Language and Literacy

Albertini, J.A. (2002). Learning to write if you are deaf: The interaction of language, modality, and instruction [Wie Gehörlose schreiben lernen: Die Interaktion von Sprache, Modalität, and Unterricht]. ***Hörgeschädigten Pädagogik*****, 56, 7449. [AN 1758]**

This review of research on the teaching of writing takes account of the fact that learning a language often occurs in parallel with learning the functions and conventions of writing. Based on the premise that writing, like language, is best learned through social interaction, it is argued that teachers promote interaction through the choice of language, modality, and method of instruction. Research indicates a relationship between proficiency in a sign language and writing skill. It indicates that many older, bilingual students prefer to compose in English; and, finally, research indicates that both language structure and text structure may be taught by means of functional, informal writing.

Implications
Research on students' knowledge of sign language and students' writing skill supports the use of sign language as a means of instruction and as a base for teaching literacy. It supports the use of some means of representing spoken English as a bridge to written English; and it supports using informal writing to teach language and writing. In other words, informal writing may be introduced to students as a means of communication and as a tool for learning.

Albertini, J., & Schley, S. (2003). Writing: Characteristics, instruction, and assessment. In M. Marschark & P. Spencer (Eds.), ***Handbook of deaf studies, language and education*** **(pp. 123-135). New York: Oxford University Press. [AN 1757]**

This review of recent research on the learning and teaching of writing to deaf and hard-of-hearing students finds similarities between deaf students and hearing students learning English as a second language. It also notes the positive effect on deaf students' writing of early exposure to American Sign Language. The teaching of writing to deaf students reflects a shift in approach in mainstream education in English speaking countries. Improvements in overall quality of writing and sentence complexity are linked to process writing approaches; yet while the use of rubrics help students improve on traits related to content and organization, they do not affect grammar, vocabulary, and mechanics. Research examining how sign language might be used to mediate writing and what methods of assessment are the most valid and reliable are also reviewed.

Implications
The persistence of sentence-level grammatical and semantic anomalies in the writing of many deaf adolescents and adults often masks the writers' strengths in content and organization. Assignments that allow choice of topic and experimentation in a variety of genres may improve the quality of writing. Approaches that take advantage of the reciprocal relationship between reading and writing and the use of writing as a tool for learning content are

promising and indicate a view of writing curricula that goes beyond teaching correct lexical and grammatical expression. Examination of the three most widely used types of writing test used today indicates that direct assessments (essay and portfolio) are better predictors of competency than indirect assessment (multiple-choice tests) for older deaf students.

Baillargeon, M., McLeod, A., Metz, D.E., Schiavetti, N., & Whitehead, R. (2002). Preservation of second formant transitions during simultaneous communication: A locus equation perspective. *Journal of Communication Disorders,* 35, 51-62. [AN 1831]

The study investigated the preservation of second formant transition acoustic cues to intelligibility of speech produced during simultaneous communication from a locus equation perspective. Experienced sign language users were recorded under conditions of simultaneous communication and speech alone, speaking a set of sentences containing monosyllabic words designed for measurement of second formant frequencies in consonant-vowel-consonant (CVC) syllables. Linear regression fits made to coordinates representing second formant transition onset and offset frequencies following stop consonant release of CVC syllables (locus equations) were used to examine place of articulation cues in both simultaneous communication and speech alone conditions. Although results indicated longer sentence durations for simultaneous communication than speech alone, locus equation slopes and intercepts obtained from speech produced during simultaneous communication were virtually identical to those obtained during speech alone, indicated no degradation of stop consonant acoustic cues during simultaneous communication.

Implications
These results indicate that place of articulation clues are maintained in simultaneous communication, despite the overall slowing of speaking rate, and that this should keep speech intelligibility from deteriorating while using simultaneous communication. Thus, teachers, parents, and siblings who use simultaneous communication with hearing-impaired children are providing an accurate speech model that does not negatively impact on speech perception or the learning of appropriate timing rules of spoken English.

