

Vocal Training Basics

Tips for Target Selection and Application

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Focus: Speech Acquisition

	Teacher skills needed	Learner skill needed
1 Speech acquisition is a behavioral process	<ul style="list-style-type: none">• Stimulus control• Analysis of controlling stimuli• Reinforcement	 The logo for ECHOIC, consisting of the word "ECHOIC" in bold red capital letters inside a white rectangular box with a thin black border, which is itself inside a larger white rectangular box with a drop shadow.
2 Speech acquisition is a mechanical process	<ul style="list-style-type: none">• Vocal anatomy• How sounds are produced (position, manner)• Normal acquisition• Target syllable sequencing	
3 Speech acquisition is a coarticulation process	<ul style="list-style-type: none">• How position of one phoneme affects adjacent sounds• Syllable fluency training	

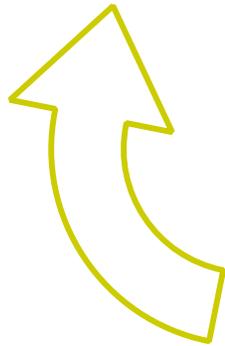
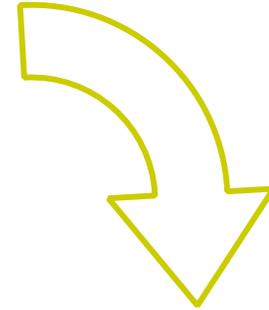
Speech acquisition is a *behavioral* process

Movement of vocal musculature



Reinforcing value of
those speech
sounds increases

Produces speech
sounds



They sound “right”
if they’ve been paired
with pleasant stimuli

Hears sounds



Early vocal-verbal (speech) acquisition

2-stage process

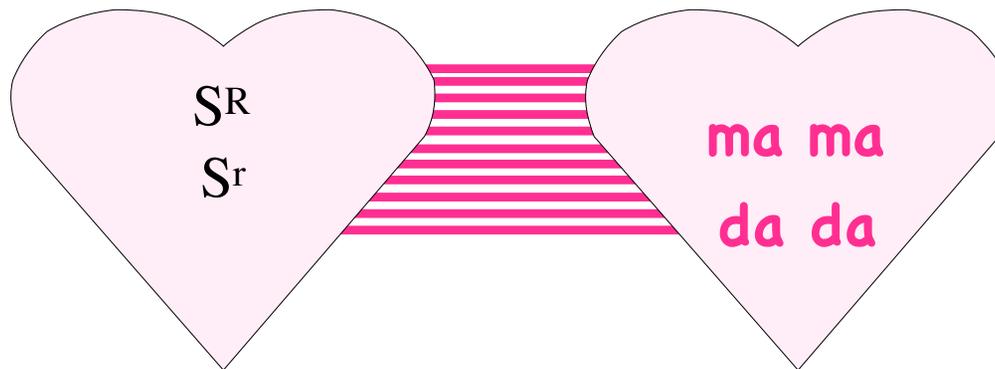
1st stage - **Pairing**

Pairing establishes “value” for
some sounds

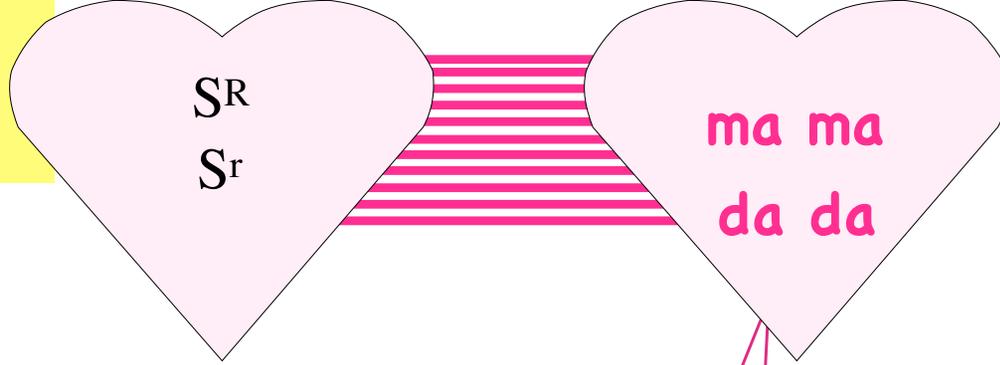
Good things are happening

Caregivers are making sounds

Those sounds now have reinforcing value



Stage 1
Pairing



Stage 2
Reinforcement

- Random vocalizations occur



Those sounds with pairing hx “sound right”

They have reinforcing value to strengthen the vocal responses that produce those sounds.

So, vocal movements that produce “mama” and “dada” will be automatically strengthened.

STEP 1

Get lots of sounds

STEP 2

Turn into functional speech

Video

Sound-making
practice
echoic

mechanical

meaningful

mand

tact

intraverbal

Vocal vs vocal-verbal

Video

Video

#1 -Speech acquisition is a *behavioral* process

Take home points

Vocal behavior comes first

Reinforcement strengthens
vocal behavior into functional VB

In between...

Lots of vocalizing practice
is needed
to achieve fluent sound-making
that can come under the control of
contingencies of reinforcement
(COR)

ECHOIC

Speech acquisition is a *mechanical* process

Mechanical practice

and

Reinforcement

Verbal
behavior

Heavily weighted toward
Echoic responses

Video

*Echoic skill is **critical** to acquiring normal speech*

What *is* normal speech?

It's a mechanical process that's fluent, fast, and accurate

- Many syllables produced on one breath
- On/off vocal fold movement to produce voiced and voiceless sounds
- Fast adjustments from one tongue position to another
- Tongue position varies for any given sound depending on the position requirements of the adjacent sounds

Speech structures

Graphic

Video

Source: University of Iowa Research Foundation (Phonetics Flash Animation Project; <http://www.uiowa.edu/~acadtech/phonetics/>)¹⁶

Components of speaking

- **Segmental** components
 - Vowels, diphthongs, consonants
 - Strings of these = syllables = words
 - Primary verbal function
(vocal mand, tact, echoic, intraverbal)
- **Suprasegmental** components
 - Loudness, pitch, duration, voice on/off
 - Secondary verbal function (autoclitic VB; Skinner, 1957, p. 318)

All these components of speech are controlled by movements of “articulators”

Video

Source: University of Southern California (Speech Production and Articulation Knowledge Group; sail.usc.edu/span/)

For visual analysis of phonetic placement for individual sounds, see:

Lawson, E., J. Stuart-Smith, J. M. Scobbie, S. Nakai (2015). Seeing Speech: an articulatory web resource for the study of Phonetics. University of Glasgow. 1st April 2015. <http://seeingspeech.ac.uk>

**What's required for sounds to come under
COR (reinforced as VB)?**

Strong & loud

Lots of different ones

Fluent

tongue moves easily from one sound position to another

Precise

tongue is precisely positioned in the mouth

Video

With practice, these all tend to be acquired without direct training.

It may take years (e.g., baby talk, misarticulations).

For normal speech, **each** skill **must be** acquired.

Training the **echoic** repertoire can fast-track this acquisition.

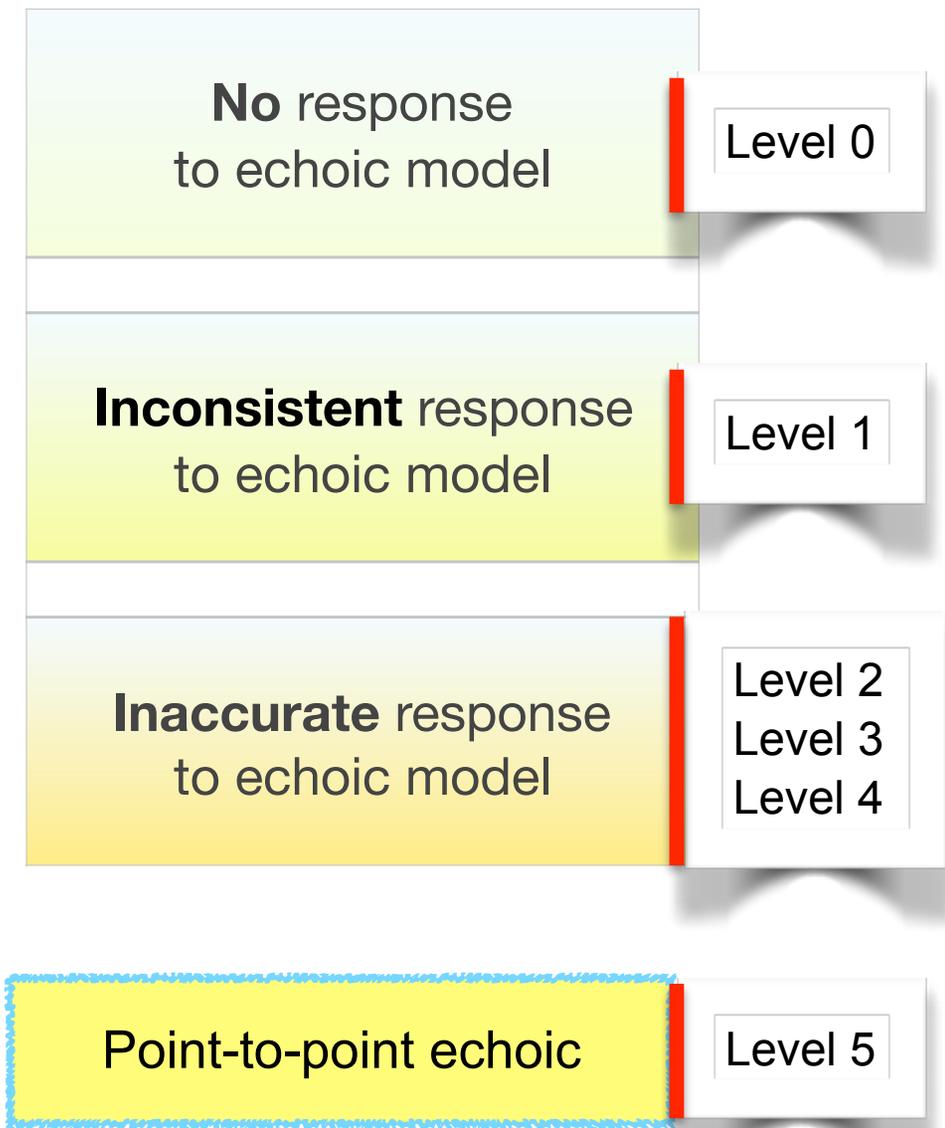
Echoic “problems”

No response to echoic model
Inconsistent response to echoic model
Inaccurate response to echoic model

Target
Increased vocalizations in general

Target
A vocal response to *every* echoic model

Target
A point-to-point matching vocal response to every echoic model



No response
to echoic model

Level 0

Inconsistent response
to echoic model

Level 1

Inaccurate response
to echoic model

Level 2

Level 3

Level 4

Level 1
Pre-Echoic

Level 2
Reliable Vocal Response

Level 3
“Echoic” *but NQR*

Level 4
“Echoic” *Clean Up*

Point-to-point echoic

Level 5

Inconsistent response
to echoic model

Level 1
Pre-Echoic

	What is responding like at this level?	Treatment Goal
Level 1 Pre-Echoic	Unreliable vocal responding to an echoic model (Doesn't always say something in response to teacher's speech model)	Establish a speech-type vocal response on 100% of opportunities, even if it's not a "match" How to get? Reinforce <i>any</i> vocal response to an auditory speech stimulus

Level 1
Pre-echoic

Current skill

**Unreliable vocal responding to an
echoic model**

Videos

Level 1
Pre-echoic

Current skill

**Unreliable vocal responding to an
echoic model**

Videos

Inaccurate response
to echoic model

Level 2
Reliable Vocal Response

	What is responding like at this level?	Treatment Goal
Level 2 Reliable Vocal Response	Says <i>something</i> in response to echoic model, but it may be far from the mark	Get “Early skill” echoics in place <ul style="list-style-type: none">• Echoes a few correct vowels (2 or 3)• Easily alternates vowels on 1 breath (4-5 syllables, e.g., ah-ee-ah-ee-ah-ee)• Easily alternates several CV and VC syllables on 1 breath (e.g., pa-pa-pa, me-me-me, oo-wah-bee)

Level 2
Reliable Vocal Response

Current skill

Says something in response to every echoic model, but it may be far from the mark

Videos

To work on...

Get “Early skill” echoics in place

- Echoes a few correct vowels (2 or 3)
- Easily alternates vowels on 1 breath (4-5 syllables, e.g., ah-ee-ah-ee-ah-ee)
- Easily alternates several CV and VC syllables on 1 breath
 - e.g., pa-pa-pa, me-me-me, oo-wah-bee

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Videos

Echoic “Quick-checks”

Video

Quick Checks Grp1	
au	
wa	
u	
fa fa	
ʌp	
ma ma	
bʌ	
wa wa	
u	
f—	
bʌ	
fa fa	
ba ba	
bu	
bʌ bʌ	
ma ma	
mu	

Knowing the mechanics of speech production helps in target selection

For example, if the learner...

- Omits /t/ or /d/ or /n/ from syllables

- Can say both “ee” and “uh”

Tongue position for t, d, n

“tee”

or

“tuh”

Inaccurate response
to echoic model

Level 3
“Echoic” *but NQR*

	What is responding like at this level?	Treatment Goal
Level 3 “Echoic” <i>but NQR</i>	Says something sort of “in the neighborhood,” but it’s <i>not quite right</i>	<p>Establish fluent (vocal) mands-tacts (at precision levels consistent with “speaking age”)</p> <ul style="list-style-type: none">• Reinforce intelligibility (even if speech isn’t precise, e.g., “baby talk”)• Increase syllable complexity (according to developmental norms) <i>This means:</i> Reinforce echoic precision with targets that are based on current skills and what typical speakers can say if they’ve been speaking for about the same amount of time

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Level 3
Echoic but NQR

Current skill

Says something “in the neighborhood,” but not quite right

Video

To work on...

