5-2013

Apraxia: What Interventions can Elementary Teachers use to Address Communication Skills?

Jillian Barrington
University of New Orleans

Recommended Citation

APRAXIA: WHAT INTERVENTIONS CAN ELEMENTARY TEACHERS USE TO ADDRESS

COMMUNICATION SKILLS?

An Honors Thesis

Presented to

the College of Education and Human Development

of the University of New Orleans

In Partial Fulfillment

of the Requirements for the Degree of

Bachelor of Science, with University Honors

and Honors in Education and Human Development

by

Jillian Barrington

May 2013

Acknowledgements

I owe my deepest gratitude to Dr. Janice Janz for her assistance, support, and guidance in completing this thesis.

I am also indebted to my thesis committee, Dr. Patricia Austin and Dr. Brenda Burrell, for reviewing this thesis, which is much improved as a result of their thoughtful criticism.

I would also like to thank the Honors Program of the University of New Orleans for the opportunity to challenge myself, learn, and grow throughout this process.

Additionally, I would like to thank my family and friends for their enduring and unselfish support and encouragement during this process.

Finally, I would like to thank my nephew, Mason, for inspiring me to learn more.

Table of Contents

Abstract

This thesis examines the basic principles of childhood apraxia of speech (CAS), including the symptoms, common indicators, causes, methods for diagnosis, treatment methods, and implications for general elementary school teachers. A wealth of research and methodology exists for young children and adults, but there is limited information regarding intervention practices available for older elementary school age children. This report collects data from various articles, reports, and books providing information concerning the symptoms, common indicators, causes, methods for diagnosis, and treatment methods for individuals with apraxia, including case studies. The goal of this report is to close the gap in information between interventions used for young children and adults in order to inform teachers of elementary age children with childhood apraxia of speech in the general education classroom. Elementary teachers need to know how to respond as classroom supporters; thus, this thesis suggests methods to address children with apraxia of speech in elementary school based on the literature about young children and adults.

Keywords: childhood apraxia of speech, elementary, education, speech, language

Apraxia: What Interventions Can Elementary Teachers Use to Address Communication

Skills?

Introduction

Apraxia of speech is a communication disorder that impacts individuals of various ages, including young children (ages 0-7) and adults. A majority of the literature is focused on those two age categories. However, there is a scarce amount of literature focused on elementary aged children. This thesis will review literature regarding apraxia and the treatments used for young children and adults before proposing interventions for elementary teachers to consider when working with a student with apraxia.

Mason

The foundation of this thesis does not begin with research: it begins with my heart. My interest in the topic of childhood apraxia of speech began with my then six-year-old nephew, Mason. He was suspected to have childhood apraxia of speech by his speech teacher, and he very well may have apraxia; we are still on a journey of discovering ways to service him in the best ways possible.

As an aunt in the field of education, I took on the task of working with Mason. He was set to go to kindergarten in the fall, and we did not know what he knew academically. Mason's speech and motor milestones were delayed from birth, so working with him was often a challenge. He began truly speaking at the age of three; in the years prior, he would mutter words or sounds that were often unintelligible. Also, we could not rely on him to answer

questions as is typical with other children his age. The summer before he went to kindergarten, I volunteered to keep him during weekdays over the summer while my sister worked from about 7am to 6pm. I made a schedule and thought of fun ways to try to figure out what Mason knew in terms of the basics, like numbers, colors, letters, and shapes, that I thought would work with almost any child.

Throughout the summer, I realized quickly that I had to create new, more inventive ways to reach Mason and to work with him in a meaningful way. In a short amount of time, I learned that Mason knew everything. He did not explicitly demonstrate his knowledge of every number, color, letter, or shape, but I sensed that he knew it all. Perhaps it was my teacher senses or my aunt senses, but I had the deep feeling that Mason understood much more than he was sharing. Mason's pattern of behavior related to sharing what he knew academically led me to believe so.

A major challenge of trying to get the information out of Mason was finding ways to ask the questions necessary without his knowing that I was aiming to figure out what he knew. For instance, if he was asked, "What color is your shirt?" and his shirt was blue, then Mason would say any color, likely because it was a color. His answers were inconsistent; every once in a while, he would respond with the correct answer, but we could not depend on his answers. The inconsistencies in his responses were such that I was skeptical about the validity of his correct answers. However, when I was coloring with Mason one day, he grabbed a purple crayon from the box and stated, "Ooh, I got purple."

In another instance, Mason and I were talking during lunch. He began describing the building implosion that had recently occurred in New Orleans and was a hot topic on the news channels. At first, it took me a minute to realize what he was talking about, but then he surprised me. Mason was telling me that we could not visit his Gammaw at work in New Orleans because the building implosion made a mess, which was on the way to Gammaw's work. We had visited her a few times at work on our field trip days and did have to pass the imploded building on the way there. At some point in the conversation, he told me, "Yeah, it's damaged." He had just used the word, "damaged," in a sentence correctly, and it was spoken clearly. His vocabulary was apparently larger than he let on, and there were particular words that he was able to speak clearly. On the contrary, Mason would say "burr-burries" instead of "blueberries" and "fofa" instead of "sofa." Based on our one-on-one time, I inferred that Mason was only sharing information when it was unpressured and seemingly meaningful to him. It was as if I had to sit and wait for Mason to give me insight as to what he knew or find ways to get him into sharing his knowledge. For instance, I would ask Mason what color he was going to use first. He would say one color, but take a different color out of the box simultaneously. I later figured out that I could get Mason to display his knowledge of colors in a different way. Mason is all about following the rules, even though he does not follow them sometimes; he likes rules. After Mason was finished coloring one day, I told him that we had to put the markers back in the box exactly as they are listed on the box. The marker box has colored dots on top in the order in which the markers are originally packaged. Mason, wanting to follow the rules, handed me the colors as I asked for them in order without allowing him to see the top of the box; he did so with 100% accuracy.

