

What Others Are Saying . . .

“My husband and I just attended your (apraxia) workshop in Victoria. **Wow!**”

— Helena, mom, British Columbia

“I just wanted to thank you for writing such amazing books. . . . I never have found any R method to be as helpful. **Your books have improved and enhanced my therapy** more than any continuing education course that I’ve taken since I graduated 11 years ago! I will highly recommend your books!”

— Kimberly, SLP, Washington

“Your work has helped support mine and the families with children with AOS tremendously. **I’ve incorporated much of what you teach with success.**”

— Monique, SLP, web comment

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— Nancy, SLP, New Jersey

“I just received your *Becoming Verbal with Childhood Apraxia* book a couple of weeks ago and am **singing your praises to everyone!**

— Karen, mom, Missouri

“**I really admire your work.** . . . Your R ideas have helped immensely this year with my clients! . . .”

— JoAnne, SLP, Wisconsin

Apraxia Uncovered

SEVEN STAGES OF PHONEME DEVELOPMENT

P A M M A R S H A L L A

MSL
Marshalla Speech and Language

Please note

This book was created as a companion reference for the *Apraxia Uncovered* audio seminar on three CDs, not as an independent publication. For professionals with experience in this subject, the book by itself can serve as a valuable resource.

To acquire the full seminar, please refer to the order form in the back of this book or visit www.pammarshalla.com.

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To ...

*Drs. David Kimbrough Oller and Marsha Zlatin Lauffer, who
taught me to think about the way infants vocalize.*

*Special thanks to the hundreds of speech and language
pathologists who provided the speech samples presented
throughout this text.*

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INTRODUCTION

Seven Stages of Phoneme Development

Children with severe expressive speech disorders have one great universal need: They must learn to speak intelligibly with correct consonants and vowels. *Apraxia Uncovered* teaches just that. The seven stages concept has evolved through thirty years of speech and language therapy with countless hundreds of children who display a wide variety of severe expressive speech disorders. The stages represent an integration of research on infant vocal development with standard practices in articulation, phonological and oral-motor therapy into a program designed to stimulate phoneme development in children with severe expressive speech delay or disorder.

Children with apraxia and dysarthria do not respond well to traditional speech therapy methods and procedures. These children seem unable to figure out how to produce specific phonemes, and the sounds they do produce emerge slowly, even painstakingly.

Children with apraxia or dysarthria need a different approach to acquire speech. They need a therapy that actually teaches them how to make their speech mechanism function correctly. If they can figure out how to work their speech mechanism, they can use that skill to produce more phonemes and intelligible speech.

A child spends his first few years of life discovering how his body works. He figures out how to sit, stand, grasp, release, hit, kick, poke his fingers into holes, turn knobs, pull off and on his clothing, eat, drink, climb, slide, swing, and countless other actions. One of these other actions is speech, the coordinated activity of respiration, phonation, resonance, and oral-motor action. While he is discovering how his body works, a child also is discovering every action necessary to make speech sounds. By the time he has reached three years of age, the average child has learned how to coordinate his body in every possible way in order to produce all the consonants and vowels of his native language. He can put these sounds together to form words and he can put words together to construct phrases and sentences.

Speech is a movement that, like all movements, is learned over time. Most children learn speech movements naturally as they grow and develop. But some children need specific training to help them learn these movements. *Apraxia Uncovered* provides such training for children with apraxia or dysarthria. Through this program, children learn specific respiration, phonation, resonance, and articulation movements—speech actions—necessary to produce all the consonants and vowels of English. This program also

guides children in the application of these phonemes to intelligible words and phrases.

This material has been written for speech and language pathologists and others interested in the development of speech in children with apraxia and dysarthria. Sound and word examples in this book are presented in phonetic transcription. However, the examples given in the audio material makes these samples comprehensible by parents, teachers, and other professionals.

This material assumes basic knowledge about apraxia and dysarthria. However, simple definitions are offered here for clarity.

Apraxia can be defined as a nonlinguistic sensorimotor disorder of articulation characterized by difficulty in planning movements for speech. In other words, the child with apraxia knows what he wants to say but cannot figure out how to make his speech system function in ways that would result in specific sounds or sound sequences. The result is the very slow onset of speech and very slow acquisition of new speech sounds.

Dysarthria can be defined as a speech production problem that is the direct result of central or peripheral nervous system disorder. Children with dysarthria know what they want to say and they go ahead and say it. But the sounds and words they make are distorted, twisted, or bent. Dysarthria in the early stages can seem like apraxia because of a severe lack of phoneme development. Children can be both apraxic and dysarthric.