Berent, G.P. (2004). Sign language-spoken language bilingualism: Code-mixing and mode-mixing by ASL-English bilinguals. In T.K. Bhatia & W.C. Ritchie (Eds.), *The handbook of bilingualism* (pp. 312-335). Malden, MA: Blackwell Publishing. [AN 1761]

Deaf and hearing individuals often communicate using aspects of both the sign language and the spoken language of their community. Given such mixing, communication may occur, for example, through "contact signing" or through simultaneous communication. At other times, users of American Sign Language (ASL) may switch to English-based signing or incorporate aspects of English into their ASL sentences. This chapter explores the combining of ASL and English as natural instances of code-mixing like the kind of code-mixing that occurs in all bilingual communication. Because sign languages are expressed through the visual-spatial modality and spoken languages through the auditory-vocal modality, sign language/spoken language bilingualism offers an additional layer of code-mixing options—specifically, the options of switching modalities or employing the two modalities simultaneously. This chapter

maintains that the products of ASL-English contact are governed by the same kinds of universal linguistic principles that govern the options available to spoken languages in bilingual settings.

Implications
This chapter discusses the products of ASL-English contact in the broader context of bilingual studies and refutes the claim that "contact signing" is an independent, or "third," system with features that are distinct from ASL and from English. Instead, it is demonstrated that "contact signing" and simultaneous communication appear to abide by the same linguistic principles that spoken language bilingual communication abides by. The additional variable of modality offers special options for sign language/spoken language bilingualism that introduce added complexity into the study and understanding of this kind of bilingualism. This bilingual perspective not only offers new insights into the nature of sign language/spoken language bilingual phenomena; it also has broad implications for the teaching, learning, use, and assessment of "grammatical" ASL/English bilingual communication.

Caccamise, F. (2004). *Catholic religion sign language vocabulary.* Rochester, NY: Rochester Institute of Technology, National Technical Institute for the Deaf.

Caccamise, F. (Ed.) (2001). *Sign language vocabulary for technical terminology: English, theater, communication, and career education.* Rochester, NY: Rochester Institute of Technology, National Technical Institute for the Deaf.

Caccamise, F., & Lang, H. (2000). *Signs for science and mathematics:A resource book for teachers and students.* Rochester, NY: Rochester Institute of Technology, National Technical Institute for the Deaf.

Caccamise, F., Mitchell, M., Hearld, S., Reeves, J., & Burch, D. (2000). *Signs for legal and social work terminology.* Rochester, NY: Rochester Institute of Technology, National Technical Institute for the Deaf.

In 1975, just seven years after NTID accepted its first students, a research project to develop sign language materials for technical terminology was initiated at NTID. The goal of this project, the NTID Technical Signs Project (TSP), was to support effective, efficient, and consistent use of sign language terminology in academic and other career-related environments by documenting and sharing how skilled, knowledgeable signers communicate content in their technical/specialized fields. Skilled signers from technical/specialized content areas were interviewed for the signs they use for terminology in their respective content areas. These signs, together with signs from previously published materials, were recorded and sent to sign-content experts across the country, who provided judgments on the acceptability/use of these signs, as well as sociolinguistic background information about themselves. Based on the results of this process, signs were selected for inclusion in materials for dissemination on a national basis. The four books listed above are part of a series of sign language instructional materials produced via this research-based approach. (National distribution for the above four books is via the Assistive Communication Center, Butte Publications, Harris Communications, and the RIT Bookstore.). See also www.rit.edu/fcncr/ASLDCM.htm1.

Implications
The results of the TSP research process demonstrates that sign language vocabulary, similar to spoken language vocabulary, follows a natural process for development, refinement, and standardization. Also, within this natural process, skilled signers develop and refine sign language vocabulary that is consistent with effective use of the human gestural-visual systems for communication. Considering this, systematic documentation and sharing of the results of the natural process for sign language vocabulary can serve as a major support to effective sign language communication in academic and other career-related environments.

