LISTENING HANDBOOK

Precision Programs Especially for the Hearing-Impaired

PART 1 of the Listening and Speech Package (LAS-PAC)

FREDERICK S. BERG

Part 1 of the Listening and Speech Training Package (LAS-PAC)

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Author's note: *Home-study course work in LAS-PAC, phonetics, and educational audiology is available through the Independent Study Division of Utah State University in Logan. Workshops in these professional areas may also be arranged by contacting the U.S.U. Department of Communicative Disorders.* Educational Audiology: Hearing and Speech Management, *published in 1976 by Grune & Stratton, provides additional background information for use with the* Listening Handbook *and* Speech Handbook.

PREFACE

Listening is defined as the perception of speech by use of audition, vision, and a combination of auditory and visual clues. Speech consists of the vocal, prosodic, and articulatory behavior of an individual. The *Listening Handbook* and companion *Speech Handbook* comprise the basic parts of the newly developed Listening and Speech Package (LAS-PAC). The LAS-PAC, which has been designed to extend and expand the spoken communication skills of hearing-impaired children and adults, is a powerful clinical tool in the hands of the knowledgeable and skilled clinician. It also provides practical and technically advanced text material for professional preparation.

The *Listening Handbook* includes background material, training guidelines, and stimuli and recording forms for a comprehensive core of data-based continuous-evaluation programs. Through an agreement with the author, the publisher grants clinicians permission to duplicate copies of the stimuli and recording forms for use with any number of clients. Copies for each client may be hole-punched and inserted in a loose-leaf workbook and thereby utilized for individualized listening management. If a client has a minimal number of speech errors, duplicated copies of needed stimuli and recording forms from the *Speech Handbook* may also be kept in the listening workbook of each client. In addition, the clinician may keep supplementary management material, clinical plans, and progress reports in there, too.

Copies of forms or reports can be duplicated for clinical filing, professional referrals, and home-training use. The notebook could then become the property of the client when he or she moves to another location where another clinician would be able to utilize the information it contains for a continuation of LAS/PAC listening management and purchase a copy of the *Listening Handbook* for procedural assistance and additional stimuli and recording forms.

An initial multidimensional listening test, located in the appendix of the *Listening Handbook,* may be administered to the client first. This test enables the clinician to determine the auditory (A), visual (V), and combined auditory–visual (AV) baselines of the client in the perception of isolated phonemes, words, sentences, and messages. Deficits in specific subtest areas reveal the types and amounts of A, V, and AV training or improvements needed.

When a client scores very low on a listening test or cannot respond to the items, he or she is in need of very basic training in perceiving speech. The closed-set listening programs of the *Listening Handbook* provide the needed training stimuli and recording forms. An extensive core of closed-set listening programs will enable the clinician to train a hearing-impaired client to perceive prosodic and phonetic stimuli, a prerequisite for open-set listening training.

A more difficult listening task is to try to decode a stimulus or message for which there are a great many options. Such open-set listening is particularly challenging to a hearing-impaired person who relies on fewer sensory clues than average for the decoding of speech. Included in the *Listening Handbook* are a great many open-set programs that assist hearing-impaired clients in extending and expanding their A, V, and AV speech perception skills. These programs require the client to learn to identify isolated phonemes, monosyllabic and polysyllabic words, sentences of increasing length, and messages containing more and more concepts.

Closed-set and open-set listening benefits clients with emerging language skills and mature linguistic competencies. Precedence is given to auditory training because of its unique capabilities for increasing the perception of speech. Visual communication training is also provided as necessary. A client is trained unisensorily and, if required, multisensorily, too.

To meet the additional demands of everyday listening, the client needs to practice decoding sentences under a series of carefully controlled situations that simulate real life. The *Listening Handbook* presents a model program of practice that includes a series of stages and intermediate steps. The critical listening variables are direction, distance, and signal-to-noise ratio, both alone and in combination. The simulated programming enables the clinician to predict how well the client can listen in face-to-face conversation, in group discussion, in a lecture hall, or over the telephone, and so on.

The *Listening Handbook* can, in addition, provide home-training programming for hearing-impaired children and adults. The clinician initially meets with the client and a parent or other helper and administers the Listening Test in order to determine the A, V, and AV training that the client needs. Then, selected workbook stimuli and recording forms are duplicated and hole-punched, sample training procedures demonstrated, and guidelines for everyday listening practice explained. Afterward the parent or helper administers listening programs to the client at home. The client and parent or helper return to the clinic for evaluation of progress and further assistance as the need arises.

Listening testing and training profiles can be obtained for clients served by a school, school district, or clinic. Such objective information is ammunition for professionals trying to influence administrators and legislators to support a needed reduction in case loads so that adequate time is available to assist hearing-impaired clients appropriately. The availability of the *Listening Handbook* and listening profiles can be important in designing and implementing individual educational programs.

CONTENTS

The culture in which we live rewards a good listener and discriminates against a poor one. Those who perceive speech effectively realize personal, social, and economic benefits that a poor listener does not. A continuing need exists to upgrade listening skills among our population. Technologies of our modern age can be utilized to assist in the accomplishment of this task.

The development of listening programming begins with a definition of terms. Broadly defined, listening is the decoding of any auditory stimulus, be it a train whistle, an orchestra playing, or a person speaking. Interpersonal listening, however, is restricted to the decoding of speech stimuli only. It is the skill focused upon in the LAS-PAC and, according to A. Ling (1974), utilizes different perceptual and memory strategies than does the decoding of nonspeech stimuli. The definition needs to be broadened to encompass the perception of speech through audition, vision (speechreading), or both in combination. We have all had the experience of having to look at a person in order to understand what was being said when the person was speaking from a distance or in the presence of noise.

Listening instruction may be defined as training in decoding speech by use of auditory clues, visual or speechreading clues, or a combination of both. It encompasses what is called auditory training, visual communication training or speechreading instruction, and combinations of the two. Listening training gives precedence to auditory training because auditory clues emanate from deep as well as surface vocal tract phenomena. In contrast, speechreading clues are limited almost entirely to articulatory activity in and around the mouth.

> When we listen under favorable conditions, the clues available are far in excess of what is actually needed for satisfactory recognition. Indeed, general context is often so compelling that we know positively what is going to be said even before we hear the words. This is why under normal conditions we understand speech with ease and certainty, despite the ambiguities of acoustic (auditory) clues. It is also the reason that intelligibility is maintained to such an astonishing extent, despite the variability of speakers, in the presence of noise and distortion. (Denes and Pinson, 1963, p. 146)

When people have hearing losses, they may continue to listen in face-to-face situations by relying more on visual clues but lose communicative contact with speakers they cannot see. If hearing loss stems from early life, a partial or complete loss of auditory clues will deleteriously affect their speech development also. For either of these reasons, auditory training is recommended. Clients need to be trained to be auditorially aware of the sounds they articulate, to discriminate between them, and to perceive them when produced by others (D. Ling, 1976). Wedenberg and Wedenberg (1970) advance another rationale for auditory training:

> In our opinion the natural synergism between hearing and the visual sense, which exists in

normal persons, is highly disturbed in these cases of impaired hearing. Approximately 90 percent of the conceptions of a person with completely normal senses are based upon the visual sense. The complete or partial loss of the auditory sense results in an even greater concentration on the other senses and an intensification of their use. The unimpaired visual sense appropriates the greater part of attention to the detriment of the impaired auditory sense. The residual hearing that exists is not rationally utilized. . . . Speechreading should not be extensively introduced until after the child has acquired the listening attitude (pp. 322–323).