Children with apraxia or dysarthria are slow to acquire speech and difficult to understand. Still they

want to communicate. Sometimes an augmentative form of communication is chosen to facilitate functional communication. The seven stages program does not disavow the advantages that augmentative communication systems bring to these children. Children who are nonverbal or minimally verbal can benefit greatly from the use of pictorial, orthographic, hand-sign, gestural, and technological communication systems. Augmentative communication systems such as these should be taught at the same time that the seven stages program is being used to stimulate phoneme development. The seven stages program also is beneficial for children who need no such augmentative communication services.

There are many approaches to the development of expressive speech. Traditional articulation therapy, phonological therapy, oral-motor therapy, and manual cueing systems all are useful in facilitating expressive speech and specific phonemes. The seven stages approach does not negate the value of these methods. The seven stages provide a framework in which these other tried-and-true methods can be placed. Simply put, the seven stages pull all these procedures together into a comprehensive developmental framework, providing a clear path of phoneme development. It teaches us how to organize our articulation, phonological, and oral-motor therapy for children with severe expressive speech disorder.

The Seven Stages

The seven stages of our program are *preparing*, *speechifying*, *honing*, *sequencing*, *solidifying*, *advancing*, and *finish-*

ing. These seven stages unfold from beginning to end throughout the course of time. Each stage represents one developmental platform of expressive speech acquisition. See table 1.

TABLE 1. THE SEVEN STAGES OF PHONEME DEVELOPMENT

1. PREPARING: Getting the voice ready for speech
2. SPEECHIFYING: Making utterances sound speech-like
3. HONING: Zeroing in on non-vocalic consonants differentiated by place
4. OSCILLATING: Creating primitive sequences with reciprocating oral movements
5. SOLIDIFYING: Establishing basic syllable constructions
6. ADVANCING: Leaping beyond simple syllable constructions
7. FINISHING: Incorporating the most difficult articulation skills

Advancement through the seven stages is marked by periods of fast and slow skill acquisition. Fast progress is made as children leap forward into their next developmental stages. Slow progress is made as children spend time learning all the skills required within their new stage. The slow periods of advancement can seem like stagnation or even failure. But therapists, parents, and teachers alike should be assured that their child is still making progress. The child is shoring up and broadening his current level of skills. He is stalling for a purpose. Stalling in a stage is a way to ensure that all the skills within that stage are mastered. This effort

assures that the child actually can and will make the necessary leap to the next subsequent stage. A slow period gives a child the experience and confidence he needs to leap forward into the next developmental stage. It ensures that he will succeed at every level of the program.

The seven stages represent major milestones learned on the path of phoneme acquisition. These stages should be regarded with flexibility because, as is true of all developmental explanations of growth, there is overlap of one stage and another. Further, clients with expressive speech disorder do not always follow an expected plan of maturation. They follow their own path of development, often learning difficult skills before easier ones. The seven stages help us understand how to push skills further along on the developmental path, and at the same time identify gaps in the learning process that, when filled, can allow a fully intelligible speech production system to emerge.

The Action Skills of Each Stage

Each of the seven stages of phoneme development consists of unique skills called *action skills*. Action skills are respiratory, phonatory, resonatory and articulatory movements that alter vocal production. Action skills are the foundational units that actually allow children to discover how their speech mechanisms work. Children acquire new action skills during each stage, and each stage is complete when the action skills of that stage have been gained and mastered. The action skills are listed by stage on table 2. Each will be described in the text and in the lecture material.

TABLE 2: ACTION SKILLS BY STAGE

<i>Stage</i>	<i>Action Skills</i>
1. Preparing	A. Voicing B. Prolonging C. Differentiating D. Posturing
2. Speechifying	A. Projecting B. Pitching C. Intoning D. Pulsing E. Laughing
3. Honing	A. Vibrating B. Occluding C. Releasing D. Popping E. Fricating F. Vowelizing
4. Oscillating	A. Jaw Babbling B. Silent Sequencing C. Lip Babbling D. Tongue Babbling E. Classic Babbling F. Advanced Babbling
5. Solidifying	A. Embedding B. Closing C. Duplicating D. Diminutizing E. Diphthongizing F. Shortening
6. Advancing	A. Jargoning B. Word Jargoning C. Whispering D. Tripling E. Enclosing