Caccamise, F., Reeves, J., Poor, G., & Carr, J. (2003). The Classroom Sign Language Assessment (CSLA): A process for assessing and supporting development of instructors' sign language skills. *NTID Research Bulletin,* 9(1), 1, 3-5. [AN 1879]

Using the Sign Language Skills Classroom Observation (SLSCO) [J. Reeves, W. Newell, B. R. Holcomb, & M. Stinson, M. (2000), American Annals of the Deaf, 145, 315-341)] as a base, during the 2001-2002 academic year (AY01-02) an NTID Faculty/Staff Communication Research Project Team initiated development of an observational tool for assessing instructors' use of sign language communication in the classroom. The development of this tool, the Classroom Sign Language Assessment (CSLA), included the construction of rating scales for the sign language linguistic features used by skilled communicators when teaching deaf students. These features were identified via a literature review, interviews with NTID students and faculty by the SLSCO investigators, refinement of the descriptors, development of an examples sheet, and development of a set of principles and guidelines for conducting CSLA Follow-Up Meetings. During AY02-03 and AY03-04, the CSLA was piloted with NTID faculty. Based on this piloting, CSLA forms and procedures were refined and sample CSLA observation reports were generated. Implementation of formal use of the CSLA with NTID faculty occurred during the AYO3-04 Spring Quarter. Current project efforts are focused on collecting reliability information for CSLA ratings and evaluative feedback from instructors on the CSLA process.

Implications
The CSLA provides a tool for assessing instructors' classroom sign language communication skills. The information from this assessment can help instructors develop their classroom sign language communication skills, thus improving communication with their students. In addition, as implemented at the National Technical Institute for the Deaf (NTID), the CSLA provides instructors with information about their sign language communication skills that they may include in their annual appraisals and in their tenure and promotion documentation.

Gaustad, M.G., & Kelly, R.R. (2004). The relationship between reading achievement and morphological word analysis in deaf and hearing students matched for reading level. *Journal of Deaf Studies and Deaf Education,* 9(3), 269-285. [AN 1826]

This study extends the findings of Gaustad, Kelly, Payne, and Lylak (2002), which showed that deaf college students and hearing middle school students appeared to have approximately the same morphological knowledge and word segmentation skills. Because the average grade level reading abilities for the two groups of students were also similar, those research findings suggested that deaf students' morphological development was progressing

as might be expected relative to reading level. This study further examined the specific relationship between morphologically-based word identification skills and reading achievement levels, as well as differences in the error patterns of deaf and hearing readers. Comparison of performance between pairs of deaf college students and hearing middle school students matched for reading achievement level shows significant superiority of younger hearing participants for skills relating especially to the meaning of derivational morphemes and roots, and the segmentation of words containing multiple types of morphemes. Group subtest comparisons and item analysis comparisons of specific morpheme knowledge and word segmentation show clear differences in the morphographic skills of hearing middle school readers over deaf college students, even though they were matched and appear to read at the same grade levels, as measured by standardized tests.

Implications
These findings show that the same "measured" reading achievement level does not carry the same significance for deaf and hearing readers, at least not in terms of their performances on morphographic word analysis. This study suggests that deaf students need direct instruction of morphological knowledge and related skills.

Gaustad, M.G., Kelly, R.R., Payne, J.A., & Lylak, E. (2002). Deaf and hearing students' morphological knowledge applied to printed English. *American Annals of the Deaf*, 147(5), 5-21. [AN 1745]

This study examined the ability of deaf and hearing students at two educational levels (college and middle school) to discriminate and apply knowledge of printed word morphology. There were 128 participants—70 deaf students and 58 hearing students. A two-part paper and pencil test was administered that examined subjects' abilities to perceive segmentation of morphemes within printed words, and to recognize the meanings associated with a variety of printed morphemes. The results showed that the hearing college students performed consistently better across all the dependent measures of the two-part test of morphological knowledge. The deaf college students' scores were significantly lower than those of the hearing college students, but similar to the performance of hearing students at the middle school level. Deaf students at the middle school level consistently scored the lowest on both parts of the test. While the performance of all students declined as the difficulty of the morphemic content increased within both tasks, this effect was greatest for middle school deaf students. Although segmentation and semantic analysis skills necessary to morphographic decoding were apparent in deaf students, their levels of mastery fell significantly below those of the hearing subjects.

