

**Combining Instruction in  
Speech Production, Language Development and Reading  
for Students With High Risk Factors**

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*Abstract: A description of an intervention which consisted of a combined program of instruction presents case studies describing 6 students ranging in age from 3 to 20, all of whom demonstrated severe difficulties in speech production. The resulting impact on their language development placed them in a high risk category for learning to read. Each received a combined program of instruction in speech remediation, language development and reading instruction, delivered by an instructor who was trained in communication disorders and learning disabilities. All of the students reached at least 80% intelligibility and were able to read with comprehension after this instruction. A short discussion of the theoretical basis for developing the program follows.*

In many populations, therapists encounter a few students whose difficulties exacerbate each other to make learning to read seem like an impossible task. My challenge was to develop instructional methods for six of these individuals. To develop these instructional methods for reading I called upon my training in three areas: as a communication disorder specialist, as director of a Head Start speech and language therapy program with a special interest in children who demonstrated delayed or disordered language development, and as a learning specialist working in a clinic setting where I received training in teaching reading and writing with a language and image-based approach. During my later work at the clinic, I noticed that a small percentage of my students demonstrated severe apraxia, which is difficulty with voluntary sequential movements of the vocal organs. The apraxia was so severe that language development and academic performance were affected. Using the treatment for apraxia outlined by Rosenbek and others in conjunction with language and reading instruction, I began a combined program of speech therapy, language development and reading instruction with a 20-year-old student. Over the next three years, five more students needed a similar program of instruction. The demographic and medical characteristics of the students varied widely. The ages at the beginning of instruction varied from 2 years, 11 months to 20 years. Four were males, two females. Two had a history of hearing loss, two had neurological impairments, two had repaired cleft palates, one of which was diagnosed with velo-cardio-facial syndrome. The following case studies describe the individual programs of instruction used with each of the six students.

“PETE” Pete’s high school had run out of things to do for him in his special education class. At 19, he was older and bigger than most of the other students, but his reading and writing skills were minimal and his speech was very difficult to understand. A bilateral hearing loss had affected his language acquisition, and although surgery had restored his hearing to near-normal levels at age 12, his language skills had not progressed much beyond the first grade level. Pete’s educational plan stressed

“functional knowledge” which would enable him to live as independently as possible. He was hoping to enter a training program where he could learn a trade, such as auto repair. He had gained some experience by working with friends and family members on their cars.

Upon examining his speech and language, I found that Pete had difficulty producing and perceiving high frequency sounds due to his early hearing loss. He spoke rapidly, “telescoping” words by omitting many sounds and word parts. He also demonstrated some signs of oral nonverbal apraxia including slow movements of his tongue and lips. He spoke in short sentences with some confusion of verb tenses and pronouns. In addition, Pete demonstrated a great deal of visual and auditory symbol confusion. He was not able to attach sounds to symbols in order to “sound out” words or to perform the opposite task of attaching symbols to sound in order to spell words correctly.

Pete’s instruction began with expanding his language by teaching him correct sentence patterns. This was accomplished by using objects such as small figures and having him describe their actions. He learned that every sentence needed an actor (noun) and an action (verb). “The soldier is marching,” or “The horse jumped.” More pieces were added to answer questions. Prepositional phrases answered “where?” (down the street; over the fence, etc.) Participating enthusiastically, he was not self-conscious about “playing with toys” or other activities he was asked to do. His genial nature contributed to the successful outcomes of his instruction.

We began a program of combined speech, language and reading instruction. The speech component was designed to give Pete practice in rapid movement of his articulators and sequencing at the syllable level. He was unable to sequence the syllables “pa-ta-ka” during initial testing. By his seventeenth session, he easily produced the sequence eighteen times in fifteen seconds. During each session he also practiced pairs of syllables and words containing sound patterns which were difficult for him to produce as well as multi-syllabic words such as “valentine” and “refrigerator.” He was given nine “target words” in his first session, and could pronounce only one of them after several tries. During the twentieth session he was able to pronounce all nine words. His speech instruction also included shaping his attention so that he noticed and could identify high frequency sounds (s, f, and sh) then learning to produce those sounds in words and in connected speech.