7. Finishing
- A. /w/-Clustering
 - B. Syllabifying
 - C. Glide Clustering
 - D. Postvocalic /s/-Clustering
 - E. Prevocalic /s/-Clustering
 - F. Stridency Overgeneralizing
 - G. 3-Consonant Clustering
 - H. Advanced Clustering

Specific Vocalizations

Acquisition of each action skill results in the emergence of *specific vocalizations*. A specific vocalization is a unique prespeech or speech sound. For example, one of the action skills a child gains in the honing stage is to release occluded voiced raspberries. As a result of gaining this action skill, the child learns to say /b/, /d/, and /g/. Phonemes /b/, /d/, and /g/ are the specific vocalizations that emerge during the honing stage.

Each action skill contains a number of specific vocalizations that are acquired in their respective stages. These details will emerge and become clear throughout the written and lecture material. Readers are strongly urged to practice each specific vocalization as the program unfolds. Adults who produce these sounds purposefully will understand this material far better than those who don't, because their learning will be multisensory. The unfolding process of vocal development will become clear in the process. The audio material provides ample opportunity for listeners to imitate, hear, and feel these vocalizations.

Facilitation Techniques

The description of each action skill is followed by suggestions for facilitating the skill. It is assumed that

readers possess basic knowledge about articulation, phonological, oral-motor, and feeding therapy, so explanations of specific methods are not given. For example, the general suggestion to “incorporate techniques to increase lip strength” is given, but the specific methods to do so are not. Readers are referred to the resources listed in the back for further reading on these topics.

Phonemes

Children should be able to produce all the phonemes—vowels, diphthongs, and consonants—of standard North American English by the end of this program. These phonemes are summarized in tables 3, 4, and 5.

TABLE 3. THE VOWELS OF ENGLISH

<i>Category</i>	<i>Vowel</i>	<i>Sample Word*</i>
Front	/i/	beet
	/ɪ/	bit
	/e/	bait
	/ɛ/	bet
	/æ/	bat
Back	/u/	boot
	/ʊ/	book
	/o/	boat
	/ɔ/	bought
	/ɑ/	box
Central	/ʌ/	but
	/ə/	bird

TABLE 4. THE DIPHTHONGS OF ENGLISH

<i>Diphthong</i>	<i>Sample Word*</i>
/ai/	bite
/au/	bout
/ɔi/	boy
/iu/	beauty

TABLE 5. THE CONSONANTS OF ENGLISH

<i>Category</i>	<i>Consonant</i>	<i>Sample Words*</i>
Stops	/p/	pie, upper, cap
	/b/	boy, rubber, cab
	/t/	toy, utter, hat
	/d/	dog, udder, mad
	/k/	car, baker, back
	/g/	go, beggar, dog
Nasals	/m/	mad, hammer, thumb
	/n/	know, inner, man
	/ŋ/	Ngu, song, singer
Glides	/w/	watch, power, cow**
	/l/	lady, caller, till
	/y/	yam, player, hay**
	/r/	run, errand, car†
Hissing§	/f/	phone, offer, laugh
	/v/	vase, oven, glove
	/θ/	thumb, cathedral, math
	/ð/	that, other, bathe
	/s/	scene, kiss, bus
	/z/	zoo, buzzer, was
	/ʃ/	shoe, usher, bush
	/ʒ/	television, beige
	/tʃ/	chew, butcher, march
	/dʒ/	jump, badger, forge
/h/	hat, behind	

Writing an IEP

Apraxia Uncovered can be used to construct a child's individual educational program (IEP). Goals and objectives can be written that represent stages, action skills, or specific vocalizations.

Samples in the Text

All the word and phrase pronunciation samples chosen for the text come from the author's direct clinical experiences and from examples provided to the author by other professional speech and language pathologists across the United States and Canada. Samples were collected from 1975 through 2004. They have been acquired from children six months through twelve years of age who represent the full spectrum of intelligence and neuromuscular abilities.

Endnotes for Tables

- * There are a number of spellings for most phonemes. For example, the sound of /t/ is represented by *f*, *ff*, *ph*, and *gh* as in *fun*, *offer*, *telephone*, and *enough*. Since our concern in this text is for pronunciation and not spelling, the words selected for tables 3, 4, and 5 illustrate many but not all of these spelling variations. Readers should refer to an introductory phonetics text (see References) or to a dictionary for complete spelling variations of each phoneme. Dictionaries usually present this information in the pronunciation tables.
- ** Considered a vowel in the final position.
- † Considered a vocalic /r/ in the final position.
- § The term *hissing* has been chosen to represent all fricative and affricate sounds whether designated as a sibilant, a strident, or neither. This simple

designation allows us to lump together /f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, /ʒ/, /tʃ/, /dʒ/, and /h/ into one category. This single designation helps us in two ways. It makes for ease in discussion and it better represents the way children actually learn to produce these sounds.