Fluent vocal mands-tacts with precision acceptable for “speaking age”

- Reinforce intelligibility, even if speech isn’t precise (e.g., baby-talk)
- Echoic-mand-tact-IV training to work on syllable complexity at developmental norm level
- Reinforce echoic precision, with targets based on current skills and similar to typical speakers at same “speaking age”

33

Somewhere between Levels 2 and 4...

- Age-appropriate *imprecision* (“baby-talk”)
- Fluent speech (tongue moves easily from one position to another)
- Many syllables on 1 breath
- Reinforcement occurring for all VB (mands, tacts, intraverbals, echoics)

Video

Inaccurate response
to echoic model

Level 4
“Echoic” *Clean Up*

	What is responding like at this level?	Treatment Goal
Level 4 “Echoic” <i>Clean Up</i>	Highly intelligible (e.g., Naïve Listener Test score) Persistent errors <ul style="list-style-type: none">• Usually on consonants• Errors may also occur with “close neighbor” vowels (e.g., <i>windy/Wendy</i>)	Get precision via contrast training and other techniques to increase vocal matching of auditory stimulus <i>monkey-money</i> <i>mine-nine</i> <i>chew-shoe</i>

Level 4
Echoic “clean up”

Current skill

Highly intelligible, but persistent errors on some consonants, and maybe even vowels

Videos

To work on...

Echoic contrast training to establish excellent auditory discrimination & matching complex syllable combinations

This is “articulation training” to establish perfect echoics, but it must be transferred to within other verbal contexts (mands, tacts, intraverbals, etc).

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- Developmental Norms
- “Close-neighbor” vowels & consonants
- Sequencing speech targets
- Early-skill Echoics
- Naïve Listener Test
- Auditory Discrimination
- Complex Syllables

Developmental norms

Speech Development Charts show a wide range of “normal” for early speech learners

Resources

- asha.org (American Speech Language Hearing Association)
- nih.gov (National Institutes of Health)
- nidcd.nih.gov (National Institute on Deafness and Other Communication Disorders)

- Vocal control
 - Loudness
 - Pitch
 - Duration
- Tongue repositioning
- Blending sounds together
 - vowels
 - vowels & consonants
- Echoing

	Birth	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	
Practice, practice, practice!			p,m,h,w,b							
			p,m,h,w,b							
			n							
			n							
			k							
			k							
			g							
			g							
			d							
			d							
			t							
			t							
			ing							
			ing							
			f							
			f							
			y							
			y							
			r							
			r							
			l							
			l							
			blends (st, pl, gr, etc.)							
			blends (st, pl, gr, etc.)							
			s							
			s							
			sh, ch							
			sh, ch							
		z								
		z								
		j								
		j								
		v								
		v								
		th (thumb)								
		th (thumb)								
		th (that)								
		th (that)								
		zh (measure)								
		zh (measure)								

Still perfecting echoic skills

* Adapted from Sander JSHD 1972; Smit, et al JSHD 1990 and the Nebraska-Iowa Articulation Norms Project

Close-neighbor vowels & consonants

Phonetics Cue Card

International Phonetic Alphabet (IPA) symbols for most English phonemes

Phoneme Type	Phonetic symbol	Sounds like
Vowels	i	beet
	ɪ	bit
	e	may
	ɛ	bed
	æ	am
	ɑ	hot
	ʌ	love
	ə	alone
	ɔ	fall
	o	boat
	u	fool
	ʊ	full
Diphthongs	aɪ	my
	ɔɪ	boy
	aʊ	out

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Esch Behavior Consultants, LLC

Phoneme Type	Phonetic symbol	Sounds like
Plosives Upper phonemes: unvoiced Lower phonemes: voiced	p b	up be
	t d	to do
	k g	key go
	s z	see zoo
Continuous, restricted airflow Upper phonemes: unvoiced Lower phonemes: voiced	f v	four van
	θ ð	bath bathe
	ʃ ʒ	shoe beige
	tʃ dʒ	chess jam
	m n ŋ	me no hang
	r ɹ	roll bird
Other	h w j l	hop we yellow ladder

Phoneme Type	Phonetic symbol	Sounds like
Vowels	i	bee t
	I	bi t
	e	ma y
	ɛ	be d
	æ	a m
	ɑ	ho t
	ʌ	lo v e
	ə	a lone
	ɔ	fa ll
	o	bo a t
	u	fo o l
	ʊ	fu ll
Diphthongs	aɪ	my y
	ɔɪ	bo y
	aʊ	o ut

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Phoneme Type	Phonetic symbol	Sounds like
Plosives Upper phonemes: <i>unvoiced</i> Lower phonemes: <i>voiced</i>	p	up
	b	be
	t	to
	d	do
	k	key
	g	go
Continuous, restricted airflow Upper phonemes: <i>unvoiced</i> Lower phonemes: <i>voiced</i>	s	see
	z	zoo
	f	four
	v	van
	θ	bath
	ð	bathe
	ʃ	shoe
ʒ	beige	
	tʃ	chess
	dʒ	jam
Nasals	m	me
	n	no
	ŋ	hang
Other	r	roll
	ɜ̃	bird
	h	hop
	w	we
	j	yellow
	l	ladder

Sounds differ in

Place

where they are made

Manner

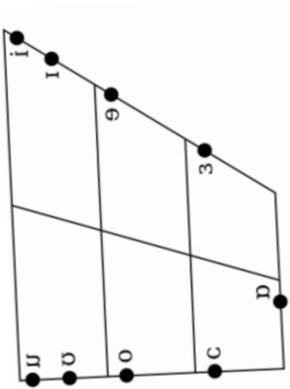
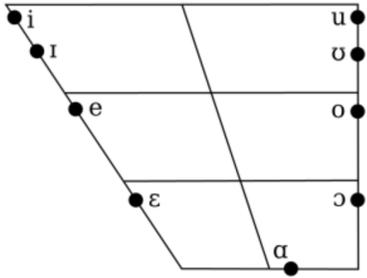
how they are made

Voicing

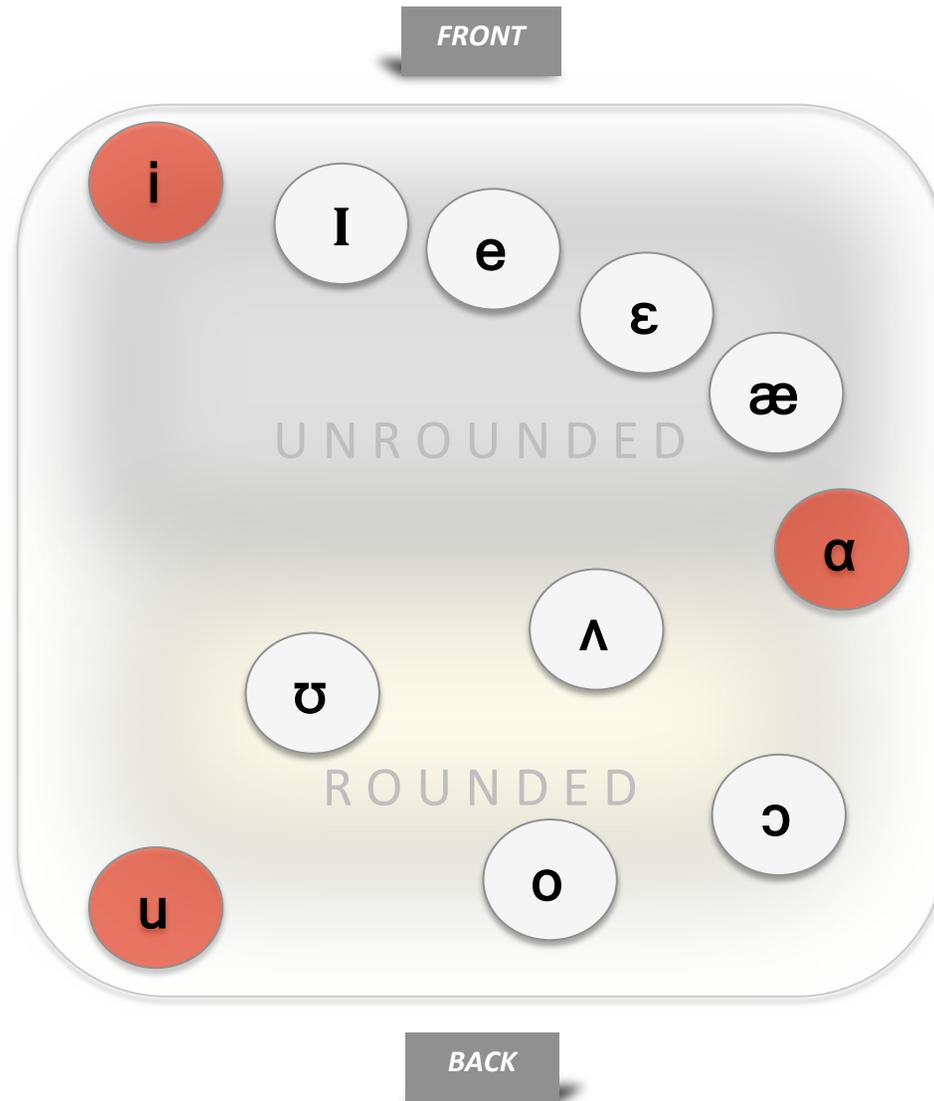
voiced or voiceless

Vowel Neighborhoods

1st and 2nd formant frequencies of vowels*



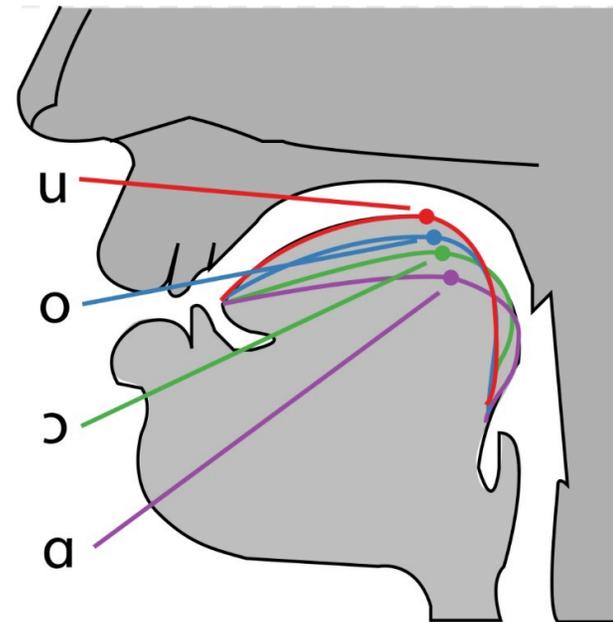
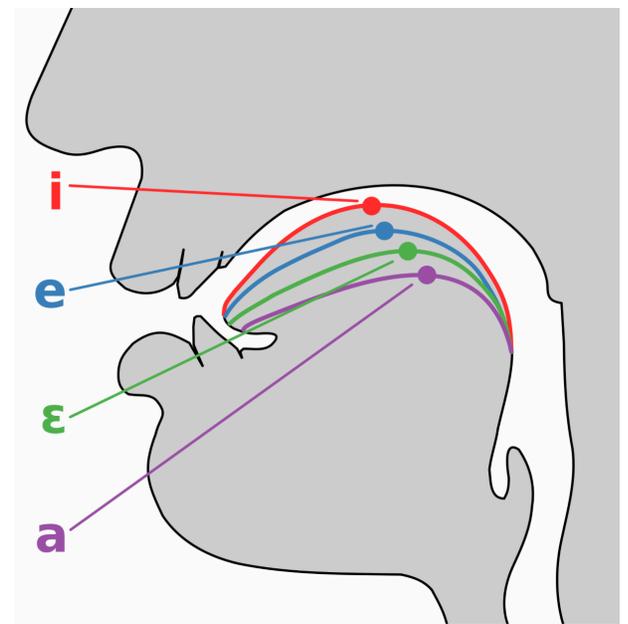
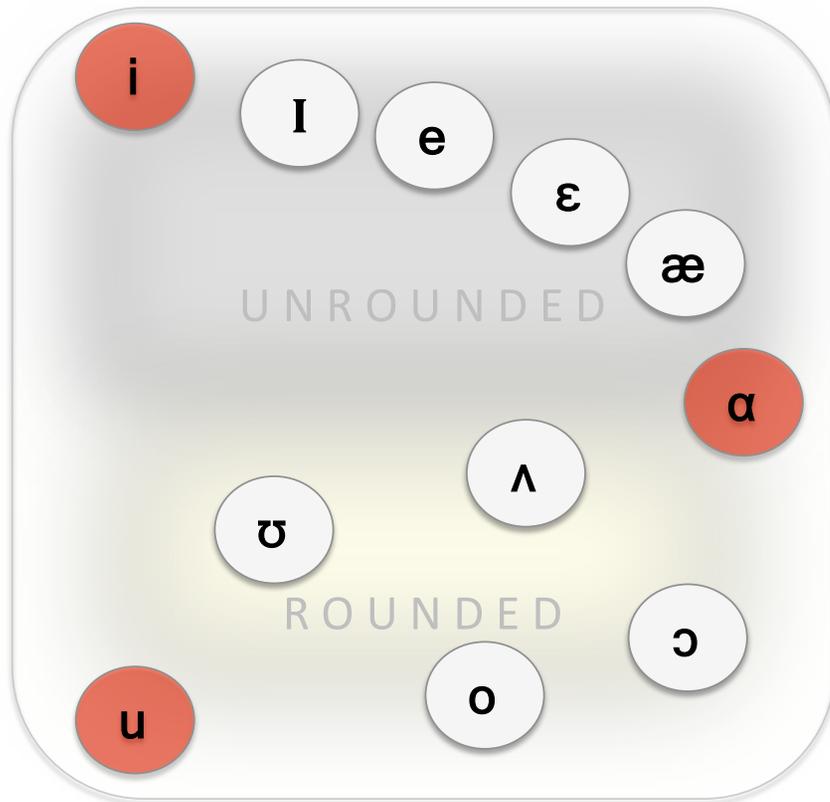
HIGH