Each lesson also contained language and reading components. The sound pairs which he was practicing were put into sentences. For example, s - th might be “What does Russ think?” Pete participated in writing the sentences following the patterns he was learning.

He practiced by reading these as well as other materials containing the target sounds. One of Pete’s assignments was to monitor his speech production (including rate of speaking and target sounds) for one half hour each evening. One of the caretakers in his group home was also asked to monitor his speech. They compared notes and kept the results on a chart. This daily monitoring helped Pete to stay aware of the skills he was learning so they would transfer to everyday situations.

Although Pete did not learn to decode accurately beyond third grade level print during this instruction, he was able to gain meaning from print written at higher levels. He learned to ask predictive questions and then read to find the answers. He could read

and follow directions for putting things together and for doing household repairs. Using all available cues such as pictures, titles and diagrams, he was able to question as he read and come up with a meaningful substitute for an unfamiliar word.

Two videotapes, one made on the first day of Pete's instruction and one made as he was finishing, approximately three months later, illustrated the gains he had made as well as his increasing confidence. In the first video, he appeared nervous and his rapid, telescoped speech was difficult to understand. In the final videotape he was relaxed, talking easily with the interviewer and reading a short paper he had written.

#### *I Like to Work*

*I like to sweep and mop floors. I like to work with my hands. I like to keep my hands busy. I like to do the kinds of jobs that will help me later on. Someday I hope to have a real job, like working on cars. I might have to go to school to learn more about it. Maybe I can get a job changing oil on the school buses. I already have a tool box.*

“JENNY” Jenny was almost 11 when I met her. Wide-eyed and shy, she spoke only a few words to her mother during our first time together. She did show some interest in the books on my desk, and her mother said Jenny desperately wanted to read. Although Jenny had been enrolled in special education since age two with speech and occupational therapies, an evaluation at age 10 indicated “failure to benefit from educational opportunities in a regular educational setting (mainstreamed) with special educational support” because her behavior was socially appropriate but inattentive. In addition, she demonstrated difficulties in memory, visual motor skills and cognitive development as well as apraxia of speech.

Because Jenny's speech difficulties were interfering with her language development and reading, her remediation program combined speech, language and reading instruction. When Jenny's instructional program began, our goals were to increase correct speech production, develop her verbal expression (both vocabulary and language structure) and increase her reading level. Although she was able to produce all sounds individually, she had difficulty with some sounds and blends in connected speech. However, the most difficult feature of speech for Jenny was sequencing of sounds and words. Using rhythmic movements, such as clapping her hands, tapping the table and jumping on a small trampoline, she learned to sequence syllables and multisyllabic words. In order to learn to sequence words in sentences, she used a visual reference in which plastic shapes stood for different kinds of words. She used these shapes to learn different sentence patterns.

Jenny practiced sequencing the nonsense syllables “pa-ta-ka” as a reference for ability to sequence. During the first class, she was able to repeat the syllables correctly four times in fifteen seconds. After six weeks she had increased to twenty-two times in fifteen seconds. She also practiced with target pairs of syllables (such as “ka-ga” and “pa-ja”) which were identified as difficult combinations for her to produce. For all the ten targeted pairs, Jenny reached the goal of ten or more repetitions in ten seconds. In order to learn to correctly sequence multisyllabic words, Jenny made up a list of ten target words such as “valentine” and “alligator”. During her first class, she could only produce four of the words correctly. As she learned the words, more were added until her

seventeenth class, in which she correctly produced fifteen of her sixteen words. Jumping on a small trampoline while she practiced the words helped her learn to sequence. The trampoline created a rhythm for her whole body. She was then able to superimpose the rhythm of the word on the rhythm created by jumping. She was also able to compose sentences using each of her target words and then read the sentences. Even though she found it difficult, Jenny enjoyed writing her own sentences and was able to read her own language.

