Contents

Preface

The Late Eight is intended for clinicians, students, and academics working with students whose speech contains errors affecting [θ], [ð], [s], [z], [l], [r] (vocalic [r] and consonantal [r]), [ʃ], or [tʃ]. These sounds typically are the last acquired by an English-speaking child, and are the sounds most likely to challenge both a school-aged student and a nonnative English speaker (Shriberg, 1993; Smit, Hand, Frelinger, Bernthal, & Byrd, 1990).

Resources for each sound include:

- Technical and nontechnical definitions
- Age of acquisition
- Common errors
- Key phonetic environments
- Useful metaphors
- Touch cues
- Initial screening tests
- Stimulability tests
- Demonstrations of place, manner, and voicing
- Phonetic placement and shaping techniques
- Speech exercises
- Language awareness and speech activities
- List of words divided by phonetic and word environments
- Minimal pairs

In total, the book contains:

- 24 different demonstrations of place, manner, and voicing
- 60 phonetic placement and shaping techniques
- 6 different types of speech exercises
- 35 language awareness and speech activities
- Over 4,000 words divided by phonetic and word environments
- Over 2,200 minimal pairs

The Late Eight does not replace coursework or an academic book. Rather, it assumes a reader has appropriate academic and clinical preparation, and that the book is a useful compendium of clinical "tools of the trade." Instead of for-

warding a specific treatment approach, the author provides options that a reader can use and adapt to fit his or her particular needs and clinical philosophy. Throughout the book an effort is made to avoid technical terminology when possible and, when not possible, to use well-established technical terminology. The exception is the author's preference for *treatment sound*, for *treatment target* (the latter sounds uncomfortably like shooting at something). Though the book is based on American English, commonalities between American English and other English varieties are sufficient for the material to prove useful elsewhere in the world. Also, professionals working in other languages may find useful ideas for treating late-acquired sounds in their communities.

Resources and their typical uses in treatment are described in Chapter One. The nine chapters that follow contain resources for each late-acquired sound, one sound per chapter. For convenience, [r] is divided into two chapters, one for vocalic [r] and the other for consonantal [r] (in the interest of brevity, henceforth consonantal [r] is abbreviated as [r]). The book concludes with a chapter, "Language Therapy for Speech Disorders," illustrating how the resources and materials are employed in one setting. Appendix A describes language activities for all late-acquired sounds, and Appendix B contains a compilation of tips to students. The accompanying CD offers materials to modify, reproduce, and print.

References

Shriberg, L. D. (1993). Four new speech and prosody-voice measures for genetics research and other studies in developmental phonological disorders. *Journal of Speech and Hearing Research*, *36*, 105–140.

Smit, A., Hand, L., Frelinger, J. Bernthal, J., & Byrd, A. (1990). The Iowa Articulation Norms Project and its Nebraska replication. *Journal of Speech and Hearing Disorders*, *55*, 779–798.

Chapter Two

[θ]

Definition

[θ] is made with the tongue tip between the upper and lower front teeth. The airstream is a continuous hiss between the upper tongue and the upper teeth. The vocal folds are apart. The technical definition of [θ] is voiceless interdental fricative.

Acquisition

50% of children acquire [θ] by 4;6 and 75% of children acquire [θ] by 6;0.

Relative Frequency

[θ] is ranked 7th in relative frequency compared to the other late-acquired consonants. It ranks 21st in relative frequency compared to all other English consonants, and its percentage of occurrence compared to all English consonants is 0.9%.

Errors

[s] for [θ] is a common error, as is [f] for [θ]. Less common errors for [θ] among school-aged students is [t] or [p] for [θ].

Key Environments

End of a syllable or word, as in ***teeth***
Before a high front vowel, as ***thin***

Possible Metaphors

Select metaphors based on the aspect of speech that is the focus of therapy.

Tongue placement:	Tongue tip sound
Fricative:	Leaky tire sound Long sound Hissing sound
Voicing:	Motor off Voice off Not a buzzing sound Voice box off

Touch Cue

Finger in front of lips.

Instructions

Place the student's finger in the middle of the front of the lips.

Initial Screening Test for [θ]

Student's Name: _____

Date: _____

Referral: _____

Instructions: Say to the student, "I'm going to say some words. Please say the words after me."
Example: "Dog. Now you say it."

Word	Student*
Beginning	
1. Thigh	_____
2. Thunder	_____
3. Thorn	_____
4. Threw	_____
5. Thriller	_____
6. Throne	_____
Medial	
7. Nothing	_____
8. Python	_____
9. Without	_____
Final	
10. Bath	_____
11. Oath	_____
12. Teeth	_____
13. Sixth	_____
14. Ninth	_____
15. North	_____

**Suggestion:* Transcribe an X if the sound is correct or, if incorrect, phonetically transcribe the error. Ignore errors produced elsewhere in the word.

Comments/Notes:

Stimulability Tests for [θ]

Student's Name: _____

Date: _____

Referral: _____

Imitation

1. **Th**umb _____
2. Too**th** _____

Best Bet Environments

End of a syllable or word

1. tee**th** _____
2. [iθ] _____

Before a high front vowel

1. **th**in _____
2. [θi] _____

Favorite Words

Names of family members: _____

Favorite people, heroes, and activities: _____

Phonetic Placement _____

1. Ask the student to place the tongue between the upper and lower teeth.
2. Instruct the student to put his or her hand in front of the mouth, and blow through the teeth to feel the airflow.

