

Sign Language Instructional Materials for Speech, Language, and Hearing Professionals

Frank Caccamise, Nancy Smith, and Valerie Yust
National Technical Institute for the Deaf

Hugh Beykirch
University of Northern Iowa

The importance of sign language and simultaneous communication skills to speech, hearing, and language professionals in their work with hearing-impaired individuals and other special learners has been discussed in previous publications. The authors of this paper address the evolution of sign language/simultaneous communication instructional materials; i.e., the principles and process used in developing these materials, a description of these materials, and suggestions for their use.

Caccamise, Hatfield, and Brewer (1978) and Caccamise and Johnson (1978) have supported the use of sign language and simultaneous communication to enhance the development of English language skills among hearing-impaired people (deaf and hard-of-hearing) and other special learners. Caccamise and Johnson specifically stressed the responsibility of professionals working with hearing-impaired people: (a) to have an understanding and appreciation for all modes of communication and (b) to possess the skills needed to communicate effectively with *all* members of this population. For speech, language, and hearing professionals, they emphasized that: "The clinician who can communicate in the mode(s) most effective for the client can better motivate the client since the client will better understand his hearing loss, communication needs, hearing aid usage, etc." (p. 108).

The authors of this paper discuss some aspects of a research project currently underway at the National Technical Institute for the Deaf (NTID)—the NTID Technical Signs Project (TSP) which addresses the need for sign

Frank Caccamise, Ph.D., is a Research Associate, Communications Program, National Technical Institute for the Deaf (NTID), Rochester Institute of Technology, Rochester, New York. Nancy Smith, Ph.D., is an Instructional Developer, NTID. Valerie Yust, M.S., is Chairperson, Communication Instruction Department I, NTID. Hugh Beykirch, Ph.D., is an Associate Professor of Audiology, Department of Communicative Disorders, University of Northern Iowa, Cedar Falls, Iowa.

language/simultaneous communication instructional materials for speech, language, and hearing professionals. The discussion includes the principles and process used in developing these materials, a description of these materials, and suggestions for their use.

NTID TECHNICAL SIGNS PROJECT (TSP) PRINCIPLES AND PROCESS

The NTID Technical Signs Project (TSP) principles (Table 1) and process (Table 2) have been discussed in several publications (Caccamise, Ayers, Finch, & Mitchell, 1978; Caccamise, Newell, Mitchell-Caccamise, Naiman, Outermans, & Pocobello, 1980; Newell, Caccamise, & Mitchell-Caccamise, 1980). In brief, the NTID Technical Signs Project (TSP) places emphasis on documenting and sharing technical signs *currently used* by skilled signers rather than on artificial sign development. Figure 1 illustrates the relationship between the natural language development process leading to standard sign *usage* (the basic TSP tenet) and the five major steps of the TSP process—sign *collection, evaluation, selection, recording, and sharing* (CESRS). Similar to development of words in any modality, sign-word *usage* is part of a natural process that begins with a *need* to communicate ideas, concepts, and feelings. This leads to the *development* and *selection* by sign communicators of agreed-upon sign-words or symbols for communicating these ideas, etc. It is at this point that the TSP process begins. This process must be on-going in order to include both new signs and modifications that occur in signs through normal (sign) language use and development (Battison, 1978; Frishberg, 1975). This process, and the materials that result, are akin to the process used for producing dictionaries.

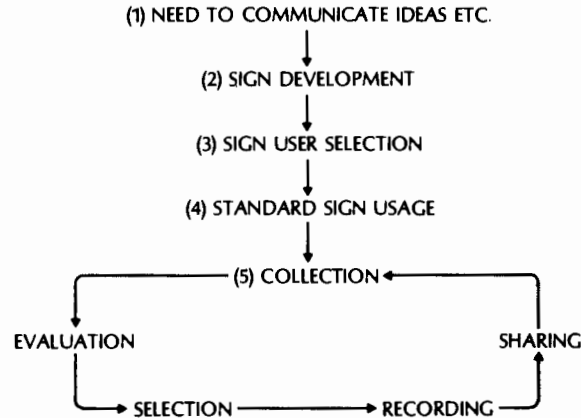


Figure 1. Natural sign development process (1-4) and its relationship to the NTID Technical Signs Project (TSP) process (5).

Table 1
General Principles for Collection, Evaluation, Selection,
Recording, and Sharing (CESRS) of Signs

-
-
1. Respect for all language and communication users
 2. Identification of important vocabulary precedes sign collection
 3. Sign collection precedes sign invention
 4. Dialectical and contextual variations in signs acceptable
 5. Fingerspelling viable alternative to sign invention
 6. Signs selected are recommended, not required
 7. On-going evaluation a necessity
 8. Cooperation important:
 - A. Internal
 - B. External/National
 9. Continued research on manual/simultaneous communication, including observations in natural communication situations
 10. Guidelines for sign collection, evaluation, selection, recording, and sharing (CESRS):
 - A. Consistency of use by native signers major guideline
 - B. Consistency of use by "content" experts who are skilled signers second major guideline
 - C. Consistency with the structural characteristics of the ASL lexicon (signs)
-
-

Table 2
A Systematic Process for Collection, Evaluation, Selection,
Recording, and Sharing (CESRS) of Signs

-
-
1. Internal identification of important vocabulary
 2. Collection of existing signs: Internal & External (I & E)^a
 3. Evaluation of collected signs (I & E)
 4. Selection of currently used signs
 5. Recording and storage of signs
 6. Dissemination/sharing (I & E)
 7. Evaluation (I & E)
 8. Development and evaluation of new and modified signs (I & E)
-
-

^aThe terms "internal" and "external" are included in order to indicate the importance of cooperation among programs and geographical regions throughout the process.

Given the above process, and the principles upon which it is based, it is evident that the TSP process is *descriptive* rather than *prescriptive*. Similar to the dependence of linguists on skilled language users as informants, this project depends on skilled signers, who are also content experts in the technical area being investigated, for collection, evaluation, and selection of

signs (see Table 1, Principles 10A and 10B).

In addition to current usage by skilled signers, a set of guidelines based on the structural characteristics of the American Sign Language (ASL) lexicon has served valuable roles in the TSP process (see Table 1, Principle 10C). These guidelines and their roles are discussed in the next section of this paper. Following this discussion, the materials produced by the TSP are discussed in terms of development, format, and use.

SIGN SELECTION GUIDELINES BASED ON THE AMERICAN SIGN LANGUAGE (ASL) LEXICON

Signs may be distinguished from simple iconic gestures in that there are some very definite rules for how signs may be constructed in terms of hand configuration, motion, direction and placement in space whereas gestures are not subject to these rules. . . . It is important then to stress that these rules are linguistic rules which govern the formation of signs. (Wilbur, 1976, p.12)

Linguistic rules that determine how the smallest units of a language (phonemes) may be combined to form meaningful units (words and affixes) in a language are termed *phonological* and *morphological constraints*. A significant factor in determining these constraints is human physiology; i.e., a "match" needs to occur in the expressive and receptive channels used in communicating a language (see Table 3). For example, Battison (1974, 1978) and Siple (1978a,b) have stressed that sign phonology is based on the natural dynamics of manual articulation (the ability to position our hands, move our hands and arms, etc.) and visual perception. In brief, naturally evolved sign languages, such as American Sign Language (ASL), French Sign Language, etc., may be expected to have developed and maintained those features or characteristics that are consistent with the functioning of the manual *and* visual systems and to have deleted those characteristics that are not.¹ Knowledge of these guidelines, therefore, can assist in selection of signs for the manual coding of English, as well as for documenting ASL signs.

Based on present linguistic research on the phonological and morphological characteristics of the ASL lexicon (signs), TSP personnel have constructed a set of 12 sign guidelines (see Table 4). These guidelines are based on current knowledge of how the four basic parameters of signs (handshapes, positions, orientations, and movements) are combined in ASL signs. Among the sign characteristics considered in these guidelines are the signing space (guidelines I, II, & III), constraints involved when two hands are used in producing signs (dominance and symmetry, guidelines IV & V), number of handshapes per sign (guideline VI), movements used to distinguish noun-verb sign pairs (guideline IX), and confusable handshapes (guideline XII). These

¹A parallel can be drawn to the spoken language mode in which a significant amount of the energy in the expression of speech matches the most sensitive frequency range of the human ear (500-3000 Hz).