Concurrently with her speech therapy Jenny worked on language development. She learned sentence patterns and learned to turn a statement into a question. She also learned to use imagery for remembering new vocabulary words by drawing a simple picture of the meaning of the word and matching her picture to the printed word. In this way, she built a “bank” of new words. In order to form more accurate memories for symbols, she learned to identify three-dimensional letters tactually, then learned to recognize letters from their distinctive features. These are the parts which make each letter different from all the others, such as the for “e” and for “w”. She also learned to recognize different “word families” such as “ell”, “ate” and “ound.”

As a result of her new skills, Jenny was able to develop a reading method in which she first predicted a story, made image notes (quickly drawn pictures which capture the important information about the meaning of the word) for unfamiliar words and stopped after each page to draw a quick picture of the content on the page. She learned to cue herself when she encountered an unfamiliar word or phrase by asking a question of the sentence. She could also summarize the story after she finished reading it. Using this method, Jenny was able to read at the second grade level. In addition, the increase in expressive language enabled her to become more verbal. Friends in her Girl Scout troop were excited when she began talking more. Some of them hadn’t even known she could talk!

Jenny’s instructional program used a combined approach of speech therapy, language instruction and reading instruction which emphasized language development as the common feature. Everything she learned was directly related to increasing her ability to understand and control language. As a result, she made gains in the whole range of language skills, including articulation, expressive language output, reading level and comprehension. She wrote the following story after a weekend of camping.

### *Jenny Sleeps in a Cabin*

*The Girl Scouts went on a boat on a lake. We slept in two bunk beds in a cabin. I slept in the top bunk. We played games. We sang songs and we had hot dogs. We went outside and looked at the stars in the dark. For breakfast I fixed eggs. We had bacon and fruit. We had apples and bananas and grapes. We had lunch outside. We had sandwiches with bacon on top and juice. We went hiking. We wrote a poem in our notebooks. It was fun! My mom came with us. My grandpa and brother go fishing at a different lake.*

“STEVEN” Steven was almost seven with a winning smile and very little expressive language when we met. Before he was adopted into a loving family at age three, his early years were marked by abuse and neglect. His adoptive parents were eager to provide whatever help he needed. He had previously attended a Language Preschool Program and was enrolled in an all day kindergarten at a private school when he came for an evaluation. Earlier testing on the Wechsler Intelligence Scale for Children (WISC-R) showed a thirty-two point discrepancy between his non-verbal score (101) and his verbal score (69). Further evaluation found Steven’s receptive language to be average (50<sup>th</sup> percentile) while his expressive language was not functional (scores below percentiles.) His physician had diagnosed Attention Deficit Disorder and prescribed medication to help him maintain focus.

Steven’s speech exhibited the markers of apraxia according to several articles, which define these markers (Chappel, 1973; Dabul, 1976; Rosenbek, 1972, 1974). First, he demonstrated oral nonverbal apraxia. He was not able to perform movements with his mouth and tongue in response to a verbal request. After the movement was modeled for him, he would attempt to move his tongue with his fingers. After a few minutes of movement sequences he would begin to gag. Other markers of apraxia were evident. His receptive abilities were much better developed than expressive, his prosody or fluency, was uneven, when he tried to speak, he sometimes exhibited “groping behavior” with his mouth and tongue as if he were trying to find the correct movement; and, most characteristically, his errors increased with increased length of response. Steven’s speech and language were characterized by short sentences, omissions of articles and some verb forms and incorrect use of pronouns. When he attempted a longer sentence, his speech was unintelligible. He also frequently inserted the syllable “nee” as a kind of place holder, when he was unable to retrieve a word or its sound from memory, or didn’t know the correct sentence structure needed.