Shaping [θ] from [s] _____

1. Demonstrate the difference between the place of production for [s] and the place of production for [θ].
2. Next, instruct the student to say /s/ while moving his or her tongue to rest between the upper and lower teeth, resulting in [θ].

Notes/Comments:

Demonstrations for [θ]

Place: Interdental

First Method

Object: Tongue depressor

Instructions:

1. Instruct the student, "Please stick out your tongue."
2. Once the tongue is out, gently close the student's mouth. If the tongue is sticking out too far, gently push it back with a tongue depressor.

Second Method

Objects: Tongue depressor or stick of candy or other favored food

Instructions:

1. Place a tongue depressor or piece of food in front of the student's mouth, about half an inch before the lips.
2. Instruct the student, "Please touch it with your tongue."
3. While the student touches the tongue depressor or food with the tongue tip, gently close the student's mouth.
4. Instruct the student, "Now pull your tongue back just a little until I say stop."

Manner: Fricative

First Method

Objects: Strip of paper or a feather

Instructions:

1. Place a strip of paper, a feather, or the student's hand held in front of your mouth while you produce several long voiceless fricatives.
2. Draw attention to the "hissing" quality and continuous nature of the sounds.

Second Method

Objects: A small paper flower on end of a pencil

Instructions:

Tape a small paper flower on the end of a pencil and encourage the student to move the flower in the wind.

Third Method

Objects: None

Instructions:

Run your finger or the student's finger down the student's arm while making several long voiceless fricatives to demonstrate the "hissing" quality and length of fricatives.

Voicing: Voiceless

First Method

Objects: None

Instructions:

Instruct the student to listen to and identify the difference between a voiceless and voiced [a].

Second Method

Objects: None

Instructions:

Place the student's hands over the ears and instruct him or her to hum, which heightens the sensation of vocal cord vibration.

Third Method

Objects: None

Instructions:

If the student is able to produce a voiced and voiceless fricative, ask him or her to cover the ears and make these sounds. Alternatively, ask the student to make [h] and [a].

Fourth Method

Objects: None

Instructions:

You and the student place one hand on your throat and the other on the student's throat while making voiced and voiceless sounds together, telling each other when the voicing goes on and off.

Fifth Method

Objects: Pencil, small piece of paper or small paper flower

Instructions:

If the student is able to produce a pair of voiced and voiceless oral stops, attach a small piece of paper or a paper flower to the end of a tongue depressor or pencil and ask the student to "make the paper (or flower) move." The paper is more likely to move when a voiceless consonant is produced than when a voiced consonant is produced (be careful in providing instructions to the student, however, because a strongly articulated voiced oral stop will also move the flower).

Phonetic Placement and Shaping Techniques for [θ]

Phonetic Placement Techniques

Both these simple phonetic placement methods focus on tongue placement (tongue between the teeth) and airflow (air over the tongue).

First Method

Objects: feather or small piece of paper

Instructions:

1. Place a feather or small piece of paper in front of the student's mouth, about one-half inch to an inch from the tongue.
2. Ask the student to blow air over the tongue to move the feather or paper, resulting in [θ].

Second Method

Objects: Tongue depressor and Q-tip

Instructions:

1. Place a tongue depressor in front of the student's mouth, instructing the student to touch the depressor with his or her tongue tip.
2. When the student's tongue is out, gently push up the student's lower jaw so that his or her teeth and tongue come into contact.
3. Instruct the student to blow air over the tongue. If the student produces an interdental [t], gently insert a Q-tip between the student's tongue tip and upper teeth to create a sufficiently broad opening to allow continuous airflow, resulting in [θ].

Shaping Exercises

(θ) from (f)

This method is for a student with a well-established [f].

Objects: None

Instructions:

1. Demonstrate the difference between the places of production for [f] and [θ].
2. Ask the student to say [f] while moving the tongue to lie between the upper and lower front teeth, resulting in [θ]. (*Note*: To facilitate [ð], develop from [v].

(θ) from (s)

This method approaches [θ] from the opposite direction as the first method: rather than from slightly anterior [f], this method approaches [θ] from slightly posterior [s].

Objects: None

Instructions:

1. Demonstrate the difference between the place of production for [s] and the place of production for [θ].
2. Next, instruct the student to say [s] while moving the tongue to lie between the upper and lower front teeth, resulting in [θ]. (*Note*: To facilitate the [ð], develop from [z].

Shell for Speech Exercises

Student's Name: _____

Date: _____

Treatment Sound: _____

Word List:	**Student Responses:**
	1. _____
	2. _____
	3. _____
	4. _____
	5. _____
	6. _____
	7. _____
	8. _____
	9. _____
	10. _____

Total Correct: _____/_____

Comments:

Imitation

Student's Name: _____

Date: _____

Treatment Sound: _____

Goal: Have the student repeat the word after you.

Instructions to Student: "You are going to hear a word with our sound. Please say it after me. Here's an example. I say *sat*, and then you say *sat*."

Word List:	Student Responses:
Thin	1. _____
Thumper	2. _____
Thick	3. _____
Thief	4. _____
Thumb	5. _____
Thank you	6. _____
Thigh	7. _____
Thunder	8. _____
Thorn	9. _____
Thumbtack	10. _____

Total Correct: _____/_____

Comments:

Minimal Pairs

Student's Name _____

Date: _____

Treatment Sound: _____

Goal: Have the student first say the word with the treatment sound, then say the rhyming word, and then say the word with the treatment sound.