Key

i	beet
I	bit
e	ba <i>it</i>
ε	be <i>t</i>
æ	ba <i>t</i>
α	lo <i>t</i>
ʌ	lo <i>ve</i>
ə	al <i>one</i>
ɔ	fa <i>ll</i>
o	bo <i>at</i>
ʊ	fu <i>ll</i>
u	fo <i>ol</i>

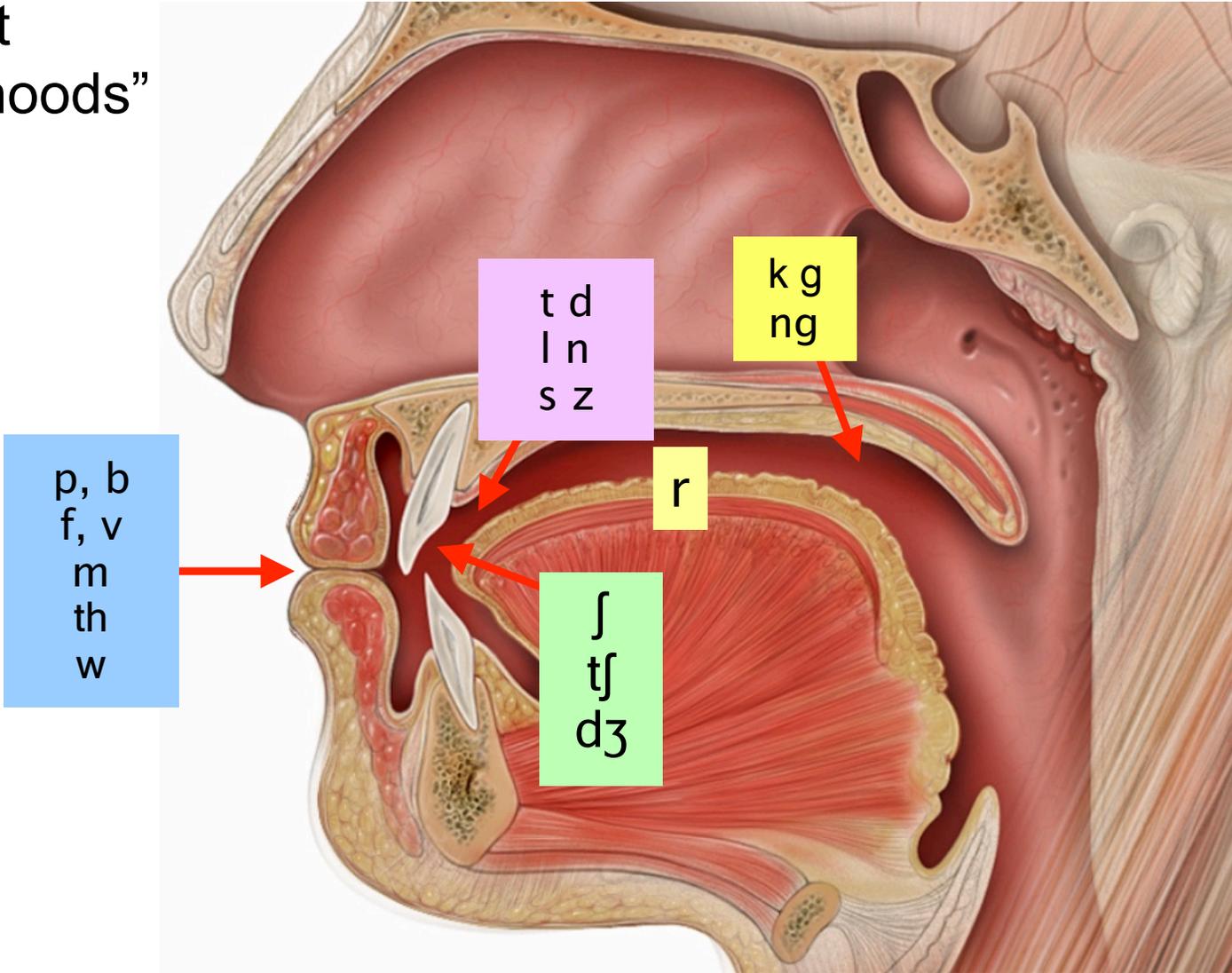
* Figure is stylized for simplicity and does not represent exact acoustic area for formant frequency ranges.
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What vowels do you hear?

Video

Consonant “neighborhoods”



English Phonemes	Phonetic symbol	Sounds like
Plosives	p b	
	t d	
	k g	
Continuous, restricted airflow	s z	
	f v	
	θ ð	
	ʃ ʒ	<u>sh</u> oe
	tʃ dʒ	

shoe
sh-oo
soo
too
oo



*Sequence from Kaufman word approximations;
<http://www.kidspeech.com>

Sequencing speech targets

1st priority – Vocalizations in general

Vocalizations

strong & fluent

Duration

Loudness

Pitch

Vowels & Diphthongs

/a/ /i/ /u/

2nd Priority – Consonants in vowel contexts

CV

VC

$C_1V_1-C_1V_1$

ma-ma (mama)

$C_1V_1-C_1V_2$

be-bi (baby)

$C_1V_1-C_2V_2$

mΛ-ni (money)

Later Priorities

Blends & clusters

st-

sk-

sp-

-nt

-lt

-st

Voice-Voiceless differences

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SAS

Level 1 Vocalizations

Pitch	Loudness	Duration	Hi voc BL
-------	----------	----------	-----------

Level 2 Vowels & Diphthongs

a	i	u			
			ai	oi	au

Level 3 Consonants in 1-syllable combos

C-V	V-C	C-V-C
-----	-----	-------

Level 4 Consonants in 2-syllable combos

Reduplicated	<i>E.g., ma-ma, bye-bye</i>		
Mixed			
	CV-CV	A – same C, diff V	<i>baby, cookie, daddy</i>
		B – diff C, same V	<i>boo-hoo, tee-pee</i>
		C – diff C, diff V	<i>potty, taco, funny</i>
	CVC-CVC	A – diff 1 st C, same V	<i>cat hat, put foot</i>
		B – diff last C, same V	<i>cop car, pack pan</i>
		C – diff 1 st /last C, diff V	<i>take bath, wash dog</i>

Level 5 Consonant blends in 1-syllable combos

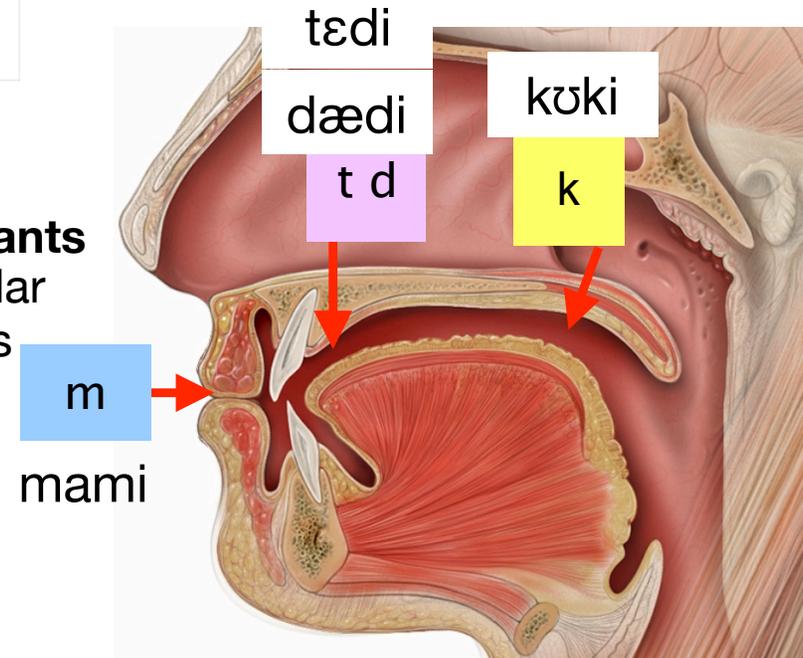
CCV, VCC	<i>blue, play, oops, ask, oink</i>
CCCV, VCCC	<i>spray, straw, asked</i>
CCVC	<i>green, clap, school</i>
CCCVC, CCCVCC	<i>street/streets, scratch/scratched</i>

Choosing targets in sequence is critical

single syllable	reduplicated syllables	alternating vowels
ba	ba - ba	ba - bi
mi	mi - mi	ma - mi
ma	ma - ma	ma - mi

Alveolar consonants
before velar
consonants

Front consonants
before alveolar
consonants



Note
Typical acquisition may not follow sequence exactly,
but *if speech teaching is needed*, the sequence can be supportive.

Speech Tracker Form

for early-skills syllable acquisition

	ee	ih _{or} eh	ay	ae	ah	uh	oh	oo
p _{or} b								
t _{or} d								
k _{or} g								
w								
m								
n								
s _{or} z								
f _{or} v								
th								
sh								
r								
l								
ch _{or} j								

Which syllables sound like

- Preferred items, activities
- Daily use items, activities

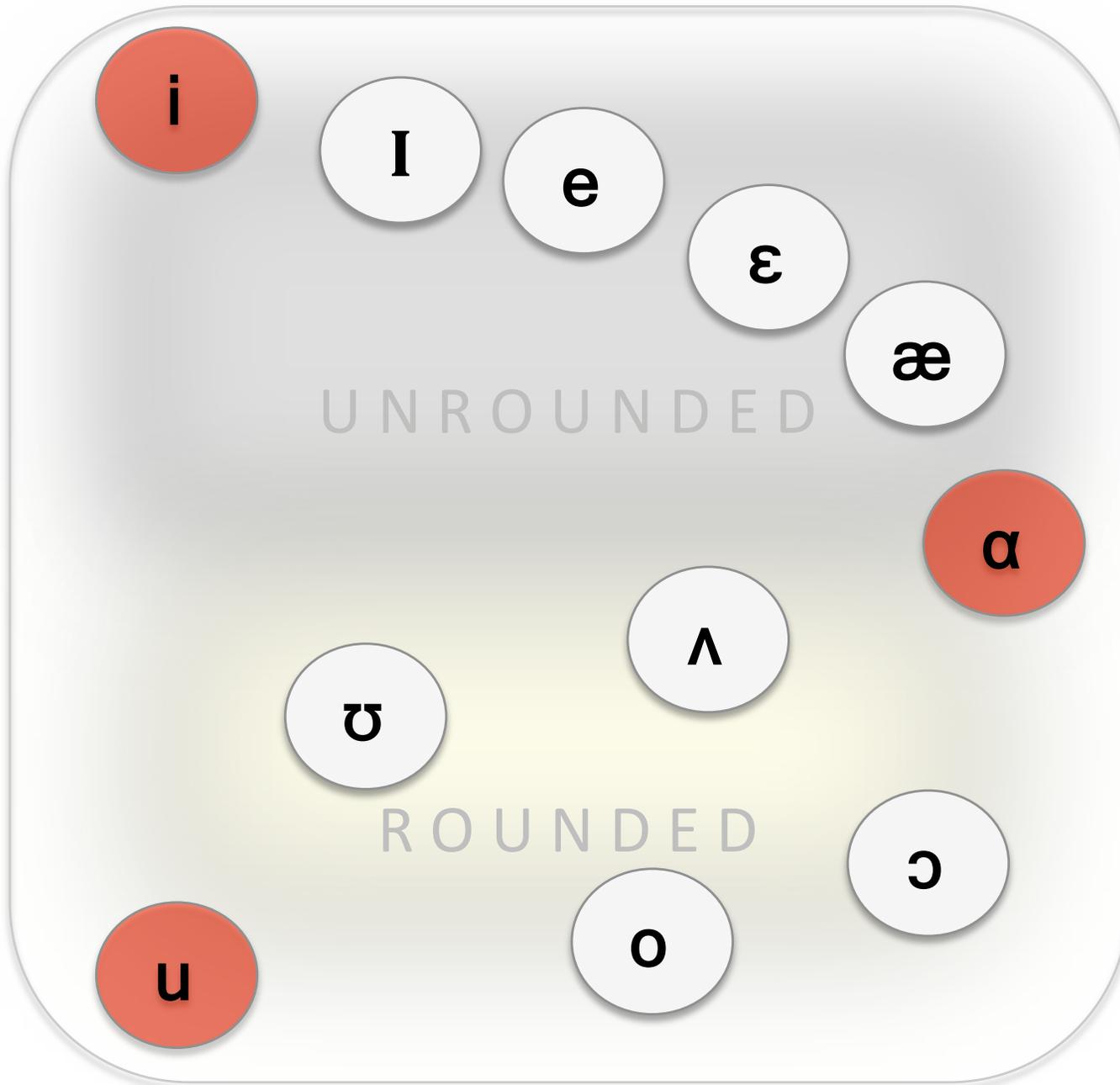
[fəneɪtɪks help ju get it rit ɪn tɑːɡɪt səleɪkʃən]

Target	tʃ ɪ p	“chip”
Learner says	ʌ	“uh”

Target	tʃɪp	tʃ	ɪ	p
Continue to fill in missing sounds		t	ɪ	p
Fill in missing sounds		<i>Need a placeholder</i>	ɪ	p
Vowel “too wrong” Get closer vowel or correct vowel			ɪ	
Current			ʌ	