Stage 1

Preparing

Getting the Voice Ready for Speech

BY THE END OF THE FIRST STAGE, a child will be able to make sound, prolong it, and direct it through the mouth and nose. He also will be able to shape the mouth in basic postures. Through this process the child will learn seven specific vocalizations: /ŋ/, /m/, /n/, /ɑ/, /i/, /u/, and /o/.

ACTION SKILLS

- voicing
- prolonging
- differentiating
- posturing

ACTION SKILL 1A

Voicing

The most fundamental skill necessary for the production of speech is voice. Voice for speech is made by setting the vocal folds into vibration during exhalation. The first speech-like vocalization is called the *quasi-resonant nuclei* (QRN). The QRN is a high, mid, unrounded, nasalized vowel of short duration. This is the sound made when the speech mechanism does nothing but produce voice. Let's examine this definition.

QUASI-RESONANT NUCLEI

- *High:* This is a reference to the jaw. The jaw is immobile. At rest, the jaw is relatively high. Therefore, in producing the QRN the jaw is characterized as high.
- *Mid:* This is a reference to the tongue. The tongue is immobile during production of the QRN. Since the QRN was first defined in ref-

erence to neonatal vocalizations, the tongue was described relative to the oral cavity as large. Thus, the tongue is bulbous and the middle sits high in the mouth.

- *Unrounded:* This term refers to the lips. The lips are unmoving—neither rounded nor retracted.
- *Nasalized:* This is a reference to the velopharyngeal mechanism. This mechanism is inactive during production of the QRN. Therefore, the sound is produced with a nasal quality.
- *Vowel:* The QRN essentially is a vowel. It is more vocalic than consonantal.
- *Short Duration:* The QRN is produced as a short pulse of sound. It is not prolonged.

Encouraging Voice

The first step in the facilitation of expressive speech is to find some way that encourages a child to produce his own voice. The second step is to find a way that directs a child's attention to his voice in such a way that he is motivated to produce more of it. We are not concerned with the specific sounds the child is producing at this stage. The treatment methods of this first action skill are applied to this skill and to most subsequent action skills. As such, they are described in detail here and are referenced regularly throughout the first part of the program. Modifications to these basic procedures are explained in each subsequent stage.

1. **SPEECH ACTIVATION TOYS:** Some toys dance and move about in response to the voice. There are several of these toys, including a butterfly who flaps its wings, a dinosaur band who rocks and rolls in response to sound, a parrot who repeats back a child's utterances, and others. These toys are fun for most children. A toy's antics encourage a child to make more voice in order to get the fun to continue. Many of these toys require a certain level of loudness before they will activate and some of our clients cannot produce that much voice. Therefore, devise some way to direct the child's voice directly to the toy and to make it louder. For example, have the child produce his voice into a tube that has one end placed at his mouth and the other at the toy, near the receiver.
2. **KAZOOS:** The kazoo is a great tool for stimulating vocal production because the kazoo only will sound when voice is directed through it.
3. **FLEXIBLE TUBES:** Flexible tubes help amplify a child's voice and direct it straight to his ear. Place one end at the mouth and the other at the ear. A child's voice will be carried directly to his own ear. It will be amplified and the air-flow will tickle the child's ear. Amplification grabs the child's auditory attention, and the tickling sensation encourages him to make more sound. The child also may want to place one end at your ear to stimulate you in these ways.

4. **FUNNELS:** Funnels amplify voice like a megaphone. In fact, use a megaphone if you can find one. Pretend these funnels or megaphones are instruments. March around the room and make music with the voice through these tools.
5. **SMALL ECHO CHAMBERS:** Encourage the child to produce voice into large bowls, pots or boxes. These act as natural sound amplifiers. Also use a plastic Echo Mic.
6. **LARGE ECHO CHAMBERS:** Make voice in acoustically reverberating bathrooms, hallways, stairwells, and closets. Also make voice in large refrigerator or stove boxes. Make voice in other hiding spaces—kid’s “forts,” under blanketed tables, inside crawling tubes, etc. All these spaces and places amplify the voice and make listening to voice fun.
7. **SYNCHRONOUS VOCALIZATIONS:** Help a child recognize and pay attention to his own voice by making his sounds at the same time he does. Imitate whatever sound he is making and do so simultaneously, as if you were cooing or singing together.
8. **MUTUAL IMITATION:** Reflect a child’s voice back to him by imitating his sounds immediately after he does. Wait for him to produce another sound, and then imitate it. Continue this back-and-forth process to create a dialogue of vocalizations.
9. **SINGING:** A child at this level is not ready for singing, *per se*, but pretending to sing is a great