Instructions to Student: "You are going to hear a word that begins with our sound. Please say the word, then replace our sound with another sound to make the word have a different meaning, and then say the word with our sound again. Here's an example. I say *seal*. You say *seal*, then change [s] to [w] to make *wheel*, and then say *seal* again. Like this: *Seal*. *Wheel*. *Seal*."

Word List:		**Student Responses:**
Thin	chin	1. _____
Thor	soar	2. _____
Third	word	3. _____
Thumper	jumper	4. _____
Thatch	hatch	5. _____
Think	pink	6. _____
Thick	sick	7. _____
Thief	chief	8. _____
Thumb	gum	9. _____
Thigh	bye	10. _____

Total Correct: _____/_____

Comments:

Deletion

Student's Name _____

Date: _____

Treatment Sound: _____

Goal: Have the student first say the word with the treatment sound, then without the treatment sound, and then with the treatment sound.

Instructions to Student: "You are going to hear word with our sound. Please say the word, and then say it with our sound deleted, and then say it with our sound included. Here's an example. I say *red*. You say *red*, then *Ed*, then *red*. Like this: *Red*. *Ed. Red*."

Word List:		**Student Responses:**
Thin	in	1. _____
Thick	ick	2. _____
Thumb	um	3. _____
Thigh	I, eye	4. _____
Thug	ugh	5. _____
Thor	or	6. _____
Thaw	awe	7. _____
Thought	ought	8. _____
Think	ink	9. _____
Theory	eerie	10. _____

Total Correct: _____/_____

Comments:

Self-Correction

Student's Name _____

Date: _____

Treatment Sound: _____

Goal: Have the student say the word three times, self correcting if errors in the treatment sound occur.

Instructions to Student: "You are going to hear a word with our sound. Please say the word three times, listening to how you say our sound and changing it to make it correctly if you say it incorrectly. Here's an example. I say *cheese*, and then you say *cheese* three times, listening to how you say our sound and changing it to make it correctly if you say it incorrectly. Like this: *Cheese*. *Cheese*. *Cheese*.

Word List:	Student Responses:
Thin	1. _____
Thumper	2. _____
Thick	3. _____
Thief	4. _____
Thumb	5. _____
Thank you	6. _____
Thigh	7. _____
Thunder	8. _____
Thorn	9. _____
Thumbtack	10. _____

Total Correct: _____/_____

Comments:

Old Way/New Way

Student's Name _____

Date: _____

Treatment Sound: _____

Goal: Have the student say the word the new way, the old way, and then the new way again.

Instructions to Student: "You are going to hear a word with our sound. Please say the word, then say it the old way you used to say our sound, and then say it the new way you say our sound. Here's an example. I say *thin*. You say *thin*, then **in*, and then *thin*. Like this: *Thin*. **in*. *Thin*.

Note: Replace * with the way the student used to say the sound.

Word List:	**Student Responses:**
Thin	1. _____
Thumper	2. _____
Thick	3. _____
Thief	4. _____
Thumb	5. _____
Thank you	6. _____
Thigh	7. _____
Thunder	8. _____
Thorn	9. _____
Thumbtack	10. _____

Total Correct: _____/_____

Comments:

Similar Sound

Student's Name _____

Date: _____

Treatment Sound: _____

Goal: Have the student first say the word with the treatment sound, then with the most similar sound the student can make, and then with the treatment sound again.

Instructions to Student: "You are going to hear a word with our sound. Please say the word, then replace our sound with *__, and then say the word with our sound. Here's an example. I say *sun*. You say *sun*, then **un*, and then *sun* again. Like this: *Sun*. **un*. *Sun*.

Note: Replace * with a sound the student can pronounce that is phonetically similar to the treatment sound.

Word List:	Student Responses:
Thin	1. _____
Thumper	2. _____
Thick	3. _____
Thief	4. _____
Thumb	5. _____
Thank you	6. _____
Thigh	7. _____
Thunder	8. _____
Thorn	9. _____
Thumbtack	10. _____

Total Correct: _____/_____

Comments:

Complete Word List for [θ]

Beginning of Words

Single Consonants	*Deletions*	*Minimal Pairs*
Thin	in	chin, pin
Thumper		jumper, bumper
Thick	ick	sick, kick, tick, pick, wick, lick
Thief		chief, beef, leaf
Thumb	um	gum
Thank you		
Thigh	I, eye	bye, high, pie, tie
Thunder		sunder
Thorn		corn, torn, horn, worn
Thumbtack		
Thong		long, song
Thighbone		my bone
Thimble		nimble, cymbal
Thug	ugh	bug, hug
Thelma		Selma
Thebes		dweebs
Thorny		corny
Thorax		Borax
Third		bird, word, nerd, heard
Thor	or	soar, core, shore, floor
Thanks		banks
Thursday		
Third base		
Thirty		dirty
Thoreau		
Thaw	awe	paw, saw
Things		
Thinnest		
Thought	ought	caught, bought
Thousand		
Thirteen		
Third world		
Thermal		
Thirsty		
Thicket		picket, wicket
Think	ink	rink, wink, pink
Thermos		

Single Consonants	*Deletions*	*Minimal Pairs*
Theme song		
Thebe		dweeb
Thoughtful		
Thatch		batch, hatch
Theory	eerie	dearie
Thorough		burrow
Thirst		burst, nursed
Thistle		missile