Start 

 missing  wrong  missing



Target	k	æ	t	<i>“cat”</i>
Learner says	t	ʌ	t	<i>“tuht”</i>
	wrong	wrong	ok	

Target	k	æ	t
Plosive sound ok; change place	k	æ	t
Get correct vowel	t	æ	t
Get closer vowel	t	a	t
Current	t	ʌ	t

Start 

Writing targets in “shells” capitalizes on typical acquisition

C u r r e n t s k i l l

blæŋkɛt

bæŋkɛt

Cluster reduction

bæ kɛ

Final consonant deletion

bæ bæ

Reduplication

bæ



bʌ dʌ fwai

bʌ dʌ fai

bʌ fai

bʌ fʌ

bʌ bʌ

bʌ

Target shells*

		mama	Date mastered	music	Date mastered	drum	Date mastered
End	Teaching steps						
	6			mew-sic			
	5			myou-see		drum	
	4	ma-ma		moo-tee moo-see		(dwum)	
	3	ah-ma		oo-tee		dum	
	2	ahm		oo-ee		um	
Start	1	ah		oo		uh	
Prerequisite sounds							

*Adapted from Kaufman word approximations; <http://www.kidspeech.com>

Practice

chip

	<i>Teaching steps</i>	Targets	Other possible syllables
<i>End</i>	8		
	7		
	6		
	5		
	4		
	3		
	2		
<i>Start</i>	1		
<i>Prerequisite sounds</i>			

Practice

chip

	<i>Teaching steps</i>	Targets	Other possible syllables
<i>End</i>	8		
	7		
	6		
	5		tship
	4	tship	tsip
	3	tsip	sip
	2	tip or sip	sahp, seep
<i>Start</i>	1	ihp	ahp eep
<i>Prerequisite sounds</i>		ih	ah or ee

Practice

pizza

	<i>Teaching steps</i>	Targets	Other possible syllables
<i>End</i>	8		
	7		
	6		
	5		
	4		
	3		
	2		
<i>Start</i>	1		
<i>Prerequisite sounds</i>			

Practice

pizza

	<i>Teaching steps</i>	Targets	Other possible syllables
<i>End</i>	8		
	7		
	6		
	5	peet suh	
	4	pee suh	
	3	pee tuh	
	2	pee uh	ee tuh
<i>Start</i>	1	pee	tuh
<i>Prerequisite sounds</i>		ee	uh



Column A

Selection Sequence Guide

Circle the type of vocalizations the learner easily says

Level

1 Vocalization (pre-req)

2 Vowels

3 Consonants (1-syllable)

CV or VC

CVC

4 Consonants (2-syllable)

Redup CVCV

Mixed Vs-Cs

5 Blends (1-syllable)

V-C Reference Chart

Vowels

ah ee oo

ih ay eh ae ("cat")

uh aw oh

ai oi au

Consonants

p b t d k g w

h s z f v m n

th sh ch j r er l ng

Note: Not all English phonemes are listed.

Column B

Available sounds

Learner can say these sounds			
C	V	C	V

Information from *Vocalization Baseline*, free operant observations, and/or echoic testing

Column C

Strong preferences

Potential vocal mands

Information from preference assessments and observations

Column D

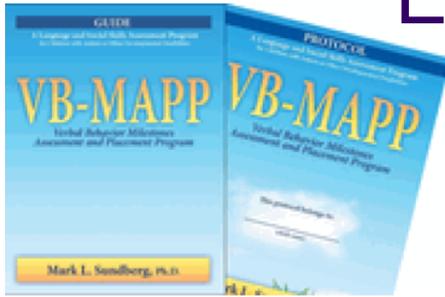
Possible target sequence

Speech targets
End (Voc Mand)
Start

Select targets and transfer this information to *Echoic-to-Mand Sequence Card*

Early-skill Echoics

Early Echoic Skills Assessment (EESA)



- | | |
|---------|------------------------------------|
| Group 1 | Simple and reduplicated syllables |
| Group 2 | 2-syllable combinations |
| Group 3 | 3-syllable combinations |
| Group 4 | Prosody in phrases |
| Group 5 | Prosody: pitch, loudness, duration |

Early Echoic Skills Assessment (EESA)

Barbara E. Esch, Ph.D., BCBA, CCC-SLP

Scoring Groups 1-3: For each item, score the best response of up to 3 trials

X = correct sounds and correct number of syllables (1 point)

/ = recognizable response, but incorrect or missing consonants or extra syllables (1/2 point)

Blank = no response, incorrect vowels, or missing syllables (0 points)

**TOTAL
RAW SCORE:**
(Groups 1-5)

ASSESSMENT			
1ST	2ND	3RD	4TH

Group 1: Simple and reduplicated syllables

Targets: vowels, diphthongs, consonants *p, b, m, n, h, w*

Probe: t

- | | | | | |
|-------------------------------|----------------------------------|--------------------------------|------------------------------|--------------------------------|
| <input type="checkbox"/> ah | <input type="checkbox"/> bye bye | <input type="checkbox"/> one | <input type="checkbox"/> moo | <input type="checkbox"/> we |
| <input type="checkbox"/> wow | <input type="checkbox"/> hop | <input type="checkbox"/> my | <input type="checkbox"/> up | <input type="checkbox"/> boy |
| <input type="checkbox"/> bee | <input type="checkbox"/> mama | <input type="checkbox"/> boo | <input type="checkbox"/> may | <input type="checkbox"/> wa wa |
| <input type="checkbox"/> knee | <input type="checkbox"/> papa | <input type="checkbox"/> no no | <input type="checkbox"/> pop | <input type="checkbox"/> toy |
| <input type="checkbox"/> oo | <input type="checkbox"/> me | <input type="checkbox"/> oh | <input type="checkbox"/> too | <input type="checkbox"/> baa |

ASSESSMENT			
1ST	2ND	3RD	4TH

Sub-total
Group 1

Group 2: 2-syllable combinations

Targets: Add consonants *k, g, t, d, f, y, ng*

- | | | | | |
|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <input type="checkbox"/> baby | <input type="checkbox"/> window | <input type="checkbox"/> open | <input type="checkbox"/> taco | <input type="checkbox"/> icky |
| <input type="checkbox"/> go eat | <input type="checkbox"/> funny | <input type="checkbox"/> oh boy | <input type="checkbox"/> foo-ey | <input type="checkbox"/> too hot |
| <input type="checkbox"/> nighttime | <input type="checkbox"/> meow | <input type="checkbox"/> yum-m-o | <input type="checkbox"/> hankie | <input type="checkbox"/> monkey |
| <input type="checkbox"/> bunny | <input type="checkbox"/> kitty | <input type="checkbox"/> potty | <input type="checkbox"/> too bad | <input type="checkbox"/> uh-oh |
| <input type="checkbox"/> my foot | <input type="checkbox"/> bow wow | <input type="checkbox"/> pay day | <input type="checkbox"/> cookie | <input type="checkbox"/> daddy |
| <input type="checkbox"/> yucky | <input type="checkbox"/> mommy | <input type="checkbox"/> pokey | <input type="checkbox"/> puppy | <input type="checkbox"/> hot dog |

ASSESSMENT			
1ST	2ND	3RD	4TH

Sub-total
Group 2

Group 3: 3-syllable combinations

- | | | | | |
|-------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|--------------------------------------|
| <input type="checkbox"/> tubby toy | <input type="checkbox"/> potato | <input type="checkbox"/> do high five | <input type="checkbox"/> tiny pan | <input type="checkbox"/> how many |
| <input type="checkbox"/> banana | <input type="checkbox"/> go bye bye | <input type="checkbox"/> oh foo-ey | <input type="checkbox"/> peek a boo | <input type="checkbox"/> potty time |
| <input type="checkbox"/> fee fi foe | <input type="checkbox"/> fat doggy | <input type="checkbox"/> binky boo | <input type="checkbox"/> teddy bear | <input type="checkbox"/> giddy-up |
| <input type="checkbox"/> yummy food | <input type="checkbox"/> goofy goat | <input type="checkbox"/> one cookie | <input type="checkbox"/> doggy bone | <input type="checkbox"/> wet mitten |
| <input type="checkbox"/> daddy up | <input type="checkbox"/> hey me too | <input type="checkbox"/> open up | <input type="checkbox"/> funny king | <input type="checkbox"/> teepee boat |
| <input type="checkbox"/> in a boat | <input type="checkbox"/> my big toe | <input type="checkbox"/> peanut hat | <input type="checkbox"/> a hiccup | <input type="checkbox"/> puppet game |

ASSESSMENT			
1ST	2ND	3RD	4TH

Sub-total
Group 3

Group 4: Prosody: spoken phrases (Model: Emphasize syllables in ***bold italics***)

X = emphasis on correct syllables (1 point)

/ = emphasis on non-target syllables (1/2 point)

Blank = monotone response (no emphasis) (0 points)

- | | | | | |
|---|--|--|---|---|
| <input type="checkbox"/> no <i>WAY</i> | <input type="checkbox"/> <i>ONE</i> bunny | <input type="checkbox"/> in a <i>MIN</i> -ute | <input type="checkbox"/> <i>TAKE</i> it | <input type="checkbox"/> my <i>MOM</i> -my |
| <input type="checkbox"/> bug-a- <i>BOO</i> | <input type="checkbox"/> <i>UH</i> -oh | <input type="checkbox"/> <i>MY</i> mommy | <input type="checkbox"/> bow- <i>WOW</i> | <input type="checkbox"/> <i>BUG</i> -a-boo |

ASSESSMENT			
1ST	2ND	3RD	4TH

Sub-total
Group 4

Group 5: Prosody: other contexts

X = response correct or nearly so (1 point)

Blank = response does not closely match model (0 points)

Pitch

- Echoes pitch variations in 1-2 lines of a familiar song Echoes continuous warble (fire truck OO-oo-OO-oo-OO)

Loudness

- Echoes whispering Echoes quiet/loud voice (bye-bye vs. BYE-BYE)

Duration

- Sustains *ahh* for 3 seconds, echoically

ASSESSMENT			
1ST	2ND	3RD	4TH

Sub-total
Group 5

Common error!

Setting specific ECH targets too early

- a range of targets might contact reinforcement more easily
- This primarily applies to learners who are still acquiring Group 1 skills on the EESA

Scoring Groups 1-3: For each item, score the best response of up to 3 trials
 X = correct sounds and correct number of syllables (1 point)
 / = recognizable response, but incorrect or missing consonants or extra syllables (1/2 point)
 Blank = no response, incorrect vowels, or missing syllables (0 points)

TOTAL RAW SCORE: (Groups 1-5)

ASSESSMENT	1ST	2ND	3RD	4TH
Group 1				
Group 2				
Group 3				

Group 1: Simple and reduplicated syllables
 Targets: vowels, diphthongs, consonants p, b, m, n, h, w
 Probe: t

<input type="checkbox"/> ah	<input type="checkbox"/> bye bye	<input type="checkbox"/> one	<input type="checkbox"/> moo	<input type="checkbox"/> we
<input type="checkbox"/> wow	<input type="checkbox"/> hop	<input type="checkbox"/> my	<input type="checkbox"/> up	<input type="checkbox"/> boy
<input type="checkbox"/> bee	<input type="checkbox"/> mama	<input type="checkbox"/> boo	<input type="checkbox"/> may	<input type="checkbox"/> wa wa
<input type="checkbox"/> knee	<input type="checkbox"/> papa	<input type="checkbox"/> no no	<input type="checkbox"/> pop	<input type="checkbox"/> toy
<input type="checkbox"/> oo	<input type="checkbox"/> me	<input type="checkbox"/> oh	<input type="checkbox"/> too	<input type="checkbox"/> baa

Group 2: 2-syllable combinations
 Targets: Add consonants k, g, t, d, f, y, ng

<input type="checkbox"/> baby	<input type="checkbox"/> window	<input type="checkbox"/> open	<input type="checkbox"/> taco	<input type="checkbox"/> icky
<input type="checkbox"/> go eat	<input type="checkbox"/> funny	<input type="checkbox"/> oh boy	<input type="checkbox"/> foo-ey	<input type="checkbox"/> too hot
<input type="checkbox"/> nighttime	<input type="checkbox"/> meow	<input type="checkbox"/> yum-o	<input type="checkbox"/> hankie	<input type="checkbox"/> monkey
<input type="checkbox"/> bunny	<input type="checkbox"/> kitty	<input type="checkbox"/> potty	<input type="checkbox"/> too bad	<input type="checkbox"/> uh-oh
<input type="checkbox"/> my foot	<input type="checkbox"/> bow wow	<input type="checkbox"/> pay day	<input type="checkbox"/> cookie	<input type="checkbox"/> daddy
<input type="checkbox"/> yucky	<input type="checkbox"/> mommy	<input type="checkbox"/> pokey	<input type="checkbox"/> puppy	<input type="checkbox"/> hot dog

Group 3: 3-syllable combinations

<input type="checkbox"/> subby toy	<input type="checkbox"/> potato	<input type="checkbox"/> do high five	<input type="checkbox"/> siny pan	<input type="checkbox"/> how many
<input type="checkbox"/> banana	<input type="checkbox"/> go bye bye	<input type="checkbox"/> oh foo-ey	<input type="checkbox"/> peek a boo	<input type="checkbox"/> potty time
<input type="checkbox"/> fee fi foe	<input type="checkbox"/> fat doggy	<input type="checkbox"/> binky boo	<input type="checkbox"/> teddy bear	<input type="checkbox"/> giddy-up
<input type="checkbox"/> yummy food	<input type="checkbox"/> goofy goat	<input type="checkbox"/> one cookie	<input type="checkbox"/> doggy bone	<input type="checkbox"/> wet mitten
<input type="checkbox"/> daddy up	<input type="checkbox"/> hey me too	<input type="checkbox"/> open up	<input type="checkbox"/> funny king	<input type="checkbox"/> tepee boat
<input type="checkbox"/> in a boat	<input type="checkbox"/> my big toe	<input type="checkbox"/> peanut hat	<input type="checkbox"/> a hiccup	<input type="checkbox"/> puppet game

