TREATMENT OF APRAXIA OF SPEECH IN ADULTS

John C. Rosenbek and Robert T. Wertz
Veterans Administration Hospital, Madison

The purpose of this paper is to discuss therapeutic principles and specific procedures in the treatment of apraxia of speech. The sources of these principles and procedures are many and varied, and include previous clinical observations (Nathan, 1947; Goldstein, 1948; Johns, 1970), experimental research (Shankweiler and Harris, 1966; LaPointe, 1969; Johns and Darley, 1970; Deal, 1970), and the authors' four years of work with a variety of apraxic patients.

General Principles

The very fact that an apraxic adult is brain damaged generates certain principles for therapy. Some of these principles are similar, if not identical, to those which have been emphasized for the aphasic. This is a fortunate economy so long as we continually remember that the forms for therapy and the specific methodology are quite different. The essential principles are:

   I.   All therapy activities should be organized according to task continua so that the patient does not struggle and so that he works at a high level of success during each session.

  II.   The brain damage in most instances will require that the patient take longer and work harder at regaining or relearning lost articulatory skills so the clinician should plan for intensive and extensive drill on stimulus-response pairs.

 III.   Because he is an adult with a history of normal speech and language comprehension-use, therapy should emphasize mastery of meaningful and useful verbal communication early in therapy. With the severe patient, of course, periods of work on oral, non-verbal movements may be necessary.

  IV.   The brain damage may have imposed physiological limits on the patient's speech production mechanism. If so,

the clinician should teach compensatory movements such as the intrusive schwa, equal and even stress, judicious use of the pause, and normal prolongation.

V. Efficient self-correction must be encouraged, although gentle reminders will be sufficient for some patients who appear to use it as a natural tendency.

VI. The apraxic adult will perseverate, so therapy should be designed which helps the patient to inhibit this behavior.

Specific Principles

Apraxia of speech is a <u>nonlinguistic</u> sensori-motor disorder of articulation characterized by impaired "capacity to program the positioning of speech musculature and the sequencing of muscle movements for the <u>volitional</u> production of phonemes" (Darley, 1969). This definition generates several specific therapeutic principles.

I. Therapy should concentrate on the disordered articulation and, therefore, be different from the language stimulation and auditory and visual processing therapies appropriate to the aphasias.

II. Therapy should emphasize the relearning of adequate points of articulation and the sequencing of articulatory gestures.

III. Therapy should provide conditions such that the apraxic patient can advance from limited, automatic-reactive speech to appropriate, volitional-purposive communication.

Apraxia of speech is characterized by inconsistency only insofar as error type is concerned. In general, a variety of phonetic conditions affect articulatory accuracy in predictable ways. These phonetic conditions are: <u>manner of articulation</u>, fricatives, affricatives, and consonant clusters are more likely to be in error than vowels, nasals, and plosives; <u>phoneme position</u>, errors more likely in initial than final phoneme; <u>difficulty of initial phoneme</u>, word most likely to be in error if it begins with fricative, affricative, or consonant cluster; <u>distance between successive phonemes</u>, likelihood of error increases as distance between successive points of articulation within an utterance increases; <u>word length</u>, errors increase as words increase in length; <u>word frequency</u>, errors more likely on rare than on common words.

Therapeutic principles derived from these phonetic conditions are several:

I.   Stimulus items should be controlled for length,
     beginning with short reduplicating utterances, de-
     pending on the patient's severity, and systematically
     increasing stimulus length. Of course, work on
     several response lengths may go on simultaneously.

II. A hierarchial arrangement of phonemes and clusters as
     a basis for therapy is advisable, therapy to begin
     with easiest phonemes and advance systematically.

III. As phoneme sequencing becomes possible, stimuli should
     be selected so that the distance as determined by
     points of articulation between successive phonemes
     is small at first and progressively increased.

IV. If real words are used, these should be selected from
     a list of high frequency of occurrence words. However,
     response length, phoneme difficulty, and distance
     between successive phonemes are the most potent in-
     fluences on articulatory accuracy and should be more
     carefully controlled.

