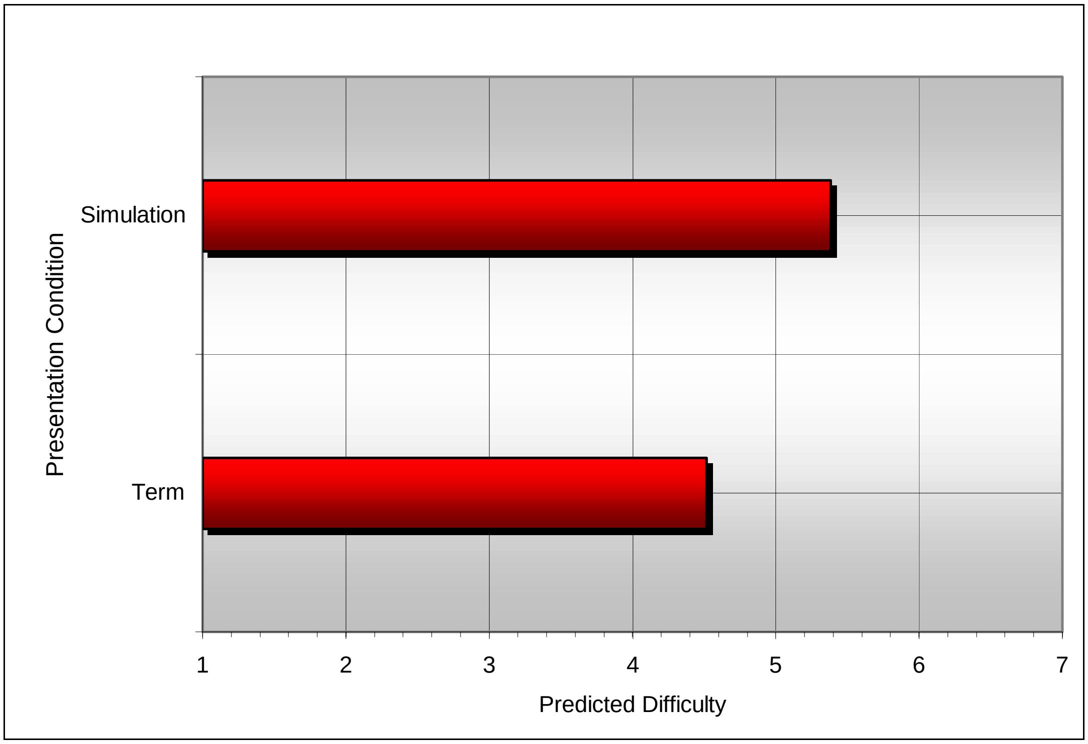
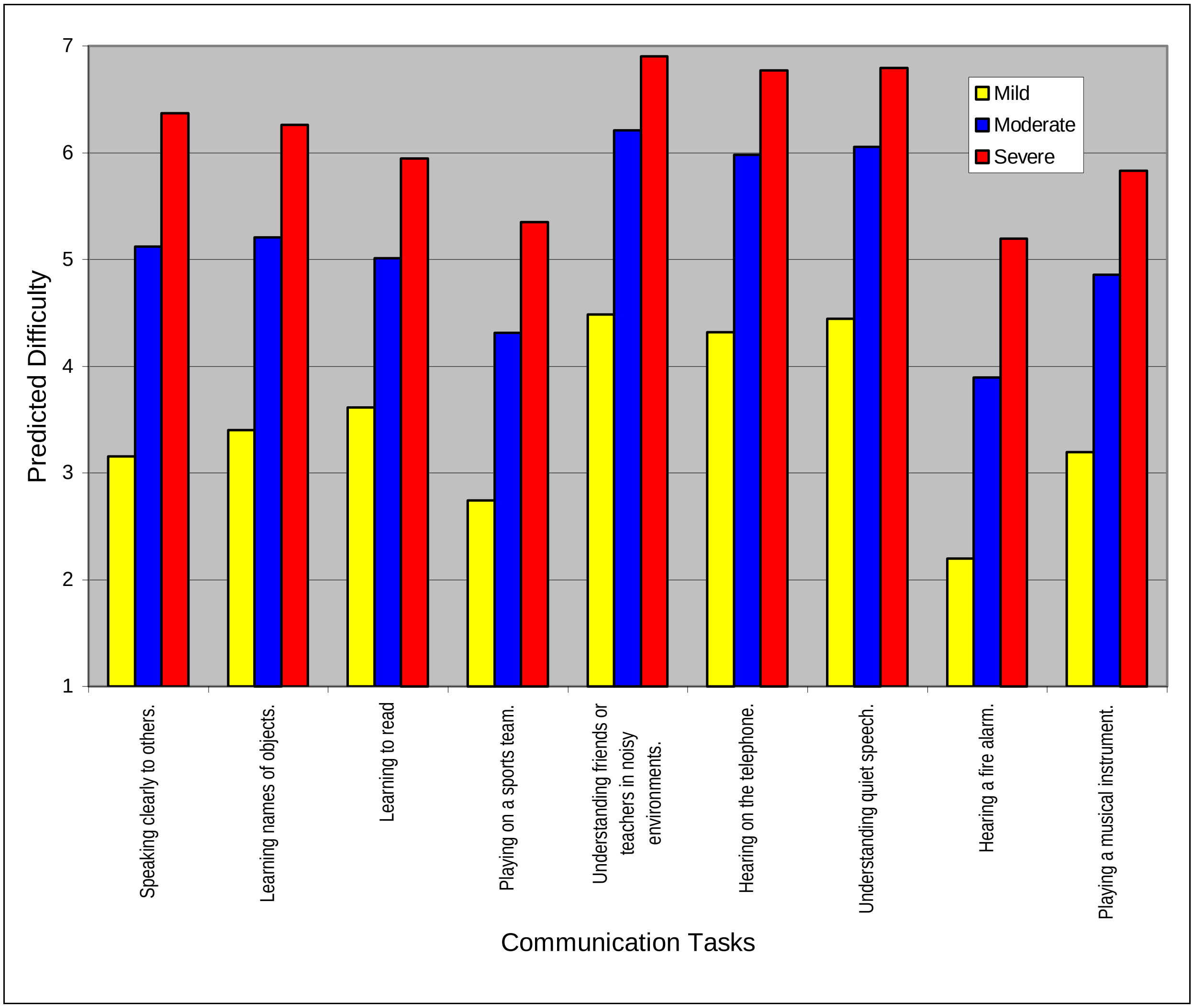