Table 3
Expressive and Receptive Modes and Channels of Communication

Modes of Communication	Channels	
	Expressive	Receptive
1. Sign	Manual (Hands & Other Body Parts)	Visual
2. Spoken	Vocal (Oral)	Auditory (Aural) and Visual
3. Written/ Graphics	Manual (Hands)	Visual

Table 4
Sign Guidelines Based on the American Sign Language (ASL) Lexicon

I. The Signing Space
II. Signs and the Visual Center of the Signing Space
III. The Relationship of Sign Hand Position and Other Sign Parameters
IV. Symmetry Condition
V. Dominance Condition
VI. Number-of-Handshapes Per Sign
VII. Signs Involving Contact
VIII. Semantically Related Signs (Morphological Preservation)
IX. Movement and Word Type: Noun-Verb Pairs
X. Compound Signs
XI. Iterations: Signs Having Single and Duplicated Executions
XII. Handshapes-of-Signs

guidelines have been discussed in detail by Caccamise, Blasdell, and Bradley (1978) and Forman and Caccamise (1979) and are explained in Appendix A of this paper.

In application, these guidelines and the natural change or modification processes that have been documented for ASL signs have assisted TSP personnel in: (a) identifying variants of signs that may be predicted as not significantly different (e.g., an "S" versus an "A" handshape on the nondominant hand is a likely example of two "pronunciations" of the same sign); (b) identifying variants of a sign that may be due to a natural process of change (e.g., the nondominant hand assuming a handshape symmetrical with that of the dominant hand); (c) being precise in recording the important characteristics of signs; and (d) explaining *how* certain signs are inconsistent with current

knowledge of the structure of naturally evolved signs, manual articulation, and/or visual perception. This latter benefit is especially important when no existing sign is acceptable to skilled signers. New signers are especially prone to inventing signs and/or accepting artificially developed signs that are shown in books. When the TSP process indicates such signs are unacceptable to skilled signers, an explanation generally can be provided based on current linguistic knowledge of sign development and structure. In such situations, alternative communication strategies are offered (see Appendix E).

Although sign selection guidelines based on a naturally evolved sign language serve valuable roles, some caution in their application is important. These guidelines are, in fact, guidelines and not strict rules. Exceptions to rules, or guidelines, are a part of all languages, regardless of the modality; e.g., irregular past tenses and plurals in spoken and written English.² As previously emphasized, therefore, *usage* by skilled signers is the primary determiner as to whether a sign is acceptable or unacceptable. Further, the sign guidelines described are only a small part of manual-visual communication.

DEVELOPMENT, DESCRIPTION, AND USE OF TSP MATERIALS

Introduction

The "sharing" aspect of the TSP has been realized through the systematic design and development of instructional materials for use both internal and external to NTID. The design and development of TSP materials has followed instructional design principles based on current theories of human learning. The materials have progressed through:

1. Assessment of the characteristics and requirement of user groups
2. Analysis of the skills to be developed
3. Selection of the appropriate media
4. Delineation of the format of the materials
5. Development of the materials
6. Specification of recommended instructional activities to supplement TSP materials.

Throughout these stages, the contributions of communication, technical content, and instructional design specialists have been used to shape the TSP materials. In addition, formal learning evaluations will soon be completed to

²The signs SIMULTANEOUS COMMUNICATION and TOTAL COMMUNICATION are sign examples that are inconsistent with the symmetry sign guideline (see Table 4 and Appendix A, sign guideline IV). Both of these signs involve two moving hands with *different* handshapes rather than the *same* handshapes as discussed in the symmetry guideline. Acceptance of these signs by skilled signers may be explained (at least partially) by the fact that the two hands are relatively close together and move forward and back in the high-acuity, lower-face area (see sign guidelines I, II, III).

provide more data about these materials.

Audience Definition

Planning for the development of TSP instructional materials began with an identification of potential user groups for these materials. Four major user groups were identified:

1. *Sign-Content Experts* who are skilled signers and possess knowledge of the technical content area
2. *Sign Experts* who are skilled signers but lack knowledge of the technical content area
3. *Content Experts* who are knowledgeable in the technical content area but are not skilled signers
4. *Non-Sign/Non-Content Experts* who are not skilled signers and lack knowledge of the technical content area

After the four potential audiences had been identified, each group was reviewed to determine the technical sign-related skills that members of each group could be expected to initially possess. This led to these groups being defined in terms of skills which would require further development. These skills, then, would be those to which technical sign materials would be addressed. The results of this needs assessment process are summarized in Table 5.

Table 5
Use of Technical Sign Materials by Four Populations:
Skills Needing Development

Populations	Skills Needing Development					
	Technical Signs		Technical Vocabulary			General Sign Skills
	Isolation	Sentences	Spelling	Pronunciation	Meaning	
1. Sign-Content Experts (e.g., instructors who are skilled signers)	X					
2. Sign Experts (e.g., interpreters)	X	X	X	X	X	
3. Content Experts (e.g., instructors who are not skilled signers)	X	X				X
4. Non-Sign/Non-Content Experts (e.g., new students who are not skilled signers)	X	X	X	X	X	X

Following the identification of the four potential audiences, it was decided that the primary audience for TSP instructional materials would be sign-content experts. The other three groups would serve as secondary audiences. This was decided primarily because materials developed for this primary audience could be easily supplemented with existing instructional materials and classes for the secondary audiences.

Task Analysis for Skills to be Developed

Once the primary and secondary audiences for the proposed materials had been identified, it was necessary to analyze the content in terms of the basic tasks or skills to be developed. It was decided that the TSP materials should emphasize development of expressive sign language and simultaneous communication skills. Further, it was determined that the TSP materials should assist users in acquiring the skills needed to:

1. Produce a given technical sign
2. Associate the technical sign with a written and spoken (or mouthed) word
3. Simultaneously produce the technical sign and say (or mouth) the word associated with it

As stated in the previous section on sign guidelines, signs possess four major parameters: (a) handshapes, (b) positions, (c) orientations, and (d) movements. Any sign production representation in which one or more of these parameters is sufficiently inaccurate to make the sign look like another sign or a nonexistent sign would render the representation unacceptable. These four parameters, therefore, must be clearly conveyed to the learner through the proposed materials.

The skill of correctly pronouncing the words also became a task composed of subtasks. At a general level, these subtasks include matching signs and printed words with specific sounds and/or matching signs and printed words with pronunciation symbols as well as speaking or mouthing words. These subtasks account for variability in sensory cues accessible to deaf, hard-of-hearing, and hearing users of TSP materials.

Media Selection

Once the skills to be developed with TSP materials had been defined, the development team was ready to select the media to be used. The first step in the selection process was to identify those cues or parameters which the media had to present to the user. These parameters include:

1. Accurate depiction of the four major parameters of signs
2. Pronunciations of words (speech and diacritical markings)
3. Spellings of words

Since ability to accurately show movement of signs was deemed a vital attribute of the media to be used, the choice fell between videotapes and 16mm or 8mm films. The lower cost and ease of use found with videotapes made this the medium of preference. In addition, in order to provide the opportunity for wider distribution of TSP materials and to provide persons who view TSP videotapes with easily accessible self-review materials, the use of printed materials was explored.

When used in a *package* approach, the videotape/printed material combination offers a powerful set of media with which to provide instruction in sign language and simultaneous communication. This combination approach offsets the weaknesses and capitalizes on the strengths of each medium.

Description of TSP Materials Produced: Videotapes and Manuals

The materials produced by the TSP include manuals and videotaped lists of signs. Videotaped lists have been produced in the areas of biology, business, communication, engineering, English, fine and applied arts, mathematics, and secretarial vocabulary. See Appendix B for a listing of titles on currently available technical vocabulary videotaped lists. Appendix C lists the vocabulary contained within the categories "Communication" and "English." Production of videotapes is underway in the areas of anthropology, career development, human sexuality, photography, physics, psychology, religion, and speech pathology (see Appendix C for speech pathology vocabulary).

In general, each videotaped list is 10-15 minutes in length, with 3-5 lists for one technical area recorded on a single 60-minute master videotape. The format for each list is as follows:

1. Lists of approximately 10-20 sign-words
2. Groups of related words (with appropriate headings) within each list³
3. Instructions that encourage the viewer to sign and talk with the presenter⁴
4. Captions which include the spelling of each word
5. Simultaneous presentation of signs and spoken words
6. Inclusion of more than one sign per word when alternative sign usage is indicated to be appropriate by skilled signers
7. Indication that a word be fingerspelled when no sign has been consistently selected by skilled signers
8. Initial presentation of each sign involves two productions
9. Opportunity for review after each group of 5-8 words (in a scrambled

³Grouping of related stimuli or words increases the meaningfulness of a task, increases the number of potential associations, and facilitates initial learning and retention (Cromwell, 1956; Underwood & Schultz, 1960).