Another major challenge in working with Mason was that he often said, "no-no" when he meant yes and said, "no" when he meant no. His version of the terms "yes" and "no" were very confusing for us until we began to understand his intentions with "no" and "no-no." When we did not respond to his requests in the way he expected based on his form of the words "yes" and "no," he would become very frustrated. Part of my plan for the summer involved having Mason use "yes ma'am" and "no ma'am" when answering yes or no questions to eliminate confusion and frustration on both ends. I selected "yes ma'am" and "no ma'am" because they are respectful responses that would require Mason to go beyond the "yes" and "no," which were jumbled at the time in terms of meaning and his expression. When he used "yes ma'am," I took it as a "yes" and vice versa. Mason learned that his words had meaning and that he had to communicate the correct response to get what he desired. Achieving this understanding took many weeks; he required a lot of prompting because I was firm in accepting only "yes ma'am" and "no ma'am" from him. Sometimes he said the wrong one related to what he really wanted, and other times he would say both together, to which he had to choose one. Eventually, Mason formed the habit of using these responses appropriately.

The specific examples above are only a few of the instances and challenges Mason and I encountered during our summer together. The following summer, I kept him again during weekdays from about 7am to 6pm and noticed growth and improvement, even though he still exhibited challenges in school and at home. Mason's speech was clearer. He also exhibited speech that was more structured, as in sentences or phrases. Mason used "yes ma'am" and "no ma'am" appropriately. He knew what to expect from our schedule, since I did not change it. Mason showed more confidence and maturity than the previous summer. He was more

comfortable with speaking to people who acknowledged him in public, whether he knew them or not. For instance, when we were waiting to tour the Stennis Space Center, Mason commented, "You ride bike," to a man wearing a bandana, boots, and a leather jacket. Also, he often told sales associates and cashiers about a toy he was holding or a shirt he was wearing. When apraxia was mentioned by Mason's kindergarten speech teacher, we had never heard of it and began looking for information.

When I began looking into childhood apraxia of speech, I realized there was a lack of research and information available related to children beyond the primary years. All references indicate a need for research related to apraxia of speech, whether it be in diagnosis, treatment methods, longitudinal studies, variety in case studies, or differentiation from other similar disorders. Edeal and Gildersleeve-Neumann (2011) claim, "Continued research with children with CAS is needed to address the importance of other motor learning principles..." McNeill, Gillon, and Dodd (2009) point out that, "...there is a scarcity of intervention studies for CAS. Current and novel treatment approaches for children with CAS must be rigorously investigated to direct treatment practices." Lewis, Freebairn, Hansen, Iyengar, and Taylor (2004) note,

> Longitudinal studies of children with CAS are needed to (a) establish more precise
> diagnostic criteria for CAS that accounts for variability with age, (b) describe speech-
> sound outcomes for children with an early diagnosis of CAS, (c) clarify the relationship of
> CAS and language impairments, and (d) examine written language...outcomes of
> children with CAS. Comparing children with CAS to groups of children with other speech-
> sound disorders will assist in identifying unique features of CAS.

The American Speech-Language-Hearing Association (2007) expresses concern about

CAS research as well: "… presently [there] is no one validated list of diagnostic features of CAS

that differentiates this disorder from other types of childhood speech sound disorders…" These

concerns are only representative of the main research deficits associated with childhood

apraxia of speech. The timing was perfect in terms of my informal research and the opportunity

to complete this thesis; thus, I outlined the task of researching apraxia and using the

interventions suggestions for young children and adults to compile best practices for general

elementary teachers to use when working with students with childhood apraxia of speech.

Based on reports from the American Speech-Language-Hearing Association (ASHA)

(2007), the prevalence of childhood apraxia of speech is still somewhat of a mystery. According

to earlier reports, childhood apraxia of speech may occur in approximately thirty to forty

children per thousand. Due to the nature of apraxia and the more recent increase in interest

and research, the prevalence of childhood apraxia of speech is complicated to identify;

however, the growing incidence places a definite need for research and education of parents,

caregivers, education professionals, and especially teachers. Currently, there is ample research

available related to apraxia on young children (ages 0-7) and adults. What about those children

in the middle, like elementary students? There is a gap in the research and methodology

related to children with childhood apraxia of speech at elementary age level, and the goal of

this report is to use the research regarding interventions used with young children and adults to

find and alter existing practices to fill the gap in interventions elementary teachers can

implement for children with apraxia, or mimicking struggles, in the classroom.

What is Apraxia of Speech?

Apraxia of speech is a motor speech disorder that impacts an individual's ability to communicate verbally as is normally acceptable. The term, apraxia, is meant to describe a lack of praxis, which is the generation of volitional movement patterns (American Speech-Language-Hearing Association [ASHA], 2007). When applied to speech, having praxis means having the ability to select, plan, organize and initiate the motor pattern necessary to form words, phrases, and sentences in order to communicate (Velleman, 2003). All of those components are necessary for verbal communication; the processes occur so quickly, and sometimes automatically, for those without apraxia of speech that we do not typically recognize that all of those processes could occur so rapidly as speech occurs naturally.

Due to the nature of the disorder, there is much debate as to how to accurately define apraxia of speech. Many researchers believe that apraxia of speech is a complication resulting from a motor issue (Moriarty & Gillon, 2006; Martikainen & Korpilahti, 2011; Hula, Robin, Maas, Ballard, & Schmidt, 2008; Edeal & Gildersleeve-Neumann, 2011; McNeill, Gillon, & Dodd, 2009; ASHA, 2007; Blakeley, 1983; and Square, Roy, & Martin, 1997). Velleman (2003) tells us that researchers have not yet reached a consensus in the belief that childhood apraxia of speech is either the result of a language issue or the result of either a motor or language issue. A continuum of apraxia ranging from executive apraxia (articulation as primary impairment) to planning apraxia (language difficulties) is suggested by Bahr, Velleman, and Ziegler (1999). The controversy over how to define apraxia of speech stems from the inconsistency in the characteristics noted of those diagnosed with or suspected to have apraxia of speech.