Consonant Clusters	*Deletions*	*Minimal Pairs*
Three		tree
Throw	row	
Thrill	rill	
Throttle		
Thrift shop		
Thread	read	tread
Throat	wrote	
Threw	rue	true, crew
Throw rug		
Thriller		
Throne	roan	grown, prone
Thrifty		
Throwing	rowing	
Threshold		
Throng	wrong	prong
Thirsty		
Thrive		
Thrash	rash	crash, brash, lash
Through	rue	grew, true, crew
Thrush	rush	brush, crush
Threat		
Thrust	rust	crust
Throb	rob	

Medial

Single Consonants

Nothing
South Seas
Something
Playthings
Earthquake
Athlete
Mouthwash
Panther
Playthings
Southpaw

Toothpick
Martha
Toothpaste
Bathroom
Toothless
Bathmat
Toothbrush
Python
Without
Toothache

Author
Nathan
Kathy
Athens
Carthage
Earthling
Gothic
Fifth grade
Bathtub
Mathew

Consonant Clusters

Heartthrob
Monthly
Swarthmore
North Pole
Bathrobe

Fourth grade
Jethro
Darth Mal
Darth Vader
Bathroom

North Star
Anthrax
Cutthroat

All Environments

Mouthwash
Heartthrob
Nothing
Darth Mal
Panther
Jethro
Bathroom
Playthings
Toothpick
Anthrax
Python
Martha
Swarthmore

Earthquake
Athlete
North Star
Something
Author
Cutthroat
Nathan
Kathy
South Seas
Darth Vader
Carthage
Earthling
Toothpaste

Athens
Fourth grade
Toothless
North Pole
Bathmat
Monthly
Fifth grade
Bathtub
Toothache
Gothic
Mathew
Toothbrush
Bathrobe

Ends of Words

Single Consonants	*Deletions*
Mammoth	
Bath	baa
Oath	oh
Dishcloth	
Ruth	rue
Teeth	tea
Babe Ruth	
Steam bath	
Macbeth	
Sith	
Goldsmith	
Sloth	slaw
Keith	key
Sweet tooth	
Bike Path	
Swath	
Birdbath	
Tooth	two
Sleuth	slew
Math	
Phone booth	
Kenneth	
Plymouth	
Faith	fey, Fay
South	sow
Blacksmith	
Sheath	she
Path	
Faith	Fay, fey
Mouth	Mao
Cheesecloth	
Beth	
Breath	
Myth	
Broth	braw
Booth	boo
Death	
Wreath	

Consonant Clusters	***Deletions***
Fourth	four
Fifth	
Sixth	six
Seventh	seven
Eighth	eight
Ninth	nine
Tenth	ten
Eleventh	eleven
Twelfth	
North	nor
Warmth	warm

Themes for [θ]

Themes

Teeth Brushing	Actions
Bath Time	Numbers and Days
Star Wars Villains	Days of Christmas
Around the Home	Directions
It's a Job	People and Places
Nature	

Teeth Brushing	***Deletions***	***Minimal Pairs***
Toothache		
Toothless		
Teeth	T, tea	wreath, Keith
Mouth	Mao	
Breath		
Thirst		burst, nursed
Sweet tooth		
Tooth	two	
Toothbrush		
Thirsty		
Mouthwash		
Toothpick		
Toothpaste		

Bath Time	***Deletions***	***Minimal Pairs***
Thumb		gum
Thigh	I, eye	bye, high, pie, tie
Mouth		
Throat	wrote	
Bathmat		
Bathtub		
Bathrobe		
Bathroom		
Bath	baa	
Playthings		

Star Wars Villains	***Deletions***	***Minimal Pairs***
Sith		
Darth Mal		
Darth Vader		
Throne	roan	grown, prone
Threat		

Around the Home	***Deletions***	***Minimal Pairs***
Bathmat		
Bathtub		
Thermos		
Threshold		
Bathrobe		
Bathroom		
Thimble		nimble, cymbal
Throw rug		
Thumbtack		
Mouthwash		
Playthings		
Toothpick		
Broth	bra	
Thread	read	tread
Toothpaste		
Thong		long, song

It's a Job	*Deletions*	*Minimal Pairs*
Athlete		
Author		
Sleuth	slew	
Blacksmith		
Cutthroat		
Thief		chief, beef, leaf
Thug		bug, hug

Nature	*Deletions*	*Minimal Pairs*
Path		
Thistle		missile
Thatch		batch, hatch
Thrush	rush	brush, crush
Thicket		picket
Mammoth		
Sloth	slaw	
Bike Path		
Thaw	awe	saw, paw
Panther		
Earthquake		
Python		
Thorny		corny
Thunder		
Thorn		corn, torn, horn, worn

Actions	*Deletions*	*Minimal Pairs*
Throwing	rowing	
Thrive		
Think	ink	rink, wink, pink
Thrash	rash	crash, brash, lash
Threaten		
Thrust	rust	crust
Throb	rob	
Throw	row	crow, pro
Threw	rue	true

Numbers and Days	***Deletions***	***Minimal Pairs***
Three	tree	
Fourth	four	
Fourth grade		
Tenth	ten	
Monthly		
Thursday		
Third		bird, word, nerd, heard
Third base		
Thirty		dirty
Thousand		
Sixth grade		
Fifth grade		
Thirteen		
Third world		

Days of Christmas	***Deletions***	***Minimal Pairs***
Third		bird, word, nerd, heard
Fourth	four	
Fifth		
Sixth	six	
Seventh	seven	
Eighth	eight	
Ninth	nine	
Tenth	ten	
Eleventh	eleven	
Twelfth		