Group 4: Prosody: spoken phrases (Model: Emphasize syllables in **bold italics**)

Group 1: Simple and reduplicated syllables

Targets: vowels, diphthongs, consonants p, b, m, n, h, w

Probe: t

<input type="checkbox"/> ah	<input type="checkbox"/> bye bye	<input type="checkbox"/> one	<input type="checkbox"/> moo	<input type="checkbox"/> we
<input type="checkbox"/> wow	<input type="checkbox"/> hop	<input type="checkbox"/> my	<input type="checkbox"/> up	<input type="checkbox"/> boy
<input type="checkbox"/> bee	<input type="checkbox"/> mama	<input type="checkbox"/> boo	<input type="checkbox"/> may	<input type="checkbox"/> wa wa
<input type="checkbox"/> knee	<input type="checkbox"/> papa	<input type="checkbox"/> no no	<input type="checkbox"/> pop	<input type="checkbox"/> toy
<input type="checkbox"/> oo	<input type="checkbox"/> me	<input type="checkbox"/> oh	<input type="checkbox"/> too	<input type="checkbox"/> baa

Scoring Groups 1-3: For each item, score the best response of up to 3 trials
 X = correct sounds and correct number of syllables (1 point)
 / = recognizable response, but incorrect or missing consonants or extra syllables (1/2 point)
 Blank = no response, incorrect vowels, or missing syllables (0 points)

TOTAL RAW SCORE:	ASSESSMENT			
(Groups 1-5)	1ST	2ND	3RD	4TH

Group 1: Simple and reduplicated syllables

Targets: vowels, diphthongs, consonants p, b, m, n, h, w

Probe: t

- | | | | | |
|-------------------------------|----------------------------------|--------------------------------|------------------------------|--------------------------------|
| <input type="checkbox"/> ah | <input type="checkbox"/> bye bye | <input type="checkbox"/> one | <input type="checkbox"/> moo | <input type="checkbox"/> we |
| <input type="checkbox"/> wow | <input type="checkbox"/> hop | <input type="checkbox"/> my | <input type="checkbox"/> up | <input type="checkbox"/> boy |
| <input type="checkbox"/> bee | <input type="checkbox"/> mama | <input type="checkbox"/> boo | <input type="checkbox"/> may | <input type="checkbox"/> wa wa |
| <input type="checkbox"/> knee | <input type="checkbox"/> papa | <input type="checkbox"/> no no | <input type="checkbox"/> pop | <input type="checkbox"/> toy |
| <input type="checkbox"/> oo | <input type="checkbox"/> me | <input type="checkbox"/> oh | <input type="checkbox"/> too | <input type="checkbox"/> baa |

ASSESSMENT				
1ST	2ND	3RD	4TH	

Sub-total Group 1

Group 2: 2-syllable combinations

Targets: Add consonants k, g, t, d, f, y, ng

- | | | | | |
|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <input type="checkbox"/> baby | <input type="checkbox"/> window | <input type="checkbox"/> open | <input type="checkbox"/> taco | <input type="checkbox"/> icky |
| <input type="checkbox"/> go eat | <input type="checkbox"/> funny | <input type="checkbox"/> oh boy | <input type="checkbox"/> foo-ey | <input type="checkbox"/> too hot |
| <input type="checkbox"/> nighttime | <input type="checkbox"/> meow | <input type="checkbox"/> yum-m-o | <input type="checkbox"/> hankie | <input type="checkbox"/> monkey |
| <input type="checkbox"/> bunny | <input type="checkbox"/> kitty | <input type="checkbox"/> potty | <input type="checkbox"/> too bad | <input type="checkbox"/> uh-oh |
| <input type="checkbox"/> my foot | <input type="checkbox"/> bow wow | <input type="checkbox"/> pay day | <input type="checkbox"/> cookie | <input type="checkbox"/> daddy |
| <input type="checkbox"/> yucky | <input type="checkbox"/> mommy | <input type="checkbox"/> pokey | <input type="checkbox"/> puppy | <input type="checkbox"/> hot dog |

ASSESSMENT				
1ST	2ND	3RD	4TH	

Sub-total Group 2

Group 3: 3-syllable combinations

- | | | | | |
|-------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> subby toy | <input type="checkbox"/> potato | <input type="checkbox"/> do high five | <input type="checkbox"/> siny pan | <input type="checkbox"/> how many |
| <input type="checkbox"/> banana | <input type="checkbox"/> go bye bye | <input type="checkbox"/> oh foo-ey | <input type="checkbox"/> peek a boo | <input type="checkbox"/> potty time |
| <input type="checkbox"/> fee fi foe | <input type="checkbox"/> fat doggy | <input type="checkbox"/> binky boo | <input type="checkbox"/> teddy bear | <input type="checkbox"/> giddy-up |
| <input type="checkbox"/> yummy food | <input type="checkbox"/> goofy goat | <input type="checkbox"/> one cookie | <input type="checkbox"/> doggy bone | <input type="checkbox"/> wet mitten |

ASSESSMENT				
1ST	2ND	3RD	4TH	

Group 2: 2-syllable combinations

Targets: Add consonants k, g, t, d, f, y, ng

- | | | | | |
|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <input type="checkbox"/> baby | <input type="checkbox"/> window | <input type="checkbox"/> open | <input type="checkbox"/> taco | <input type="checkbox"/> icky |
| <input type="checkbox"/> go eat | <input type="checkbox"/> funny | <input type="checkbox"/> oh boy | <input type="checkbox"/> foo-ey | <input type="checkbox"/> too hot |
| <input type="checkbox"/> nighttime | <input type="checkbox"/> meow | <input type="checkbox"/> yum-m-o | <input type="checkbox"/> hankie | <input type="checkbox"/> monkey |
| <input type="checkbox"/> bunny | <input type="checkbox"/> kitty | <input type="checkbox"/> potty | <input type="checkbox"/> too bad | <input type="checkbox"/> uh-oh |
| <input type="checkbox"/> my foot | <input type="checkbox"/> bow wow | <input type="checkbox"/> pay day | <input type="checkbox"/> cookie | <input type="checkbox"/> daddy |
| <input type="checkbox"/> yucky | <input type="checkbox"/> mommy | <input type="checkbox"/> pokey | <input type="checkbox"/> puppy | <input type="checkbox"/> hot dog |

Scoring Groups 1-3: For each item, score the best response of up to 3 trials
 X = correct sounds and correct number of syllables (1 point)
 / = recognizable response, but incorrect or missing consonants or extra syllables (1/2 point)
 Blank = no response, incorrect vowels, or missing syllables (0 points)

TOTAL RAW SCORE: (Groups 1-5)

ASSESSMENT	1ST	2ND	3RD	4TH

Group 1: Simple and reduplicated syllables
 Targets: vowels, diphthongs, consonants p, b, m, n, h, w
 Probe: t

<input type="checkbox"/> ah	<input type="checkbox"/> bye bye	<input type="checkbox"/> one	<input type="checkbox"/> moo	<input type="checkbox"/> we
<input type="checkbox"/> wow	<input type="checkbox"/> hop	<input type="checkbox"/> my	<input type="checkbox"/> up	<input type="checkbox"/> boy
<input type="checkbox"/> bee	<input type="checkbox"/> mama	<input type="checkbox"/> boo	<input type="checkbox"/> may	<input type="checkbox"/> wa wa
<input type="checkbox"/> knee	<input type="checkbox"/> papa	<input type="checkbox"/> no no	<input type="checkbox"/> pop	<input type="checkbox"/> toy
<input type="checkbox"/> oo	<input type="checkbox"/> me	<input type="checkbox"/> oh	<input type="checkbox"/> too	<input type="checkbox"/> baa

Sub-total Group 1

ASSESSMENT	1ST	2ND	3RD	4TH

Group 2: 2-syllable combinations
 Targets: Add consonants k, g, t, d, f, y, ng

<input type="checkbox"/> baby	<input type="checkbox"/> window	<input type="checkbox"/> open	<input type="checkbox"/> taco	<input type="checkbox"/> icky
<input type="checkbox"/> go eat	<input type="checkbox"/> funny	<input type="checkbox"/> oh boy	<input type="checkbox"/> foo-ey	<input type="checkbox"/> too hot
<input type="checkbox"/> nighttime	<input type="checkbox"/> meow	<input type="checkbox"/> yum-o	<input type="checkbox"/> hankie	<input type="checkbox"/> monkey
<input type="checkbox"/> bunny	<input type="checkbox"/> kitty	<input type="checkbox"/> potty	<input type="checkbox"/> too bad	<input type="checkbox"/> uh-oh
<input type="checkbox"/> my foot	<input type="checkbox"/> bow wow	<input type="checkbox"/> pay day	<input type="checkbox"/> cookie	<input type="checkbox"/> daddy
<input type="checkbox"/> yucky	<input type="checkbox"/> mommy	<input type="checkbox"/> pokey	<input type="checkbox"/> puppy	<input type="checkbox"/> hot dog

Sub-total Group 2

ASSESSMENT	1ST	2ND	3RD	4TH

Group 3: 3-syllable combinations

<input type="checkbox"/> tubby toy	<input type="checkbox"/> potato	<input type="checkbox"/> do high five	<input type="checkbox"/> tiny pan	<input type="checkbox"/> how many
<input type="checkbox"/> banana	<input type="checkbox"/> go bye bye	<input type="checkbox"/> oh foo-ey	<input type="checkbox"/> peek a boo	<input type="checkbox"/> potty time
<input type="checkbox"/> fee fi foe	<input type="checkbox"/> fat doggy	<input type="checkbox"/> binky boo	<input type="checkbox"/> teddy bear	<input type="checkbox"/> giddy-up
<input type="checkbox"/> yummy food	<input type="checkbox"/> goofy goat	<input type="checkbox"/> one cookie	<input type="checkbox"/> doggy bone	<input type="checkbox"/> wet mitten
<input type="checkbox"/> daddy up	<input type="checkbox"/> hey me too	<input type="checkbox"/> open up	<input type="checkbox"/> funny king	<input type="checkbox"/> teepee boat
<input type="checkbox"/> in a boat	<input type="checkbox"/> my big toe	<input type="checkbox"/> peanut hat	<input type="checkbox"/> a hiccup	<input type="checkbox"/> puppet game

Sub-total Group 3

ASSESSMENT	1ST	2ND	3RD	4TH

Group 4: Prosody: spoken phrases (Model: Emphasize syllables in **bold italics**)
 X = emphasis on correct syllables (1 point)
 / = emphasis on non-target syllables (1/2 point)

Group 3: 3-syllable combinations

<input type="checkbox"/> tubby toy	<input type="checkbox"/> potato	<input type="checkbox"/> do high five	<input type="checkbox"/> tiny pan	<input type="checkbox"/> how many
<input type="checkbox"/> banana	<input type="checkbox"/> go bye bye	<input type="checkbox"/> oh foo-ey	<input type="checkbox"/> peek a boo	<input type="checkbox"/> potty time
<input type="checkbox"/> fee fi foe	<input type="checkbox"/> fat doggy	<input type="checkbox"/> binky boo	<input type="checkbox"/> teddy bear	<input type="checkbox"/> giddy-up
<input type="checkbox"/> yummy food	<input type="checkbox"/> goofy goat	<input type="checkbox"/> one cookie	<input type="checkbox"/> doggy bone	<input type="checkbox"/> wet mitten
<input type="checkbox"/> daddy up	<input type="checkbox"/> hey me too	<input type="checkbox"/> open up	<input type="checkbox"/> funny king	<input type="checkbox"/> teepee boat
<input type="checkbox"/> in a boat	<input type="checkbox"/> my big toe	<input type="checkbox"/> peanut hat	<input type="checkbox"/> a hiccup	<input type="checkbox"/> puppet game

Scoring Groups 1-3: For each item, score the best response of up to 3 trials
 X = correct sounds and correct number of syllables (1 point)
 / = recognizable response, but incorrect or missing consonants or extra syllables (½ point)
 Blank = no response, incorrect vowels, or missing syllables (0 points)

Group 1: Simple and reduplicated syllables
 Targets: vowels, diphthongs, consonants p, b, m, n, h, w
 Probe: t

<input type="checkbox"/> ah	<input type="checkbox"/> bye bye	<input type="checkbox"/> one	<input type="checkbox"/> moo	<input type="checkbox"/> we
<input type="checkbox"/> wow	<input type="checkbox"/> hop	<input type="checkbox"/> my	<input type="checkbox"/> up	<input type="checkbox"/> boy
<input type="checkbox"/> bee	<input type="checkbox"/> mama	<input type="checkbox"/> boo	<input type="checkbox"/> may	<input type="checkbox"/> wa wa
<input type="checkbox"/> knee	<input type="checkbox"/> papa	<input type="checkbox"/> no no	<input type="checkbox"/> pop	<input type="checkbox"/> toy
<input type="checkbox"/> oo	<input type="checkbox"/> me	<input type="checkbox"/> oh	<input type="checkbox"/> too	<input type="checkbox"/> baa

