Apraxia of speech results from an impairment in the ability to program the positioning of speech muscles and to sequence muscle movements for the volitional production of phonemes. Apraxia may affect an individual's articulation, rate, prosody (stress, intonation and rhythm) and fluency of speech. The person with apraxia may also exhibit weakness of the speech muscles and of the tongue, lips and face. In 1994 Square and Martin wrote that apraxia of speech is most commonly caused by frontal subcortical and cortical lesions, as well as midparietal lesions. The etiology in the majority of cases they studied was vascular, degenerative or traumatic. Dworkin (1991) found that vascular etiologies accounted for nearly 60 percent of the cases, with single left hemisphere stroke being most common.

In 1984 Wertz, LaPointe and Rosenbek described the four major characteristics of apraxia of speech:

1. effortful speech with trial and error type groping, articulatory imprecision and attempts at self-correction

2. altered prosody—stress, intonation and rhythm

3. articulatory inconsistency on repeated productions of the same utterance

4. difficulty initiating utterances

The person with apraxia often says, "I know what I want to say, but I can't get it out." He will exhibit a slow rate of speech with inconsistent articulatory errors. He is often acutely aware of his errors and may demonstrate groping (audible or silent) behaviors in an attempt to locate articulatory targets. For example, in response to the question, "Where did you go to high school?" he may respond with "sock, crock, rrrock [silent visible groping of the tongue] rr . . . rrocking [pause], Rockville Center." The person with apraxia will usually slow his rate while groping for sounds and will appear to anticipate difficulties and attempt to self-correct. He generally knows what he wants to say and can write it or describe it.

Automatic speech is usually better than volitional speech and may even be error free. For example, your client automatically says, "hello" when someone enters the room, but can't say the word "hello" during structured drills. He complains, "Why can't I say the word 'shopping' when I want to?" Production of the same utterance is often variable and the error type may change. For example, "paper" could be said as "peep, pap, baber, pencil, or pepper."

Initiation of speech is usually difficult, with many pauses, restarts and repetitions of initial sounds, syllables or words. "Peanut" may be said as "p, p, [pause], pea, pea, peam, no . . . pea, pea, peanut." The initial position is usually the most difficult due to poor initiation.

Some frequently observed characteristics of apraxic speech are substitutions, transpositions, distortions, omissions, additions and repetitions. Errors are usually inconsistent and more errors occur with volitional/purposeful speech than with automatic/reactive speech. The most frequent errors are substitutions and transpositions, such as "me" for "tea." The person with apraxia may also substitute more complex consonant clusters for a single sound target. For example, when asked to repeat the word "television," she might say "bel, strel, trelvision."

There is usually variability in the production pattern during repeated trials of the same target, and the error type may change. "Bicycle" may be produced as, "bis, bikl, brikl, bricycle, bicycle."

Introduction

Wertz, LaPointe and Rosenbek (1984) found that articulatory errors increased as the complexity of the speech task increased, with vowels being easiest and consonant clusters being the most difficult. They discovered that most errors occur on initial consonants and on phonemes that occur least frequently in the language. In addition, there is usually an increase in errors as the word length increases.

When treating people with apraxia, your objective is to make communication effective, efficient and natural sounding. This is accomplished by assisting the person with apraxia in improving her ability to program speech movements and therefore improve articulation. In addition, therapy aims to improve prosody and self-monitoring skills.

Much of apraxia therapy focuses on performing drills and structured exercises to improve the ability to program speech movements. Wertz, LaPointe and Rosenbek (1984) described therapy for apraxia of speech as "the structured relearning of speech movements." Clients should be encouraged to monitor their own speech and to correct their own errors. In addition, the clinician's feedback provides reinforcement and is a necessary part of therapy. Visual feedback is usually very helpful. The client can watch your mouth, and some individuals can profit by using a mirror to watch their own mouths. Therapy is described in more detail in the following section "How to Use This Manual."