Even when people do not have hearing losses, they may have listening problems. Deficiencies in decoding speech may be exhibited as inattention, perceptual confusion, or short memory span. Listening training is designed to contribute to the elimination or alleviation of these deleterious behaviors. The wife who complains that her husband is not listening or the teacher who says that a certain child is inattentive may find relief after listening training has been administered to the husband or the child.

Training a client to listen is facilitated when the clinician follows the principles of programmed instruction. Training proceeds in small, carefully programmed steps so that correct responses occur often and move systematically toward a desirable terminal response. The program for each client specifies stimuli, responses, consequences, and criteria.

Designing a program is exciting but difficult, demanding work. One must learn to think logically, to understand the smallest details of behavior being programmed, to apply carefully the principles of learning, and to engage tirelessly in the design-test-redesign sequence which eventually leads to a smoothly running effective program. (Costello, 1977, p. 25)

Individualized programming is feasible when extensive, carefully programmed stimuli and recording forms are readily available to the clinician. The stimuli and forms need to pinpoint small increments of progress in imitating sounds, words, and sentences and in comprehending speech messages. When clients have been trained to repeat words and sentences and to comprehend messages, they need controlled practice in using these skills in representative situations that simulate real life. Sanders (1971) suggests using a sequence of listening situations that systematically decreases the pool of auditory and visual clues.

Listening Training Studies

Instruction in listening may be traced to the beginning of the nineteenth century. In 1802, Itard devised specific training procedures to develop auditory awareness and discrimination. Later in the century, Urbantschitsch trained many hearing-impaired children to discriminate words and sentences through audition (Wedenberg, 1951). His approach called the Acoustic method, was introduced into the United States by Max Goldstein. The method focused upon reciprocal perception and production of speech stimuli (Goldstein, 1939).

Since 1939 the technology of listening instruction has become increasingly sophisticated. This developing technology underpins the listening management programming of the LAS-PAC. A series of 12 listening training studies exemplify the many technical features of sophisticated programming in decoding speech. These will first be described in chronological order, with features incorporated into instructional guidelines afterward.

1. Beginning in 1939, Wedenberg (1954) conducted a longitudinal study of auditory training with 36 preschool-age hearing-impaired children. He correlated audiometric data on clients with spectrographic information to hypothesize the consonants, vowels, and diphthongs that would be learned auditorially. He conditioned his clients to perceive and produce speech stimuli using a unisensory auditory approach. Even though his clients often had profound hearing impairment, many learned to speak, listen, and develop language skills through primary use of audition.

2. Kelly (1954, 1974) conducted 6-week remedial programs for school-age hard-of-hearing children that included daily auditory training. Speech stimuli were presented auditorially, children often responded through speech, and the clinician or other children provided feedback on the correctness of the responses. In addition, discrimination training between the error choice and the correct stimulus was provided. Speech perception scores improved an average of about 20 percent. The gains were revealed auditorially using alphabet letter sequences, words, and sentences similar to the training stimuli. Messages of different lengths were used to improve auditory memory span.

3. By the early 1960s, teaching personnel of the St. Joseph School for the Deaf in St. Louis incorporated listening training into their academic curriculum. The children had hearing losses between 75 dB and 110 dB. Initially, few children could understand any of the lesson stimuli auditorially. After training, many could discriminate the stimuli through audition, and many others were able to discriminate if visual clues were added. Speech perception gains were evidenced also by speech and language growth. Success in auditory training was generally correlated with amount of residual hearing (Hogan, 1961).

4. Later, Guberina (1969) developed successful auditory programming at a school for the hearing impaired in Zagreb, Yugoslavia. Bellefleur (1967) noted that the profoundly hearing-impaired children enrolled there generally had more natural-sounding speech than did students with similar hearing losses in American schools for the deaf. Guberina attributed the superiority of his students to daily auditory stimulation with hearing aid equipment that provided selective amplification to meet individual needs.

5. Bode and Oyer (1970) conducted a short-term auditory training experiment using 32 adults with mild sensorineural hearing loss. The auditory stimuli were monosyllabic words included in multiple-choice sets and in open-set format. The tasks increased in difficulty as a result of worsened signal noise (S/N) ratios or lowered signal intensities without regard to meeting criteria. Feedback on correctness of response was not provided until the end of a 25-minute training session. Subjects inhibited initial noise distractions by learning to concentrate selectively on training stimuli. The results revealed that subjects listening to stimuli 15 to 25 dB above speech reception thresholds (SRT) improved as much as those responding to signals 25 to 30 dB above SRTs. Subjects listening at 35 to 40 dB SRTs improved about half as much. The average discrimination change was 4.2 percent.

6. Individual and immediate feedback on correctness of response was featured in an auditory training experiment of Doehring and Ling (1971). Eight children with severe, severe-to-profound, and profound hearing losses discriminated vowels in word sets having three stimuli apiece, for example, *bin, bean, bone*. Optimal listening levels were individually determined beforehand. Testing, training, and retraining sessions were conducted in a sound-damped, distraction-free classroom. During a

3-month period the children improved steadily with practice. During training and retraining the proportion of correct responses increased, and the number of sessions required for meeting the criterion decreased. A "learning to learn" effect was noted from session to session. Generalization also occurred from the one speaker in the training series to another speaker employed during retraining. A 13-choice pretest and posttest was administered. Apparently the step from training tasks to the test was too large. The subjects did not reveal pre-posttest improvements. Holland (1967) noted that new material in programmed instruction must be introduced in small steps.

7. Larson (1972) conducted a 50-session, 10-week auditory training experiment with an 8-year old boy who had a 97-dB loss. Since the age of 2, the boy had been utilizing his residual hearing. He began training with 55 percent word discrimination on an open-set task. He spent 8 hours discriminating isolated phonemes in stimulus pairs and 10 hours identifying monosyllabic words in a five-choice format. Speech perception and speech production improved. The highest word-perception score was 77 percent. The best performance occurred when the subject received reinforcers in addition to feedback on correctness of response.