Group 2: 2-syllable combinations
 Targets: Add consonants k, g, t, d, f, y, ng

<input type="checkbox"/> baby	<input type="checkbox"/> window	<input type="checkbox"/> open	<input type="checkbox"/> taco	<input type="checkbox"/> icky
<input type="checkbox"/> go eat	<input type="checkbox"/> funny	<input type="checkbox"/> oh boy	<input type="checkbox"/> foo-ey	<input type="checkbox"/> too hot
<input type="checkbox"/> nighttime	<input type="checkbox"/> meow	<input type="checkbox"/> yum-o	<input type="checkbox"/> hankie	<input type="checkbox"/> monkey
<input type="checkbox"/> bunny	<input type="checkbox"/> kitty	<input type="checkbox"/> potty	<input type="checkbox"/> too bad	<input type="checkbox"/> uh-oh
<input type="checkbox"/> my foot	<input type="checkbox"/> bow wow	<input type="checkbox"/> pay day	<input type="checkbox"/> cookie	<input type="checkbox"/> daddy
<input type="checkbox"/> yucky	<input type="checkbox"/> mommy	<input type="checkbox"/> pokey	<input type="checkbox"/> puppy	<input type="checkbox"/> hot dog

Group 3: 3-syllable combinations

<input type="checkbox"/> subby toy	<input type="checkbox"/> potato	<input type="checkbox"/> do high five	<input type="checkbox"/> siny pan	<input type="checkbox"/> how many
<input type="checkbox"/> banana	<input type="checkbox"/> go bye bye	<input type="checkbox"/> oh foo-ey	<input type="checkbox"/> peek a boo	<input type="checkbox"/> potty time
<input type="checkbox"/> fee fi foe	<input type="checkbox"/> fat doggy	<input type="checkbox"/> binky boo	<input type="checkbox"/> teddy bear	<input type="checkbox"/> giddy-up
<input type="checkbox"/> yummy food	<input type="checkbox"/> goofy goat	<input type="checkbox"/> one cookie	<input type="checkbox"/> doggy bone	<input type="checkbox"/> wet mitten
<input type="checkbox"/> daddy up	<input type="checkbox"/> hey me too	<input type="checkbox"/> open up	<input type="checkbox"/> funny king	<input type="checkbox"/> teepee boat
<input type="checkbox"/> in a boat	<input type="checkbox"/> my big toe	<input type="checkbox"/> peanut hat	<input type="checkbox"/> a hiccup	<input type="checkbox"/> puppet game

Group 4: Prosody: spoken phrases (Model: Emphasize syllables in **bold italics**)
 X = emphasis on correct syllables (1 point)
 / = emphasis on non-target syllables (½ point)
 Blank = monotone response (no emphasis) (0 points)

<input type="checkbox"/> no WAY	<input type="checkbox"/> ONE bunny	<input type="checkbox"/> in a MIN -ute	<input type="checkbox"/> TAKE it	<input type="checkbox"/> my MOM -my
<input type="checkbox"/> bug-a- BOO	<input type="checkbox"/> UH -oh	<input type="checkbox"/> MY mommy	<input type="checkbox"/> bow- WOW	<input type="checkbox"/> BUG -a-boo

Group 5: Prosody: other contexts
 X = response correct or nearly so (1 point)
 Blank = response does not closely match model (0 points)

Pitch
 Echoes pitch variations in 1-2 lines of a familiar song Echoes continuous warble (fire truck 00-oo-00-oo-00)

Loudness
 Echoes whispering Echoes quiet/loud voice (bye-bye vs. **BYE-BYE**)

Duration
 Sustains ohh for 3 seconds, echoically

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Group 4: Prosody: spoken phrases

X = emphasis on correct syllables (1 point)

/ = emphasis on non-target syllables (½ point)

Blank = monotone response (no emphasis) (0 points)

(Model: Emphasize syllables in **bold italics**)

<input type="checkbox"/> no WAY	<input type="checkbox"/> ONE bunny	<input type="checkbox"/> in a MIN -ute	<input type="checkbox"/> TAKE it	<input type="checkbox"/> my MOM -my
<input type="checkbox"/> bug-a- BOO	<input type="checkbox"/> UH -oh	<input type="checkbox"/> MY mommy	<input type="checkbox"/> bow- WOW	<input type="checkbox"/> BUG -a-boo

Scoring Groups 1-3: For each item, score the best response of up to 3 trials
 X = correct sounds and correct number of syllables (1 point)
 / = recognizable response, but incorrect or missing consonants or extra syllables (1/2 point)
 Blank = no response, incorrect vowels, or missing syllables (0 points)

TOTAL RAW SCORE: (Groups 1-5)	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 1: Simple and reduplicated syllables

Targets: vowels, diphthongs, consonants p, b, m, n, h, w

Probe: t

- | | | | | |
|-------------------------------|----------------------------------|--------------------------------|------------------------------|--------------------------------|
| <input type="checkbox"/> ah | <input type="checkbox"/> bye bye | <input type="checkbox"/> one | <input type="checkbox"/> moo | <input type="checkbox"/> we |
| <input type="checkbox"/> wow | <input type="checkbox"/> hop | <input type="checkbox"/> my | <input type="checkbox"/> up | <input type="checkbox"/> boy |
| <input type="checkbox"/> bee | <input type="checkbox"/> mama | <input type="checkbox"/> boo | <input type="checkbox"/> may | <input type="checkbox"/> wa wa |
| <input type="checkbox"/> knee | <input type="checkbox"/> papa | <input type="checkbox"/> no no | <input type="checkbox"/> pop | <input type="checkbox"/> toy |
| <input type="checkbox"/> oo | <input type="checkbox"/> me | <input type="checkbox"/> oh | <input type="checkbox"/> too | <input type="checkbox"/> baa |

Sub-total Group 1	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 2: 2-syllable combinations

Targets: Add consonants k, g, t, d, f, y, ng

- | | | | | |
|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <input type="checkbox"/> baby | <input type="checkbox"/> window | <input type="checkbox"/> open | <input type="checkbox"/> taco | <input type="checkbox"/> icky |
| <input type="checkbox"/> go eat | <input type="checkbox"/> funny | <input type="checkbox"/> oh boy | <input type="checkbox"/> foo-ey | <input type="checkbox"/> too hot |
| <input type="checkbox"/> nighttime | <input type="checkbox"/> meow | <input type="checkbox"/> yum-o | <input type="checkbox"/> hankie | <input type="checkbox"/> monkey |
| <input type="checkbox"/> bunny | <input type="checkbox"/> kitty | <input type="checkbox"/> potty | <input type="checkbox"/> too bad | <input type="checkbox"/> uh-oh |
| <input type="checkbox"/> my foot | <input type="checkbox"/> bow wow | <input type="checkbox"/> pay day | <input type="checkbox"/> cookie | <input type="checkbox"/> daddy |
| <input type="checkbox"/> yucky | <input type="checkbox"/> mommy | <input type="checkbox"/> pokey | <input type="checkbox"/> puppy | <input type="checkbox"/> hot dog |

Sub-total Group 2	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 3: 3-syllable combinations

- | | | | | |
|-------------------------------------|-------------------------------------|---------------------------------------|-------------------------------------|--------------------------------------|
| <input type="checkbox"/> subby toy | <input type="checkbox"/> potato | <input type="checkbox"/> do high five | <input type="checkbox"/> siny pan | <input type="checkbox"/> how many |
| <input type="checkbox"/> banana | <input type="checkbox"/> go bye bye | <input type="checkbox"/> oh foo-ey | <input type="checkbox"/> peek a boo | <input type="checkbox"/> potty time |
| <input type="checkbox"/> fee fi foe | <input type="checkbox"/> fat doggy | <input type="checkbox"/> binky boo | <input type="checkbox"/> teddy bear | <input type="checkbox"/> giddy-up |
| <input type="checkbox"/> yummy food | <input type="checkbox"/> goofy goat | <input type="checkbox"/> one cookie | <input type="checkbox"/> doggy bone | <input type="checkbox"/> wet mitten |
| <input type="checkbox"/> daddy up | <input type="checkbox"/> hey me too | <input type="checkbox"/> open up | <input type="checkbox"/> funny king | <input type="checkbox"/> teepie boat |
| <input type="checkbox"/> in a boat | <input type="checkbox"/> my big toe | <input type="checkbox"/> peanut hat | <input type="checkbox"/> a hiccup | <input type="checkbox"/> puppet game |

Sub-total Group 3	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 4: Prosody: spoken phrases (Model: Emphasize syllables in **bold italics**)

X = emphasis on correct syllables (1 point)

/ = emphasis on non-target syllables (1/2 point)

Blank = monotone response (no emphasis) (0 points)

- | | | | | |
|--|---|---|--|--|
| <input type="checkbox"/> no WAY | <input type="checkbox"/> ONE bunny | <input type="checkbox"/> in a MIN -ute | <input type="checkbox"/> TAKE it | <input type="checkbox"/> my MOM -my |
| <input type="checkbox"/> bug-a- BOO | <input type="checkbox"/> UH -oh | <input type="checkbox"/> MY mommy | <input type="checkbox"/> bow- WOW | <input type="checkbox"/> BUG -a-boo |

Sub-total Group 4	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 5: Prosody: other contexts

X = response correct or nearly so (1 point)

Blank = response does not closely match model (0 points)

- Pitch**
- Echoes pitch variations in 1-2 lines of a familiar song Echoes continuous warble (fire truck 00-oo-00-oo-00)
- Loudness**
- Echoes whispering Echoes quiet/loud voice (bye-bye vs. **BYE-BYE**)
- Duration**
- Sustains *ahh* for 3 seconds, echoically

Sub-total Group 5	ASSESSMENT			
	1ST	2ND	3RD	4TH

Group 5: Prosody: other contexts

X = response correct or nearly so (1 point)

Blank = response does not closely match model (0 points)

Pitch

- Echoes pitch variations in 1-2 lines of a familiar song Echoes continuous warble

Loudness

- Echoes whispering Echoes quiet/loud voice (bye-bye vs. **BYE-BYE**)

Duration

- Sustains *ahh* for 3 seconds, echoically

Video

Naïve Listener Test

Naïve Listener Test:

Listener doesn't know the evocative stimulus

A way to measure intelligibility
and its improvement over time

Many ways you could do this
(This e.g. is with tacts; SC is easier)

It doesn't identify specific
sounds or sound combos
that need to be targeted

Anyone can give this type of test
“Pass” level is simply *intelligibility*

This is not an articulation test

Its results are intuitive...any
caregiver or professional can
interpret it and use the results

Naïve Listener Test

intelligibility of acquired tacts

Listener faces away from tact stimuli being presented

Alternatively, listener can listen to audiotape

Naïve Listener Test

intelligibility of acquired tacts

- 1 **Camera** _____
- 2 **Slide** _____
- 3 **phone** _____
- 4 **spoon** _____
- 5 **snake** _____
- 6 **elephant** _____

Show 50-100 pix/obj

Use items already “acquired” as tacts

- Listeners understand & reinforce the current vocal form OR the sign

Nouns	Test 1 5-2-15	Test 2 6-6-15	Test 3 7-11-15	Transcription (BE) 6-8-15
Fish	-	-	+	<i>fit</i>
Frog	-	-	-	<i>fo-go</i>
Fork	+	-	-	<i>pfo-go</i>
Glasses	-	-	-	<i>ga-tha</i>
Grapes	+	+	+	<i>graph</i>
Giraffe	-	+	-	<i>jew-wah</i>
Guitar	-	+	+	<i>gi-tah</i>
Hat	+	-	+	<i>ha-tah</i>
Ice Cream	+	-	+	<i>ai-cree</i>
Keys	+	+	+	<i>key</i>
Phone	-	-	-	<i>fo</i>
Shoes	+	+	+	<i>shew</i>
Spoon	-	-	+	<i>beeyih</i>
Sheep	-	-	-	<i>sheep-ee</i>
Snake	-	-	-	<i>thak</i>
Slide	-	-	-	<i>shwai</i>
Star	-	-	+	<i>dah</i>
Scissors	-	+	+	<i>scizzih</i>
Spider	-	-	-	<i>ah-pah-duh</i>
Swing	-	+	+	<i>thwih</i>
Train	-	-	+	<i>tray</i>
Table	-	-	+	<i>tibuh</i>
Teddy Bear	+	+	+	<i>teh beh</i>
Umbrella	-	-	-	<i>oh-blah-lah</i>
Results	15/50	19/50	28/50	
	30%	38%	56%	

Video

chips
1
2
3
4
5
6
7
8
9
10

Video

*

Possible targets

	chips
1	shoes
2	chicken
3	cow
4	fish
5	fork
6	glasses
7	grapes
8	guitar
9	sheep
10	dinosaurs

Sounds like	Supposed to sound like	What affects intelligibility?	
ʃɪs	ʃʊs	vowel wrong	*
tʃɪkɪ	tʃɪkɪn	omitted final /n/	
ka	kar	omitted final /r/	
fɪʃ	fɪʃ	(ok)	
fokɛ	fork	vowel @ end adds a syllable	*
gwæɛz	glæɛz	w/l	
gwɛps	greps	vowel wrong and w/r	*
gɪtə	gɪtər	omitted final /r/	
ʃɪp	ʃɪp	vowel wrong	*
dəʊ	dəɪnəsər	vowel wrong & deleted syllable	*

Auditory Discrimination

Interaction between the 2 components of speaking...

Segmental

Vowels, diphthongs, consonants

Suprasegmental

Loudness, pitch, duration, voice on/off

If the **final sound** is

Voiced

Unvoiced

Then **vowel duration** is

Longer

Shorter

aɪ z

aɪ s

p l i z

p l i s

k æ b

k æ p

This info informs treatment...