The prognosis for recovery of "normal" speech is based upon a variety of factors including the severity of your client's apraxia in addition to her health, motivation, intelligence, age and the recency of illness or injury. Your client also needs perseverance, patience and a high tolerance for frustration to cope with what may be a long and tedious process.

The same brain lesion that causes apraxia can affect language functions. In fact, a review of the literature on apraxia of speech reveals that the majority of people with apraxia also exhibit concomitant language disorders. It is important to remember that apraxia itself does not affect comprehension, aphasia does. The person with apraxia but without aphasia shouldn't have difficulty with silent reading, writing and auditory comprehension. In addition, his self-monitoring is usually good, and he will repeatedly try to correct his errors. He will usually show much improvement with repeated attempts at words and drill work. He will also benefit from stimulation and feedback from listening and watching the clinician's mouth.

Individuals with both apraxia and aphasia will generally make semantic and syntactic errors, as well as traditionally apraxic errors. Phonological errors are often reflected in their writing and auditory comprehension, and the ability to self-monitor and self-correct are usually reduced.

In this section I will describe how you can best use the exercises in this book to successfully treat your own clients. The manual contains hundreds of stimulus items that can be used in both individual and group therapy sessions. You can also give them to clients to practice independently.

Contents

The *Apraxia Treatment Manual* is organized into four sections. The first section, "Articulation," has three levels and consists of exercises to improve articulation presented in a hierarchy of increasing length and complexity. The second section, "Prosody," contains materials to improve rate, rhythm and stress of speech. The third section, "Advanced Activities for Articulation, Self-Monitoring and Prosody," contains more challenging exercises to be used to improve self-monitoring of speech, fine-tuning and making speech sound more natural. The final section, "Group Activities," addresses all the goals in a naturalistic setting. You can easily adapt the tasks in the last section to use with individual clients as well as groups.

Treatment

First assess the client's level of functioning to decide which exercises to begin with. A client who starts at the phrase or sentence level does not need to practice easier exercises such as CV or VC words. As the client demonstrates progress and achieves success with the material presented, move through the continuum to material of increasing difficulty.

Therapy should begin as soon as possible following the injury and continue as frequently as possible in the early stages of rehabilitation. The therapeutic process is a long one; the client can continue to make gains over a long period of time. In the early stages, the most effective type of therapy appears to be direct articulation therapy, on a one-to-one basis, using drillwork and progressing to more functional conversational activities as the client demonstrates gains. Group therapy is then appropriate and is beneficial for its psychosocial aspects. Group sessions provide peer support and a more naturalistic setting to practice communication.

Most experts suggest beginning with vowels and then progressing to plosives, nasals, laterals, fricatives and then affricates. However, you should consider each person's individual pattern. The order in which your client will progress through the sounds usually depends on their visibility on the face, the client's ability to feel placement and the frequency of occurrence in familiar words and phrases (family names, social words).

It is often difficult to determine which techniques will be successful for each client. Therefore, I have found that it is important for you to be flexible and try a variety of techniques. Use whatever methods are successful at each stage of rehabilitation. The therapy should be individualized for each client; however, there are several techniques (described below) which have prevailed over the past two decades and are still the basis of effective apraxia therapy.

In 1973 Rosenbek and his colleagues proposed an eight-step task continuum for treating apraxia of speech. According to this paradigm, tasks are arranged in a hierarchy from easiest to hardest. The client practices exercises within his ability to achieve success each session and moves up the hierarchy after demonstrating significant progress. The eight steps are outlined on the next page.

How to Use This Manual

1. *Listen and watch me.* The clinician says the target word while the client watches the clinician's mouth and listens to the target. The clinician should say the word slowly with deliberate exaggeration. The clinician can also use diagrams to illustrate proper placement.

2. *Imitation of target.* The clinician models the target sound, and the client imitates it immediately. The clinician then fades the auditory cue and mouths the target, giving only a visual cue.

3. *Imitation of target without cueing.* The client imitates the target without any visual or auditory cueing.

4. *Repetition of target.* The client repeats the target several times without any type of cueing.

5. *Oral reading.* The client reads the written stimulus aloud without any cueing.