Directions	***Deletions***	***Minimal Pairs***
North	nor	
South	sow	

People and Places	*Deletions*	*Minimal Pairs*
North Star		
Jethro		
Thumper		jumper, bumper
Swarthmore		
North Pole		
South Seas		
Faith	fey, Fay	
Babe Ruth		
Ruth	rue	
Thebe		dweeb
Mathew		
Thebes		dweebs
Beth		
Athens		
Nathan		
Kathy		
Carthage		
Martha		
Nathan		
Macbeth		
Goldsmith		
Keith		
Kenneth		
Plymouth		
Thelma		Selma
Thor	or	soar, core, shore, floor
Thoreau		

Chapter Eleven

Language Therapy for Speech Disorders

Introduction

Resources in this book may be used in diverse ways within many different approaches. This chapter illustrates how they are employed to evaluate and treat students in one school setting. The illustration is descriptive rather than prescriptive, suggesting how the resources *might* be used rather than indicating how they *should* be used.

Clinical Orientation

Use of resources described in this chapter is based on three ideas:

1. Treatment of late-acquired sounds reflects the dual nature of speech.
2. Treatment success depends as much on human variables as linguistics ones.
3. Treatment activities are functional.

The Dual Nature of Speech

Speech has a dual nature: it is both a channel of communication and a part of language (Bleile, 2004). The dual nature of speech is the basis of the conceptual distinction between an articulation disorder (disorder arising in the channel of communication) and a phonologic disorder (a disorder in the language component).

Articulation

A primary reason the eight are acquired late is that they are hard to pronounce. What late-acquired sounds share in common is that none are made with the articulators touching throughout (as stop consonants and nasals are) or with the articulators relatively far apart (as glides and vowels are). Instead, late-acquired sounds require a student to position the articulators not touching, not far apart, but somewhere in the middle, making the airflow variously stop and start (affricates), hiss (fricatives), flow over the sides of the tongue (lateral), or flow around and over an atypical tongue configuration ([r]). Examples of resources focusing primarily on the articulation aspect of speech include definitions, metaphors, demonstrations, phonetic placement and shaping techniques, and key environments.

Phonology

Being a skilled motor movement is only one-half of speech's dual nature. Speech also is an aspect of language, requiring language knowledge similar to but distinct from knowledge that underlies syntax, morphology, semantics, and discourse. A critical aspect of treating late-acquired sounds entails drawing a student's attention to the communication value of speech. In addition to learning how to pronounce a sound, a student must also learn how sound affects meaning, how a sound is similar to and different from other sounds, and how to self-monitor and self-correct to ensure that communication occurs. Examples of resources focusing primarily on the phonologic aspect of speech include speech exercises, language activities, and word lists.

Human Variables

A speech problem does not exist independently from the person who has the problem. Factors such as motivation, intelligence, family support, attention, and desire to learn are equally important for clinical success as linguistic ones. To give just one illustration of the diversity of the people attached to speech problems, one recent morning three students in the same grade and school received speech therapy, one after the other. The first was embarrassed by his speech problem, the second thought his speech problem sounded pretty cool, and the third didn't know he had a speech problem. Later that same day another student was treated—a teenager with a severe [r] difficulty who desperately wanted speech help for an upcoming radio presentation with his class. He promised to do anything to have better speech—except give up basketball practice for speech therapy. Radio address or not, basketball had a higher priority. The point is not to criticize this priority—only to emphasize that students bring far more than their linguistic system to the therapy setting. Examples of resources focusing primarily on human variables arising in the treatment of late-acquired sounds include acquisition, relative frequencies, and errors.

Human Variables

What is more trite and less controversial than the assertion that treatment success depends as much on human variables as linguistic ones? Nonetheless, considering that most clinicians believe such variables are important, it is amazing how poor our knowledge base is about human variables compared to our knowledge of linguistic factors. Far more research is needed before we understand how learner attributes interact with speech factors to influence treatment outcome.

Functional Activities

All students, children, and adults, gifted or delayed, learn and grow throughout their life. Time devoted to treatment of late-acquired sounds should further this learning whenever possible. In practice, this entails using activities that encourage learning and personal growth. Class materials, books, and projects are excellent sources of activities for school-aged students, as newspapers and movies and upcoming social events are for older school-aged students and adults. In addition to providing support for learning, a critical benefit of treatment relying on such activities is that it encourages use of a treatment sound in contexts that matter to a student. Examples of resources that most directly support classroom and life-based activities are the speech exercises and language activities.

Clinical Resources

The order in which resources are described in the following sections is modified slightly from that in Chapter One to better approximate their use with a hypothetical student from the evaluation through conclusion of treatment. The sequence is indicated in Table 11–1.

Evaluation

The following resources are used primarily in assessment:

- Initial Screening
- Screening for stimulability
- Definition
- Acquisition
- Relative frequency
- Errors

Table 11–1. Clinic Resources Used in Evaluation and Treatment.

Assessment	Initial screening
	Screening for stimulability
	Definition
	Acquisition
	Relative frequency
	Errors
Treatment	Metaphors
	Touch cues
	Demonstrations
	Phonetic placement and shaping techniques
	Key environments
	Word lists
	Speech and awareness exercises
	Language activities

Initial Screening, Screening for Stimulability

The most typical referral source for a student is a parent or teacher. A student may then be observed in a classroom or playground before receiving an initial speech screening and a screening test for stimulability.

Initial Screening

An initial screening helps determine if a student experiences difficulty pronouncing a late-acquired sound. An initial screening assesses a treatment sound at the word level in a variety of phonetic contexts. In addition to determining if a problem with a sound exists, an initial screening often serves as a pretest against which treatment progress is measured. If a student's speech is found to contain speech errors, a screening test for stimulability typically is administered.