Voiced

Final sound

Unvoiced

Longer

Vowel duration

Shorter

bag

back

Increase **vowel** duration
instead of a stronger final sound
*avoids the “intrusive schwa” - *bag-guh*

Accept the unvoiced final sound as
a **placeholder** until overall artic
skills improve

Barbara E. Esch.
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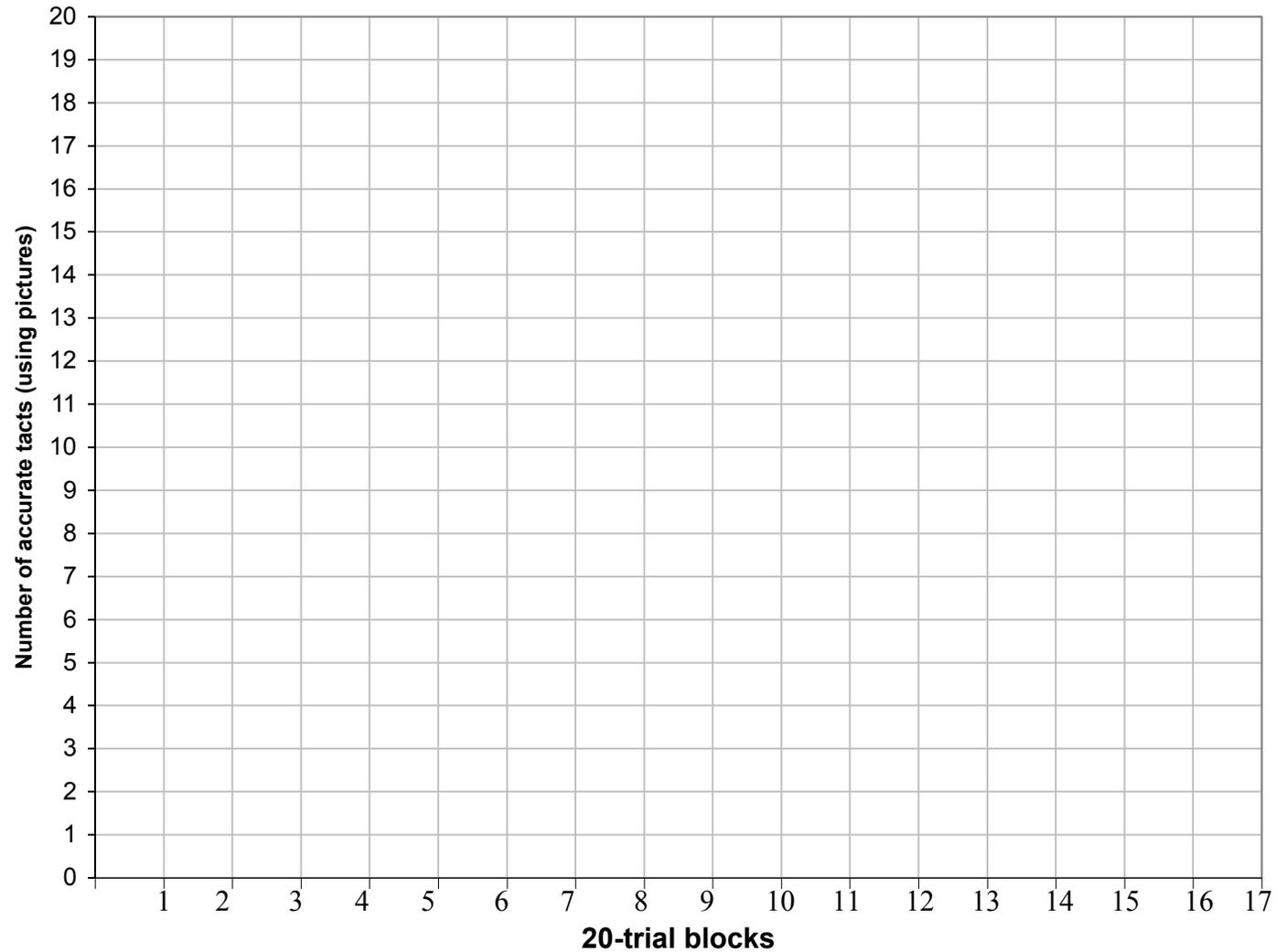
PICTURES

- 1 TOE
- 2 TACO
- 3 TWO
- 4 TABLE (tay-buh)
- 5 TOOTH
- 6 TV
- 7 TUB
- 8 TEETH
- 9 TUMMY
- 10 TIGER (ti-guh)
- 11 COW
- 12 BACON
- 13 BACKPACK
- 14 CAT
- 15 FORK
- 16 BEAK
- 17 CHICKEN
- 18 FRECKLES (feh-kos)
- 19 NICKEL (nih-ko)
- 20 PICKLE (pih-ko)

Contrast place (plosives t/k)

TACT accuracy

Training t/k discrimination



Shuffle picture cards after each block of 20 so presentation order is random.

Complex Syllables

Skill set for /t/

ti-ma-bi

tu-bi-wi

no-ta-me

Alternated with
different consonants

ta-ti-tu

tu-ta-ti

ti-tu-ta

Repeated with
different vowels

ta-ta-ta

ti-ti-ti

tu-tu-tu

Repeated 3/s

ta

ti

tu

w/ main vowels

simple - to - complex

tubby toy

ʈʌbɪtoɪ

to my house

təmaɪhaus

take me too

tekmitu

I want tacos

aɪwʌntakoz

my teacher

maɪtɪtʃə

it's Jack's turn

ɪtsdʒækstɜːn

Group 3: 3-syllable combinations

tubby toy

banana

fee fi foe

yummy food

daddy up

in a boat

potato

go bye bye

fat doggy

goofy goat

hey me too

my big toe

do high five

oh foo-ey

binky boo

one cookie

open up

peanut hat

tiny pan

peek a boo

teddy bear

doggy bone

funny king

a hiccup

how many

potty time

giddy-up

wet mitten

teepee boat

puppet game

tubby toy

t ʌ b i t oɪ

t ʌ _ _ t oɪ

Reduplicated

tuh tuh

C₁V₁ C₁V₁

t	ʌ			t	oɪ
t	ʌ	b	i	t	oɪ

C₁V₁ C₁V₂

C₁V₁ C₂V₂ C₁V₃

Echoic Phrases
Syllable Lengths 1-to-6

①	②	③	④	⑤	⑥
pop	baby	banana	peanut butter	I want a puppy	I want a small puppy
mom	mommy	go bye bye	blow up balloon	under the table	under the big table
cup	daddy	spaghetti	helicopter	get my pajamas	get my blue pajamas
cat	bye-bye	I want juice	I want to stop	pancakes and syrup	oops, I dropped my soda
dog	open	garbage can	I want to go	bubbles in the tub	put bubbles in the tub
eat	ice cream	overnight	I want a break	open the book now	open up the book now
up	Barney	hamburger	Winnie the Pooh	time to go to bed	it's time to go to bed
go	pizza	teddy bear	Cookie Monster	let's read a good book	let's all read a good book
no	bubble	video	this is my nose	the man is driving	the old man is driving
juice	water	no more milk	where is Big Bird	the cat is climbing	the big cat is climbing
milk	puppy	strawberry	cheese & crackers	the dog is barking	the gray dog is barking
shoe	kitty	potato	cover me up	water is running	the water is running
car	soda	bologna	hammer & nails	a big apple tree	it's a big apple tree
cake	bubbles	Donald Duck	coloring book	how much do you want	how many do you want
doll	cookie	Mickey Mouse	video tape	in the swimming pool	it's in the swimming pool
ball	candy	brush it off	peas & carrots	let the water out	don't let the water out
chips	cracker	paper towel	goldfish crackers	can you come with me	butter on the popcorn
book	popcorn	underpants	cream & sugar	the sun is yellow	the big sun is yellow
one	Skittle	McDonald's	give me pizza	refrigerator	make a bowl of oatmeal
cheese	movie	go home now	I want yogurt	a big mud puddle	a really big puddle
three	bath tub	no, thank you	I like bagels	little brown puppy	my little brown puppy
bed	tickle	on my shoe	breakfast & lunch	my pencil is lost	my new pencil is lost

#2 -Speech acquisition is a *mechanical* process

Take home points

- Normal-sounding, fluent, accurate sound production requires years of practice
- Knowing how & where sounds are produced in the mouth can inform target selection
- It benefits the learner to establish sound-production fluency before articulation accuracy (b/c more responses to reinforce)

Speech acquisition is a *coarticulation* process

Coarticulation

Tongue placement to produce any sound
is affected by requirements of
adjacent phoneme positions

ACCURACY

v.

SPEED

First, we learn to make long strings of sounds fluently

Precision requirements can decrease fluency

This is why focusing on too-specific consonant articulation is *contraindicated* for early speech learners who don't yet produce fluent strings of syllables

სისელსისელზბაიღასიფორ

Video

Tongue twisters: SYSTEM LOAD!

- Syllable combos are atypical
- Not well-practiced
- Requires rapid tongue repositioning

slow
&
accurate

or

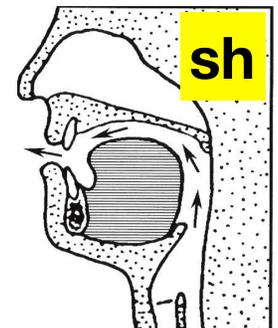
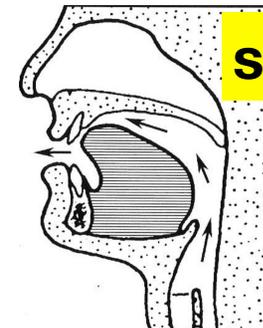
fast
&
inaccurate

f i s ε l z s i f ε l z b a i ð ʌ s i f o r

voiced-to-unvoiced
same position

voiced-to-unvoiced (or uv-v)
different tongue position

close, but different, tongue position



Any speech sound

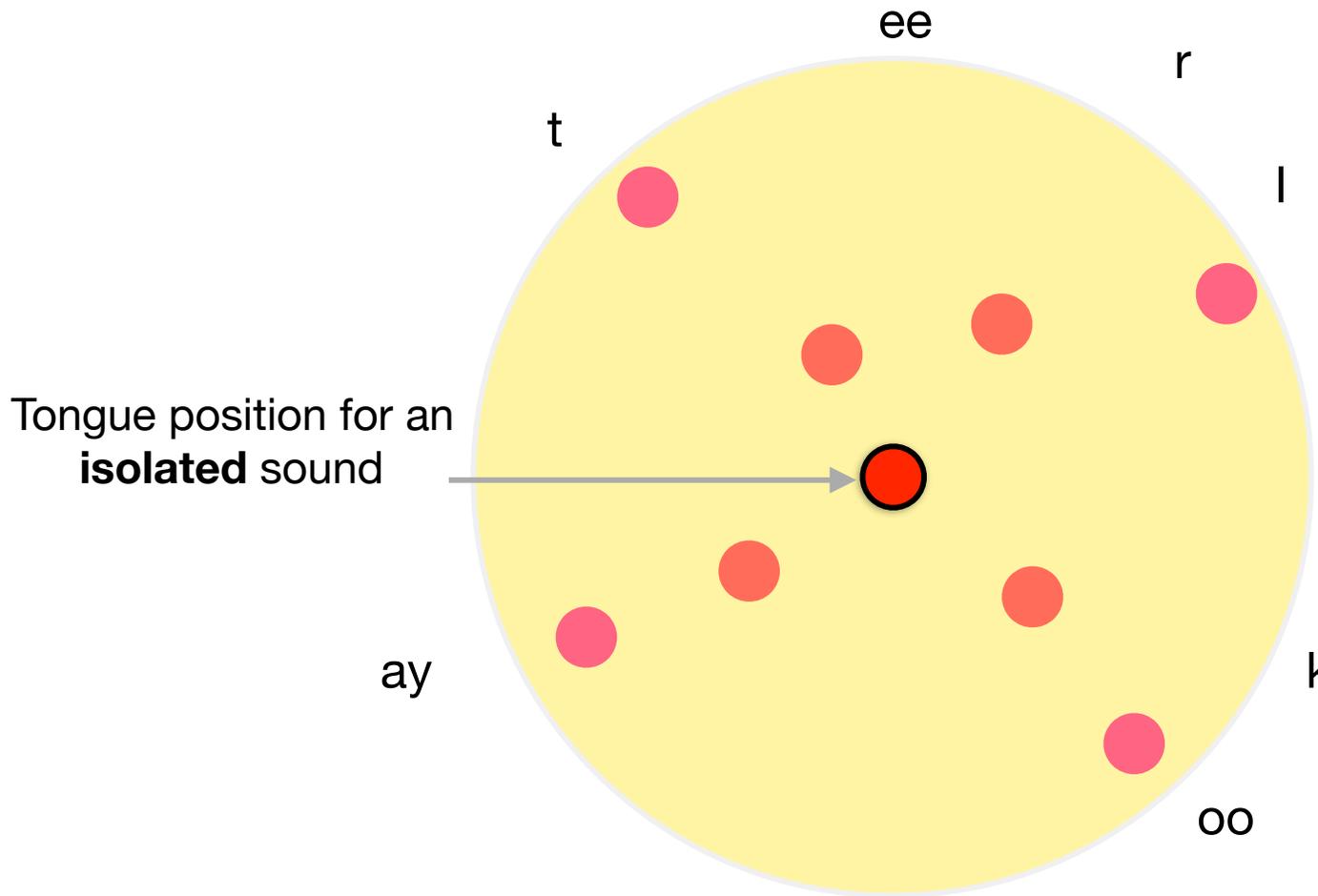


Figure shows area in mouth for any given speech position perceived as "correct"

Tongue position for the same sound changes when *preceded* or *followed* by another sound

w a t ə
+ + - +

Vocal cords on/off

waTer or wadder?

w a d ə
+ + + +

Vocal cords on/off

We change our articulation to meet the demands of effective communication



Rapid speaking

(wadder)

Clarification

(waTer)