⁴See Cummings and Goldstein (1962) and Merrill (1971) for discussions on the importance of active learner involvement in developing psychomotor skills.

order) with a final review of all signs when all words have been presented⁵

10. Inclusion of the following captions during the initial presentation of each signed and/or fingerspelled word, as appropriate:
 - a. a key word to clarify the meaning
 - b. identification of the part of speech (e.g., noun, verb, adjective)
 - c. "sm" if a sign must have a single movement or production and "dm" if a sign must have duplicated movement (see ASL guideline XI in Appendix A)
 - d. "abbr" if the word is signed as an abbreviation
 - e. "fs" if the word is fingerspelled
11. For the initial presentation, captions appear at the bottom of the screen a few seconds prior to and throughout the signing of each word
12. For the review sections, the presenter states there will be a review and encourages viewers to sign and say the words before the presenter does;⁶ and spelling, key word, and part of speech captions are presented at the bottom of the screen for a few seconds prior to the presentation of each sign

Companion manuals designed to provide a hard copy version of the videotapes use the following format:

1. An introductory section which notes:
 - a. videotape(s) designed to be accompanied by the manual
 - b. skills which need development among members of four technical sign user populations (see Table 5)
 - c. suggested guidelines for TSP materials usage by each of these four intended audiences/populations
 - d. movement symbols used in all TSP manuals for depicting signs (the majority of these symbols are from Sutton Sign Writing®; see Sutton, 1981)
 - e. meanings of the "sm," "fs," "dm," and "abbr" abbreviations with sign diagrams
2. Signs presented in the same order as they are shown during initial presentation on videotapes
3. Signs depicted using primarily Sutton Sign Writing® movement symbols and line drawings; generally line drawings show the initial and final positions for each sign with movement symbols placed between these two positions (see Figure 2)

⁵On the first 10 TSP videotapes (see Appendix B), initial presentation of *all* words on each list precedes a general review. All subsequent videotapes will follow the new review format as described in this paper.

⁶These and other instructions on the videotapes focus users' attention, help them to remain involved in the activity, and serve as organizers. See Ausubell (1960) for a discussion of "organizers" and their importance to learning.

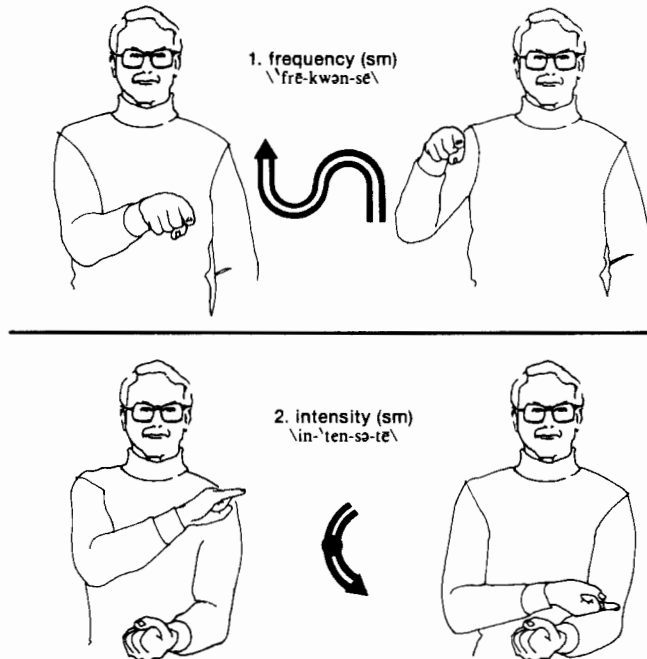


Figure 2. Sample sign diagrams from NTID technical sign manuals.

4. Captions for sign-words which include:
 - a. spellings
 - b. Webster's diacritical markings indicating pronunciations of words
 - c. indication of parts of speech (if necessary)
 - d. abbreviations (as required) to indicate if a sign is an abbreviation, fingerspelled word, and/or requires a single (sm) or duplicated (dm) movement or production

In addition to the videotaped word lists and companion manuals, the Technical Signs Project has also produced a set of videotaped audiology sentences (see Appendix D). These sentences are presented using simultaneous communication. All of the sentences relate to questions and statements an audiologist makes during hearing assessments. These groups of sentences proceed from history taking to discussion of assessment results. Sentences for specific audiological tests (e.g., oto-admittance, pure-tone, and speech reception threshold tests) are grouped together. Each sentence is presented twice; first at a slow-normal speed and then at a slow speed.⁷

⁷See Jaspen (1950) and Merrill (1971) for discussions of the importance of slowing rate of presentation in order to facilitate development of psychomotor skills.

Usage Guidelines for TSP Materials

As stated previously, Table 5 summarizes the skills which need to be developed by members of the primary and secondary audiences of TSP materials. Also, as indicated above, TSP materials are not designed to address all of the instructional needs of the secondary audience. For optimum results, all users should follow the general usage guidelines which follow. Members of specific user populations should then augment the instruction provided by TSP materials with as many of the following suggested activities as possible.

Whenever possible, *all* users of technical sign materials should seek demonstration of technical signs by sign-content experts in their program and/or geographical area. The following sequence should be followed in using NTID Technical Sign materials:

1. Read *Technical Signs Manual 1 (Overview of Technical Signs Project Principles, Process, and Materials)*
2. View the videotape(s) for a technical area
3. Read *Technical Signs Manual 2: Reading Technical Sign Diagrams*
4. Read the manual which accompanies the previously viewed videotape(s)

Sign experts (population 2) should:

1. Use materials which provide definitions and present technical vocabulary in sentences, and the spelling of each technical term
2. Discuss the meaning and usage of technical vocabulary with content experts
3. Use materials which aid learning the pronunciation of each technical term (e.g., a series of videotapes have been produced at NTID that provide individualized instruction in the Webster diacritical pronunciation marking system)
4. Enroll in technical communication courses which provide for the grouping of students according to their major area of study/training (such courses, in conjunction with regular technical education courses, have proven effective at NTID for introducing definitions, spellings, and pronunciations for technical terms)
5. Practice signing/interpreting sentences and paragraphs recorded on audio tapes (tapes should incorporate technical vocabulary and vary in speaking rate according to users' signing and/or interpreting skill levels)

Content experts (population 3) should:

1. Enroll in a sign language course commensurate with present signing skills (participants should be grouped by same or similar content areas whenever possible)
2. Participate in both formal and informal situations involving the use of

signed communication

3. Practice using technical signs in signed and spoken sentences
4. Practice signing in front of a mirror
5. Receive instruction on how to effectively use speech and signing together (simultaneous communication)
6. Participate in seminars and workshops on how to use *all* modes of communication and instruction (spoken, signed, written, drawn, etc.) and other strategies for effective communication with hearing-impaired people (e.g., the Teaching Effectiveness Program at NTID provides seminars/workshops and other experiences aimed at improving student-instructor interaction)
7. Receive information/instruction on how to effectively work with an interpreter
8. Use some of the suggestions noted in Appendix E: Use of Technical Signs and Fingerspelling in Academic Settings

Non-sign/non-content experts (population 4) should:

1. Follow guidelines 1-5 suggested for population 2 (Sign Experts)
2. Follow guidelines 1-5 suggested for population 3 (Content Experts)

SUMMARY AND CONCLUSIONS

The potential usefulness of sign language and simultaneous communication in the development of English language skills by hearing-impaired people and other special learners has been documented by Caccamise and Johnson (1978) and Caccamise, Hatfield, and Brewer (1978).

The authors of this paper have discussed sign language/simultaneous communication instructional materials for speech, language, and hearing professionals. Although the development of such materials is important, even more significant is their application by speech, hearing, and language professionals in their delivery of services and general interactions with hearing-impaired persons and other special learners/clients.

The materials discussed, in conjunction with other experiences, can help clinicians to develop the skills needed to communicate in a direct, unambiguous manner with their clients. These skills can benefit clients and clinicians in several ways, including: (a) interviewing/history taking, (b) instructions for and explanation of test procedures, (c) obtaining reliable and valid test results, (d) explanation of test results and recommendations, and (e) counseling. Although obviously relevant to all of the above points, a shared means of communication is particularly critical to effective counseling. Enhanced communication between clinicians and clients is conducive to developing greater trust and increased motivation for clients since they will better understand their communication problems, needs, potentials, and recommendations for development of their communication and language skills.

In conclusion, it is of the utmost importance that *all* speech, language, and hearing professionals appreciate and respect all modes of communication and that they extend efforts to develop the communication skills needed to communicate in an effective and direct manner with as many (potential) clients as possible. As Caccamise and Johnson (1978, p. 124) concluded: "A breakdown in the communication process is the major problem confronted by the deaf person. This breakdown can best be dealt with through a sharing of responsibility for communication by client and clinician."