Screening for Stimulability

Screening for stimulability helps determine if a student can pronounce a possible treatment sound. Information on stimulability is helpful in predicting how

rapidly treatment is likely to proceed. In general, if a student has some initial capacity to pronounce a sound, treatment proceeds more rapidly than if such a capacity must first be established.

Definition, Acquisition, Relative Frequency, and Errors

These resources bundle together after stimulability testing is completed and as a clinician decides between possible treatment sounds. Typically, deciding which sound to select is based on weighing multiple factors, personal and linguistic. Personal factors include a clinician's judgment about a student's attention span, interests, and concerns. The linguistic aspect of sound selection includes stimulability, definition, acquisition, relative frequency, and errors. No single variable trumps the others. Rather, a clinician weighs multiple considerations to reach a balanced decision.

Definition

The definition is a prose description showing how a sound is produced. The definition contributes to treatment decisions because understanding how a sound is made suggests which resources may be needed to teach it. To illustrate, for [l] a clinician thinks about where the tongue is, how easily it might be to teach a student this tongue position, what types of demonstrations might be needed, what phonetic placement and shaping technique to use, and the types of exercises available. Alternately, for [s] an additional consideration might be to develop short probes to determine which [s] is easier for a student—tongue tip raised or lowered? Typically, a clinician follows the student's lead—that is, if a student already makes [s] with the tongue tip lowered, the clinician teaches [s] with a lowered tongue. If a student does not have a preferred way, a clinician may feel freer to select an appropriate variant.

Acquisition

Acquisition data indicate the age at which 50% and 75% of children acquire a sound. If all other things are equal (they seldom are), a clinician may decide to first treat an earlier acquired sound. Indeed, for some clinicians the importance of acquisition data is the primary criterion used in the selection process.

Relative Frequency

Relative frequency is the frequency of occurrence of a sound. Typically, remediation of a sound with a higher frequency of occurrence has greater impact on intelligibility than one with lower frequency. For this reason, a clinician may

incline to first teach more frequently occurring treatment sounds. To illustrate, if a clinician is deciding between [s] and [z], [s] might be selected because of its higher frequency of occurrence.

Errors

Errors are the major errors to which a sound is susceptible. This information weighs in sound selection in at least two respects:

1. Some errors may be socially stigmatized.
2. Errors have varying effect on intelligibility.

In general, errors that may lead to a student being stigmatized socially are a high treatment priority. To illustrate, a lisp and [w] for [r] are often early treatment sounds because they may provoke teasing. Impact of an error on intelligibility also influences sound selection. Errors that negatively affect intelligibility are good candidates for treatment. These include deletions, changes in place of production, and substitutions in the beginning of words.

Treatment

Three Questions

Before selecting treatment resources, at least three questions must be resolved:

- How many sounds should be treated?
- What constitutes a correct production of a treatment sound?
- Should a student be stimulable for a treatment sound?

How Many Sounds to Treat?

The assessment typically yields one or more possible treatment sounds. This raises the following questions:

- If a student's speech contains more than one possibility, which sound to select?
- Should one sound be worked on to completion and then another?
- Should two be worked on simultaneously, changing from one to another in the same treatment session or in alternate sessions?
- Does working on two or more treatment sounds confuse a student?

The author's view is that answers to these questions have more to do with human variables than linguistic factors. Some students—especially older ones—

can work on a sound from beginning to completion, while others benefit from alternating between sounds, sometimes within a single treatment session, sometimes in alternate sessions. A useful dynamic assessment is to initially select several treatment sounds, alternating between them either in a single session or in alternate sessions, and then re-evaluate the choice after several treatment sessions.

What Constitutes a Correct Production of a Treatment Sound?

Whenever possible, treatment should avoid practicing a speech error—something the student probably already has lots of practice doing! Ideally, a sound should be entirely correct during practice. An analogy might be: suppose a coach wanted to teach a student a new tennis stroke. Ideally, the coach wants to establish the stroke perfectly and then engage in perfect practice. However, in both speech-language pathology and tennis, sometimes something less than ideal is accepted, and both a clinician and a coach may need to practice a skill that is better than before, but still not perfect. For this reason, a "3," "2," "1" rather than a "correct/incorrect" system often proves useful (Highnam, 2004). A student's old speech pattern is a "3," and the goal is to establish it as a "1" (perfect). However, in many instances a "3" does not automatically become "1," and, instead, the student produces something like a "2"— a more correct version of the old pattern, but one still not perfect. Speech treatment often contains many more "2"s than "1"s. While practicing a less than perfect sound the student learns to make it a "1" through self-reflection activities and prompts.

Should a Student Be Stimulable for a Treatment Sound?

An important, much debated question is will a student self-correct stimulable sounds without treatment (Dietrich, 1983; Powell, 1991; Powell, Elbert, & Dinnsen, 1991; Shine, 1989)? Research suggests extensive individual variation, with some students self-correcting and others not. Some clinicians choose to work with only stimulable sounds and others select only to treat nonstimuable ones. Many other clinicians fall in the middle, working first on a stimulable sound to build a student's confidence before tackling more difficult nonstimulable sounds.

In general, the author prefers to teach stimulable sounds. A useful "trick of the trade," especially with a younger or less motivated student, is to first treat a stimuable sound to help build confidence before attempting the more challenging nonstimulable sounds. However, selecting a stimulable sound often is not an option for an older school-aged student (typically, preteens and teenagers) or an adult nonnative speaker. In this situation, a nonstimulable sound is selected for treatment.