After some initial instruction focusing on teaching correct sentence patterns and building more accurate memories for letters, a program of combined speech, language and reading instruction was recommended for Steven. His parents enthusiastically agreed, and we started with 3 classes per week for 8 weeks. We had two goals for this set of classes. First, Steven needed to be able to produce intelligible, grammatically correct

sentences while self - monitoring his production. Second, Steven needed to increase the length and complexity of his sentences to the level needed for reading 1<sup>st</sup> grade level print.

Steven's speech instruction was based on principles outlined in the previous stories. These included: systematic drill with a limited number of stimuli; use of meaningful words, phrases and sentences as stimuli; use of the visual modality and use of rhythm, intonation, stress and motor movements to facilitate response.

His language instruction focused on dictating correct sentences which were then used for speech practice. He learned to ask questions and used imagery to learn new words by drawing picture notes and matching his picture to the printed word. His reading instruction involved having him dictate stories for pictures or "wordless books" and then reading his own language.

Being a 7-year-old, Steven responded best when these activities were put into a game format. He dearly loved playing "What is in the box?" and "What color is the bear?", both questioning games, and "Who stole the cookies from the cookie jar?", a rhythmic chanting game used for practice in sequencing and prosody. Jumping on a small trampoline also helped him learn to sequence long words and phrases and speak more rhythmically. Acting out sentence patterns with small plastic animals was another favorite activity. Matching a pattern such as "The \_\_\_\_ is \_\_\_\_ing," we took turns choosing an animal and making it "do" something, for example: The tiger is running, The pig is jumping, etc. One day I made the elephant walk slowly and then roll onto its side. I thought he might say "The elephant is sleeping." Steven watched closely. "The elephant," he announced soberly, "is dead!"

Beginning with easier sounds such as pa-ba, Steven practiced sequencing syllables, later progressing to more difficult sequences such as la-ga. Timing him with a stopwatch turned it into a game as he tried to beat the latest record number of "goofy words" he could say in ten seconds. A metronome helped him to establish a rhythm at first. Later he learned to clap or tap on the table to make his own rhythm. He made up a list of ten long words to practice such as "valentine" and "helicopter" and learned the correct sequence for all of them.

During his instruction, approximately forty hours, Steven's intelligibility improved to eighty percent. He used pronouns correctly eighty-five to ninety percent of the time and was able to ask questions correctly. In addition, he learned to read and write at the first grade level.

Approximately three years later, I happened to see Steven and his mother in an elevator. He had grown, of course, but we recognized each other, and he said very clearly, "Yes, I remember you, and I can read just fine now."

"LARRY" Larry was 20 years old when we began working together. A file approximately six inches thick, full of medical and educational information accompanied him. Larry had a developmental evaluation at age five at Mary Bridge Children's Health Center which reported that he was "functioning over-all in a retarded range" and that his low scores were "in some measure due to his slowness in language development." His performance score on the Wechsler Intelligence Scale for Children was 20 points higher than his verbal score. Other difficulties were noted in sequencing abilities, motor ability

and poor attention span. Larry was given a comprehensive evaluation at age 8 at the Child Development and Mental Retardation Center (CDMRC) at the University of Washington. At that time, Dr. Lamson, who managed Larry's case, explained that "Larry's delays in cognitive development, fine and gross motor coordination, and language production are all due to neurological impairment." He recommended that Larry be educated as neurologically impaired or mildly retarded and receive intensive therapy in speech and language as well as in motor areas.

After placement in self-contained Special Education classes in public school, Larry received some academic instruction in elementary school, but mostly functional and vocational instruction in junior high and high school. When we began working together, he was finishing his high school program which consisted of supervised job training. He worked 6 hours a day as a janitor with regular visits and monitoring by a vocational teacher. He performed his duties at work independently, used public transportation and was receiving help with managing his money. Larry was living in a group home and had frequent contact with his large extended family who were very supportive. Since many of his family members were employed in the construction business, Larry was also interested in doing construction work. This desire was evident in his responses on career interest and aptitude tests.