Preferred terms exist when referring to an individual with apraxia. Adults with the disorder are said to have apraxia of speech (AOS). Children with the disorder are said to have childhood apraxia of speech (CAS) or developmental apraxia of speech (DAS). However, it is important to note that in the United States, childhood apraxia of speech is the preferred term because it is the more theory-neutral, insurance-friendly term (ASHA 2007). When "developmental" is used, it typically relays a message to insurance companies that the disorder is something that the child will grow out of with time and without continuing treatment, which is not true of the disorder ASHA (2007); therefore, childhood apraxia of speech is the preferred term and is the term to be used throughout this work.

What are the Symptoms?

Individuals with apraxia of speech often have difficulty imitating sounds, have difficulty imitating non-speech movements, grope when trying to produce or coordinate sounds, have inconsistent errors, have a slow rate of speech, are unintelligible to unfamiliar listeners, and have a somewhat preserved ability to produce automatic speech (ASHA, 2007). Expressive language is typically inferior to receptive language, supporting the notion that individuals with apraxia generally understand more than they are able to communicate (Lewis, Freebairn, Hansen, Iyengar, & Taylor, 2004). According to ASHA (2007), the three main features agreed upon by most investigators of apraxia of speech in children are: "inconsistent errors on consonants and vowels in repeated productions of syllables or words, lengthened and disrupted coarticulatory transitions between sounds and syllables, and inappropriate

prosody…" Prosody is the fluidity and tone at which a person speaks, which should sound natural to other listeners.

Sample Case Studies

Young child. Martikainen and Korpilahti (2011) provide a sample case study of a young, Finnish child with childhood apraxia of speech:

At the beginning of the study, SS was 4;7 years old. She had a normal birth and medical history. She produced her first words at the age of 12 months, but they disappeared for a period of 6 months. Speech development speeded up at 36 months, when word-joining also appeared. Several of SS's family members and relatives had speech and/or language disorders, but none of them had the diagnosis of CAS. At age 3;5 years, SS was referred for assessment by a speech and language therapist. The referral came from a child welfare clinic. At that age SS's speech was difficult to analyse properly due to her reluctance to produce sounds and words on request. On the whole, her speech was very limited and unintelligible. The consonant inventory was notably restricted and many consonants were substituted by glottal stops. All Finnish vowels were heard in her speech, but they were used inconsistently. Language comprehension was within normal limits. Speech and language therapy was given by the first author, and it started 3 months after the assessment. Therapy was infrequently executed, 12 times in all (from 3;8 to 4;6 years of age), before SS was referred to the intervention study. (p. 12)

The patient described above provides typically evident struggles for children with apraxia. The disappearing speech, limited and unintelligible speech, and difficulty with requested sounds

and words are telling of a young child with childhood apraxia of speech, although not every

child exhibits the same characteristics.

> **Adult.** Hashimoto and Frome (2011) provide a sample case study of an adult with

apraxia of speech:

> MB is a 72-year-old, right-handed former nursing assistant and store owner who
>
> sustained a cerebrovascular accident in 2000. She is a primary English speaker with
>
> reported normal vision, and no history of neurological, psychiatric, or learning
>
> difficulties… Overall testing of language functions revealed a moderately severe aphasia
>
> characterized by deficits in comprehension of slightly complex or abstract material,
>
> verbal output limited usually to common, familiar words and occasional phrases due to
>
> reduced verbal expressive skills and apraxia of speech, and significantly impaired oral
>
> naming abilities. (p. 461)

The patient described above exhibits difficulties that are typical of adults with apraxia, as well

as an accident. Lacking expressive skills and struggling to speak words and phrases are common

characteristics which can be indicators of apraxia of speech.

What are Possible Causes of Apraxia?

The cause or causes of childhood apraxia of speech can be challenging to identify as

well. According to ASHA (2007), "CAS may occur as a result of known neurological impairment,

in association with complex neurobehavioral disorders of known or unknown origin, or as an

idiopathic neurogenic speech sound disorder." In other words, CAS may be caused by a

neurological-related issue or for an unknown reason, regardless of connection to any other

existing issues. Apraxia of speech in adults is commonly caused by stroke, but traumatic brain

injury, dementia, tumors, and progressive neurological disorders, like multiple sclerosis, may also be causes (ASHA, 2007). Since adults are typically diagnosed with apraxia after an incident, determining the problem can be simpler than that of children.

How is Childhood Apraxia of Speech Diagnosed?

Speech-language pathologists with knowledge and experience concerning CAS can diagnose a child with childhood apraxia of speech. In regards to preschool-age children, diagnosis of CAS is not often encouraged, so the diagnostic status may be labeled as such: "*CAS cannot be ruled out*, *signs are consistent with CAS*, or *suspected to have CAS*" (ASHA, 2007). Velleman (2003) provides a definitive view of a likely approach to the diagnosis of childhood apraxia of speech, including forms of assessment: prior to administering the assessment for CAS, psychosocial history, history of feeding difficulties, speech oral-motor factors, intelligibility, communicative means, and inconsistency will typically be identified, which is comparable to a patient history before other forms of medical treatment. The assessment will likely be composed of an oral mechanism and motor speech examination, communicative means assessment, phonological assessment, language characteristics assessment, literacy assessment, and play characteristics assessment.

How is Apraxia Different in Adults and Children?