ACKNOWLEDGMENTS

This manuscript was prepared in the course of an agreement between the Rochester Institute of Technology and the U.S. Department of Education.

Recognition is extended to William Newell, Marilyn Mitchell-Caccamise, Laurie Outermans, Phyllis Naiman, Donna Pocobello, Charles Bradley, Robert Ayers, Bonnie Meath-Lang, and Paul Peterson for their contributions to the ideas and work discussed in this paper.

Appreciation is extended to Dorris Fox and Peter Chudoba, Word Processing Center, National Technical Institute for the Deaf, for their assistance in bringing this manuscript from a beginning draft to a final publication-ready manuscript.

Also, the authors wish to extend their appreciation to Lynne Beykirch, Jane Johnson, and Marilyn Mitchell-Caccamise for their assistance in editing and proofing this manuscript.

REFERENCES

- Ausubell, D.P. Use of advance organizers in the learning and retention of meaningful verbal material. *Journal of Educational Psychology*, 1960, *51*, 267-272.
- Baker, C., & Padden, C. Focusing on the non-manual components of American Sign Language. In P. Siple (Ed.), *Sign language research: Implications for the study of language*. New York, N.Y.: Academic Press, 1978.
- Battison, R. Phonological deletion in American Sign Language. *Sign Language Studies*, 1974, *5*, 1-19.
- Battison, R. *Lexical borrowing in American Sign Language*. Silver Spring, Md.: Linstok Press, 1978.
- Battison, R., Markowicz, H., & Woodward, J. A good rule of thumb: Variable phonology in American Sign Language. In R. Shuy & R. Fasold (Eds.), *New ways of analyzing variation in English, II*. Washington, D.C.: Georgetown University Press, 1975.
- Bellugi, U., & Fischer, S. A comparison of sign language and spoken language: Rate and grammatical mechanisms. *Cognition*, 1972, *1*, 173-200.
- Bellugi, U., & Newkirk, D. Formal devices for creating new signs in American Sign Language. *Sign Language Studies*, 1981, *30*, 1-35.
- Caccamise, F., Ayers, R., Finch, K., & Mitchell, M. Signs and manual communication systems: Selection, standardization, and development. *American Annals of the Deaf*, 1978, *123*, 877-902.
- Caccamise, F., & Blasdel, R. Reception of sentences under oral-manual interpreted and simultaneous test conditions. *American Annals of the Deaf*, 1977, *122*, 414-421.
- Caccamise, F., Blasdel, R., & Bradley, C. The American Sign Language lexicon and guidelines for the standardization and development of technical signs. In F.C.C. Peng (Ed.), *Sign language and language acquisition in man and ape: New dimensions in comparative pedolinguistics*. Boulder, Co.: Westview Press, 1978.
- Caccamise, F., Dirst, R., DeVries, R., Heil, J., Kirchner, C., Kirchner, S., Rinaldi, A.M., &

- Stangarone, J. (Eds.), *Introduction to interpreting*. Silver Spring, Md.: Registry of Interpreters for the Deaf, 1980.
- Caccamise, F., Hatfield, N., & Brewer, L. Manual/simultaneous communication research: Results and implications. *American Annals of the Deaf*, 1978, 123, 803-823.
- Caccamise, F., & Johnson, D. Manual and simultaneous communication: Their role in rehabilitation with the adult deaf. *Journal of the Academy of Rehabilitative Audiology*, 1978, 11, 105-131.
- Caccamise, F., Newell, W., Mitchell-Caccamise, M., Naiman, P., Outermans, L., & Pocobello, D. *Technical signs manual 1: Project overview: Videotape and print materials for signs used in academic and career environments*. Bloomington, In.: Handicapped Learner Materials Distribution Center, Indiana University, 1980.
- Cromwell, R. Factors in the serial recall of names of acquaintances. *Journal of Abnormal and Social Psychology*, 1956, 53, 63-67.
- Cummings, A., & Goldstein, L. The effect of overt and covert responding on two kinds of learning tasks. In J.P. DeCecco (Ed.), *Education Technology—Readings in Programmed Instruction*. New York, N.Y.: Holt, Rinehart & Winston, 1962.
- Forman, J., & Caccamise, F. Some structural characteristics of American Sign Language. In F. Caccamise, J. Stangarone, & M. Mitchell-Caccamise (Eds.), *Interpreting potpourri: A focus on a variety of interpreting skills*. Silver Spring, Md.: Registry of Interpreters for the Deaf, 1979.
- Frishberg, N. Arbitrariness and iconicity: Historical change in American Sign Language. *Language*, 1975, 51, 696-719.
- Frishberg, N., & Gough, B. Time on our hands. Paper presented at the 3rd Annual California Linguistics Association Meeting, Stanford University, Palo Alto, Ca., May, 1973.
- Jaspen, N. *Effects on training of experimental film variables Study II: Verbalization, "how it works," nomenclature, audience participation, and succinct treatment*. Port Washington, N.Y.: U.S. Naval Training Device Center, Office of Naval Research, Tech. Report No. SDC 269-7-11, March, 1950.
- Johnson, D., & Crandell, K. The adult deaf client in rehabilitation. In J. Alpiner (Ed.), *Handbook of adult rehabilitative audiology* (Rev. 2nd ed.). Baltimore, Md.: Williams & Wilkins, 1981.
- Klima, E., & Bellugi, U. *The signs of language*. Cambridge, Ma.: Harvard University Press, 1979.
- Klopping, H. Language understanding of deaf students under three auditory-visual stimulus conditions. *American Annals of the Deaf*, 1972, 117, 389-396.
- Lane, H., Boyes-Braem, P., & Bellugi, U. Preliminaries to a distinctive feature analysis of American Sign Language. *Cognitive Psychology*, 1976, 8, 263-289.
- Liddell, S. Non-manual signals and relative clauses in American Sign Language. In P. Siple (Ed.), *Understanding language through sign language research*. New York, N.Y.: Academic Press, 1978.
- Liddell, S. Non-manual signals in American Sign Language: A many layered system. In W. Stokoe (Ed.), *Proceedings of the First National Symposium on Sign Language Research and Teaching*. Silver Spring, Md.: National Association of the Deaf, 1980, 193-227.
- Merrill, M. Paradigms for psychomotor instruction. In M. Merrill (Ed.), *Instructional design readings*. Englewood Cliffs, N.J.: Prentice-Hall, 1971.
- Newell, W. A study of the ability of day-class deaf adolescents to comprehend factual information using four communication modalities. *American Annals of the Deaf*, 1978, 123, 558-562.
- Newell, W., Caccamise, F., & Mitchell-Caccamise, M. Technical sign materials: Description, use, and benefits. In F. Caccamise, J. Stangarone, M. Mitchell-Caccamise, & E. Banner (Eds.), *A decade of interpreting awareness in a century of deaf awareness*. Silver Spring, Md.: Registry of Interpreters for the Deaf, 1980.
- Siple, P. (Ed.) *Understanding language through sign language research*. New York, N.Y.: Academic Press, 1978a.

- Siple, P. Visual constraints and the form of signs. *Sign Language Studies*, 1978b, 19, 95-110.
- Stokoe, W., Casterline, D., & Croneberg, G. *A dictionary of American Sign Language on linguistic principles*. Washington, D.C.: Gallaudet College Press, 1965. (Re-issued by Linstok Press, Silver Spring, Md., 1976).
- Stuckless, R. *An interpretive review of research on manual communication in the education of deaf children: Language development and information transmission*. Paper presented at a Seminar on the Place of Manual Communication in the Education of Deaf Children sponsored by the Royal Institute for the Deaf, London, England, 1975, April 11-14.
- Stungis, J.F. Practical application of a theoretical model to technical sign acceptability. In F. Caccamise & D. Hicks (Eds.), *Use of American Sign Language in a bilingual, bicultural context*. Silver Spring, Md.: National Association of the Deaf, 1980.
- Supalla, T., & Newport, E. Systems for modulating nouns and verbs in American Sign Language. In P. Siple (Ed.), *Understanding language through sign language research*. New York, N.Y.: Academic Press, 1978.
- Sutton, V. *SIGN WRITING for everyday use*. Newport Beach, Ca.: Sutton Movement Writing Press, 1981.
- Underwood, B., & Schultz, R. *Meaningfulness and verbal learning*. Philadelphia, Pa.: Lippincott Co., 1960.
- Wilbur, R. The linguistics of manual languages and manual systems. In L. Lloyd (Ed.), *Communication assessment and intervention strategies*. Baltimore, Md.: University Park Press, 1976.