Larry's learning profile was evaluated by Carol Stockdale, M.A., an experienced learning specialist and researcher. She noted that approximately fifty percent of his speech was unintelligible. He also demonstrated difficulty with language symbols, language delays and motor delays. She made the following recommendations for his instruction:

*"His instruction must go from whole to part; in other words, he needs to have an overview of a new concept, preferably with a visual representation, which he can describe in his own words. Then as he learns each part he should understand how it fits into the 'big picture'. He should work at the imagery level, linking the images to the language he learns. He needs to learn to use rating scales for evaluating and comparing tasks and his own level of control. Finally, he needs to stabilize his memory for symbols."*

After 12 hours of instruction, Larry was able to draw visual notes both for the content of a story and for the meaning of a new vocabulary word. Because he had fine motor difficulties, he needed instruction in drawing accurate visual notes. He needed to identify the distinctive features of the image and include them in his picture. For example, if the story was about going somewhere on a bus, he would ask himself, "What are the important parts of a bus? It's long and rectangular, has wheels and a large door." He could then draw the essential parts and when he looked at the picture at a later time, he would recognize it as a bus. He also learned to recognize letters and words by their distinctive features. At the same time, he was learning to read and write different kinds of sentence patterns, including simple, complex and compound. However, he was using very few vowels when he wrote sentences independently. I asked him if he knew what vowels were. "Oh, yes," he replied, and added, "You have to buy them." I was baffled for a moment, and then it clicked. "Have you been watching Wheel of Fortune on TV?" I asked. He nodded, "Yes, it's one of my favorite shows!" I assured him that he would not be charged for vowels, and we began working on "word families." These are groups of words which all contain a common part, such as "ake" or "ound." Larry drew an image which would remind him of the word part and what it sounded like, such as "pound" with

a picture of a hammer pounding four nails with “o,” “u,” “n” and “d” on them. He would then be able to remember other words in that “family” such as “hound,” “around,” “flounder,” etc., and the image would help him to remember the “look” of the word including difficult vowel combinations.

At this point, it became clear that Larry needed another part added to his instruction. He needed to learn to articulate better in order to be understood by others and to progress in his language development. We proposed a program which combined intensive articulation therapy with his language-based reading and writing instruction. Larry had three half hour sessions per week and two one hour sessions. Larry’s articulation therapy focused on learning to self-monitor the muscle tension and movement patterns necessary for intelligible speech. Facilitating movement patterns were identified. These are sounds which helped him to produce a target sound correctly when placed together. For example, if trying the “r” sound in different contexts showed that the “g - r” combination produced a normal sounding “r”, that combination would be used for practice. Larry was asked to write sentences containing a word that ends in “g” next to a word that begins with “r”, such as “A big red truck went by.” He practiced at the syllable, word and sentence level during each session using a combination of material written by himself, his instructor and printed materials. We devised a rating scale for Larry to use for evaluating his production of target sounds. This was a scale of 0 – 2 shown by a hand signal. (Thumb up = 2, thumb down = 0, thumb sideways = 1). We both rated his production and then compared our ratings. He also continued with the work he had already begun on symbols, imagery and language structure.

Although the proposed extended program for Larry including instruction and maintenance was to cover eighteen months, funding was approved for only three months. After the three months Larry was able to speak with approximately seventy five to eighty percent intelligibility. In addition, he was reading at a beginning fourth grade level and completed a unit from a fourth grade science book on simple machines. He read the information and wrote questions about the unit which he was able to answer at a later time. Using visual notes also helped him to learn new vocabulary and recall material that he read.

Larry was able to write a variety of sentence patterns including simple, compound and complex. After writing a sentence or paragraph he could check it to make sure no words were left out. For the first time ever, he wrote a letter – a one-page hand-written letter to his sister in Virginia, telling her about all the things he was learning at his “new school.”