Implications
Deaf students are arriving at college without critical word decoding skills that should be taught throughout their K-12 educational experiences. In fact, as documented in the findings of this study, deaf colleges students' word segmentation skills and morphological knowledge appear to be similar to that of hearing middle school students.

Kardach, J., Wincowski, R., Metz, D.E., Schiavetti, N., Whitehead, R., & Hillenbrand, J. (2002). Preservation of place and manner cues during simultaneous

communication: a spectral moments perspective. ***Journal of Communication Disorders,*** **35, 533-542. [AN 1837]**

Spectral moments, which describe the distribution of frequencies in a spectrum, were used to investigate the preservation of acoustic cues to intelligibility of speech produced during simultaneous communication in relation to acoustic cues produced when speaking alone. The spectral moment data obtained from speech alone were comparable to those spectral moments data reported in the research literature. The spectral moments obtained from speech produced during simultaneous communication were statistically indistinguishable from those obtain during speech alone, indicating no measurable degradation of obstruent spectral acoustic cues during simultaneous communication.

Implications
Despite the slowing of speech during simultaneous communication, speakers appear to maintain the spectral integrity of the obstruents examined as reflected by the comparability of the spectral moments between the speech alone and simultaneous communication experimental conditions. These results are consistent with previous investigations of experienced signers that have reported maintenance of various temporal rules of spoken English and the maintenance of important perceptual cues despite elongation during simultaneous communication. It seems reasonable to conclude that the elongated temporal pattern of speech that occurs during simultaneous communication does not disrupt obstruent specrtral patterns of spoken English as measured by spectral moments. Thus the hearing-impaired child who depends of aural and oral cues for the understanding of speech will not be negatively impacted by the use of simultaneous communication.

Kelly, R.R., Albertini, J.A., & Shannon, N.B. (2001). Deaf college students' reading comprehension and strategy use. ***American Annals of the Deaf, 146*****(5), 385-400. [AN 1766]**

Two comprehension studies were conducted with 46 deaf college students. In the first study, twenty deaf college students representing higher and lower reading ability levels were tested for correctly stating the main idea of a passage, answering content questions, indicating their understanding of the words and phrases, and recognizing a topically incongruent sentence embedded in the passage. The results suggest that deaf students profess a better understanding of what they read than they are able to demonstrate. Also, the students' inability to identify a topically incongruent sentence in the passage further suggests a need for them to more carefully and accurately self evaluate their understanding of what they are reading. A second study then investigated the effect of strategy review instruction on deaf college students' comprehension of short reading passages. Students reading at a higher level showed improved comprehension on the post-training passage, whereas students reading at a lower level did not. Similarly, the control group of deaf students comparable to the higher-level readers did not show improved comprehension.

Implications
These findings suggest that deaf students do not have sufficient experience with critiquing the meaning of text. Teachers need to implement strategies to help deaf students focus attention on overall meaning of the text, rather than on vocabulary, as well as to synthesize the main idea. Additionally, they need to expose students to authentic text (not constructed text), and help them develop a notion of coherence and congruence—i.e., a sense of what makes a text

an organized whole. Further suggestions for teachers are provided in the discussion section of this study.