8. A listening training experiment was conducted by Berg (1972) on a young adult with an even greater hearing loss. Previously, this subject had been tested for both speech reception and speech discrimination in an audiometric test booth. He was unable to repeat any of the spondaic or phonetically balanced (PB) test stimuli. However, he could auditorially discriminate the number of syllables and simple stress patterns presented through a master hearing aid. During the experiment, three unisensory and four multisensory conditions were compared: auditory (A), facial meaning speechreading plus tactile speech clues (B), and electrovisual or video patterns (C) and the combinations of AB, AC, BC, and ABC. A training session included seven tasks and lasted approximately 45 minutes. Training sessions were held over a period of 6 weeks. The stimuli of each task were 36 consonants, vowels, and diphthongs critical to articulation. The experimenter articulated each stimulus, and the subject tried to repeat it.

The results revealed that the subject learned to discriminate each stimulus from each other stimulus under all unisensory and multisensory conditions. By the fourth session, he achieved essentially errorless responding. His responses under the auditory condition were relatively less reflexive for certain stimuli, particularly during earlier training sessions. Prior to the experiment, he had been trained to articulate the stimuli on target so that the experimenter could identify his speech responses. During sensory training, the subject also refined his articulation of certain vowels, diphthongs, and affricatives.

A major finding of this sensory training experiment was that the subject could identify auditorially isolated phonemes in a relatively open set of 36 items. Having discovered this, the experimenter then trained him with 30 consonant–vowel–consonant (CVC) words (Boothroyd, 1967). With less practice than before, the subject learned to reiterate the words also. The CVC words were similar in length and phonemic content to the auditory discrimination stimuli of the PB test originally administered during the hearing aid evaluation. In contrast to zero performance on initial PB word identification, however, the subject was able, on clinical retest, to repeat most of the items correctly. Six weeks later the subject was retested using the CVC stimuli and again reiterated most items correctly. Months later, he once more successfully repeated most CVC items.

The client also demonstrated, following listening training with phonemes and words, that he could repeat in sequence up to four words of a sentence with auditory input. If permitted to speechread also, he repeated additional words of a sentence but often out of order. The client had not mastered the morphosyntactic subsystems of language.

9. Prescott (1972) has developed a mediated auditory training program that requires a client to make a visual-motor response to sound. Sixty-four verbal, vocal, and nonvocal stimuli are incorporated into 40 acoustic puzzles or forced-choice tasks. Each puzzle includes three to eight pictures. A subject listens to a stimulus and responds by pointing to one of these pictures. Each auditory stimulus is a 4-second recording.

Prescott and Turtz (1975) have studied the progress of 55 young hearing-impaired children in learning to discriminate these stimuli through audition. Twenty-eight had hearing losses of 92 dB or greater, 16 had impairment of 70 to 88 dB, 5 had losses from 50 to 62 dB, and 6 had impairment from 30 to 48 dB. Training was continued until a client met criterion or failed to meet it. The criterion was 100 percent correct identification of auditory stimuli of a set or task for two consecutive presentations. Then the next of the 40 tasks was administered. This procedure was repeated for additional tasks or sets of signals. If clients did not meet the criterion on the first five tasks in eight successive sessions, they were considered to have failed. If clients reached the criterion on 10 or more successive tasks, they had succeeded. At this point they had identified a minimum of 16 different auditory stimuli in closed sets of four signals apiece. An observer recorded trials to criterion, error matrices, and response latency times.

All the clients with mild, moderate, and severe (to 88 dB) hearing losses were successful. Of the 28 clients with losses of 92 dB and greater, 10 succeeded. A few clients spent as long as 6 months to meet the criterion on the first task. Before training, one of these subjects had not responded to the human voice. Eventually this client identified all task voices except the bird. Such perceptual reorganization supports the findings of Gengel (1971), who reported that a quantum leap can occur in auditory perceptual learning. After training, a number of Prescott's clients responded for the first time to life situational analogs of the experimental stimuli.

The speed with which audiometric groups of subjects learned the auditory tasks varied exponentially with mean hearing threshold level. A child with a 100-dB loss learned four times slower than one with an 80-dB loss and eight times slower than one with a 50-dB hearing level. Given sufficient practice, this profoundly hearing-impaired client learned to identify speaker differences and broad outlines of acoustic correlates of emotions such as soothing, warning, and calling. Notwithstanding hearing loss among the clinical successes, stimulus generalization was reported among all such clients in one form or another.

10. Conkey (1973) has developed ten prescriptive programs of auditory training, beginning with recognition of presence of sound and ending with discrimination of acoustically similar words in 5-dB S/N ratios. Within a given program, Conkey specifies an overall behavioral objective and a series of more detailed steps or behavioral objectives. He also lists several additional instructions.

Conkey described the progress of one client using one of the ten programs. The clinician utilized a series of audio flashcards to present 15 spondaic words like *airplane* and *toothbrush*. The criterion for completion of the task was 90 percent correct responses for two consecutive blocks of items. The schedule of reinforcement shifted from 1:1 to 1:2 and 1:3 during training. The reinforcer was food. During 16 sessions the 15 stimuli were presented 21 times. The number of items correct during the first four presentations of all stimuli were six, three, five, and four. Between the tenth and fifteenth blocks, at least 14 of 15 items were discriminated. Up to this time, stimuli had been presented through earphones. When a wearable hearing aid was utilized instead, criterion was not met again until the twentieth and twenty-first blocks.

Two collaborators of Conkey, Peck (1975) and Smith (1975), have detailed procedures utilized in sentence and word discrimination programs, respectively. Peck, for example, specifies materials, details of stimulus presentation and of consequences, criterion levels for acceptable and unacceptable performance, a series of alternate or branching procedures, selection of stimuli, baseline procedures, and schedules of reinforcement. She also indicates the locations of visual correlates of the auditory stimuli within forced-choice sets.

In Peck's sentence program the overall objective is for clients to point to the printed form of each auditory stimulus five consecutive times. Before training, they must understand the meanings, signs or finger spelling, and words of the sentences. They use wearable hearing aids or auditory trainers. The clinician presents live rather than recorded stimuli at a signal level of at least 60 dB. She faces a client, covering her mouth only when presenting a target sentence. The client responds by pointing or repeating or imitating the utterance of the clinician.

Consequences for both correct and incorrect responses are detailed in the Peck program. When the client is correct, the aide communicates this and provides a reinforcer, following a predetermined schedule of reinforcement. If the client is wrong, the aide says and signs, "No, I said point to (sentence)." The client then repeats the trial. The aide also indicates correct and incorrect responses on the data sheet.

11. Brown (1974) has designed a four-stage, 18-step, program of listening instruction. The four stages are $S_1S_2S_3$, S_2S_3, S_3S_4, and S_5, respectively. S_1 is the graphemic or printed word condition; S_2 is speechreading; S_3 is auditory in quiet; S_4 is auditory in 26 dB S/N, 22 dB S/N, and 18 dB S/N; and S_5 is auditory in 14 dB S/N, 10 dB S/N, and 6 dB S/N. Within each stage or stimulus condition, clues are faded or noise is introduced in steps. The stimuli are 150 sentences selected from a pool of 600 developed by Magner (1972) of the Clarke School for the Deaf. Each sentence includes ten syllables.