Apraxia of speech is demonstrated in adults and children in the same way, in that, the same features of speech and prosody are impacted. However, adults and children demonstrate apraxia of speech in quite different ways. Adults with the onset of apraxia of speech have prior linguistic experiences to rely on during treatment; they do not have the language functionality

barrier that children just learning English, or any other language, may encounter. The main

concern with adults is the loss of automaticity of speech because they have not lost the

linguistic background; they have lost the motor ability to produce sounds with good prosody, or

flow of speech (Youmans, Youmans, and Hancock, 2011). Velleman (2003) notes, "Verbal

routines (social niceties, songs, prayers, rhymes, expletives, counting, the alphabet, etc.) are

usually still available to persons with AOS for communication purposes," which children do not

inherently possess (p. 6).

Children must be taught the rules of the language before they can begin to speak it

appropriately. For those with childhood apraxia of speech, their challenge not only entails that

they learn the motor facets of speech, but they must learn the language itself to be able to use

it in the planning, sequencing, and coordination of the muscles used to speak. The primary

difference is best described by Moriarty and Gillon (2006) when noting that, "...children must

acquire literacy skills amid a disordered linguistic system..." which is different from adults who

have already learned the skills and must work to gain them back due to apraxia of speech (p.

716). Due to this major difference between adults and children with apraxia of speech, applying

treatment strategies used with adults to children is sometimes discouraged because there is

much more diversity in the impact of CAS due to its developmental factor, which is on ongoing

debate in the literature according to Mortiarty and Gillon (2006).

How is Apraxia Treated in Young Children and Adults?

There are some basic guidelines to consider when planning for treatment of apraxia of

speech. Even though there are commonalities which can be applied, there is no single solution

for treating this disorder. Velleman (2003) offers an explanation as to how treatments are

devised:

> The intervention approaches recommended by various practitioners and researchers are
>
> heavily dependent upon their view of the disorder and vice versa: the discovery of a
>
> remediation approach that works typically influences the discoverer's view of the nature
>
> of the disorder. Some approaches are quite motoric, dependent upon drill and focused
>
> upon the achievement of a hierarchy of articulatory gestures. Others incorporate
>
> linguistic components as well, with more emphasis on flexible, functional
>
> communication. The common thread among the vast majority of intervention
>
> approaches today is their emphasis upon the dynamic nature of speech. (p. 8)

Young children. Treatment methods for childhood apraxia of speech differ in

implementation (See Table 1). Over time, various treatment methods for children have

seemingly merged incorporating many of the same features and somewhat forming a

framework for treatment. Due to the inconsistent nature of childhood apraxia of speech, there

are many ways to go about treating one child. As stated by ASHA (2007), "Not all children with

CAS are the same;" therefore, they cannot all be treated in the exact same ways. Also, a child

typically will make inconsistent errors, be slow to progress, and may even appear to regress

during treatment.

Prior to and frequently throughout treatment, assessments must be completed to

ensure the best services are being provided for the child's current skill level. Treatment will

need to be altered accordingly by such assessment results. Many children progress slowly in

small steps with little or no apparent progress (Velleman 2003). Slow progress can often cause

parents and teachers to become frustrated, which in turn can frustrate the child. The speech-

language pathologist must act as the motivational glue supporting the child, parents, and

teachers throughout the process. Providing frequent status reports about the child's progress

related to specific goals is a way for the speech-language pathologist to limit frustration.

Treatment must be intensive and be supported at home and in the classroom to be effective

(Blakeley, 1983).

Due to the nature of rapid growth available during the primary years, early intervention

is key. The earlier a child can receive treatment, the better the chances a child has for

development of normalization of speech and prosody (ASHA, 2007). In regards to format,

treatment should be individual, as opposed to group, to provide specific support for a child with

CAS. According to ASHA (2007), "…treatment for CAS should involve a variety of speech tasks, in

a variety of settings, so that children get ample practice and gain skills in the planning necessary

for a variety of speech movements." Hammer (2009) notes his impression of treatment:

> …a child's diagnosis of apraxia of speech does not mean that he or she needs or is
>
> entitled to intensive one-on-one treatment throughout the course of intervention. In an
>
> outpatient setting, [his] goal is to reduce gradually the number of sessions per week as
>
> speech motor issues subside. (p. 24)

Hammer's goal is for an individual to progress in a manner in which intensive treatment is no

longer necessary. He would rather lessen the frequency of treatment as improvements are

made. However, there is always a chance that an individual may need additional support as

individuals with apraxia can exhibit inconsistent characteristics. A speech-language pathologist

determines the methods and frequency of treatment. The components involved in treatment of

childhood apraxia of speech vary among sources, although some overlap in ideology. The

various methods can be broken into categories based on the type of resources utilized.

Music/melody. Martikainen and Korpilahti (2011) suggest Melodic Intonation Therapy

which makes use of melodic lines, tempo, rhythm, and stress in order to improve prosody and

the sequencing of sounds and words. An individual would practice speech in song-like fashion

closer to the desired natural rhythm of typical speech. The American Speech-Language-Hearing

Association (2007) recommends the use of rate/rhythm treatment which slows the normal rate

of speech of an individual in order to allow him/her to form the necessary mouth gestures

appropriately. Treatment often utilizes metronomic pacing and metrical pacing for repetitive

practice. Metronomic pacing requires an individual to speak one syllable at each metronome

beat, which is slower than normal speech rate for the individual. Metrical pacing utilizes

computer-generated tones produced at the individual's typical speech rhythm and can include

hand-patting or choral speech.

Cueing systems. Martikainen and Korpilahti (2011) suggest the Touch-Cue Method

which aims to improve the sequencing of sounds by associating light touches to the face and

neck with speech sounds as they are made. The goal is for an individual to associate a particular

speech pattern, or steps necessary to produce certain words, with the touch in an attempt to

assist more automatic speech sequencing. Edeal and Gildersleeve-Neumann (2011) recommend

integral stimulation techniques in order to improve speech through the use of auditory, visual,

and tactile cues. Auditory cues are given as a "listen and repeat" fashion. Visual cues are

provided to show mouth formation to produce particular sounds. Tactile cues are used as those

described in the Touch-Cue Method. ASHA (2007) suggests the use of articulatory-kinematic

treatment which focuses on the physicality necessary to properly produce speech sounds.