Larry was hired as an assistant to the caretaker of the campus and outdoor equipment at a Catholic high school. A few years later, I saw him working at Home Depot, a large, warehouse-type store which sells all kinds of home improvement items. His job was to locate items in the warehouse and bring them to the customers. He liked his job, he said, and was sharing an apartment with some friends. His speech had deteriorated somewhat, but I was able to understand him. When I asked if he was still reading, he said yes, he always read the sports pages in the newspapers and needed to read some at his job. He added that he would like to come back to my “school” sometime and learn some more.

“DARLA” Sixteen-year-old Darla was skeptical about teachers. She felt embarrassed around them because they were always asking her to do things she couldn’t or didn’t want to do. So the fact that I gave her a bunch of tests right away didn’t make me her favorite person. As soon as I realized that Darla’s test scores were not at all indicative of her abilities, we dispensed with the testing and began developing methods for her to use in school.

Several years earlier, Darla had been diagnosed with Velo-Cardio-Facial Syndrome, which is characterized by a submucous cleft palate, conductive hearing loss, heart defect and learning disabilities. She had been provided with bilateral hearing aids and had undergone heart surgery approximately 6 months earlier. In addition, she had both visual-spatial and motor-spatial difficulties. Her speech could be understood although she had difficulty with high frequency sounds such as “s” and “f” due to her hearing loss and some hypernasality from her cleft palate. According to her mother, Darla’s reading ability was “stuck” at the third grade level.

Darla was extremely self-conscious about her difficulties. She spoke very softly and would not attempt to answer if she was unsure. When asked to draw a picture, she would hold her hand over her drawing so it would not be seen. Gradually, she became more trusting and more comfortable with one-to-one instruction. We made some goals. She wanted to be able to read better and to remember information for tests. She also wanted to be able to write stories. I wanted to help her to expand her frame of reference and awareness of the outside world as well as improve her speech production. With these goals in mind, we worked on developing a reading method for Darla. She learned to draw visual notes and was able to remember information by using them. However, she was still not comfortable with drawing so we experimented with using the tape recorder. She would describe an image on the tape, and when she played it back, she recalled what she had read. Thinking of questions about what she read and either writing them using a word processor or recording them on tape was another useful method for recall. Darla learned to understand and write different kinds of sentence patterns. She began writing paragraphs and short stories using a word processor. We read newspaper and magazine articles, found their locations on maps and globes and discussed their significance. Darla watched the news on TV and reported on a news story which had piqued her interest each time we met. She began to show more interest and to have opinions about what was happening in the world.

Another part of Darla’s instruction was to call her attention to high frequency sounds. Since she had a hearing loss, she was not accustomed to attending to these sounds. She practiced identifying them in others’ speech and practiced producing the sounds in isolation, syllables, words and phrases. Because she was so self-conscious, Darla needed to work on her speech in private, following the exercises outlined for her. Her intelligibility improved gradually.

Darla’s instruction continued twice a week for nine weeks and then once a week for three more months. Because she was having some health problems, she was not able to continue. At the end of her combined speech, language and reading instruction, Darla could read and comprehend content material at the fifth grade level, and she was reading novels written for teenagers. She was able to use imagery either by drawing visual notes or by describing an image. She could ask a question to the main point of a paragraph and

either write or record it on tape for later review. Best of all, she was able to express herself in writing, as shown by the following:

*Lilly*

*One day I got a new puppy. It was love at first sight for both of us. The only problem was, she was deaf. We needed to teach her how to come when we called her. We have another dog and that helped, because, whenever you call her, both dogs come. I taught Lilly (that's the new puppy) to come when I motioned "come here" with my finger. I also learned to stamp my foot on the floor to get her attention. She feels the vibrations and will wake up. Lilly is a sweet, lovable dog, and we don't mind that she's deaf at all.*