The first stage includes six steps. Six sentences are used for each step. Printed words of sentences are faded 20 percent, 40 percent, 60 percent, 80 percent, or 100 percent from step 2 to step 6, respectively. Full speechreading and auditory clues are available throughout.

Five steps are included in the second stage. Six sentences are used for each step. In step 1, the clinician faces the client. In step 2, his face is turned at a 45-degree angle from front view. The facial angle is 60, 90, and 110 degrees for steps 3, 4, and 5, respectively. By the fifth or last step, the client cannot see the lips of the clinician. Thus the last step leaves only S_3 or auditory clues operative.

The third stage includes 12 sentences in each of four steps. S/N ratios of 26, 22, and 18 dB are introduced in steps 2, 3, and 4, respectively. The fourth stage similarly has 12 sentences for each of three steps: 14 dB S/N, 10 dB S/N, and 6 dB S/N, respectively. White noise is filtered 12 dB per octave above 1000 Hz. Its masking effects are similar to those of four persons speaking simultaneously (Viehweg, 1968).

During each of the four stages, the training format specifies the step, stimulus condition, stimuli, response instruction, consequence for correct and incorrect responses, schedule of reinforcement, criteria, and branches. The first step of the first stage, for example, indicates that full clues will be utilized and that six sentences will be used as $S_1S_2S_3$ stimuli. The client is to respond to each sentence presented by listening and lipreading it, reading it from a card, and repeating it aloud. If the client is correct, the "right" light of a cumulative response counter is turned on, and social reinforcement is provided. If the client is incorrect, the "wrong" light is turned on. The clinician also points to a sentence feedback chart to indicate the positions of omitted or incorrect words. The schedule of reinforcement is 100 percent. All six sentences have to be repeated correctly.

The sentence feedback chart devised by Brown is shaped like a ruler. It is subdivided by nine vertical lines into ten sections. The numbers 1 to 10 are successively placed at the top of each section. Thus sentences with up to ten words can be represented. If a part of a sentence is not repeated correctly, the serial locations of the word(s) in error can be identified by pointing. For example, in the sentence *Father got a long letter from a boy,* the client might repeat *Father got a letter* on the initial presentation. The clinician can then refer to the chart and say, "You got it right, except for omitting a word here (fourth space) and three words here (sixth, seventh, and eighth spaces)."

One of Brown's clients was a young female adult with a 60-dB loss and a 74 percent speech discrimination score. She moved through each stage without requiring a branch. She had most difficulty with the final step of the program. At this point, 12 sentences had to be presented 23 times under a 6-dB S/N ratio before she could repeat them correctly.

A second client was a young male adult with a 95-dB loss. Prior to training, he did not respond to PB words utilized during audiological testing. He progressed rapidly through the first stage but made many errors on the second one. He eventually completed it but did not progress into the auditory stages incorporating S/N ratios because of time constraints. He did, however, learn to repeat sentences auditorially during the fifth step of the second or auditory-speechreading stage.

12. Tobin (1975) has developed a sophisticated response device that provides immediate and detailed feedback of training information. A trial counter indicates the number of items that have been presented. A percent correct indicator provides a cumulative measure of progress on a program. As many as eight choices can be opposed on any one trial or as few as two in a minimal pair condition. Stimuli that are confused are displayed on an 8 x 8 matrix. A four-celled decision matrix provides a readout of confidence of response. The options are a hit, a miss, a false alarm, and a correct rejection. Tobin states that clients prefer to monitor their own progress and assess their own capabilities.

Instructional Guidelines

The effectiveness of listening management is dependent upon numerous instructional variables. Many guidelines have been identified in the review of the literature. Others of equal importance can be derived from other sources and clinical accounts.

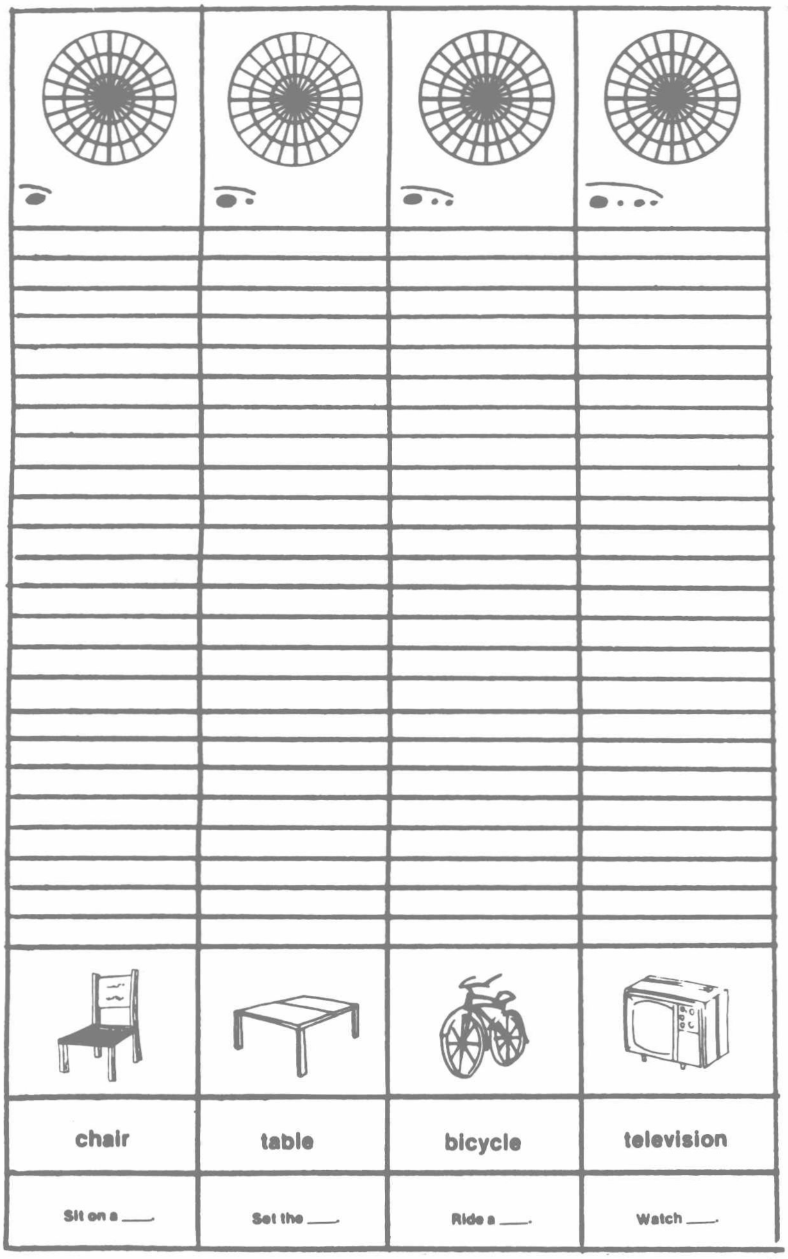

Figure 1 *Stimuli and recording form for first closed-set prosodic discrimination task*