APPENDIX A

SIGN GUIDELINES BASED ON THE AMERICAN SIGN LANGUAGE (ASL) LEXICON

Battison (1974, 1978); Lane, Boyes-Braem, and Bellugi (1976); Siple (1978a); and Stokoe, Casterline, and Croneberg (1965, 1976) have identified four major phonological parameters of ASL signs: (a) position; (b) handshape or configuration; (c) movement; and (d) orientation, which primarily refers to the directions of the palm and knuckles. Also, Battison (1978) has identified five basic *sign types* that represent conditions of possible combinations of these four parameters. These sign types are: (a) Type O signs which are one-handed signs articulated in free space without contact (e.g., LECTURE); (b) Type X signs which are one-handed signs that contact the body in any place except the opposite hand (e.g., APPLE, CHINESE); (c) Type 1 signs which are two-handed signs in which both hands are active and perform identical motor acts (the hands may or may not contact each other, they may or may not contact the body, and they may move together or with alternating movement, e.g., WHICH, PUT); (d) Type 2 signs which are two-handed signs in which one hand is active and one hand is passive, but both hands have the same handshape (e.g., SHORT, SIT); and (e) Type 3 signs which are two-handed signs in which one hand is active and one hand is passive, and the two hands have different handshapes (e.g., WRITE, GROW).

The guidelines discussed below are based on existing ways in which the four major phonological parameters are combined in ASL signs; i.e., they reflect phonological and morphological constraints that guide the development of signs for each of the *sign types* identified by Battison (1978). In application, therefore, these guidelines may be used to assess signs in terms of acceptable and unacceptable combinations of the four major parameters of ASL signs. Refinement of these guidelines and development of additional guidelines are expected as more is learned about sign language in general and the articulatory, perceptual, and sociolinguistic factors that impact on the structural characteristics of both manually coded English and ASL in particular.

1. *The Signing Space*. Signs generally fall within a particular signing space, bounded by

the top of the head and the area just above the waist, with the space towards the sides and front of the body involving a comfortable, but not fully extended, reach of the arms. The physical center of the signing space is the space in front of the hollow of the neck (Frishberg & Gough, 1973). It is important to recognize that for a variety of reasons signs may be made outside this general signing space (e.g., for theatrical signing, for platform signing, and for emphasis).

The mouth area is considered not to be within the general signing space. This is partly based on the fact that it has been consistently observed and reported by signers themselves that, when reading signs, people tend to watch the face area of the signer rather than the signer's hands per se. This agrees with the contention that facial expressions and lip movement (whether words are mouthed or spoken) are important parts of sign communication. Also, in making observations of historical changes in signs, Frishberg (1975) found that signs made in the mouth area tended to displace away from the mouth toward the sides of the mouth or the chin area. For example, the sign RED previously was made on the lips (and is still depicted that way in many sign books); however, many signers now make the sign lower, on the chin. An effort should be made not to obstruct the mouth area when signing (also, see guideline #II).

- II. *Signs and the Visual Center of the Signing Space.* The visual center of the signing space is the nose-mouth area (Siple, 1978b). Many signs are made in close proximity to this visual center, but signs are seldom made within this center.

In addition to what is presented in guideline #I, the logic for this is based on the following:

- A. Visual acuity is sharpest near the visual center of the signing space, becoming less sharp (clear) as you move toward the periphery or away from this visual center (Siple, 1978b).
- B. Research has shown that deaf and hard-of-hearing persons perform better on tests of receptive English communication skills when oral and manual communication modes are used together as opposed to either alone (Caccamise & Blasdel, 1977; Caccamise, Hatfield, & Brewer, 1978; Johnson & Crandall, 1981; Kloppling, 1972; Newell, 1978; Stuckless, 1975). If lip movement is contributing to this superiority of the combined oral-manual condition over either oral or manual alone, then blockage of the mouth area may reduce efficiency of communication.
- C. Recent research has suggested that the face and mouth areas are important for grammatical expression in ASL (Baker & Padden, 1978; Bellugi & Fischer, 1972; Liddell, 1978, 1980).

- III. *The Relationship of Sign Hand Position and Other Sign Parameters.* Signs made near the visual center of the signing space tend to have finer distinctions for all parameters than signs made in the periphery (Siple, 1978b). The probability of perceiving detailed information is greatest in areas of high acuity and in areas like the face which have a large number of visually distinguishable landmarks. Therefore, smaller motions and distinctions among signs are feasible in such areas (i.e., areas close to the visual center) as opposed to lower acuity areas (i.e., areas more peripheral to the visual center).

- IV. *Symmetry Condition.* In general, signs made near the visual center of the signing space involve the use of one hand, while signs made near the periphery tend to involve two hands having symmetrical handshapes, movements, positions, and orientations.

It is logical to expect that duplication of information through the use of two symmetrical handshapes, etc., is of greater importance for signs made in peripheral or low acuity areas, as opposed to signs made closer to the high acuity visual center area of signing. In fact, duplication involving the two hands in the high acuity face area is often

over-redundant (Frishberg, 1975).

Based on these facts it is suggested that:

- A. For signs made in the neck and face area, use one hand with the position toward the periphery for face area signs (also, see guideline #II).
- B. For signs made below the neck, use two hands having the same handshape. Also, the movements, positions, and orientations of the two hands should be symmetrical (Battison, 1974, 1978).

Movements are considered symmetrical if the hands have the same basic movement either in the same or in opposite directions.

Positions are considered symmetrical if the hands contact the same position or corresponding positions on halves of the body.

Orientations are considered symmetrical if the orientations of the hands are the same or are polar opposites (reciprocals).

V. *Dominance Condition.* For two-handed signs in which only one hand moves:

- A. The nonmoving (passive or nondominant) hand should have one of the seven neutral handshapes (1-A-S-B-C-5-O) or should have the same handshape as the moving (active or dominant) hand (Battison, 1974, 1978).
- B. When two or more such signs differ only in the handshape of one hand, this difference should occur in the moving hand. Logically, one would expect that for signs involving one moving and one nonmoving hand, the receiver would attend to the moving hand.

VI. *Number of Handshapes Per Sign* (Battison, 1978). Most signs in ASL (whether one-handed or two-handed) require only one handshape on each hand. However, some signs require that the handshape change during the articulation of the sign. For example, MILK is made in neutral space with one hand, and that hand closes from a C handshape to an S handshape (repeatedly); PRINT uses two handshapes, one with the thumb and forefinger separated and one in which they contact. What is important to note about these handshape-changing signs is that they all involve no more than two handshapes; there is no ASL sign which uses three or more handshapes. Undoubtedly, this has naturally evolved in order to limit the number of handshape discriminations necessary in the ASL lexicon. In view of such an absolute restriction found in the lexicon of this naturally developed sign language (i.e., ASL), it is recommended that no selected sign use more than two handshapes.

VII. *Signs Involving Contact.* Four major areas of "contact" in signs are the head, trunk, arm, and hand. Battison, Markowicz, and Woodward (1975) found that ASL signs are systematic in regard to the contacts in these areas, and this adds to the redundancy factor in signing which is necessary for efficient language reception.

Signs made with double contacts are made within the same major area (e.g., INDIAN has both contacts on the head, WE has both contacts on the trunk, etc.). The exceptions to this rule are signs that are historically derived from compounds and move from a contact in one major area to a second contact in another major area (e.g., REMEMBER, a compound derived from THINK + SEAL, contacts first the head area and then the opposite hand; DAUGHTER, derived from GIRL + BABY, contacts first the head and then the arm).

Therefore, it is recommended that signs having two contacts have both contacts within one of the four major areas previously listed; i.e., the head, trunk, arm, or hand.

VIII. *Semantically Related Signs.* Signs which are semantically related (i.e., related in meaning) are often related in terms of formation. "Semantically related" refers to those signs whose English glosses are approximately synonymous with one another and/or whose

English glosses have a conceptual relationship. For example, a change in handshape can change the meaning of the sign GROUP to CLASS, ASSOCIATION, or SOCIETY. All of these are semantically related in that each refers to a group or kind of group. Also, all are formationally related in that their corresponding signs have the same position, movement, and orientation with only handshapes distinguishing among them. Other examples of sign "families" include the gender families (MALE signs share the forehead position and FEMALE signs share the cheek/side of face position) and the feeling family (these signs share the "open 8" handshape; e.g., FEEL-SICK-EXCITED-DEPRESSED). For further discussion of this, see Caccamise, Newell, Mitchell-Caccamise, Naiman, and Outermans (1980). This relationship between semantics (meaning) and formation of signs is an example of internal structure at the morphological level (Frishberg, 1975). This type of structural relationship should be taken into account by those involved in sign collection, evaluation, selection, recording, and sharing.