V.   Careful selection of stimuli with regard to initial
     phoneme will increase response adequacy and should,
     therefore, be considered in preparation of thera-
     peutic materials.

VI. Teaching points of articulation for some phonemes in
     the final position of a VC syllable is advisable in
     some cases.

     Articulatory accuracy in apraxia of speech is influenced
by mode of stimulus. Auditory-visual stimulation is better
than auditory or visual alone--visual in this instance refers
to watching the clinician as he speaks. Useful as well are
written stimuli for many apraxic patients, especially those
who are relatively free of a coexisting aphasia. Finally,
apraxic patients, in general, achieve greater phonemic
accuracy (at least at the single sound level) if they are
allowed to monitor their own speech in a mirror. Principles
of therapy, then, are obvious.

I.   The integral stimulation method ("listen to me and
     watch me") is parsimonious, effective, and should be
     tried first.

II. As therapy progresses and the patient becomes able to
     produce volitional, nonimitative speech, first
     auditory then visual cues should be gradually faded.

III. Only after the integral stimulation method has failed
     with a patient or with a particular phoneme should
     the clinician move to other methods. Useful alter-
     natives are phonetic placement, phonetic derivation,
     and the "key word" method.

IV. Developing a strong visual memory of correct
    production should be emphasized from "day one"; the
    mirror and written word are useful to this process.

Case Report

What follows is an outline for therapy which is only one
of several possible prototypes, but the one with which we are
most satisfied. The patient for whom this therapy was devised
is a 58 year-old female with a six-year duration of apraxia of
speech. A short period of therapy had ended in no progress
five and one-half years before she first came to us. Her use-
ful speech consisted of five or six automatic phrases and
counting to five, omitting three. Aphasia was minimal, and
there was no dysarthria.

Our goal was to help this lady program a few simple
commands and social utterances, such as "I'm fine." We
realized, of course, that the utterances we could expect would
be tempered by her own particular repertoire of phonemes
which, if one ignored phonemes present in her automatic speech,
consisted of one, /a/, which she could produce imitatively.
All other sounds were not stimulable during the first session.
After five sessions, we had determined that she could, with
very strong stimulation and several trials, also imitate /i/,
/aI/, and /t/. We decided that one thrust of the therapy then
would be to teach her "I want to eat." We emphasize the "one
thrust" because we saw her eight times a week and worked on
other sounds and utterances simultaneously. Let us examine
just this one phrase, however, because it satisfies most of
the criteria outlined previously, and it allows us to present
our specific therapy techniques with adequate rationale.

The phrase "I want to eat" is useful, the words are short
and of high frequency, the phonemes are visible, and any
combination requires minimal excursions for proper points of
articulation. Some of the phonemes were stimulable in iso-
lation by the integral stimulation approach, and the phrase
"want to" existed in a slightly different form, counting
/wʌn tu/, in her preserved automatic speech.

While we broke the command down into several parts (/aI/,
/wʌn tu/, /i/, /t/) in the initial sessions, our method for
these individual portions and for the utterance as a whole,
was similar and followed the following steps.

Step I.   Integral stimulation [look at me (a); watch me
           (v_1)] and simultaneous production (client-
           clinician saying it together).

Step II.   Integral stimulation (a, v_1) and delayed pro-
           duction (client saying it after clinician) with
           visual (v_1) cue.

Step III.   Integral stimulation (a, v_1) and delayed production with no v_1 cue.

Step IV.   Integral stimulation and successive productions without intervening stimulation of auditory or visual (v_1) cues.

Step V.   Simultaneous production with written stimuli (v_2) only. Patient reads the response from board or cards.

Step VI.   Delayed production with v_2 cue only. In this condition, the stimulus is written and then erased or concealed before client attempts it.

Step VII.   Appropriate response prompted by a question (in this case, "What do you say when it's 5:30 and you are hungry?").

Step VIII.   Appropriate response in role playing situation when clinician, appearing as a nurse, walks into the therapy room.

Step IX.   Appropriate response in true life situation.