A challenging situation can arise if a preteen or teenager with a nonstimulable sound is an unwilling participant in therapy, "forced" to receive treatment by parents or teachers. In this situation, after an initial period of therapy a stu-

dent may be placed on a semester by semester contract in which continued treatment is dependent on a student's effort and success. The purpose of the contract is to avoid a difficult situation in which an unmotivated student continues in therapy semester after semester, bored, demoralized, and unsuccessful. Better a therapeutic break than a broken spirit!

Stimulability and Religion

In the absence of research clearly supporting one position or the other, the discussion of stimulability at times almost seems religious, some fervently asserting this and others just as fervently asserting that. An alternative to accepting one or the other position is to be your own researcher, experimenting with different perspectives. Perhaps you will find that you have more success with nonstimulable sounds than reported by some, or perhaps you will have less. Or perhaps you will discover which students on your caseload seem to require a treatment sound that is stimulable and which do not. No matter what you discover, experimenting with different approaches may yield important insights about what works best for you and the students you serve.

Once a sound or sounds have been selected for treatment, the following resources are used:

- Metaphors
- Touch cues
- Demonstrations
- Phonetic placement and shaping techniques
- Key environments
- Word lists
- Awareness and speech exercises
- Language activities

Metaphors, Touch Cues, and Demonstrations

Metaphors, touch cues, and demonstrations all provide useful ways to refer to treatment sounds, and especially during early treatment phases may help focus a student on the task at hand. As treatment progresses, they serve as reminders and prompts.

Metaphors

Metaphors provide useful analogies for a treatment sound. Typically, a clinician presents several possible metaphors, allowing a student to select between them. With a younger student, the metaphors make analogy with something familiar—perhaps an engine starting, a hissing snake, or a leaky tire. With an older student the metaphors often refer to an aspect of the treatment sound—that is, an interdental may be the tongue-out sound, [s] with a lowered tongue tip may be the tongue-down sound, or [l] may be the pointy sound. For a student who is a teenager or an adult, many times a treatment sound is called by its technical name. To illustrate, with an adult student a clinician may decide to call [s] "a fricative sound" or "a fricative made at the alveolar ridge."

Often, a metaphor proves more successful when a student helps select it. Typically, a clinician presents several options and asks the student to select one. Allowing a student to help select a metaphor entails the clinician giving up a measure of control—after all, a student is not obliged to select the metaphor that the clinician thinks best captures the nature of the speech problem. A clinician weighs selection of the most appropriate metaphor against a student's need for involvement. In the author's experience, most often the issue does not arise and selection of a metaphor presents few problems. If a question of appropriateness versus student involvement arose, most clinicians give up the best, most appropriate metaphor in favor of student involvement.

Touch Cues

Touch cues are finger positions that represent a treatment sound, allowing a clinician to refer to a treatment sound using modalities other than speech. Touch cues grossly mimic speech movements. An older student understands that, for example, the touch cue for velar consonants is made parallel to the back of the mouth, representing where the tongue is raised. A younger student may benefit from a touch cue without realizing its mimicking quality. For such a student, a touch cue is a visual and tactile reminder, a way to say, "Remember: this is the sound we are working on."

Demonstrations

Demonstrations show a student how a treatment sound is produced. By drawing attention to such aspects of speech as tongue position and airflow a student may better understand how to pronounce a treatment sound. Older students often find demonstrations intellectually engaging and interesting. Others, especially those under 7 years, may find demonstrations more confusing than helpful. Demonstrations find their most use early in treatment. Later in treatment, an occasional demonstration may serve as a reminder about how a treatment sound is produced.

Phonetic Placement and Shaping Techniques

Phonetic placement techniques show a student how to place the articulators to pronounce a sound, and shaping techniques show a student how to convert one sound into another. These techniques are used when a nonstimulable sound is selected for treatment. Students seven years or older typically possess sufficient attention and language skills to benefit from these techniques. With a younger student success with these techniques is more hit-or-miss. The techniques are typically inappropriate (and ineffective) with a child under 4 years.

Though every clinician has favorite phonetic placement and shaping technique, no single technique works for every student. In general, a clinician selects one that makes intuitive sense and then engages in trial-and-error dynamic assessment. Often, from a few to 5 to 10 minutes is sufficient to determine if a particular technique will prove successful. In general, when selecting a technique, most clinicians prefer those that are simpler and have shorter instructions. Longer techniques are turned to when the shorter, simpler ones do not yield results.

The phonetic placement and shaping techniques listed in this book are "bare bones recipes" to expand and modify as a clinician desires. Often, the actual phonetic placement or shaping technique used with a student contains the following elements:

1. An initial self-demonstration by the clinician.
2. The student practices the steps in the technique. Use of a touch cue and metaphors focus the student and help remind him or her about how the sound is pronounced.
3. The student attempts to make the sound.
4. The clinician gives feedback about the success of the attempt.

The following illustrates one possible way to fully expand a bare bones phonetic placement technique:

Phonetic Placement Technique for [θ]

Objects: Feather or small piece of paper

Instructions:

1. First demonstrate the method on yourself.
2. To begin, place your tongue between your upper and lower front teeth.
3. Place a feather or small piece of paper in front of your mouth, about a half-inch to an inch from your tongue.
4. Blow air over your tongue to move the feather or paper.