way to facilitate active production of voice. Allow the child to make any sound he wants during the song. Use children's songs, songs on the radio, and make up silly songs throughout the day.

10. ROUGH HOUSE AND GROSS MOTOR PLAY: Some children are very quiet unless engaged in rough house or gross motor play. We can use these to stimulate and encourage early vocalizations. Combine them with the synchronous voice and mutual imitation procedures described above.
11. HORNS, WHISTLES, AND SIRENS: Horns, whistles and sirens do not require the production of voice to be sounded. Therefore, they are not used to stimulate the voice required for this action skill. However, the movement of air into and out of the lungs is the basis of all vocal production. Therefore, horns, whistles and sirens are included here. Such blow toys are used to help a child become aware of the movement of air into and out of his lungs. Once aware, blow toys are used to increase volume of inhalation and prolongation of exhalation. Some toys encourage only inhalation, some only exhalation, and others both. Each blow toy should be analyzed for the inspiration and expiration qualities it encourages. Horns, whistles and sirens come in a wide variety of shapes and sizes, and each style requires a different amount of air-flow and a different mouth shape to make it sound. Some are easy to blow and others are

hard. Begin with the easy ones and progress to the hard ones. An inspiration and expiration spirometer is another excellent tool that can be used like a blow toy.

12. SENSITIVITY: Some children respond negatively to horns, whistles and sirens because of oral-tactile hypersensitivity. In this case, introduce these items at a pace the child can tolerate. Apply other methods to normalize sensitivity in the meantime.
13. ORAL STRENGTH: Some children cannot work a horn, whistle or siren because they haven't got enough lip movement or strength to wrap their lips around the mouthpiece. Employ other oral-motor and feeding techniques to increase these skills.
14. DIALOGUE: Engage in dialogue in such a way that the child is encouraged to use his spontaneous vocalizations in dialogue with you.

ACTION SKILL 1B

Prolonging

Once a child can make voice, his first development comes in the form of prolonging that sound. A child learns to prolong his QRN by inhaling more deeply and exhaling longer. Longer productions of the QRN catch his attention and motivate him to make more sound. Children typically enjoy the sensation of making voice because it stimulates the chest, throat, pharynx, mouth, and nose. This pleasure encourages them to make sound often, and they do so as a form of self-entertainment and calming.

Facilitating Prolongation

The key to prolonged vocal production is the ability to inhale more deeply, to exhale longer, and to sustain voice throughout the prolonged exhalation.

1. CONTINUE: Continue all voice and airflow stimulation activities as described in action

skill 1a. Encourage deeper inhalation and longer exhalation or voice production with each item.

2. PROLONGATION WHISTLES: Some whistles specifically encourage prolonged exhalation. The toy market carries an assortment of these ever-changing products.
 - A. *Slide whistles* encourage a child to blow longer while he slides a moving piece back and forth to alter pitch. Encourage the child to make different sounds.
 - B. *Rainbow blowers* require prolonged exhalation to keep their rainbow-colored string moving through the pipe. Encourage the child to keep the string going.
 - C. *Frog blowers* encourage prolongation of exhalation in order to keep the frog's ball-shaped eyes afloat above its head. Encourage the child to keep the eyes up.

ACTION SKILL 1C
Differentiating

Once a child is able to prolong voice, he can begin to experiment with channeling the sound stream differentially through his mouth or nose. The velopharyngeal mechanism, located at the back of the mouth, controls the channel of oral and nasal air-flow in the speech production system. Children seem to discover the velum by activating it antagonistically with the back of the tongue.

1. ORAL SOUND: Oral sound results when the velum and the back of the tongue move away from one another. The velum elevates upward to close off the nasal cavity, and the tongue-back lowers to allow sound to travel into and through the mouth.
2. NASAL SOUND: Nasal sound results when the velum and tongue move toward one other and when they articulate. The velum relaxes