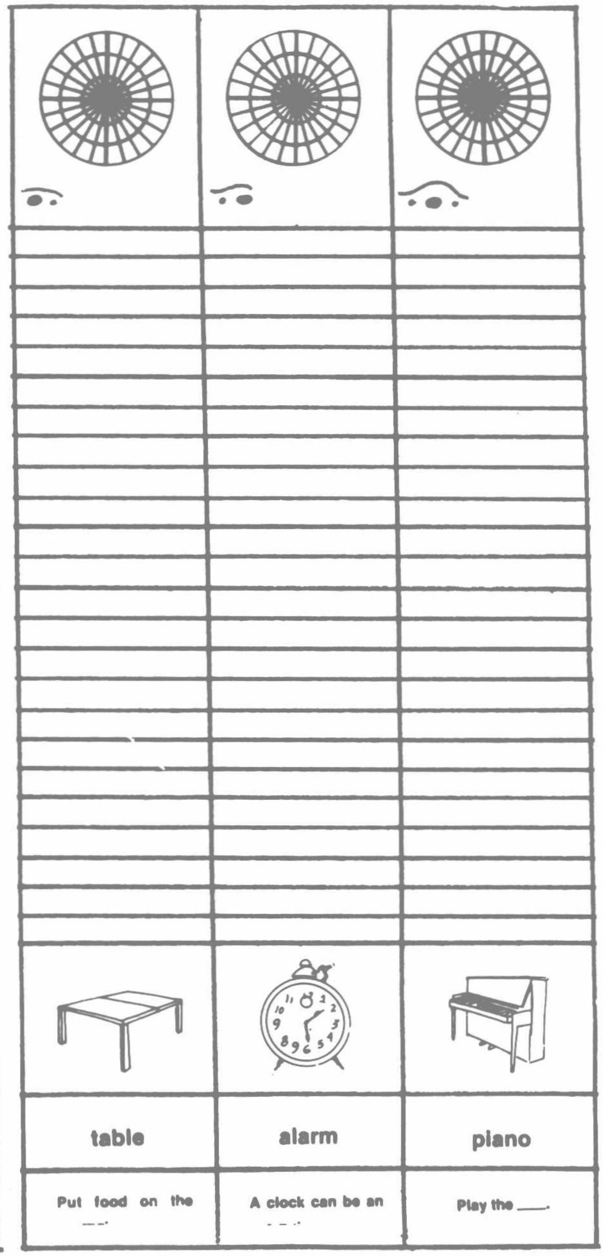

Figure 2 *Stimuli and recording form for second closed-set prosodic discrimination task*

Initially, a clinician should identify a client's baselines of auditory (A), visual (V), and AV listening. Stimulus options should include isolated phonemes, words, sentences, and messages. Whenever possible the stimuli should be within the linguistic repertoire of a client. With A, V, and AV baselines, the clinician can predict specific areas and extents of listening training needed.

When an auditory area of a client reveals that residual hearing exists, precedence should be given to auditory training but not to the exclusion of visual communication training and combined AV listening training. Audiometric data on a client should be correlated with spectrographic data to enable the clinician to hypothesize speech stimuli that may be identified auditorially. Auditory stimulation should meet individual needs through hearing aids that provide selective amplification. Optimal listening levels should be determined prior to training.

The training stimuli should be comprehensive, extensive, and loaded with prosodic and phonetic features of speech. The critical articulations should be included in lists of isolated phonemes and meaningful stimuli. Word lists should sample common prosodic patterns and the many phonetic contexts. Sentence lists and messages should incrementally increase in length and complexity.

The response options should include various closed-set and open-set formats. Regardless of the size of a response set, precedence should be given to speech responses. Whenever needed, speech

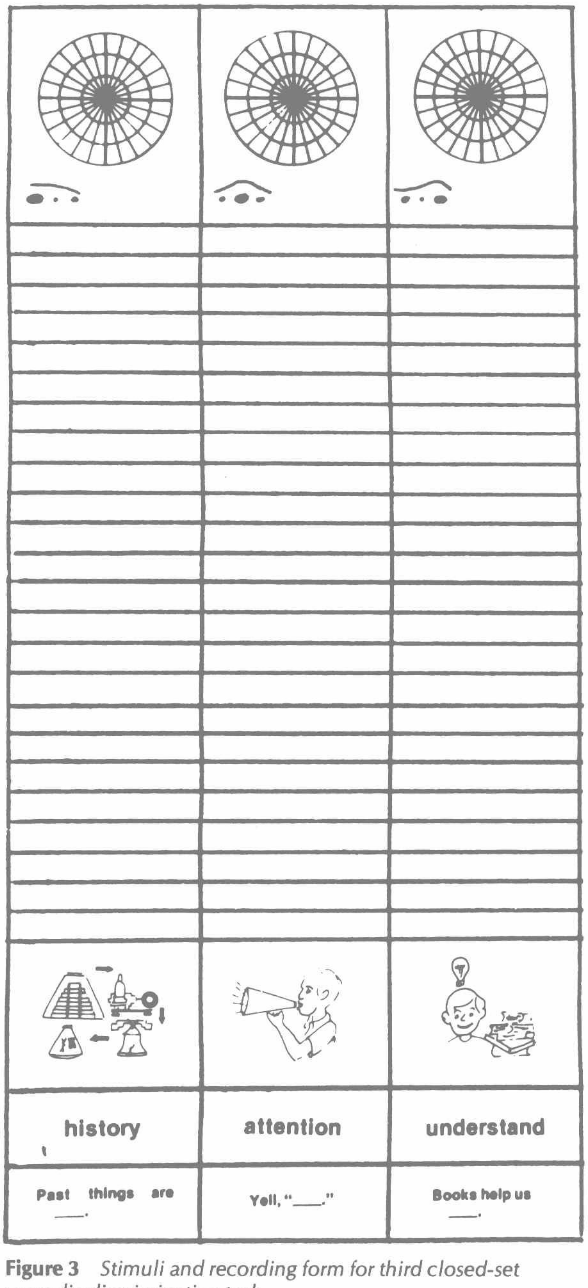

Figure 3 *Stimuli and recording form for third closed-set prosodic discrimination task*