Coarticulation is a function of consonant place, manner, and voicing

Different “t” position:

put

putðəki

Different “th” position:

putðəki

ðɪsɪztɛdi

m a m i ε n d æ d ɪ

↑ ↑

front front

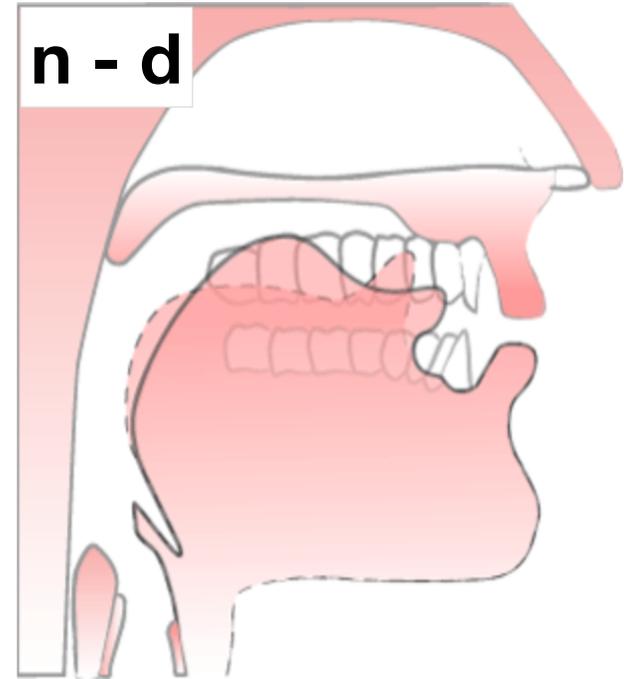
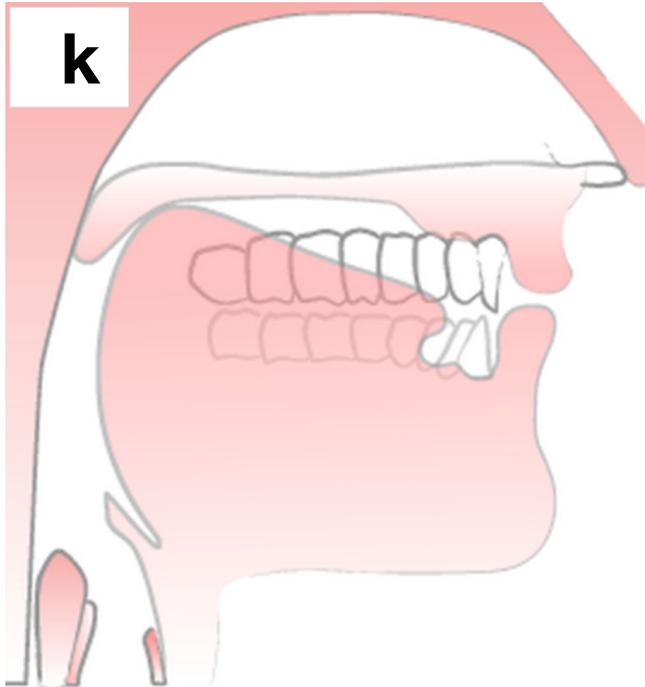
m a m i ε n k e d ɪ

↑ ↑

front back

m a m i ε n k e d i

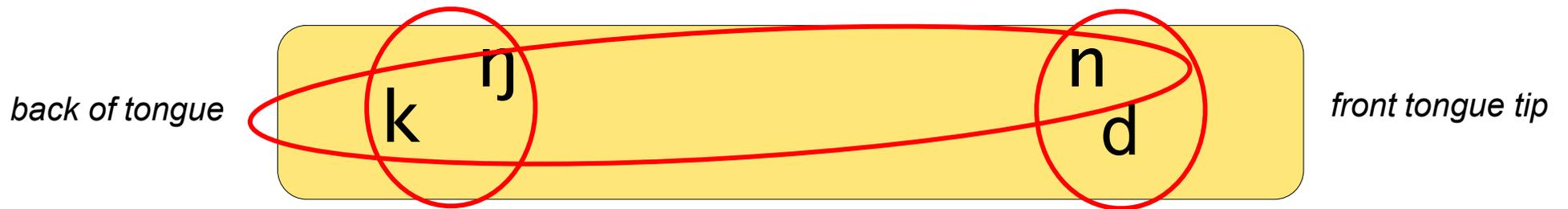
m a m i ε n d æ d i



back of tongue

tongue tip

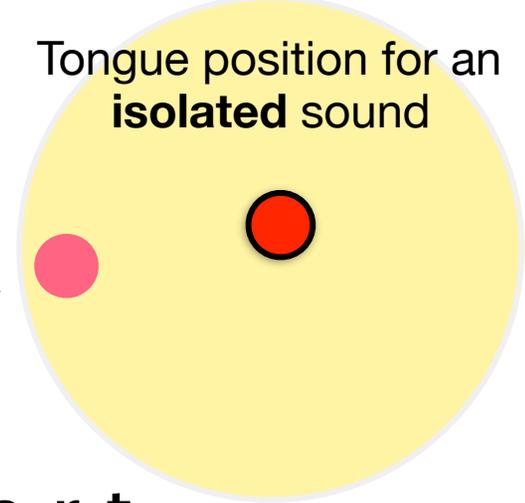
m a m i ε n k e d ɪ



m a m i ε n d æ d ɪ

Tongue position for an isolated sound

k



m a r **k** **s** **k** a r d ʌ z n a **t** **s** **t** a r t

back of tongue

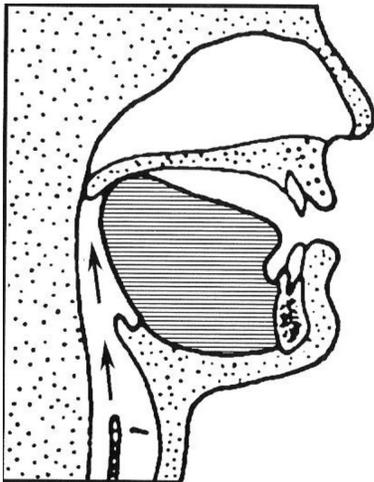
k

s



s t

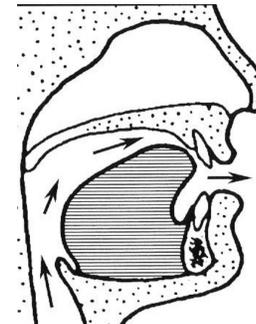
front tongue tip



k-g position



t-d position



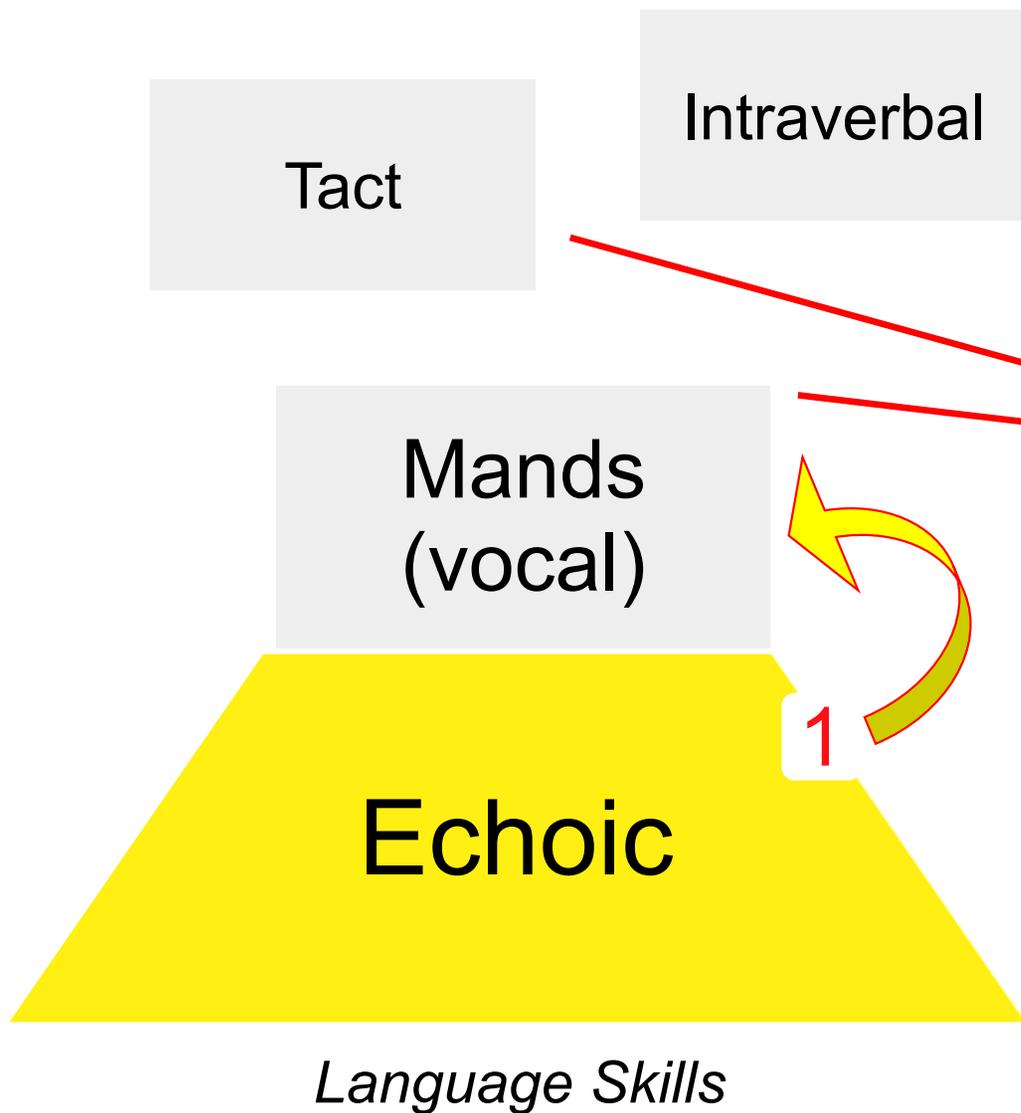
s-z position

#3 -Speech acquisition is a *coarticulation* process

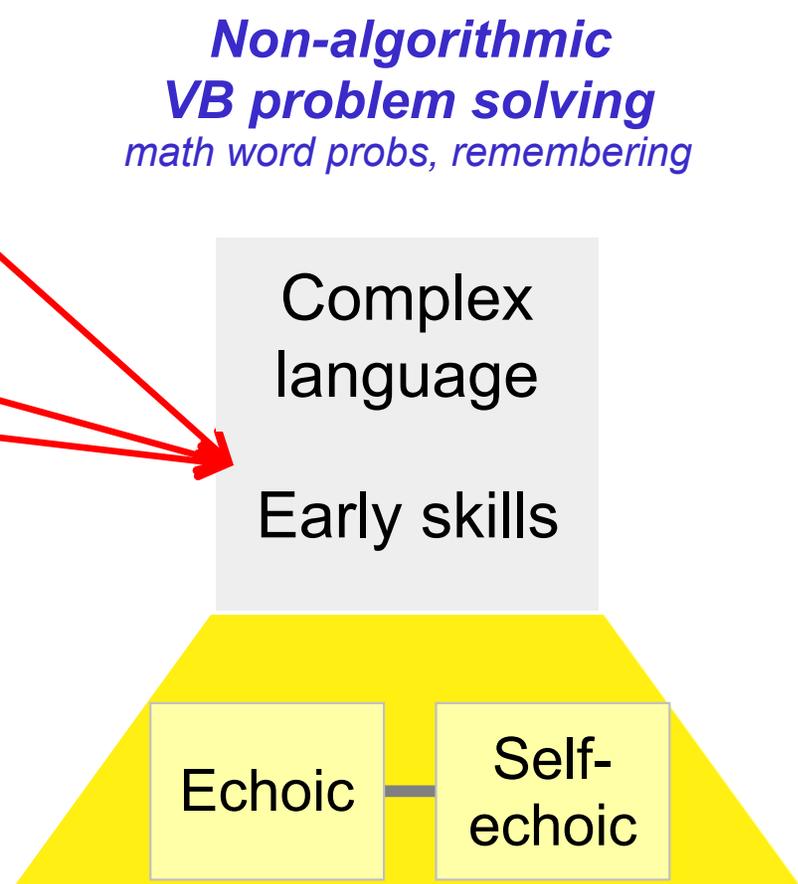
Take home points

- “Correct” tongue position isn’t absolute - it depends on required tongue position of adjacent sounds
 - So single syllable speech work is unlikely to result in fluent speech
- The verbal community tolerates “precision errors” for years, while the mechanical skills are acquired that produce complex, rapid movement combinations (i.e., fluent, connected speech)
- First, establish fluent, even though “misarticulated,” syllable strings and reinforce as mands, tacts, etc, while continuing to improve articulation precision (through echoic practice) and lengthen MLU

Early speech learners



Sophisticated talkers



Mand-Tact

Criterion for reinforcing:
Is it intelligible?

Select targets from:

- Current available syllables
 - Echoic syllables (*EESA*)
 - Syllable skills (*SAS*)
 - NLT
 - Preferred items & activities

Reinforce most 1st vocal attempts for learners with weak vocal repertoires or any beh issues

Embed vocal practice into *most* activities & give echoic prompts as needed

Echoic

Criterion for reinforcing:
Is it precise?

Select targets from:

- Shell components to support vocal mands-tacts (write on echoic-to-mand card)
- Information from *EESA*, *SAS*, and *NLT*

Simplify shell component(s) if vocal attempts are unintelligible

Early speech training

If

- Low vocal frequency
- Low vocal variability
- Weak or no echoic

Select temporary “bridging” response mode

Fast
Easy
Cheap
Understood
Always available

Develop strong MO
for people & things

Increase vocals

Frequency and Variability
SSP/AR, in play, fun interactions

If

- Consistent “echoic” occurs
- Even if weak or inaccurate

Do echoic-mand-tact training

1. Reinforce all early vocal-verbal attempts
2. Set 1st targets at “low bar”
3. Raise bar as sequential targets are mastered
4. Reinforce any vocals near current target

Get precise echoics

to support vocal-verbal training

Contact

besch1@mac.com