Motoric practice, modeling-repetition, and articulatory cueing are utilized in articulatory-

kinematic treatment. Motoric practice is repeated practice of moving the mouth to and from

various positions. Modeling-repetition is provided as a "I do, we do, you do" format to

repetitively practice particular movements for articulation. An individual would listen, repeat

with the clinician, and then try on his/her own. The purpose of articulatory cueing is to increase

self-awareness in relation to phonetic placement cues and phonetic derivation. Phonetic

placement focuses mainly on the aspects of sound production, like mouth position and the tone

of the sound; phonetic derivation focuses on modifying the current level of articulation and

movements to improve speech.

     Pictures. McNeill, Gillon, and Dodd (2009) recommend the use of an integrated

phonological approach which uses phonological structure as the base for identifying sounds,

letters, and words. Individuals may participate in game-like activities requiring them to break

the sounds of a given word into individual letter sounds and to identify letter names relative to

letter symbols and sounds. Letter blocks and pictures are often used as part of the treatment

method related to the interests of the child. The integral stimulation techniques suggested by

Edeal and Gildersleeve-Neumann (2011) described above also utilized pictures as part of

treatment.

The methods of treatment suggested above are intended for individual or small group

instruction and are typically delivered in a more clinical setting. Bahr, Velleman, and Ziegler

(1999) provide a study based on whole-group instruction in a classroom setting: a Florida school

served as a great example of an inclusive classroom setting which mixed children with

childhood apraxia of speech and children with typically developing speech and language

patterns. A general education teacher and a full-time speech-language pathologist were in

charge of the classroom; they worked collaboratively to implement strategies, plan for

instruction, and create an ideal learning environment in which all students could flourish. The

students did well in the classroom, even though those with apraxia still needed treatment and

some were not cognitively ready to move to the next grade level. Social skills were one of the

most important skills that all of the children likely gained. For children with childhood apraxia of

speech, it is difficult to truly gain the social skills that are normally acquired through typical,

verbal communication, even during play with peers. Also, it was apparent that the students

with childhood apraxia of speech gained a desire to speak once they found comfort in their

classroom setting; they began to feel as if someone wanted to know what they were thinking or

what they wanted to say, which improved their self-worth and confidence (Bahr, Velleman, and

Ziegler, 1999).

Adults. The suggested treatment methods for adults with apraxia of speech also vary

among sources with some overlapping (See Table 1). Some of the treatments for adults are

more focused on retrieval of knowledge and mouth positions; however, some mirror methods

used with young children. The various methods for adults can also be broken into categories

based on the type of resources utilized like those related to young children.

Music/melody. Wambaugh, Duffy, McNeil, Robin, and Rogers (2006) recommend the use of rate/rhythm treatment as described above for young children and intersystemic facilitation/reorganization treatment which utilize melody. Intersystemic facilitation/reorganization treatment makes use of body gestures, singing, and graphic stimuli in order to improve speech sounds or words. Body gestures are paired with, or connected to, sounds or words as a multisensory, memorable tactic. Singing uses melodies and stresses of song to improve flow and rhythm of speech. Graphic stimuli are used when pictures of desired mouth positions are shown for imitative purposes and are typically integrated with other treatment strategies. Square, Roy, and Martin (1997) suggest a motor learning treatment approach focused on the shaping of the vocal cavity and making subtle adjustments. The treatment strategy is intended to increase self-awareness of positions necessary to achieve correct speech sounds compared to current positions. Also, control of positioning and transitions between positions are practiced using melody and slowed rate of speech.

Cueing systems. Wambaugh, Duffy, McNeil, Robin, and Rogers (2006) recommend articulatory kinematic treatment as described above for young children and PROMPT (Prompts for Restructuring Oral and Muscular Phonetic Targets) to provide specific feedback as to each physical aspect of articulation. PROMPT makes use of auditory, visual, tactile, and kinematic cues. Auditory, visual, and tactile cues are used in the same manner as described above in the integral stimulation techniques recommended for young children. Kinematic cues are based solely on the motion or mechanics necessary to produce appropriate sounds when sound is applied.

Pictures. Wambaugh, Duffy, McNeil, Robin, and Rogers (2006) suggest intersystemic facilitation/organization treatment and PROMPT described above, as well as alternative/augmentative communication treatment. Alternative/augmentative communication treatment aims to improve speech through the use of avenues other than speech. Multiple forms of communication are encouraged as to create a comprehensive communication system including, "natural speech, a communication book/aid, a spelling system, a drawing system, a gestural system, and informed communication partners" (Wambaugh, Duffy, McNeil, Robin, & Rogers, 2006, p. 41). Perfecting one alternate form of communication of speech, using writing when expressive language is difficult verbally, role playing, and practicing outside of treatment are advised as part of alternative/augmentative communication treatment. Hashimoto and Frome (2011) recommend using a semantic features analysis approach which aims to retrieve connections among words. Individuals are asked to name a picture card. Next, the individual would be asked to describe four features of the picture card. For instance, if the picture card was a frog, then the individual could use green and small as describing words. The individual then reviews and repeats all words before naming the picture card again.

Scripting. Youmans, Youmans, and Hancock (2011) suggest script training. Participants orally rehearse premade scripts of conversational language and topics. Scripts are typically practiced phrase by phrase. The goal is for individuals to acquire more automatic responses to conversational language outside of treatment and retrieving conversational communication techniques.

