Sound Evidence:

Updates in Treating Speech Sound Disorders in Children

A. Lynn Williams, Ph.D.

College of Clinical and Rehabilitative Health Sciences

East Tennessee State University

Disclosure statements

- Financial disclosure
  - Book
  - iPAD app
- Non-Financial disclosure

Workshop Objectives

Make it ACAP!

- Assessment
  - Relational “error” analysis (PVM)
  - Independent + Relational analysis (SPACS)
- Target Selection
  - Different Approaches to Target Selection
  - Another Look at Norms

Morning

- Intervention Approaches
  - Aligning Client Factors to Appropriate Approaches
  - Intervention Intensity
- Clinical Decision-Making
  - Putting it All Together

Afternoon

Workshop Objectives

Match the treatment to the diagnosis

Did you know …

- Nearly 1 in 12 children 3-17 years old have a communication disorder?
  - Speech sound disorders (SSD) are the most prevalent communicative disorder
  - Highest among children 3-6 years
  - This means there are 2-3 students in every classroom who have a communication disorder

NIH (2012)

Did you know …

- Preschool children with SSD do not perform as well as their peers in literacy and learning during the early school years?
  - This continues until at least 9 years of age
  - Negatively impacts various aspects of children's lives, such as their verbal communication skills, interpersonal interactions, ability to handle stress, and participation in daily life activities with long term consequences on their educational experiences and employment outcomes
- So SSD are not confined solely to speech or to early childhood!

McCormack, McLeod, Harrison & McAllister, 2010

Did you know …

- There is a critical age hypothesis for remediating unintelligible speech?
  - Unintelligible speech must be resolved by age 5;6 in order to significantly reduce academic problems associated with speech disorders
  - Given that many children do not come to SLP for treatment until age 4, there is a significant need for efficient and effective therapies to remediate the speech disorder within a short time period (e.g., 18 months!)

Bishop & Adams, 1990

Did you further know …

- Organization and time management is one of the 9 critical skills that we need to be teaching our graduate students in addition to the technical knowledge of the field?

And …

- It's not uncommon for children with multiple sound errors to be on our caseloads for 5-6 years?

Long (2001)

Clearly …

Neither our clients or speech-language pathologists have time to waste!

Time Management

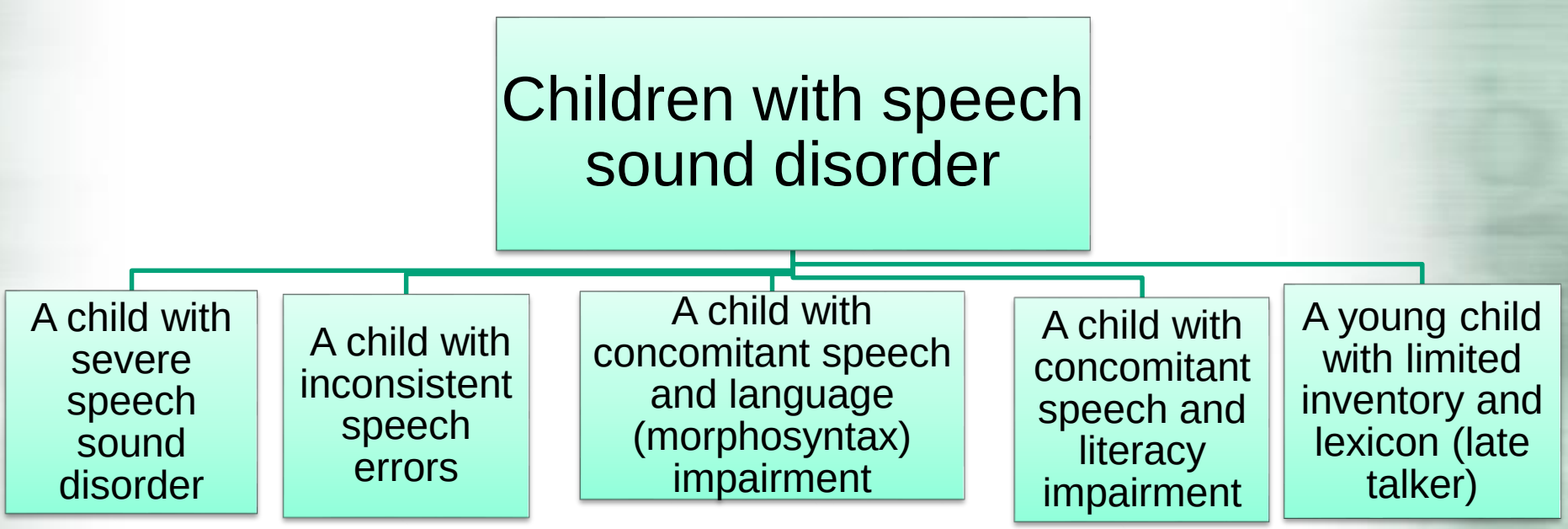
Work smarter, not harder!