IX. *Movement and Word Type: Noun-Verb Pairs.* Noun-verb sign pairs are defined as two signs (one a noun, one a verb) which have the same handshape, the same basic position, and the same or reciprocal orientation but differ in movement. Supalla and Newport (1978) studied the movement of 100 such sign pairs and reported that the nouns had restrained (short, repeated) movement while the verbs had hold or continuous movement. Examples of noun-verb sign pairs reported by Supalla and Newport include AIRPLANE-FLY, CHAIR-SIT, and FOOD-EAT. These findings should be considered in the selection of signs.

X. *Compound Signs.* Combining two or more signs to form compounds is a productive feature of ASL and certainly an acceptable process for forming new signs for technical vocabulary. There are two kinds of compounding, lexical and grammatical.

First, lexical sign compounds can be recognized as signs which are made up of several signs that become reduced. Thus, the sign for "fruit" in ASL is APPLE-ORANGE-BANANA-ETC., where assimilations occur between each of the signs and the individual signs for each fruit are articulated with shorter durations than when they are being listed individually. These compounds are also marked by the fact that the individual signs from which they are made do not necessarily define the complete semantic domain for the whole compound. That is to say, APPLE-ORANGE-BANANA-ETC., does not only refer to apples, oranges and bananas but to the whole set of fruit. As a matter of fact, APPLE-ORANGE-BANANA-ETC., can be used to exclude one of the component fruits listed as in the sentence YESTERDAY (ME) BUY APPLE-ORANGE-BANANA-ETC., BUT NO APPLE. In English this would mean 'Yesterday I bought some fruit but not apples.'

The second type of compounding is a very large category composed of many different kinds of constructions. Grammatical compounding is the concatenation (connecting together in series) of lexical elements to form a sign. Bellugi and Newkirk (1981) discussed the following examples of grammatical compounding in ASL: HEREDITY CHANGE for 'genetic engineering,' LETTER NUMBER for 'zip code,' and SIGNATURE RECTANGULAR for 'credit card' (= compounded). Another example of this type of compounding from signs collected at the National Technical Institute for the Deaf (NTID) is HEART STUDY for 'cardiology.'

Compounding is a highly productive strategy in ASL for representing concepts and should be considered before sign invention, including initialization. (See Bellugi & Newkirk, 1981, and Klima & Bellugi, 1979, pp. 198-242, for discussions of compounding and the development of new signs.

XI. *Iterations: Signs Having Single and Duplicated Execution.* Battison (1978) discussed

the iterations or number of executions or beats per ASL sign, defining execution as the production of the basic specified units of a sign—its position, handshape, movement, and orientation. A single execution or beat, therefore, is one complete cycle of a sign with no part of it being repeated. Battison stressed that there are signs that are limited to one execution or beat in unmarked contexts (singular form of a noun, etc.). Signs requiring at least two executions, however, have no absolute limit on their number of iterations; i.e., signs that must have more than one execution make no distinctions between two or more than two iterations.

Given the above, it is recommended that signs (in unmarked contexts):

- A. Be identified as single iteration indicated by single movement (sm) only when they *must* have sm.
- B. Be identified as duplicated iteration indicated by duplicated movement (dm) only when they *must* have dm.

Further, it is recommended that the specification of two movements being required for any sign (as opposed to three, four, or more) only be done after extensive support by skilled sign language users.

XII. *Handshapes of Signs*. Preliminary evidence suggests the following precautionary recommendations in relation to sign handshapes and initialization:

- A. Signs differing only in handshape should not have similar handshapes unless the signs are near the visual center of the signing space (see guidelines I, II, & III). Similar handshapes are defined as handshapes among which confusions are likely to occur in the reception/identification of signs. Similar handshapes may be identified as follows (based primarily on the work of Lane, Boyes-Braem, & Bellugi, 1976, and Stungis, 1980):
 - 1) Handshapes within the following three groups:
 - a. + *Compact Handshape Group* composed of handshapes having the middle three fingers bent or closed (X, M, N, baby O, O, C, baby C, E, A, S, T, Y, and I)
 - b. + *Broad Handshape Group* composed of handshapes having at least three fingers extended (5, 8, F, W, and B)
 - c. + *Index Handshape Group* composed of handshapes having one or two fully extended fingers one of which is always the index finger (V, 3, R, H, L, G, D, Index, and K).
 - 2) "*Adjacent*" handshapes on one of the following three *Extendedness Continua Handshape Groups*:
 - a. L, G (D, Index), X, baby O, A
 - b. B, C, O, E, A
 - c. 5, 8, Y, I, A
- B. Regardless of location, two signs of the same position and type may have the same or similar handshapes if their sign production has either contrastive movements or a contrastive difference or change in palm orientation.

APPENDIX B**TITLES FOR LISTS ON NTID TECHNICAL SIGN VOCABULARY
VIDEOTAPES AVAILABLE FOR SHARING**

Tape # & Technical Area	Titles for Lists on Each Tape
1A. Biology	<ul style="list-style-type: none"> a. General 1 b. Cell and Tissue 1 c. Genetics 1 d. Microbiology 1
2A. Business	<ul style="list-style-type: none"> a. General 1 b. Investments, Stocks, and Bonds c. Accounting 1 d. Accounting 2
3A. Communication	<ul style="list-style-type: none"> a. Unit 1: General b. Audiology 1 c. Audiology 2
4A. Engineering	<ul style="list-style-type: none"> a. Circuit Analysis 1 b. Circuit Analysis 2
5A. English	<ul style="list-style-type: none"> a. Unit 1 b. Unit 2 c. Unit 3: Reading & Writing Concepts
5B. English	<ul style="list-style-type: none"> a. Unit 4: Mechanics A b. Unit 5: Mechanics B & Media Equipment c. Unit 6: Affixes (Suffixes and Prefixes)
6A. Fine & Applied Arts	<ul style="list-style-type: none"> a. General Foundations 1 b. General Foundations 2 c. General Foundations 3
7A. Mathematics	<ul style="list-style-type: none"> a. Unit 1 b. Unit 2 c. Unit 3 d. Metrics 1
8A. Secretarial	<ul style="list-style-type: none"> a. General 1: Question Words and People b. General 2: Places c. General 3: Verbs
8B. Secretarial	<ul style="list-style-type: none"> a. General 4: Office Forms and Supplies b. General 5: Office Equipment and Numbers c. General 6: Time d. General 7: Miscellaneous

APPENDIX C

TECHNICAL SIGN VOCABULARY FOR NTID COMMUNICATION AND
ENGLISH TECHNICAL SIGN VOCABULARY VIDEOTAPES AND MANUALS

TAPE 3A

COMMUNICATION: UNIT 1: GENERAL

Communication and Language

1. communication
2. expressive (sm)
3. receptive (sm)
4. sender (sm)
5. information (sm)
- 6A. feedback (communication)
- 6B. feedback (communication) (dm)
7. mode (fs)
8. read
9. write
10. fingerspell
11. sign language
- 12A,B. simultaneous communication
13. speech
- 14A,B. speech therapy
15. speechread, lipread (dm)
16. auditory training
17. language (sm)
18. English (sm)
- 19A. American Sign Language
- 19B. American Sign Language (abbr)
20. Ameslan (sm)
21. verbal

People

22. hearing impaired
- 23A,B. deaf (sm)
24. hard-of-hearing (sm)
25. hearing person (sm)

COMMUNICATION: AUDIOLOGY 1

Hearing Testing

- 1A. audiology
- 1B. audiology (dm)
2. audiogram (sm)
3. earphones, headphones (sm)
4. listen (sm)
5. hear (sm)
6. test (sm)
7. loss (sm)
8. hearing impairment (sm)
9. level (sm)
10. evaluation
11. average (dm)
12. pure tone average (abbr)

13. threshold (fs)
14. speech reception threshold (abbr)
15. speech awareness threshold (abbr)
16. speech discrimination
- 17A. most comfortable listening level (sm)
- 17B. most comfortable listening level (abbr)
- 18A. uncomfortable listening level (sm)
- 18B. uncomfortable listening level (abbr)

Hearing Aids

19. hearing aid (general) (dm)
20. hearing aid (body) (sm)
21. hearing aid (ear level) (sm)
22. battery (dm)
23. cord (sm)
24. microphone (abbr)
25. amplifier
26. feedback (dm)
27. receiver (fs)
28. earmold
29. impression (earmold) (sm)