Lang, H.G., & Albertini, J.A. (2001). Construction of meaning in the authentic science writing of deaf students. *Journal of Deaf Studies and Deaf Education, 6,* 258-284. [AN 1730]

This study examines how students construct meaning through writing during authentic science activities. To determine how well students understood science concepts, we analyzed 228 writing samples from deaf students in grades 6 through 11 as well as the explanatory and reflective comments of their teachers. The analyses indicate that certain process writing strategies were differentially useful in helping deaf students to construct meaning and in allowing teachers to evaluate the constructed meaning. Three instructional conditions and two teacher variables were found to play roles in determining the accuracy and adequacy of the writing: the writing prompts the teachers used, the focus for the writing, follow-up to the initial activity, the teacher's content knowledge, and the teacher's ability to interpret student writing.

Implications
The results of this research suggest that process-writing strategies help students learn science. The results varied, however, according to classroom variables and teacher characteristics. The best results were obtained by teachers who provided clear and focused prompts for the writing and who were able to respond to or follow up the writing with another activity. How well the teachers understood the content of the lesson and how well they understood their students' writing were also important. Further, the results suggest that regular use of such writing in science classes helps teachers monitor and assess student learning.

Marschark, M., Convertino, C., McEvoy, C., & Masteller, A. (2004). Organization and use of the mental lexicon by deaf and hearing individuals. *American Annals of the Deaf, 149,* 51-61. [AN 1857]

Two experiments explored the organization of word/concept knowledge in deaf and hearing college students. Results indicated that deaf and hearing students' lexical knowledge is similar in terms of overall organization, but strengths of association between concepts are stronger for hearing than deaf students in ways likely to affect reading, problem solving, and learning. Hearing students' performance in related tasks reflect the organization of their knowledge whereas deaf students' responses did not.

Implications
These findings implicate the interaction of word knowledge, world knowledge, and literacy skills, emphasizing the need to adapt instructional methods to student knowledge in educational contexts.

MacKenzie, D.J., Schiavetti, N., Whitehead, R., & Metz, D.E. (2004). Effects of noise and filtering on the intelligibility of speech produced during simultaneous communication. *Journal of Communication Disorders*, 37, 505-515. [AN 1834]

This study investigated the effects of noise and filtering on the intelligibility of speech produced during simultaneous communication. Experienced sign language users were recorded under conditions of simultaneous communication and speech alone, speaking a forced-choice contrast material designed for measurement of speech intelligibility. Normal-hearing listeners audited the speech samples produced under simultaneous communication and speech alone, under conditions of noise and filtering. Results indicated longer sentence durations for the simultaneous communication than for speech alone; there were no differences in intelligibility of speech produced during simultaneous communication versus speech produced during speech alone under either the noise or filtering speech listening conditions. Thus, temporal alterations of speech produced by simultaneous communication do not produce degradation of temporal or spectral cues to speech intelligibility or disruption of the perception of specific English phoneme segments.

Implications

These results are consistent with previous research showing maintenance of phonetic rules of spoken English despite the temporal elongation shown during simultaneous communication. It is concluded, therefore, that because speech produced during simultaneous communication does not disrupt the phonetic rules of spoken English, speech intelligibility is preserved for listeners in simultaneous communication even under difficult listening conditions, e.g., noise and filtering, as the acoustic redundancy of speech was appropriately maintained. Thus the use of simultaneous communication for communication between hearing and hearing-impaired persons appears appropriate for the maintenance of both acoustic and phonetic contrasts necessary for the understanding of speech.

Samar, V. (in press). Brain imaging of language processing: Event related potentials. *Encyclopedia of language and linguistics*, 2d ed. Elsevier: London. [AN 1880]

This is an invited review of the emerging literature on electrical brain imaging of language processing. The brain's transient electrical response to language stimuli, the event related potential (ERP), is a powerful tool for imaging the dynamic activity of neural language systems. Because of their excellent time resolution, their good spatial resolution, and their sensitivity to processing within different levels of language representation, ERP studies of spoken and signed languages are playing a major role, alongside other emerging brain imaging techniques, in addressing central questions of psycholinguistic theory and the neurobiology of language.