Figure 3. Average predicted communication difficulty for each presentation condition

Tukey post-hoc analysis revealed that among the nine communication tasks, predictions fell naturally into three categories, language learning topics, environmental awareness, and speech perception. As alluded to in the introduction, task numbers 1, 2, 3 and 9 dealt with language learning topics, tasks 4 and 8 dealt with environmental awareness, and tasks 5, 6, and 7 focused on speech perception ($p<0.05$), and this categorization was confirmed by a Tukey post hoc analysis. Ratings for these three communication tasks groups were significantly different from each other, but within each group, ratings did not differ significantly ($p>0.05$).

Although the ANOVA revealed a significant interaction between hearing loss condition and communication task, Tukey post hoc analysis used to explore this interaction revealed that the pattern of responses was similar for each hearing loss condition (Figure 4). All nine communication tasks were rated significantly higher in predicted difficulty level in the severe hearing loss condition than in the mild or moderate hearing loss condition (p<0.0001). Predicted difficulty ratings in the mild and moderate condition were also significantly different (p<0.0001).



<u>Figure 4.</u> Predicted difficulty level for the nine communication tasks, across hearing loss conditions.

Although the interaction between presentation condition task was significant, Tukey post hoc analyses showed that the predicted difficulty was significantly higher for the simulation condition than for the term condition (p<0.0001), for all nine of the tasks.

Tukey post hoc analyses of the significant interaction between the hearing loss conditions and the two presentation conditions (term and simulation) revealed that there was not a significant difference in predicted difficulty between the two presentation conditions for the severe hearing loss condition ($p>0.05$). However, there was a significant difference in predicted difficulty between the two presentation conditions, for the mild and moderate hearing loss conditions.

Finally, Tukey post hoc analyses revealed that all nine communication tasks in the mild and moderate hearing loss conditions were rated as significantly more difficult in the simulated than the term condition ($p<0.05$). For the severe hearing loss condition, only communication task 2 was rated significant higher in the simulated condition ($p<0.05$) and communication tasks 1, 8, and 9 were rated higher in the term condition than the simulated condition($p< 0.05$).

Discussion

The purpose of this investigation was to examine if perception of hearing loss by graduate speech-language pathology students differs depending on how it is presented. The perceptions of graduate speech-language pathology students were of interest because this population had not been included in earlier investigations, despite the fact that they often work with hearing-impaired children in the school systems. Interest in this investigation arose from past experiences of listening to the misconceptions of parents and various educators regarding the ramifications of a hearing loss. The investigation was initiated following a literature review that confirmed that erroneous belief regarding the impact that hearing, more specifically hearing loss, has on language acquisition and academic excellence.