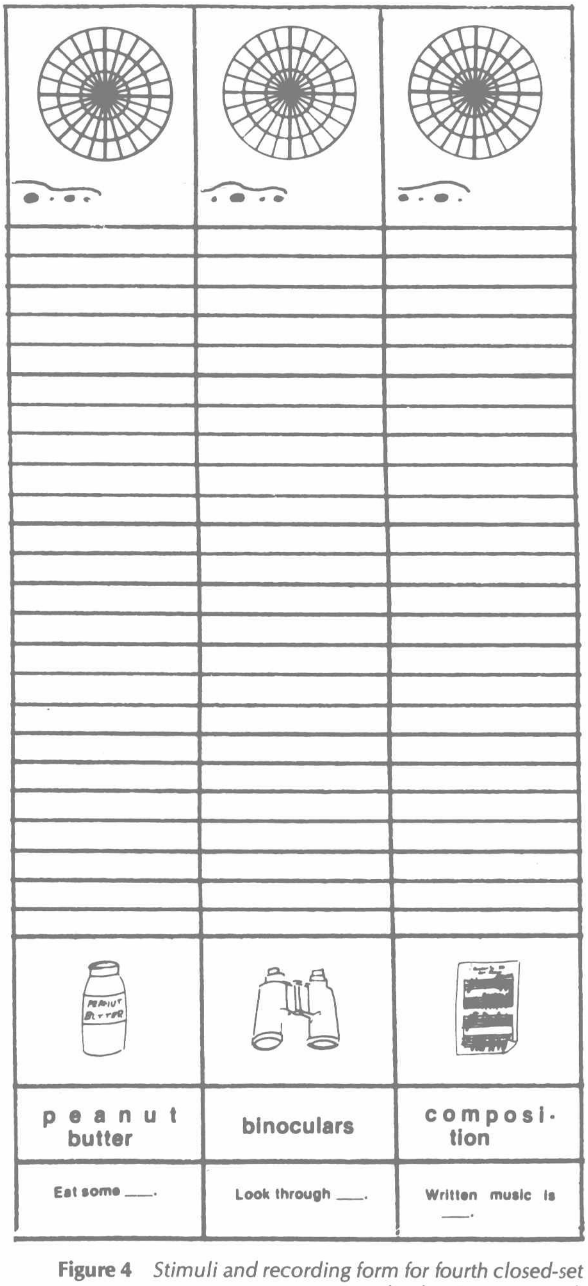

Figure 4 *Stimuli and recording form for fourth closed-set prosodic discrimination task*

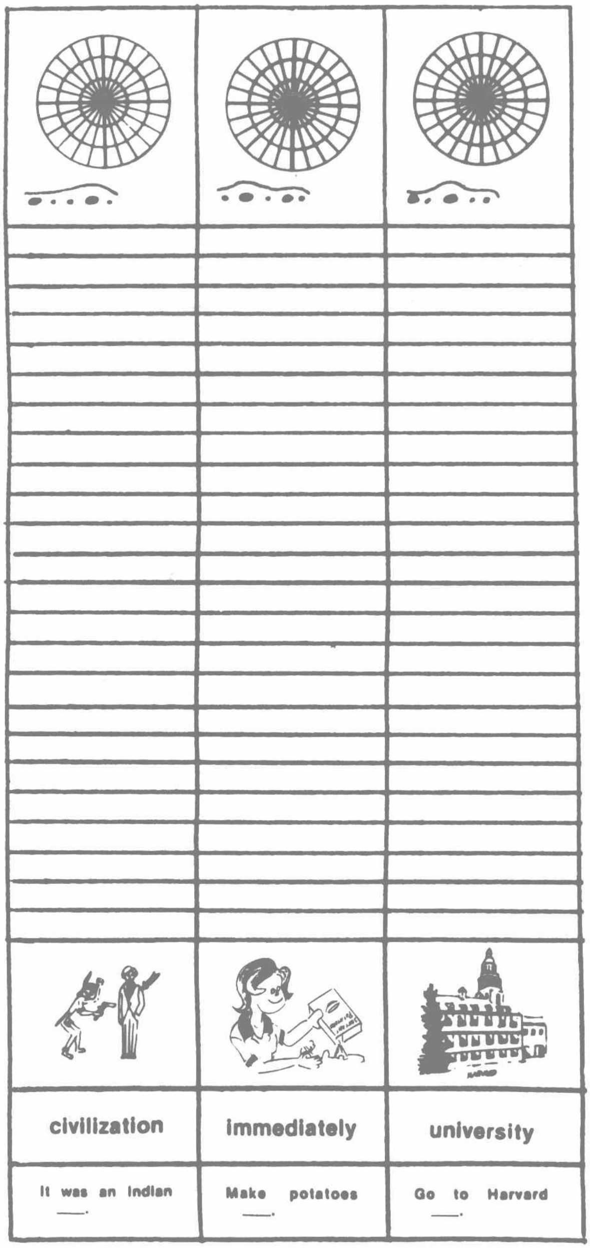

Figure 5 *Stimuli and recording form for fifth closed-set prosodic discrimination task*

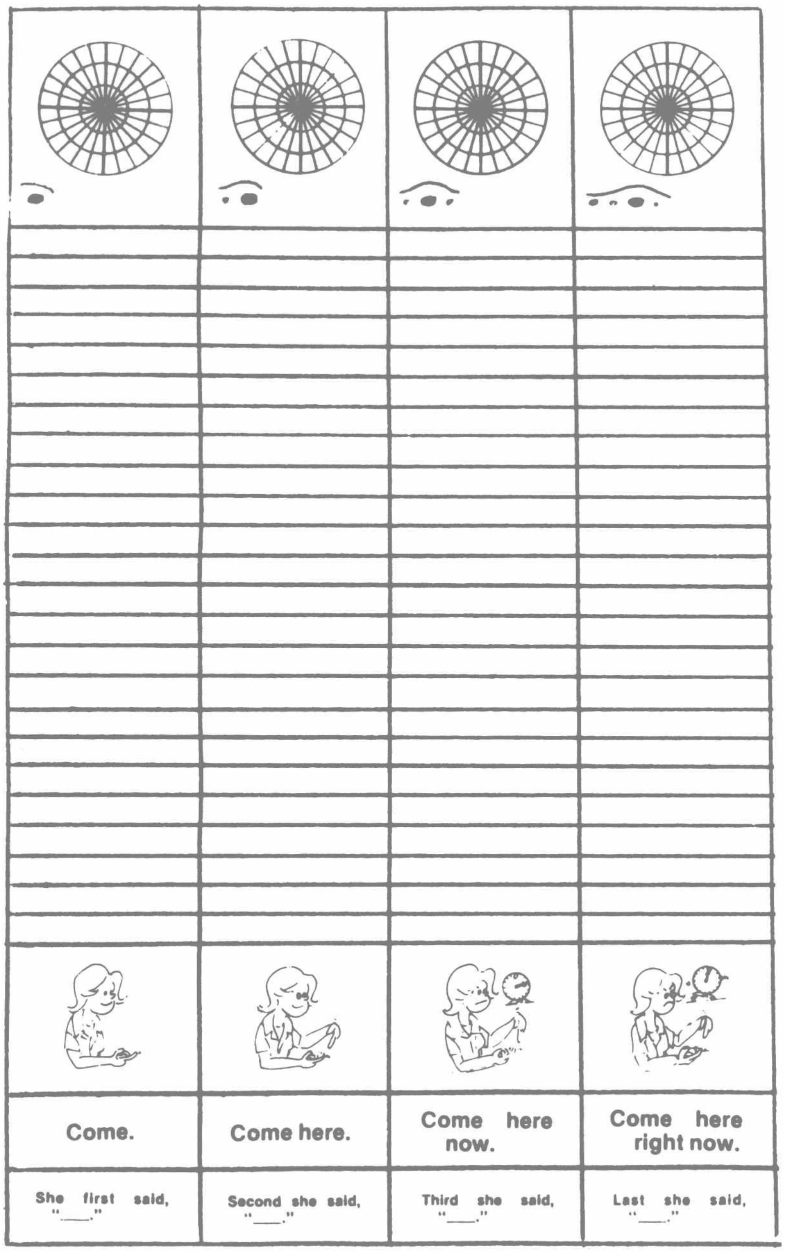

Figure 6 *Stimuli and recording form for sixth closed-set prosodic discrimination task*

training should accompany or even precede listening training so that the clinician can determine whether the client's spoken response to a listening task is accurate. Listening training and speech instruction are reciprocally related and mutually supportive.