Discussion

With each patient, we may not pass systematically through all steps for a variety of reasons. Obviously, at the single sound and, to a lesser extent, at the single word level, Steps VII, VIII, and IX would be impossible. In other instances, the patient may be able to jump from Step IV to Step IX. This is often the case with very simple utterances or with the moderately or mildly impaired patient. It is also the case when response generalization occurs as it sometimes does even with the severe patient, and he begins to engage in effective, efficient, searching, and self-corrective behavior. All these conditions which permit skipping of some steps should prompt the clinician to probe systematically for the target response while progressing through the steps.

Auditory discrimination does not precede production in the model outlined--and for a very good reason. The apraxia of speech patient who is either pure or only mildly aphasic does not need discrimination training as Aten, Johns, and Darley (1970) have demonstrated; nor does the model emphasize a motokinesthetic approach, because deficits in oral sensation and perception have been demonstrated in patients with apraxia of speech (Rosenbek, 1970; Larimore, 1970). Trial therapy employing this approach can be utilized if integral stimulation has failed and if oral sensation and perception is intact at the time of diagnosis. It does emphasize the auditory and visual modalities, especially the visual, because these appear to be most potent in guiding the articulators. While there

is no experimental evidence, establishing or strengthening "visual memory" appears extremely important to therapeutic success with the apraxic adult.

Because the outline would become burdensome, several slight modifications of our nine-step procedure were omitted; however, they should be mentioned. At the utterance level, all words may not be under the same control. Rather than delaying work at this level until individual words or sounds can be managed with equal reliability, the clinician should make several adjustments. These include cueing some sounds and not others and accepting omissions, substitutions, or distortions if these do not adversely affect the overall communication. For example, omissions in the final position often go unnoticed in the speech of normals and may be accepted in the speech of the apraxic if failure to permit these errors would delay the patient's using a few meaningful, useful utterances. Telegraphic utterances also should be accepted unless the omitted words are in the patient's response repertoire.

Other modifications not reflected in the nine steps include variations in the clinician's stimulus presentation. In general, stimuli are presented slowly with pauses between some words, with prolongation of some consonants and vowels, and with use of an intrusive schwa to break up consonant clusters. Some parts of an utterance may be produced louder and/or with exaggerated articulatory gestures. Some may be presented musically or with a particular rhythm pattern. For example, the contraction /aIm/ was practiced for weeks as aI: m:, with a rising and falling inflection. In other instances, instead of putting a pause between words, they may be combined as a single utterance--a condition which is closer to normal production. For example, /wʌn tu/ which became /wantu/ was always rehearsed as a single word. The rule is, "Do what increases the patient's response adequacy."

Some sounds may not respond to an integral stimulation method--at least initially. The clinician, therefore, should be versatile. _Phonetic placement_ is a useful method, especially for the front sounds. The phoneme /f/ entered our patient's repertoire after four days of placing her lower lip between her teeth, guiding her mouth closed in a bite, and then asking her to "blow." At one point, gesturing toward her mouth was sufficient to get her to produce an acceptable /f/.

Singing seems to facilitate speech in some apraxic patients. In our patient, it was the only way we could get her to produce an /l/. /lʌ/ /lʌ/ing to "Jingle Bells" was most effective. For the milder patient with a large phoneme repertoire, singing may facilitate whole phrases and sentences.

A variation on the "key word" method is also useful. Previously mentioned was the rather easy modification of /wʌn tu/ to /wantu/. It is sometimes possible to dissect a

sound from a "key word," usually an automatic response, and then combine it with other phonemes. The sound /g/ existed only in /gUd/. By having out patient say /gud/ /gUd/, /gou/, we have arrived at a point where she now produces the /g/ about 20% of the time without a preceding /gud/.

By no means have we presented all the possibilities in apraxia therapeutics. This therapy admits to wide individual differences prompted both by client and clinician. Instead, we have attempted to provide a skeletal framework for therapy in the hope that individual clinicians will provide the modifications and nuances, the flesh and blood of any successful therapy. Finally, we offer these principles and methods not so much as answers to the sometimes perplexing questions of apraxia therapeutics but as developmental milestones so that we can look back one day and see how far we have come.

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