Implications

ERP studies are now helping to sort out those language processes that are universal to human language and those that depend specifically on the auditory and visual modalities. This review emphasizes the central contribution that ERP studies of sign language processing have played in advancing our understanding of both universal and modality-specific language development in the brain.

Samar, V.J., & Parasnis, I. (2005). Dorsal stream deficits suggest hidden dyslexia among deaf poor readers: Correlated evidence from reduced perceptual speed and elevated coherent motion detection thresholds. *Brain and Cognition, 58,* 300-311. [AN 1881]

Prelingual deafness and developmental dyslexia have confounding developmental effects on reading acquisition. Therefore, standard reading assessment methods for diagnosing dyslexia in hearing people are ineffective for use with deaf people. Here, we report new psychometric and psychophysical evidence, based on measures of perceptual speed and coherent motion detection, that deficits in dorsal stream function, as previously suggested by Samar, Parasnis, & Berent (2002), are associated with relatively poor reading comprehension in deaf adults.

Implications

Our results generally imply that dyslexia is a hidden contributor to relatively poor reading skill within the deaf population, and that it has a similar neurobiological basis in deaf people as in hearing people. One implication of this finding is that dyslexia in many deaf individuals could be diagnosed by psychometric tests or brain imaging procedures that assess dorsal stream function. A second implication is that some of the same brain training techniques that are currently being used with hearing dyslexics might be effective interventions for deaf dyslexics.

Samar, V.J., Parasnis, I., & Berent, G.P. (2002). Deaf poor readers' pattern reversal visual evoked potentials suggest magnocellular system deficits: Implications for neuroimaging of dyslexia in deaf individuals. *Brain and Language, 80,* 21-44. [AN 1738]

Deafness and developmental dyslexia in the same individual may jointly limit the acquisition of reading skills for different underlying reasons. A diagnostic marker for dyslexia in deaf individuals must therefore detect the presence of a neurobiologically-based dyslexia but be insensitive to the ordinary developmental influences of deafness on reading skill development. We propose that the functional status of the magnocellular visual system in deaf individuals is potentially such a marker. We present evidence based on pattern-reversal visual evoked potentials (VEP) recorded to low and high contrast checkerboard patterns, that adult deaf poor readers as a group display magnocellular system deficits not observed in deaf good readers. Our results indicate that developmental dyslexia exists within the deaf population and is associated with the same underlying magnocellular system deficit that has been observed in hearing dyslexics.

Implications

The results of this study have two important implications. First, the findings suggest that direct neural imaging of the status of the magnocellular visual system in deaf individuals may eventually provide differential diagnosis of developmental dyslexia in the deaf population. Second, our work provides the first objective neurobiological evidence that dyslexia and other learning disabilities (LD) exist in the deaf population. This result should be a boon to deafness professionals, teachers, parents, and deaf individuals with LD who are currently struggling with agencies and institutions that disallow the concurrent classification of a deaf individual as learning disabled. Such exclusionary policies inappropriately complicate or limit access to LD services for deaf people. These results and further objective evidence of the occurrence of dyslexia and other forms of LD in the deaf population will aid educators and

disability activists in their efforts to eliminate such policies and to advocate for specific LD services for deaf people.

Schiavetti, N., Metz, D.E., Whitehead, R., Brown, S., Borges, J., Rivera, S., & Schultz, C. (2004). Acoustic and perceptual characteristics of vowels produced during simultaneous communication. *Journal of Communication Disorders, 37*, 275-294. [AN 1833]

This study investigated the acoustical and perceptual characteristics of vowels in speech produced during simultaneous communication. Normal-hearing, experienced sign language users recorded under conditions of simultaneous communication and speech alone, a set of sentences containing monosyllabic words designed for measurement of vowel duration, formant frequencies, and fundamental vocal frequency in consonant vowel-consonant syllables. Listeners audited the speech samples. Although results indicated longer sentence and vowel durations in simultaneous communication versus speech alone, the data showed no difference in spectral characteristics of vowels produced during simultaneous communication versus speech alone, indicating no degradation of vowel spectrum by rate alteration during simultaneous communication. Further, no difference was found in listeners' ability to identify vowels produced during simultaneous communication versus speech alone, indicating no degradation of vowel perceptual cues during simultaneous communication.