COMMUNICATION: AUDIOLOGY 2

Sound

1. sound
2. intensity (sm)
3. soft (dm)
4. loud
5. frequency (sm)
6. pitch (fs)
7. tone (fs)

Hearing Loss: Degree

8. degree, amount (sm)
9. normal (sm)
10. abnormal (sm)
11. mild (fs)
12. moderate (fs)
13. severe (sm)
14. profound (fs)

Hearing Loss: Type and Location

15. type (sm)

16. conductive (fs)
17. sensorineural (abbr)
18. central (sm)
19. functional (dm)
20. location (sm)
21. external ear
22. middle ear (sm)
23. inner ear (sm)
24. cochlea (fs)

Age of Onset

25. congenital (sm)
26. adventitious (sm)
27. prelingual (sm)
28. postlingual (sm)

TAPE 3B (in preparation)**COMMUNICATION: SPEECH
PATHOLOGY 1****General**

1. articulation (abbr)
2. pronounce (sm)
3. pronunciation (sm)
4. spell (sm)
5. spelling
6. letter (sm)
7. word (sm)

Speech Dynamics

8. dynamic (fs)
9. air (fs)
10. flow (sm)
11. force (sm)
12. pressure (sm)
13. vibrate (dm)
14. rhythm (dm)

**COMMUNICATION: SPEECH
PATHOLOGY 2****Voice Characteristics**

1. voice (sm)
2. characteristic (sm)
3. smooth (sm)
4. stress (sm)
5. high pitch (sm)
6. low pitch (sm)
7. inflection (sm)
8. monotone (sm)
9. tense (sm)
10. breathy (dm)
11. hoarse (sm)

**COMMUNICATION: SPEECH
PATHOLOGY 3****Speech Sounds**

1. speech sound (sm)
2. phoneme (fs)
3. target (sound) (sm)
4. syllable (sm)
5. consonant (fs)
6. vowel (fs)
7. diphthong (fs)
8. blend (sm)

Features of Speech Sounds

9. feature (fs)
10. voiced (sound)
11. voiceless (sound) (sm)
12. cognate (fs)
13. stop (sm)
14. plosive (sm)
15. fricative (sm)
16. nasal (dm)
17. front (of mouth) (sm)
18. back (of mouth) (sm)

TAPE 5A**ENGLISH: UNIT 1**

1. English (sm)
2. grammar (sm)
3. language (sm)
4. linguistics (sm)
5. word (sm)
6. letter (alphabet) (sm)
7. vocabulary (sm)
8. verb (sm)
9. idiom (sm)
10. clause (sm)
11. paraphrase (sm)
12. command (sm)
13. sentence (sm)
- 14A,B. structure
(composition) (sm)
15. newspaper (dm)
16. noun (fs)
17. adjective (abbr)
18. adverb (abbr)
19. preposition (abbr)
20. conjunction (abbr)

ENGLISH: UNIT 2

1. paragraph (sm)
- 2A,B. chapter (sm)
3. composition (sm)
4. essay (sm)
5. organization (plan) (sm)
6. article (magazine) (sm)
7. topic (sentence) (fs)
8. topic, title (sm)

9. quote (sm)
10. report (verb) (sm)
11. book (sm)
12. dictionary (dm)
13. encyclopedia (dm)
- 14A. story (sm)
- 14B. story (dm)
15. magazine (sm)
16. literature (abbr)
17. library
18. drama, play (dm)
19. comedy (sm)
20. tragedy (sm)
21. myth (dm)
22. fiction (dm)
23. fantasy (dm)
24. satire (sm)
25. character, characteristic (person) (sm)
26. character (play) (sm)

**ENGLISH: UNIT 3:
READING & WRITING CONCEPTS**

General Concepts

- 1A,B. general (sm)
- 2A,B,C. specific (sm)
3. concrete (sm)
4. abstract (idea) (sm)
5. creative (sm)
6. logic
7. present (time) (sm)
8. past (time) (sm)
9. future (sm)

Reading Concepts

10. judgment (sm)
11. interpretation (sm)
12. inference (fs)
13. main idea (sm)
14. comprehension (sm)
15. conclusion (sm)
16. climax (sm)
17. conflict (sm)

Writing Concepts

18. précis (fs)
19. summary (sm)
20. description (sm)
21. definition (sm)
22. comparison
23. explanation (sm)
24. analysis (dm)
25. controlling idea (sm)
26. example (sm)

TAPE 5B

**ENGLISH: UNIT 4: MECHANICS A
SENTENCES**

1. simple sentence (sm)
2. complex (sentence) (fs)
3. compound (sentence) (fs)

General

4. infinitive (abbr)
5. singular (sm)
6. plural (dm)
7. clause (sm)
8. independent (sm)
9. dependent (sm)
10. coordination (sm)
11. transition (sm)
12. tense (time) (sm)
13. past participle (sm/abbr)
14. present participle (sm/abbr)
15. punctuation (sm)
16. subordination (fs)
17. capital (letter) (sm)
18. subjective (fs)
19. objective (factual) (fs)
20. fact (sm)
21. opinion
22. contrast, opposite (sm)
23. outline (fs)
24. modify (sm)
25. phrase (sm)

ENGLISH: UNIT 5:

MECHANICS B & MEDIA EQUIPMENT

Mechanics Part B

1. introduction (sm)
2. body (of composition) (fs)
3. plot (fs)
4. main plot (sm/fs)
5. subplot (fs)
6. narrative (sm)
7. dialogue (literary) (dm)
8. dialogue (general) (dm)
9. agreement (of verb) (sm)
10. separable verb (sm)
11. inseparable verb (sm)
12. transitive (abbr)
13. intransitive (abbr)
14. active (verb)
15. passive (fs)
16. agentless passive (fs)
17. article (a, an, the) (fs)
18. subject (of sentence) (abbr)
19. object (abbr)

20. agent (sm)
21. focus (main idea) (sm)

Media Equipment

22. transparency (sm)
23. slide projector (sm)
24. overhead projector (sm)
25. slides (dm)
26. film (dm)
27. videotape (sm)

ENGLISH: UNIT 6:**AFFIXES (SUFFIXES & PREFIXES)****Noun Suffixes**

1. -er, -or, -ist, -ian, etc., (person; e.g., writer, painter) (sm)
2. -ion, -tion (e.g., discussion, description) (sm)
3. -ment (e.g., development, agreement) (sm)
4. -ness (e.g., slowness, happiness) (sm)
5. -s (regular plural; e.g., writers, books)
6. -reduplication (irregular plural; e.g., children)

Verb Suffixes

7. -ed, -d (regular past; e.g., discussed, agreed)

8. -(irregular and regular past); e.g., wrote, read) (sm)
9. -ing (progressive; e.g., writing, reading) (sm)
10. -en (past participle; e.g., written, taken)
11. -s, -es (third person singular; e.g., agrees, discusses)

Noun-Verb Suffix

12. -'s (possessive, contraction; e.g., writer's, what's) (sm)

Adjective Suffixes

13. -er (comparative; e.g., slower, happier) (sm)
14. -est (superlative; e.g., slowest, happiest) (sm)
15. -able, -ible (e.g., agreeable, collectible) (sm)
16. -ly (e.g., slowly, neatly) (fs)

Prefixes

17. pre- (e.g., pre-test, prearrange) (sm)
18. post- (e.g., post-test, post-war) (sm)
19. un-, im-, in-, ir-,dis- (negativizers; e.g., unhappy, impossible, inactive, irresponsible, dishonest) (sm)

APPENDIX D**AUDIOLOGY SENTENCE VIDEOTAPES PRODUCED AT NTID
(IN PREPARATION)****AUDIOLOGY SENTENCES 1: INTRODUCTION AND HISTORY TAKING, LIST A**

1. Hello, My name is _____
2. I am an audiologist.
3. Today I will test your hearing.
4. First, I need to ask you some questions.
5. When were you born?
6. How did you lose your hearing?
7. How did your parents find out you were deaf?
8. How old were you?
9. Are other people in your family deaf or hard-of-hearing?
10. Have you had any surgery for your hearing loss?
11. Have you taken any medicine for your ears?
12. Do you have other problems related to your hearing loss?
13. For example, dizziness?

AUDIOLOGY SENTENCES 2: INTRODUCTION AND HISTORY TAKING, LIST B

1. Where did you go to school?
2. Were you in special classes or regular classes?
3. How did your teachers communicate with you?
4. How do you prefer to communicate?
5. When did you get your first hearing aid?
6. Which ear(s)?
7. Do you still wear your hearing aid?
8. Why did you stop using a hearing aid?
9. Are you satisfied with your hearing aid?
10. Is your hearing aid working properly?
11. Do you have feedback from your hearing aid?
12. How old is your earmold?
13. What other information should I know about your hearing?
14. Now we will start the hearing tests.
15. Please give me your hearing aid.
16. After we finish the testing, we will discuss the results.