The test and training environments should be closely controlled. The room should be sound-damped, free of distractions, optimally lighted, and sufficiently large. The clinician should be able to incrementally introduce competing noise and distraction stimuli.

Training should proceed from baseline measures in small, carefully programmed steps to desirable terminal responses. Stimulus materials, recording forms, and summarizing formats should be readily available to the clinician. Immediate and individualized feedback on correctness of responding should be provided. The client should participate in scoring and analyzing each series of responses and in planning each step of training.

Based upon listening test and preliminary training data, the clinician should design an individualized program for a client. Ordinarily, the program should include discrimination and imitation of isolated phonemes, words, and sentences; comprehension of concepts in messages; and listening practice in simulated real-life situations through control of distance, angle, and S/N ratio. Within each stage of a program design, the clinician should specify an overall behavioral objective and a series of more detailed steps or behavioral objectives. The clinician should also specify materials, details of stimulus presentation and of consequences, criterion levels, branching pro-

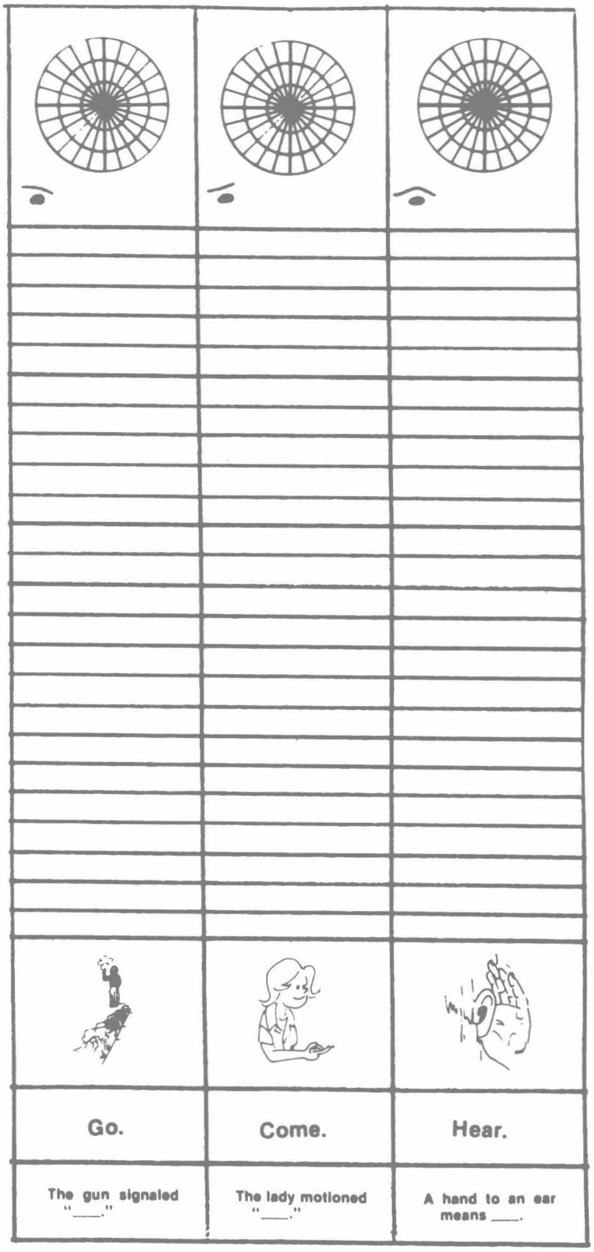

Figure 7 *Stimuli and recording form for seventh closed-set prosodic discrimination task*

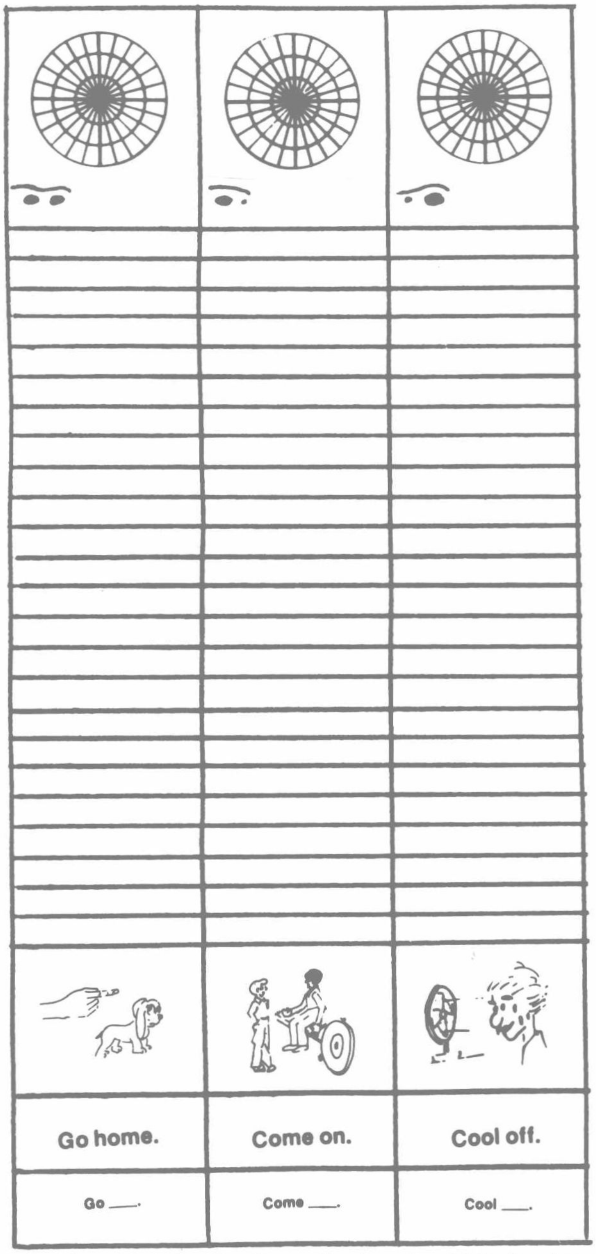

Figure 8 *Stimuli and recording form for eighth closed-set prosodic discrimination task*