"BRENT" Brent's mother was a consultant for the clinic where I worked when I first met her and heard about her son who was then two years old. He had experienced many health problems including a submucous cleft palate, skeletal dysplasia and a digestive disorder. His life at that point had included a series of long hospital stays and medical interventions such as being fed through a "button" in his stomach. These problems prevented him from having the usual experiences of a two-year-old. Brent was almost three when his mother asked me about giving him speech therapy. She responded to my suggestion that they might want to wait until he was older by describing how much it bothered him that he couldn't speak clearly. "He practices," she said, "he will work and work at trying to say something so we can understand." Since that kind of motivation in one so young could not be denied, I began working with Brent in two half-hour sessions per week.

First I did a brief evaluation of Brent's speech and language abilities. He spoke mostly in one or two word utterances, and at this level he could be understood about 50% of the time. When he tried longer phrases, his intelligibility decreased rapidly. My evaluation of his mouth and tongue structures and movements indicated that he was able to produce all the sounds in isolation. Language testing indicated that he had a large receptive vocabulary including names of animals and toys. His vocabulary did not include words related to food or eating, however, since he had no experience with eating. I concluded that Brent's difficulty with intelligibility during connected speech stemmed from his inability to produce the rapid movements needed to sequence sounds. I found that he was, indeed, embarrassed about his speech, and it took a while for him to become comfortable enough with me to try the exercises I asked him to do.

Brent's program of instruction combined speech and language instruction. He practiced saying pairs of syllables which were difficult because they had sounds or sound combinations that were troublesome for him (such as "ka-ga" and "fa-va"). I used a stopwatch to see how many times he could say the combination in 10 or 15 seconds. We used the syllables "pa-ta-ka" as a baseline measure to track his progress. Letting him

have a turn with the stopwatch to time me made him feel better about the whole thing. Brent also practiced words, phrases and short sentence patterns during each session. The sentence patterns gave him a framework for practice while teaching him correct language structure. The sentences were gradually expanded to include prepositional phrases and adjectives. Brent played with toy people and animals, narrating what they were doing. Later on he learned short rhymes, made up stories for “wordless books” and learned phrases from repetitive stories.

When his instruction began, Brent could repeat only seven of the nineteen target syllable pairs and he was not able to sequence the syllables “pa-ta-ka.” He learned all the pairs and began to work on speed. After ten months (approximately forty hours of instruction), he was able to produce all the syllable pairs from seven to thirteen times in ten seconds, and could sequence “pa-ta-ka” fifteen times in fifteen seconds. He learned to produce eight multisyllabic words (snowman, valentine, bicycle, etc.) and made up sentences with them. His intelligibility increased to approximately eighty-five percent. As he learned to speak in complete sentences, his mean length of utterance (mlu) increased from 1.5 words to 6.2 words. He also learned to use language as a tool: to ask questions; make requests and to narrate his own and others’ activities (such as talking his way through putting together a puzzle). He learned “spatial” words such as “in,” “through” and “under,” by acting them out. During this time, Brent’s health improved and he was able to begin eating. He finally progressed to the point where the “button” was removed from his stomach. Then he began learning words related to eating such as “Big Mac & Fries!” In addition, because Brent’s understanding of language was above average, he was very good at the “cloze” method. If I gave him the beginning of a sentence, he was able to predict the rest of it.

After he turned four, Brent started preschool in a small class with an exceptionally able teacher. He reported with great excitement, “My kids are there!” He lived for “Bag Day” when everybody brought something in a bag to show and tell about. Brent is now in second grade and reads above grade level. His responses on the Test of Language Development-Primary (TOLD-P) are in the average or above-average range on all subtests. This test measures both receptive and expressive abilities in vocabulary (semantics) and language structure (syntax). He reached his last articulation goal which was to stabilize the “r” sound in connected speech. stories. The following is a story he made up with lots of “r’s” in it for practice.