AUDIOLOGY SENTENCES 3: OTO-ADMITTANCE AND PURE-TONE TESTING**Oto-Admittance Testing**

1. This test tells me how your eardrum and middle ear are working.
2. Please relax and sit very still.
3. Please do not open your mouth, swallow, or talk.
4. First, I will look in your ear.
5. I will put a small tip in your ear.
6. You will feel a change in pressure.
7. As the pressure changes, your eardrum will move.
8. This machine will tell me if your eardrum is moving normally.

Pure-Tone Testing

9. Listen carefully.
10. You will hear some very soft tones or beeps.
11. You may also hear some loud tones.
12. Each time you hear the tone, push the button.
13. Remember, some of the tones will be very soft.
14. Do you hear any ringing in your ears?
15. Now I will put the headphones on you.

AUDIOLOGY SENTENCES 4: MCL AND UCL TESTING**Most Comfortable Listening Level (MCL)**

1. Now you will listen to speech.
2. Each time you hear speech, raise your hand.
3. Listen and tell me when the voice is most comfortable and clear for you.
4. Not too loud, not too soft.
5. The level at which it is best for you to listen and understand speech.

Uncomfortable Listening Level (UCL)

6. Listen and tell me when the voice is uncomfortable for you.

7. The voice will become louder.
8. Tell me when it starts to bother you.
9. What happens?
10. Do your eyes move back and forth?

AUDIOLOGY SENTENCES 5: SPEECH RECEPTION THRESHOLD (SRT) TESTING

1. Please put your hearing aid (ear-level) on.
2. The man's voice will stay on one level.
3. Adjust the volume of your hearing aid so that the man's voice is comfortable for you.
4. Now you will listen to some two-syllable words.
5. For example, hot dog, sunset, and baseball.
6. See the box?
7. First you will practice the words.
8. Push the button after each word.
9. The words will be in order, starting with baseball.
10. Now the words will be mixed up.
11. You decide which word you heard and push the button.
12. The words will become softer and softer.
13. Now you will listen to pairs of words.
14. For example, you will hear "baseball-baseball," or "sunset-baseball."
15. If you think the words sound the same, push "same."
16. If you think the words sound different, push "different."

AUDIOLOGY SENTENCES 6: SENTENCE TESTING

1. Now you will listen to sentences.
2. Each sentence will be said once.
3. Write what you think the person said.
4. If you are not sure, please guess.
5. If you can only understand one word, write that word.
6. Write what you do understand.
7. Try to fill in the blanks.
8. Do your best.
9. The man speaks quickly.
10. There are no practice sentences.

AUDIOLOGY SENTENCES 7: EXPLAINING TEST RESULTS, LIST A

1. This is an audiogram.
2. Have you seen an audiogram?
3. Do you know what it means?
4. Can you explain it to me?
5. Across the top are the different frequencies or pitches.
6. Down this side is the intensity or loudness.
7. When I put the two together, I know how loud I had to make each frequency so you could hear it.
8. We do not use percent hearing loss.
9. Your average hearing loss is 90dB.
10. "dB," or "decibel," is the unit of measure for hearing loss.
11. It is important to know how much speech you can understand when you are only listening, not speechreading and listening together.
12. You can understand some two-syllable words.

13. You can understand 40% of the words in sentences.
14. That means you understand part of the message when you are listening only.
15. You really need to speechread and listen together to understand people.
16. You cannot understand same/different.

AUDIOLOGY SENTENCES 8: EXPLAINING TEST RESULTS, LIST B

1. Your hearing aid seems to be working fine.
2. You can understand speech well.
3. We have a special course for people who use a hearing aid and can understand speech.
4. This course is called Auditory Training.
5. In Auditory Training, you practice and improve your listening skills.
6. We have a special course for people who have not used a hearing aid before.
7. This course is called Orientation to Hearing Aids, OHA.
8. In OHA you have the opportunity to learn about hearing aids and to try new hearing aids.
9. Your hearing aid is not working well.
10. You need a hearing aid evaluation.
11. You need a new earmold.
12. You need to have your hearing aid repaired.
13. Do you know where the Hearing Aid Shop is?

APPENDIX E

USE OF TECHNICAL SIGNS AND FINGERSPELLING IN ACADEMIC SETTINGS

Frank Caccamise, Peggy Quinsland, Mary Lou Basile, and Paul Menkis
(from Caccamise, Dirst, DeVries, Heil, Kirchner, Kirchner,
Rinaldi, & Stangarone, Eds., 1980)

1. *Importance of Context and All Modes of Communication:* When introducing unfamiliar technical vocabulary, the unfamiliar word(s) should be spoken, signed (if there is a sign), fingerspelled, written, illustrated, explained, mimed, and related in meaning or concept to familiar vocabulary. Remember, fingerspelling or signing an unfamiliar word or concept does not guarantee that the student understands the meaning any more than you will know the meaning of an unfamiliar spoken or written word just because you hear or see it.
2. *Meaning/Concept Base of Signs:* The meaning or concept base of signs should be maintained. Do not try to always use strict English word-for-sign equivalents. Be aware of the meaning or referent of the sign; e.g., to *get* sick vs. to *get* a new car (using the same sign for these two meanings may cause confusion in communication).
3. *Synonyms:* Remember, the same sign can be used to represent more than one English word. Therefore, when you encounter a word for which you think you do not have a sign, a sign expressing a similar meaning may be used; e.g., the sign "MEETING" can be used for "session, conference, seminar, and convention." Expanding your sign vocabulary means three things: (a) acquiring new signs; (b) applying familiar signs to English synonyms; and (c) modulating base signs according to context and meaning.
4. *Fingerspelling:* Fingerspelling is an art that is to be encouraged. There is no need to have signs for all words, but remember that fingerspelling is a difficult skill for some people to master, especially reception of fingerspelling. This is true for hearing, deaf, and hard-of-hearing people. It may be helpful to practice commonly fingerspelled words to build up speed. (See also #5)
5. *Use of Fingerspelling and Signs Together:* It is often desirable for a fingerspelled word to be

accompanied by a sign so that both the specific English word and the general concept are presented. This fingerspelling-sign relationship can be accomplished in two ways: either the finger-spelled word is presented first, followed by the sign, or the general meaning is signed first with the fingerspelled word following. The connection between the two should be maintained the first few times the new word is presented. Then gradually the fingerspelled word or the sign can be dropped. It may be helpful to think of this technique in the same way one introduces an acronym in a professional paper. That is, the first two or three times the acronym appears in parentheses following the name for which it stands. Later, the longer name is phased out and the acronym is used in isolation.

6. *Learning from Students*: Students can be an excellent source of information for the *right ways* and *different ways* to manually communicate information. Naturally, the manual communication skills, American Sign Language skills, English language skills, and communication/language backgrounds of the students need to be considered. Some caution is necessary here. Students who have good manual communication skills may give you misinformation about the appropriate ways information may be signed. There are three primary reasons for this: (a) the student may have recently learned signs, and s/he may sometimes sign too strictly according to English pronunciation and/or spelling rather than meaning; (b) the student may not understand the specific meaning of the word or phrase you wish to communicate; and (c) some fluent signers are not *aware* of the grammar or lexicon of their own "sign language" although they use it quite well. This is true of many users of any language; e.g., although the average American communicates fluently in English, s/he would find it most difficult to explain even many of the basic characteristics of this language. Therefore, it is important that you thoroughly understand the communication and language skills of your students and that you clearly explain the meaning of what you wish to communicate. Generally, it is a good idea to check signs with two or three students and staff members who are skilled signers.
7. *"Inventing" Signs*: Care should be taken in "inventing" new signs for instructional purposes (or any purpose!). Before considering sign invention, check with instructors, students, and interpreters in your area to see if the word or phrase you wish to express already has a generally accepted sign. The "artificial development" or invention of signs is not encouraged because of the confusion in communication that often results. Remember, fingerspelling is acceptable and encouraged. If you do believe a sign needs to be invented, please seek the assistance of skilled signers who have a knowledge of the structure of American Sign Language signs, functioning of the human visual system, and human manual expression capabilities. For further discussion of this, see F. Caccamise, R. Ayers, K. Finch, & M. Mitchell, "Signs and manual communication systems: Selection, standardization, and development," *American Annals of the Deaf*, 1978, 123 (7), 877-902.
8. *Note*: With all of the preceding, it is important to always use general principles of effective communication and instruction.