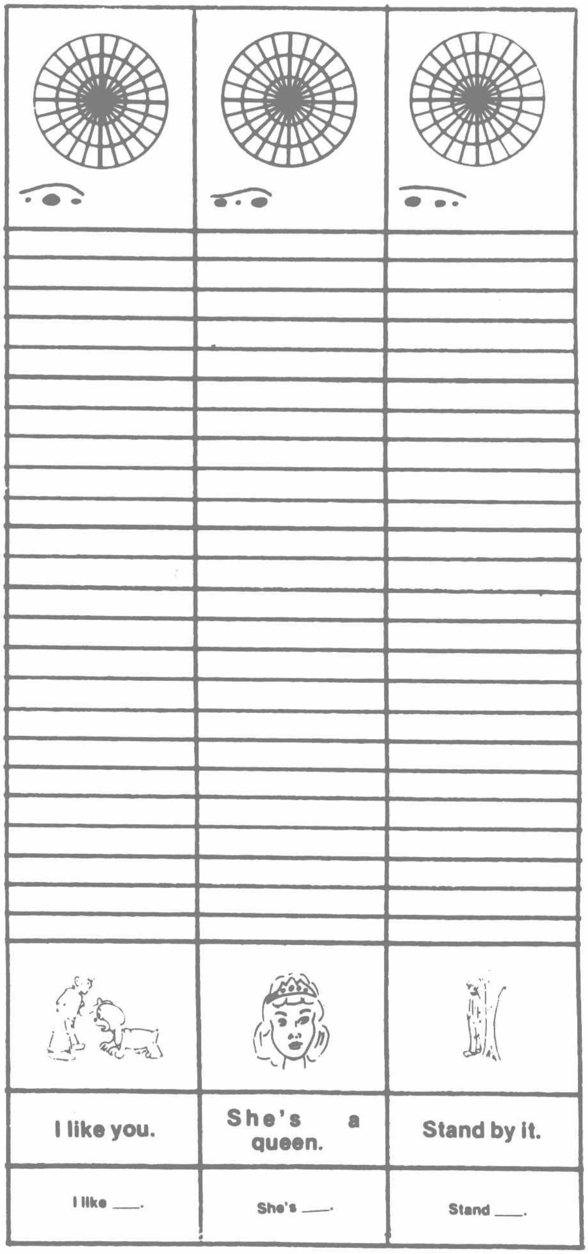

Figure 9 *Stimuli and recording form for ninth closed-set prosodic discrimination task*

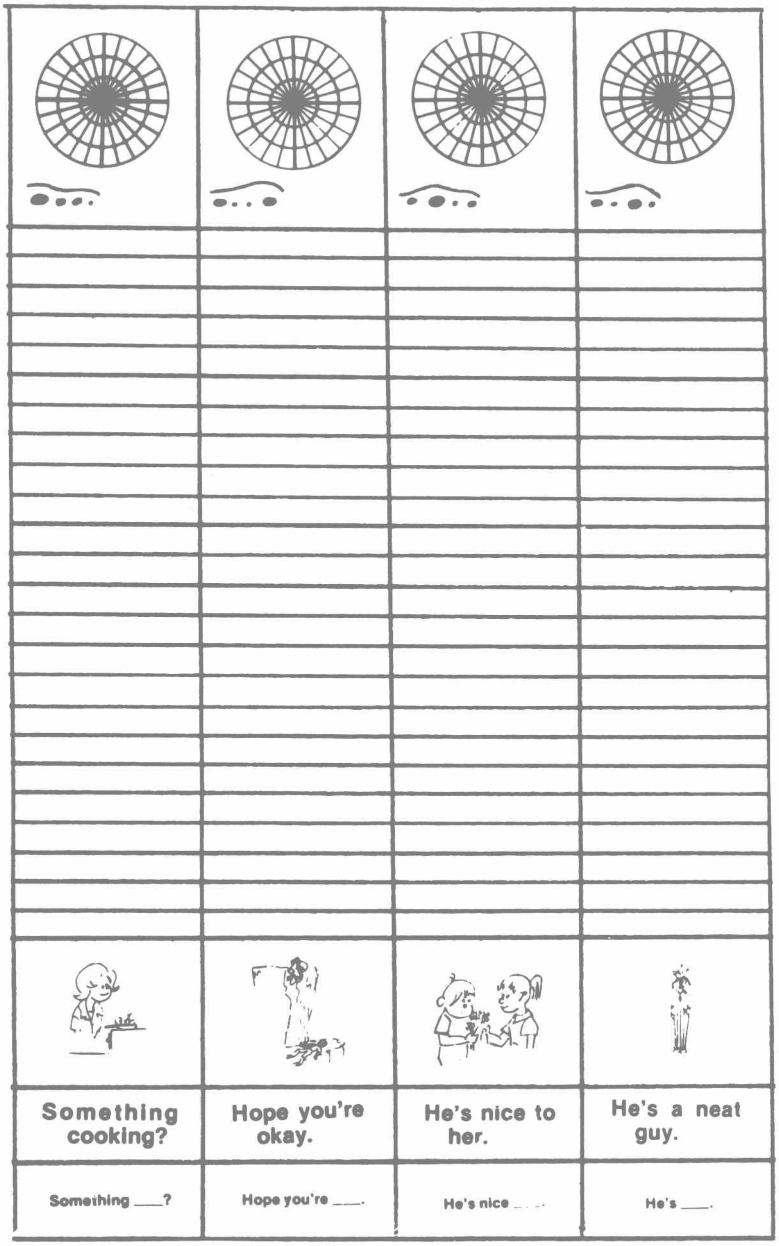

Figure 10 *Stimuli and recording form for tenth closed-set prosodic discrimination task*

cedures, and schedules of reinforcement.

Visual aids should be utilized to direct a client's attention to each listening task and to inform him of progress. These aids include charts, matrices, tables, figures, and counters. A hand calculator is useful for computing percentages.

A client may need both intrinsic and extrinsic reinforcers to be an efficient learner. Evidence of progress, particularly generalization to real-life listening, may be sufficient motivation for some clients but not for others. Often, progress is gradual, and the client adjusts to it undramatically. Children want to have fun as they learn, and token reinforcers and an exchange item or payoff activity may be very helpful.

The LAS-PAC Program

The remainder of this volume describes a precision technology for the alleviation of listening difficulties experienced by many clients. Stimuli and recording and summarizing forms enable a clinician to determine a client's listening baselines and to train his listening skills to maximum levels. An extensive number of closed-set and open-set management options are available. Basic programming incorporates prosodic and phonetic discrimination in small and then in larger closed sets. More advanced training utilizes isolated phonemes, words, and sentences in open sets. Programming then proceeds to messages of different lengths and finally to instructional sessions that simulate the direction, distance, and signal/noise variables of real-life listening. Except for simulated