### *The Bus Ride*

*The bus runs to the zoo. We take a bus ride to see the animals. We saw the walrus swim around and around in the water. The tiger growled and wanted to eat some rabbits, but the rabbits ran away. Then the bus ride took us back home.*

Although these programs were individualized to meet each student’s needs, six common features can be identified in each one. These features include:

1. Combined simultaneous instruction in articulation, language and reading
2. Use of various language development activities in which students participated in generating the materials used in their articulation therapy
3. During each session, the students learned new words and sentence patterns. Then they created word combinations, sentences and stories which became practice materials for speech production.
4. Use of different modalities to reinforce learning in all three areas
  - a. Visual: Visual modeling of correct speech sounds; Self monitoring by looking in a mirror; Associating a picture with names and shapes of letters; Identifying letters by just their distinctive features; Building sentences with plastic shapes representing different parts of speech; Learning word families
  - b. Auditory: Verbal description of speech sounds; Listening for facilitating contexts; Discussing meanings of words; Conversation to stimulate language; “Cloze” method: instructor begins a sentence and the student predicts the rest
  - c. Motor: Tactile feedback such as feeling throat, airflow, movement of articulators; Practicing syllable pairs and word pairs; Tapping, clapping, jumping; Identifying 3-D and 2-D letters by touch; Physically “acting out” a sentence; Drawing visual notes for words and content; Writing question notes
5. Practice in sequencing at syllable, word and sentence levels
6. All the students demonstrated difficulty with sequencing. This need was met with practice in syllable pairs in order to increase the ability to produce sounds rapidly, practice with word pairs to provide facilitating contexts for difficult sounds, and practice with correct sequence of sentence patterns in order to produce and read a variety of sentence types.
7. Emphasis on meaningful material used for practice  
Each session progressed rapidly from syllables to words and sentences because the students were more interested and engaged when they were dealing with meaningful language.
8. Using a language and image-based approach to reading
9. The students learned to predict content, become familiar with vocabulary before reading a passage, make visual notes for vocabulary and content, and to question the print.

Because the students had all reached some kind of impasse, which interfered with the communication process, combined instruction in the three related abilities was crucial to their progress.

RELEVANT RESEARCH: Rosenbek (1974) wrote extensively on diagnosis and therapy for persons with apraxia of speech. "Speech is not merely a modality for language, but an influence on it and reciprocally influenced by it. We try to exploit this reciprocity". Hugh Catts (1986) reported that "...many RD [reading disabled] children may be less able than normal children to carry out the motor programs of speech accurately... some RD children have deficits in the production of speech. These difficulties appear to be an extension of RD children's various deficits in phonological processing." In a later article, Catts (1993) concluded that studies had shown, in general, that articulation ability was unrelated to reading achievement. However, Magnusson and Naucler (1990) have proposed that "a subgroup of children with articulation impairments may have a high incidence of reading disabilities." These are children who show sequential errors such as assimilation and metathesis. (Assimilation refers to sounds which are changed by neighboring sounds and metathesis happens when two sounds change places.) Catts (1993) adds that he has found a correlation between reading problems and some phonological errors, including weak syllable deletion in which unaccented syllables are left out; and assimilation in multisyllabic words and phonetically complex phrases. These kinds of errors are consistent with the profile of individuals demonstrating apraxia of speech as reported by Odell (1990).

In addition to the authors previously cited, other writers have recommended integrated approaches to remediation. Schwartz (1980) presented a synergistic view of linguistic disorders in which he states, "...strategies of remediation should be developed that deal with disorders of phonology and other aspects of language in an interrelated fashion, not the isolated fashion to which we have become accustomed ... Piecemeal approaches to remediation seem to be far less efficient means of dealing with concomitant deficits in different aspects of language than integrated approaches." Some have suggested that the "piecemeal approach" is a result of "professional territoriality" in which each discipline uses its own vocabulary to describe their subjects without collaborating with other disciplines (Kamhi & Catts, 1986). Training in several different disciplines allowed me to use combined approaches to remediation for the six students described here.

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