Table 1

Intervention Methods by Purpose, Type, and Age-Level

General Purpose and Type	Young Children	Adults
Improve rate of speech and ability to imitate speech sounds Music/Melody	Melodic Intonation Therapy (Martikainen & Korpilahti 2011)	Intersystemic Facilitation/Reorganization Treatment (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	Rate/Rhythm Treatment (ASHA 2007)	Rate/Rhythm Treatment (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	–	Motor Treatment Approach (Square, Roy, & Martin 1997)
Improve ability to imitate speech sounds and imitate non-speech movements Cueing Systems	Touch-Cue Method (Martikainen & Korpilahti 2011)	PROMPT (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	Articulatory-Kinematic Treatment (ASHA 2007)	Articulatory Kinematic Treatment (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	Integral Stimulation Techniques (Edeal & Gildersleeve-Neumann 2011)	–
Improve ability to imitate speech sounds and non-speech movements Pictures	Integral Stimulation Techniques (Edeal & Gildersleeve-Neumann 2011)	Alternative/Augmentative Communication Treatment (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	Integrated Phonological Approach (McNeill, Gillon, & Dodd 2009)	Intersystemic Facilitation/Reorganization Treatment (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	–	PROMPT (Wambaugh, Duffy, McNeil, Robin, & Rogers 2006)
	–	Semantic Features Analysis (Hashimoto & Frome 2011)
Improve automatic speech Scripting	–	Script Training (Hula, Robin, Maas, Ballard, & Schmidt 2008)

The treatment recommendations provided by various sources reflect the idea that

apraxia is a motor speech disorder, aligning with ASHA's (2007) description. The variety in the

treatment recommendations suggests that there are many ways to approach apraxia of speech which may work for some and not others. Also, there is overlap in some of the treatment method suggestions among those specifically recommended for young children with childhood apraxia of speech and for adults with apraxia of speech: rate/rhythm treatment and articulatory-kinematic treatment.

What Strategies Can Elementary Teachers Implement?

Thus far, this thesis has provided numerous strategies used with young children and adults with apraxia of speech. Can any of the strategies be implemented or altered to aid elementary children? This section will examine those strategies and provide suggestions. Speech services for an individual with apraxia of speech are typically provided by a speech-language pathologist. However, I am under the impression that elementary children would benefit more from their speech services if the same expectations and support are provided in the classroom. General elementary teachers can use some of the strategies in the classroom to provide support as they are needed: "In the school setting, classroom teachers are a readily available resource for carryover practice collaboration" (Hammer, 2009, p. 34). Teachers are needed for providing support in the classroom related to what an individual is doing with the speech-language pathologist.

Collaboration between the speech-language pathologist, classroom teacher, and family is needed in order to develop and support meaningful and effective interventions. The communication within this team should be seamless. The speech-language pathologist is in charge of what therapies are used and should communicate practice activities or strategies for

teachers and parents to utilize during their time with the child. A child with apraxia needs

continuity throughout the avenues of his daily interactions with others in order to make use of

the strategies and techniques he learns in therapy; if he never uses them in authentic

situations, then the purpose of therapy is defeated. Using the literature on young children and

adults, teachers can use aspects of the treatments described regularly in the classroom as

deemed appropriate to improve outcomes for elementary students.

Music and rhythmic speech can be utilized when students read passages chorally as a

class or when students sing songs, even if those songs are not academic. Choral reading and

singing are ways to incorporate all students and still aid those with childhood apraxia of speech

(CAS) in developing appropriate rate and rhythm. Researchers of young children and adults

mentioned above encourage the use of music and melody in treatment.

Cueing systems and self-awareness can play a part in the general education classroom

for elementary students with CAS if they are part of the treatment implemented by the speech-

language pathologist. For instance, teachers could act as encouragers of various cues during

class and could provide feedback related to errors when appropriate during class. Seating the

student closer to the teacher may also be preferable to provide for quick connection.

Researchers of young children and adults mentioned above suggest the use of cueing systems

and encourage self-awareness to aid the individual in realizing the current and desired actions.

Communication skills are an aspect that general elementary teachers can also

incorporate based on the research provided. Communication can be achieved in different ways

in the classroom, and, depending on the students, may be implemented in various ways.

Alternate forms of communication suggested for use with adults include communication books, drawing systems, and gestural systems. Each of these could be practiced and utilized as a regular part of the classroom in order to help a student with CAS to be unlimited by speech challenges; conversely, a teacher would not want to discourage a student's speech. Role play and practicing conversational language, like less-formalized script training, could be implemented in the classroom as well. Students could practice together and work as partners, perhaps as a station or center activity. Elementary students tend to enjoy interacting with one another, even if they are given specific role play guidelines. Conversation partners may be an option depending on the grade level of students and speech skills of the student with CAS in the classroom.

Modeling, repetition, and word familiarization can be addressed by elementary teachers in a way that aids students with CAS in the general education setting. Modeling via the "I do, we do, you do" strategy, suggested by ASHA (2007), is beneficial for many students, regardless of CAS classification; however, in reference to students with CAS, this modeling strategy allows for the teacher to determine the pace and support given at each stage. If more repetition is necessary, then the teacher can incorporate more practice according to need. For students who need additional experiences with words, teachers can modify multi-sensory approaches, recommended for children and adults, like the integrated phonological approach and the semantic features analysis approach. Both approaches utilize visuals, repetition, and a playful atmosphere. The more students believe that practice is fun or a game, the more they will likely enjoy and engage in it.

All of the suggestions provided based on the literature available on young children and adults are best accompanied by more classroom management related tips provided by Bahr, Velleman, and Ziegler (1999). Examining the relationships between the teacher, speech-language pathologist, and students provides insight as to how to make it all work. For instance, all students need to feel valued and comfortable in their classroom environment. Creating a classroom community that promotes learning for all students regardless of ability by teaching them to respect one another will encourage students to feel valued and comfortable. Establishing trusting relationships is also another task pertinent to aiding an elementary student with CAS because when a student trusts those who can help them, they are generally more open to receive the help.