5. Explain, "That's how you make the leaking tire sound. Now it's your turn."
6. Instruct the student to stick out his or her tongue just as you did.
7. When the tongue is out, place the feather or paper before the mouth.
8. Explain, "Now blow to make it move."
9. If the sound is made correctly, say, "That's right. You did it. You made [θ]—the leaky tire sound." If the sound is made incorrectly, say something like, "Good try. Let's try again."

Key Environments

Key environments describe phonetic environments in which a student is likely to pronounce a sound correctly. In addition to being used during the evaluation to determine if a student has the capacity to make a sound, key environments find good use after a treatment sound (or sounds) is selected, providing a possible succession of environments in which to treat a sound. The following illustrates how key environments might be used to establish [s], [l], and [r] in the beginning of words, end of words, between vowels, and in consonant clusters.

Beginning of Word

Establish [s], [l], and [r] before a high front vowel. Once established, expand the number of different vowels that follow. For a student that is strongly affected by the adjacent vowel, back high vowels are likely to be more challenging than front ones.

End of Word

[s] is more likely to be established here than [l] and [r]. Establish after a high front vowel. Next, to make word-initial sounds, have the word-final sounds be followed by a word beginning with a vowel, such as "bus and." This encourages the sound to "migrate" to start the following word, resulting in, for example, "bu sand."

Between Vowels

[l] and [r] are more likely to be established here than [s], though some students find [s] easier to make here, too. For all three consonants, establish between two high front vowels, as in *ili*. Once established, add different adjacent vowels. To expand to word-initial position, have the student drop the first vowel, resulting in, for example, [li]. To expand to word-final position, follow the same procedure, resulting in, for example, [il].

Consonant Clusters

For [s], establish after [t] as in "pizza" or the nonsense word [tsi]. To expand the environments in which [s] occurs, have [ts] be followed by different vowels. To help expand [s] to syllable-initial position, encourage the student to drop the [t]. For [l] and [r], establish after a consonant with a different place of production than [l] and [r] (most often, select [p] or [b]) followed by a high front vowel. Next, to help expand [l] and [r] ask the student to drop the initial consonant in the consonant cluster.

Word Lists

Word lists are used to generate stimuli to help establish a sound in a student's speech, and then to practice it. Words, rather than nonsense syllables, are the vehicle for teaching a treatment sound for two reasons:

1. Words, carefully selected, offer relatively simple phonetic contexts in which to teach a sound, and
2. Words, being a student's everyday means of communication, are used both in and outside of treatment, making them a critical bridge to generalization.

Word lists in this book are divided by phonetic environment; in the accompanying CD lists of minimal pairs, deletions, and themes also are included. Word lists are therapeutic building blocks for many different exercises and activities. The value of using isolated words diminishes as treatment proceeds and the clinician shifts to more naturalistic activities.

Awareness and Speech Exercises

Awareness exercises focus a student's attention on the treatment sound. They are used frequently early in therapy to orient a student, and later in therapy may be used primarily as prompts and reminders.

Speech exercises help a student to gain experience with a treatment sound, providing practice in pronouncing, self-monitoring, and self-correcting speech. The most frequently used exercises are imitation, minimal pairs, deletions, multiple productions, old way/new way, and similar sounds. Speech exercises are used most often in language activities and, less frequently, as a list of words. Many times a mix of exercises is used. For example, a student may be asked to delete the treatment sound and then say the word with the treatment sound three times.

Discrimination Versus Awareness

The difference between discrimination exercises and awareness exercises lies in conception, not actually practice. If a reader prefers, awareness exercises described in this book may be used as and called discrimination exercises. However, within the author's perspective the conceptual distinction between discrimination and awareness is important. The term *discrimination* implies a student's difficulty lies in the auditory system's inability to distinguish between sounds; however, research strongly suggests that the auditory system, in common with other sensory systems, matures early, and has adultlike capacities near the end of a child's first year (Pascallis, de Haan, & Nelson; 2002). The term *awareness* implies the therapeutic challenge is to focus a student's attention on the difference between an intended pronunciation and what actually comes out of the mouth. A student with a speech problem, like most other persons, is not likely to closely monitor his or her speech even when what comes out the mouth differs considerably from the speech of the community. An awareness exercise is a little verbal tap on the shoulder, saying "Remember what sound you are working on. Focus on what you are doing."

Language Activities

Language activities use school books and other outside materials, including stories a student is reading, favorite stories from home, and articles from newspapers and magazines. These materials, because they are familiar and widely used, are easy to adapt by families, aides, and teachers. Many times their use also has the practical advantage of improving a student's academic skills. Though the purpose of therapy is speech, much is gained if in the process of learning speech a student also does better on classroom assignments or gives a better oral report.

Summary

The discussion in this chapter illustrates *one way* care might be conceptualized and carried out. Within this perspective, treatment for late-acquired sounds is conceptualized as helping a student learn new ways of speaking and to unlearn

old ones. This requires a treatment approach focusing on both the articulation and phonologic aspects of speech. Within this view, a treatment program focused solely on articulation is like a building a train that doesn't actually go anywhere, while a treatment program focused solely on phonology is like a destination without a vehicle to get there. Treatment of late-acquired sounds requires careful attention to building a good train to reach a worthwhile travel destination. An additional characteristic of this framework is that human variables such as motivation, intelligence, family support, attention, and desire to learn are recognized as being at least equally important for clinical success as linguistic ones. Lastly, the framework emphasizes the importance of using functional activities that contribute to the advancement of a student's education and social development.

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