Three levels of hearing loss (mild, moderate, and severe) were introduced using two different presentation conditions. In one condition, a descriptive term from the Goodman scale was used to describe the hearing loss. In the other presentation conditions, a simulated hearing loss was presented to the participants. Following each presentation of each hearing loss, the participants rated the potential communication difficulty a child with that loss may have in the classroom using a seven-point scale. The participants rated potential difficulty for communication related tasks that were grouped into three main categories: language learning topics, environmental awareness, and speech perception.

In general, participants predicted significantly greater difficulty when presented with the simulated hearing loss, than when presented with the descriptive term for the same degree of hearing loss with a few exceptions. These findings mirror the results obtained by Haggard and Primus (1999), who studied parents' perception of a child's hearing loss across the same nine communications related tasks. In the present study, however, some deviation from that trend was found for the severe hearing loss condition. For that condition, only "learning names of objects" was rated significantly higher for the simulation condition than the term condition. Although participants predicted greater difficulty in the simulated condition for five other communication tasks (learning to read, playing a team sport, understanding friends or teachers in noisy environments, hearing on the telephone, and understanding quiet speech), the difference between the predictions in the two presentation conditions was not significant. The questionnaire scale used in this investigation may have limited the range of difficult the participants had to select from. For the three remaining communication tasks, in the severe hearing loss condition, predicted difficulty for the term condition were higher than for the simulation condition. These three tasks involved hearing a fire alarm, playing a musical instrument, and speaking clearly to others. It is debatable whether or not hearing loss impacts these tasks. A comment from one participant stated that Beethoven, despite his deafness, composed and played the piano. Another possible explanation is related to the rating scale itself. There was no available rating above 7 and no open commentary section. Participants' verbal comments to the experimenter throughout the study revealed their surprise upon learning which simulated hearing loss matched which term. Between the two presentation conditions, greater variability appeared among the mild and moderate hearing loss conditions, than for the severe hearing loss condition, possibly because the word "severe" conveyed more serious consequences or because the rating scale limited responses.

The results of this investigation indicated that the standard method of classifying hearing loss results in underestimation of the impact a hearing loss might have for a child. Language delays, grade retention and socio-economic issues are all impacted.

In earlier studies of social and emotional development, children with moderate to profound hearing losses have been shown to demonstrate a number of problems (Bess & McConnell, 1981, Raymond & Matson, 1989). Even children with unilateral hearing losses experience social, emotional, and behavior problems in school (Bess & Tharpe, 1984). These findings all allude to the fact that even the mildest forms of permanent hearing losses can be associated with poorer functional health status.

Hearing impaired children are not only predisposed to poorer social and emotional health, but are also at a greater risk for grade retention. The high retention rate for children with MSNHL imposes a financial burden on the education system. Of the roughly 46 million school-age children in the United Stated (United States Department of Education, 2000), 2,484,000 (5.4%) will have a MSNHL. Of these, 919,080 (37%) are projected to fail at least one grade. Assuming it takes approximately an average of $6000 (United States Department of Education, 2000) to educate a child for one year, the total expense for grade repetition surpasses 5.5 billion dollars.

The findings in this investigation clearly demonstrate the discrepancy between the initial impression of a hearing loss based on its definition and the difficulties that the child experiences. The use of a simple term does not begin to explain how the loss will impact a life-socially, academically, and emotionally. As an audiologist, the primary goal is not only to identify a hearing loss, but to follow the rehabilitation of that hearing loss and to make sure the proper steps are taken to insure a total communication environment for the child is in place. This includes the promotion of speech and language development, as well as social understanding of hearing loss by classmates, educators, and parents.

Simulation of hearing loss represents one way to extend the counseling process to enable the Speech-Language Pathologist and other teachers of the hearing impaired to understand the child’s loss better. This proved to be a very direct and effective counseling method for the graduate students who participated in this study.

Another issue and great area in need of improvement is the background noise levels in typical classrooms. Although many factors influence the determination of appropriate acoustical conditions in a room, prior literature suggests that SNRs in communication environments for listeners with SNHL should equal or exceed +15. These recommendations are based on the data that the speech perception of listeners with hearing impairment tend to remain relatively constant at SNRs in excess of +15 dB, but deteriorate at poorer SNRs. It has also been shown that when these acoustical criteria are not met, persons with hearing loss have to expend much more effort to attend to the acoustical message and often prefer to communicate through other modalities (Crandell & Smaldino, 1996).