6. *Oral reading from memory.* The client looks at the written stimulus which is then removed. She then tries to produce it from memory.

7. *Elicitation of target.* The clinician attempts to elicit the target by asking a question rather than through imitation of oral reading.

8. *Role-play.* The client tries to produce the target during more naturalistic conversational activities such as role-playing.

Wertz, LaPointe and Rosenbek (1984) and Rosenbek and LaPointe (1985) recommended using imitation of contrasts after functional units of speech are established. This technique is widely practiced and highly effective. The approach consists of having the clinician stimulate the client by saying the target while the client watches and listens. The therapist then models a single target in minimally different CV or VC units (*see, so, sue* or *am, aim, I'm*). The client slowly repeats the target while concentrating on feeling for the correct placement and movement. He then progresses to imitating contrasts (*me/see, low/go*) then rhyming units (*bee, fee, he, key, me, pea, see*) with the same vowel while still focusing on feeling the contrast between the placement of the sounds. Finally, the client progresses to contrastive stress drills, which consist of a question and answer dialogue using phrases and short sentences. Stress varies depending upon the target. This exercise also helps improve prosody, as the client consciously focuses on a guiding rhythm. If the target is "I like coffee," the clinician says, "Do you like tea?" The client responds, "No, I like coffee."

Rosenbek, Wertz and LaPointe also recommend using phonetic placement techniques, articulation diagrams, phonetic derivation techniques and the key word technique.

- *Phonetic placement techniques and articulation diagrams* describe place (where the sounds are made), manner and voice (how sounds are made), imagery (such as "hissing" for /s/) and tactile cues.

- *Phonetic derivation techniques* consist of building on an orofacial skill that the client can already perform. For example, if a client can pop his lips, that skill may serve as the basis for providing both spatial and manner parameters for the production of bilabials.

- *The key word technique* consists of finding a word containing the target sound that the client can produce and cueing the client to "feel" the sound. For example, if you are working on volitional production of /m/, and the client can successfully produce her name, Marie, that word can be used to demonstrate the "feel" of the target /m/.

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As the client achieves the therapy goals, she should progress to more difficult tasks. She is considered to have made progress when her speech more closely approximates "normal speech" or when she has developed a more efficient means of speech. After the client can recall how sounds are made, you should work on contrasting those sounds with other sounds, combining them into words and phrases, and then using them in conversation.

Square and Martin (1994) and Wertz, LaPointe and Rosenbek (1984) suggest that, since many clients are both apraxic and aphasic, you can address both disorders simultaneously. Systematic drillwork is best for mild apraxia with mild or no aphasia. For moderate to severe apraxia with aphasia, articulation therapy should be accompanied by language therapy. However, you need to address the primary problem more vigorously. You can work on production of words while working on language. For example, while working on the target "candy," you can also use language exercises such as closure techniques, "I want_____"; forced alternatives, "Do you want candy or fruit?"; or question and answer techniques, "What do you want?"

Below is a list of strategies helpful to keep in mind when you are working with the client with apraxia.

Strategies for Working with the Person with Apraxia

- Present stimuli slowly with deliberate pauses between words or groups of words and use increased stress and exaggerated articulation.

- Instruct your client to face you. Have him follow the "listen and watch me" approach by listening to you produce the target and watching your mouth before producing it himself.

- Encourage the client to try to "feel" the placement of his articulators when he produces a sound correctly.

- Remind the client to self-monitor his speech and self-correct his errors. Self-correction of repeated trials of a target tends to improve performance and is essential for positive change.

- Have the client slow down his rate of speech and pause at syllable breaks.

- Foster motivation and provide psychological support. Make frequent encouraging remarks such as "good job" and "try again."

- Provide constant visual and auditory feedback. You can use mirrors, audio recordings and video recordings as well as praise. Written recordings of the client's baseline performance and progress, in the form of a graph or a chart, are helpful as well.

- Encourage clients, especially those with more severe impairments, to use gestures, alphabet charts and writing in addition to oral communication.

- Educate the client and the family about the nature of apraxia and its treatment.