The strategies and suggestions for teachers provided above are intended to help teachers be part of the treatment process in the classroom by adjusting and incorporating aspects of classroom practices that can make a big difference. Research regarding elementary-aged students with childhood apraxia of speech and formalized strategies for general elementary teachers to use in the classroom are still in need. The need for information regarding elementary students with CAS is pertinent.

Learning from Mason

Over my two summers with Mason, I was able to develop strategies that worked for us and reflect the same ideals held in the apraxia research. In hindsight, I did what I thought was best and aimed to create a fun, engaging summer program just for Mason. Progress in various areas was obvious during and after both summers. For instance, I required Mason to use "yes

ma'am" and "no ma'am." As noted above, Mason originally used "no" and "no-no" to communicate yes and no. When he began using yes ma'am and no ma'am, he required a lot of prompting. For example, I would ask if he wanted a hot dog for lunch: if he said "no-no," then I would repeat the question and ask, "yes ma'am or no ma'am?" Sometimes he would say "yes ma'am no ma'am," to which I would say, "Pick one. Yes ma'am or no ma'am?" Some days, we could go on for twenty minutes back and forth about yes ma'am and no ma'am, but we had the time to spend on this process. We had the whole summer to make this a habit for Mason, and eventually, he began saying yes ma'am and no ma'am without prompting. Today, Mason still uses yes ma'am and no ma'am; if he answers yes or no, we ask him to say yes ma'am or no ma'am instead. Being firm with Mason about yes ma'am and no ma'am and taking the time necessary to implement this standard showed me that he is capable of so much more than we likely realize; he just needed the extra push.

I required Mason to speak in full sentences. When Mason and I began our first summer together, he did a lot of pointing and gave one- or two-word responses that were sometimes unintelligible in order to communicate what he wanted. For example, he would point to a movie that he wanted to watch or a toy that he wanted to play with at the time. Also, Mason would say, "Drink," if he wanted something to drink. I knew he was capable of more, so I began requiring him to speak in full sentences at all times, beginning with prompting and repetition. If I asked what he would like for lunch, I began by having him repeat, "I would like…" Mason would say it then fill in the blank, and I would require him repeat it to help him with sounding more fluid. Any time I asked Mason a question requiring an answer beyond yes ma'am or no ma'am, I expected him to respond in a full sentence, even if I had to model and repeat it with

him. Mason became used to responding in full sentences; he knew what was expected, and he followed those expectations. When Mason began kindergarten after our first summer together, his teachers complained that he was barely talking to them. I knew that Mason was capable of more, so I advised his teachers that if he was not required to do something, or held to a high standard, then he would not go beyond what was expected of him. In other words, if they expected him to talk, then they had to require him to talk, similar to what I had done over the summer. Mason continues to speak in full sentences at home. Sometimes he gives short answers, and I do not correct him because I know he is capable of speaking in full sentences and often in common conversational speech, full sentences are not used.

During our second summer together, Mason showed great improvements as he was already familiar with the expectations to speak in full sentences and respond with yes ma'am and no ma'am. Also, we kept the same schedule, so he knew what we would likely be doing each day. One area that we really worked on that summer was intelligibility. At times, Mason would try to tell me something that I could not understand. I found that instead of requiring him repeat the same thing over and over, asking him to use different words or to tell me in another way would help the process. Mason was usually able to say, "like" or "you know" then choose new or different words in order to explain what he was originally trying to say. I was surprised that this strategy worked; however, Mason had to really think to be able to explain something in a different way.

Mason surprised me by showing me a new skill he possessed: reading. While I was driving us to the beach with a friend, Mason randomly says, "That's money." I looked around

and noticed that there was a boat attached to a truck. The name of the boat had "Quarter" in it.

Mason apparently recognized the word quarter and knew that it is related to money. Another

similar instance occurred over the summer when Mason was visiting our home with his mother

and sister. I was baking a cake from scratch that called for evaporated milk, and Mason wanted

to help me. I asked him to shake the can of evaporated milk, but did not say what was in the

can. While I was doing something else, Mason says, "What's that? Milk?" I looked straight at

Mason with surprise. He apparently knew the word milk and noticed it on the can. The even

more interesting aspect of this story is that Mason is allergic to milk, so he does not see milk

cartons often. These two examples support the notion that Mason really knows more than we

know or than he leads us to believe; it is simply finding the key as to how to get the information

out of him consistently without having to wait for him to share what he knows.

Music was almost always a part of our day. We would sing along to music DVDs with the

subtitles. Sometimes he or I would sing alone, or we would simply listen to the music. Music

was a nice way to incorporate rhythm, tone, and melody. Mason usually enjoyed our music

time, but he did not realize that listening or singing along was actually something I purposed to

help him. Music was an enjoyable way for Mason to hear and practice rhythm, melody, and

tone.

Each day before his nap time, I would read to Mason. He could pick out a few books for

us to look at each day, and he tended to pick the same ones each day. Sometimes I would

recommend other books in addition to those he really seemed to like. Other times, Mason

would offer to read his books; his reading was not typically in full sentences. He would repeat

the same words on different pages and skip through the pages, but he wanted to read. Mason

was able to recall stories and connect them to what he saw. For example, he really enjoyed a

book about a character lying. When he saw a similar situation on television one day, he noted

that it was just like the book and began telling me a little bit about the book.

All of the practices I used with Mason were altered just for him. I had to pay close

attention to the ways in which he expressed his knowledge and interests in order to respond to

him appropriately. The differences between each summer were grand to me, but Mason's

choice to speak at school has not changed since kindergarten. Currently, his teachers still note

that he does not talk to them much, and when he does, it is not in complete sentences. Mason

receives speech therapy three times a week. One session is individual, and the other two

sessions are conducted in a small group setting. He has received speech therapy to different

degrees since he was almost three years old. Currently, Mason's speech-language pathologist is

exploring new ways to work with him.