Implications
Despite the temporal slowing of speech during simultaneous communication, speakers appear to maintain the same acoustic characteristics of vowels in simultaneous communication as they do when speaking alone. Because of this, listeners are able to identify speakers' vowel produced during simultaneous communication as well as they identify vowels produced during speech alone. This is further evidence of the appropriateness of simultaneous communication as a speech model to present to hearing-impaired children and as a mode of communication with hearing-impaired adults.

Schley, S., & Albertini, J. (2004). Assessing the writing of deaf college students: Re-evaluating a direct assessment of writing. *Journal of Deaf Studies and Deaf Education, 10*(1), 96-105 [AN 1882]

The NTID Writing Test was developed to assess the writing ability of post-secondary deaf students entering the National Technical Institute for the Deaf, and to determine their appropriate placement into developmental writing courses. Changes in curriculum and the rater pool necessitated a new look at inter-rater reliability as well as concurrent validity. We evaluated the rating scores for 236 samples from students who entered the college during the Fall of 2001. Using a multi-pronged approach, we confirmed the inter-rater reliability (using correlation coefficients and intra-class correlations), as well as the validity of this direct measure of assessment (from analyses of paired differences, correlations to an indirect measure of writing ability, and a Principle Components Analysis).

Implications
This paper discusses continued use of this test in light of recent context-specific definitions of validity, local control, and the nature of writing.

Schley, S., & Wellbrock, G. (2003). Incorporating phonics-based instruction into a dual-language program: A discussion. *Odyssey: New Directions in Deaf Education, 5*(1), 56-57. [AN 1807]

In this paper, a classroom teacher and a teacher preparation faculty member discuss ways of incorporating phonics-based instruction into a bilingual ASL/English school program.

Implications
Implications for practitioners and faculty are discussed. Too often, phonics-based components are not built into deaf education classrooms, as students in these classrooms have reduced hearing abilities. Clear examples of how to incorporate these components are presented. Because some research shows that good readers who are deaf seem to have acquired access to the phonological code of English, using these techniques may provide a bridge to reading and literacy learning in deaf and hard-of-hearing students.

Whitehead, R.L., Schiavetti, N., MacKenzie, D.J., & Men, D.E. (2004). Intelligibility of speech produced during simultaneous communication. *Journal of Communication Disorders,* 37, 241-253. [AN 1832]

This study investigated the overall intelligibility of speech produced during simultaneous communication as perceived by hearing-impaired listeners. Four hearing, experienced sign language users were recorded under conditions of simultaneous communication and speech alone conditions while speaking forced-choice phonetic contrast material designed for measurement of speech intelligibility. Although results indicated longer speech production during simultaneous communication versus speech produced during speech alone, results showed no difference in overall intelligibility of speech produced during simultaneous communication versus speech produced during speech alone, nor any difference in pattern of phonetic contrast recognition errors during simultaneous communication. Thus the temporal alterations produced by simultaneous communication do not produce degradation of temporal or spectral cues in speech or disrupt the perception of specific English phoneme segments.

Implications
It is reasonable to conclude from this research that because the speech produced during simultaneous communication does not disrupt the phonetic rules of spoken English, speech intelligibility is preserved for listeners, thereby indicated that simultaneous communication is appropriate for use as a speech model to present to hearing-impaired children and as a mode of communication with hearing-impaired adults. Thus, speech intelligibility represents a behavioral standard for the usefulness of simultaneous communication. If simultaneous communication is as intelligible overall as speech alone, then it is appropriate for use as a means of communication because the spoken message passes from speaker to listener with the same accuracy as speech alone.

Note: *[AN XXXX] represents a local NTID publications designation. Please include when requesting copies of these publications.*