There are children in every classroom, especially in the early elementary grades, who cannot hear or understand the spoken message properly. This has a very significant impact on learning and attention, especially learning to read and articulate properly. Classroom noise and reverberation compound the problem. We need creative, inventive solutions, including amplification (FM systems), and classroom acoustics that are more conducive to better listening conditions. These solutions will come at some additional cost, both time and money, but the benefits will exceed the cost.

Finally, these results should not been seen as a reflection of a specific SLP program, but as generalizations to the population of SLP students nationwide. The masters program in SLP at the University of South Florida includes a course requirement to listen to simulated hearing losses. This serves to help the students appreciate what different degrees of hearing loss resemble and help them to understand what it would be like to miss a portion of or all of a speech signal. It would also be interesting to see how audiology students rate the communication tasks in the two presentation conditions. A better understanding of hearing loss and its impact on communication, will not only serve to strengthen graduate programs, but help deliver a higher level of service to children with all degrees of hearing loss and educate many other professionals, who also deal hearing impaired children.

References

American Academy of Otolaryngology-American Council of Otolaryngology. (1979). Guide for the evaluation of hearing handicap. *Journal of the American Medical Association*, 241(19), 2055-2059.

American National Standards Institute. (1996). *American national standard specification for audiometers* (ANSI S3.6-1996). New York: Author.

American Speech-Language-Hearing Association. (1985). Guidelines for identification audiometry. *Asha*, *27*(5), 49-52.

Bess, F. H. (1999). School-aged children with minimal sensorineural hearing loss. *The Hearing Journal*, *52* (5), 10-16.

Bess, F. H. & Tharpe A.M. (1988). Performance and management of children with unilateral sensorineural hearing loss. *Scandinavian Audiology*, 75-79.

Bess, F. & Tharpe, A. (1986). An introduction to unilateral sensorineural hearing loss in children. *Ear and Hearing*, 7, 3-13.

Bess, F. (1985). The minimally hearing-impaired child. *Ear and Hearing*, 6, 43-47.

Bess, F. & McConnell, F. (1981). *Audiology, education and the hearing-impaired child.* St. Louis, MO: C.V. Mosby.

Crandell, C. & Smaldino, J. (1996). Sound field amplification in the classroom: Applied and theoretical issues. In F. Bess, J. Gravel, & A. Tharpe (Eds.), *Amplification for children with auditory deficits* (pp. 229-250). Nashville, TN: Bill Wilkerson Center Press.

Crandell, C. & Smaldino, J. (1995). An update of classroom acoustics for children with hearing impairment. *Volta Review*, 1, 4-12.

Crandell, C.C. (1993). Speech recognition in noise by children with minimal degrees of sensorineural hearing loss. *Ear and Hearing*, *14* (3), 210-216.

DeBeer, H. (1995). *Ahoy there, little polar bear*. New York: North-South Books.

Goodman, A.C. (1965). Reference zero levels for pure-tone audiometers. *Asha*, *7*, 262-263.

Haggard, R.S. & Primus, M.A. (1999). Parental perceptions of hearing loss classification in children. *American Journal of Audiology*, *8*, 83-92.

Konkle, K.D. (1995, April). Classifying terms, degrees of hearing sensitivity. *Hearing Instruments*, *11*.

Lass, N. Tecca, J., & Woodford, C. (1987). Teachers' knowledge of, exposure to, and attitudes towards hearing aids and hearing aid wearers. *Language, Speech, and Hearing Services in Schools*, *18*, 86-95.

Martin, F. & Clark, J. (1996). *Hearing care for children*. Boston, MA: Allyn and Bacon.

Oyler, R., Oyler, A., & Matkin, N. (1988). Unilateral hearing loss: demographics and educational impact. *Language, Speech, and Hearing Services in Schools*, *19*, 201-210.

Appendix A Subject# ______

Condition: Stimulated / Term Degree: MLD MOD SVR

<u>Questionnaire</u>

Directions: With special attention to the hearing loss just simulated, rate how difficult you feel the following situation would be for your client/patient if he/she had this hearing loss. The higher the number on each scale, the greater the difficulty indicated.

I. Speaking Clearly to Others

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

II. Learning Names of Objects

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

III. Learning to Read

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

IV. Playing on a Sports Team

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

V. Understanding Friends or Teachers in Noisy Environments

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

VI. Hearing on the Telephone

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

VII. Understanding Quiet Speech

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

VIII. Hearing a Fire Alarm

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult

IX. Playing a Musical Instrument

7	6	5	4	3	2	1
Very Difficult			Moderately difficult			Not difficult