As my nephew is preparing to move to second grade, the need for information about

elementary-aged children with childhood apraxia of speech, regardless of his diagnosis or lack

thereof, is reality. My concerns for Mason revolve around what his teachers can do in the

classroom. My hopes for his future involve teachers with information and resources that will

benefit him in their classrooms. The research began with Mason, and it will not end here.

Conclusion

In closing, this thesis has examined strategies used with young children and adults with

apraxia of speech and explored opportunities to incorporate similar strategies in order to

benefit elementary students with apraxia in the classroom. My hopes for this thesis are for it to be useful for elementary teachers working with students with childhood apraxia of speech. Elementary teachers are given many tasks to complete on top of teaching, so incorporating a few strategies taken from detailed therapies is more manageable than incorporating an entire therapy technique. Communication between the speech-language pathologist, parents, and teachers is key to implementing effective strategies. Each needs to know what to do, how the current approaches are working, and what to do next.

In addition to a positive impact on classroom practices, I hope that research will be done with elementary students with apraxia in order to provide better insight about that population. In turn, research would likely provide more selective therapies and strategies related to childhood apraxia of speech. Longitudinal studies conducted on elementary students would provide insight as to what strategies work and why, as well as any alterations that had to be, should have been, or could have been made to the strategies implemented with individuals. Also, longitudinal studies of individuals from the time they receive services as a young child throughout schooling, and possibly adulthood, would greatly benefit and impact future implementation and development of strategies useful for individuals with apraxia. A more clinical approach in general with elementary students is desired in order to gain insight regarding what works with that particular population of students. Once more data is collected based on elementary aged children, strategies can be informed, altered, and created as necessary.

References

American Speech-Language-Hearing Association (2007). Childhood Apraxia of Speech. Retrieved

from http://www.asha.org/policy/TR2007-00278.htm.

Bahr, R. H., Velleman, S. L., Ziegler, M. A. (1999). Meeting the Challenge of Suspected

Developmental Apraxia of Speech through Inclusion. *Topics in Language Disorders* (19-

35). Aspen Publishers Inc.

Blakeley, R. W. (1983). Treatment of Developmental Apraxia of Speech. In W. Perkins (Eds.),

Current Therapy of Communication Disorders: Dysarthria and Apraxia (25-33). New York:

Thieme-Stratton Inc.

Edeal, D., & Gildersleeve-Neumann, C. (2011). The Importance of Production Frequency in

Therapy for Childhood Apraxia of Speech. *American Journal Of Speech-Language

Pathology*, *20*(2), 95-110.

Hammer, D. W. (2009). Apraxia Services in the Schools. *ASHA Leader*, *14*(12), 24-34.

Hashimoto, N., & Frome, A. (2011). The Use of a Modified Semantic Features Analysis Approach

in Aphasia. *Journal Of Communication Disorders*, *44*(4), 459-469.

Hula, S., Robin, D. A., Maas, E., Ballard, K. J., & Schmidt, R. A. (2008). Effects of Feedback

Frequency and Timing on Acquisition, Retention, and Transfer of Speech Skills in

Acquired Apraxia of Speech. *Journal Of Speech, Language, And Hearing Research*, *51*(5),

1088-1113.

Lewis, B.A., Freebaim, L.A., Hansen, A.J., Iyenger, S.K., & Taylor, H. (2004). School-Age Follow-

Up of Children with Childhood Apraxia of Speech. *Language, Speech, And Hearing*

Services In Schools, 35(2), 122-140.

Martikainen, A., & Korpilahti, P. (2011). Intervention for Childhood Apraxia of Speech: A Single-

Case Study. *Child Language And Teaching Therapy*, 27(1), 9-20.

McNeill, B. C., Gillon, G. T., & Dodd, B. (2009). Effectiveness of an Integrated Phonological

Awareness Approach for Children with Childhood Apraxia of Speech (CAS). *Child*

Language Teaching And Therapy, *25*(3), 341-366.

Moriarty, B. C., & Gillon, G. T. (2006). Phonological Awareness Intervention for Children with

Childhood Apraxia of Speech. *International Journal Of Language And Communication*

Disorders, *41*(6), 713-734.

Square, P. A., Roy, E. A., & Martin, R. E. (1997). Apraxia of Speech: Another Form of Praxis

Disruption. In Rothi, L. & Heilman, K. Editor (Eds.), *Apraxia: The Neuropsychology of*

Action (173-206). UK: Psychology Press.

Velleman, S. (2003). *Childhood Apraxia of Speech Resource Guide*. K. Bleile (Ed). Delmar
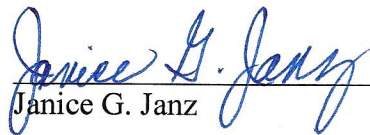
Learning.

Youmans, G., Youmans, S.R., & Hancock, A.B. (2011). Script Training Treatment for Adults with

Apraxia of Speech, *American Journal of Speech-Language Pathology*, 20(1) 23-37.

Wambaugh, J. L., Duffy, J. R., McNeil, M. R., Robin, D. A., & Rogers, M. A. (2006). Treatment

Guidelines for Acquired Apraxia of Speech: Treatment Descriptions and

Recommendations. *Journal of Medical Speech-Language Pathology*, 14(2), 35-67.
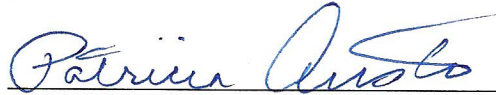
APPROVAL SHEET

This is to certify that Jillian Renee Barrington has successfully completed her Senior Honors Thesis, entitled:

Apraxia: What Interventions can Elementary Teachers Use to Address Communication Skills?

Janice G. Janz   Director of Thesis
Janice G. Janz

Patricia Austin   for the Department
Patricia J. Austin

Brenda Burrell   for the Department
Brenda Burrell

Abu Kabir Mostofa Sarwar   for the University
Abu Kabir Mostofa Sarwar   Honors Program

April 25, 2013
Date