Focus on PRINCIPLES of Assessment, Target Selection, and Intervention

What is the population of children with SSD?

DIVERSITY AND DEFINITION OF SSD

Diversity of SSD

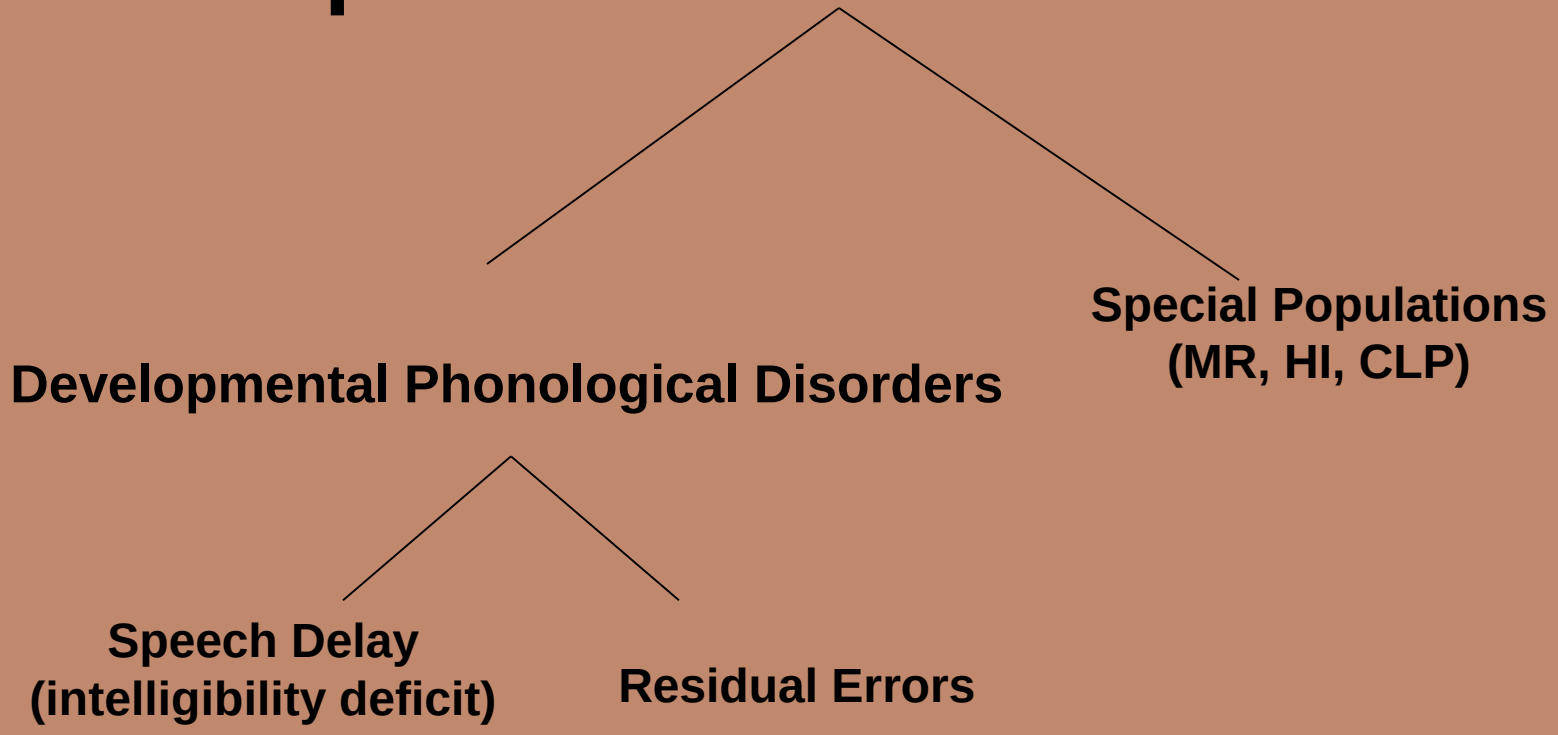


Defining Speech Sound Disorders

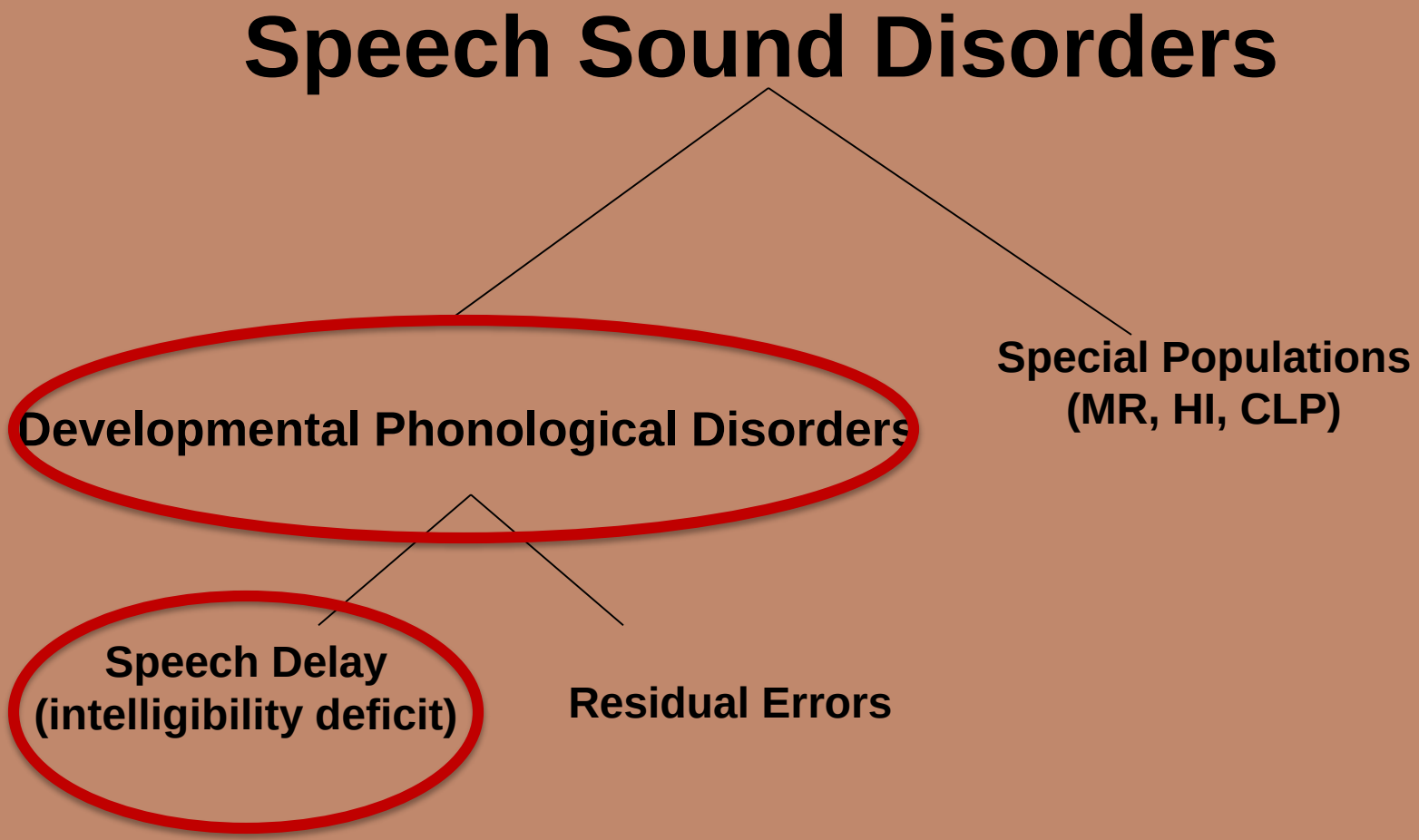
- Speech Sound Disorders (SSD) in children is a complex neurodevelopmental disorder that is quite diverse and ranges in both severity and type of disorder (Shriberg, 2010).
  - SSD include articulatory, phonological, and motor speech disorders and have been identified as one of the most prevalent types of communication impairment among children.
  - Further, SSD can co-occur with other impairments of communication, such as language impairment, literacy difficulties, or fluency.
- Given the complexity of SSD, differential diagnosis is essential to designing effective intervention.
- Sound clinical decision-making based on reasoned evidence-based practice is required to select the most appropriate intervention approach given the characteristics of the child's SSD and the clinician's expertise.

Classification of Children with SSD

Speech Sound Disorders



Classification of Children with SSD



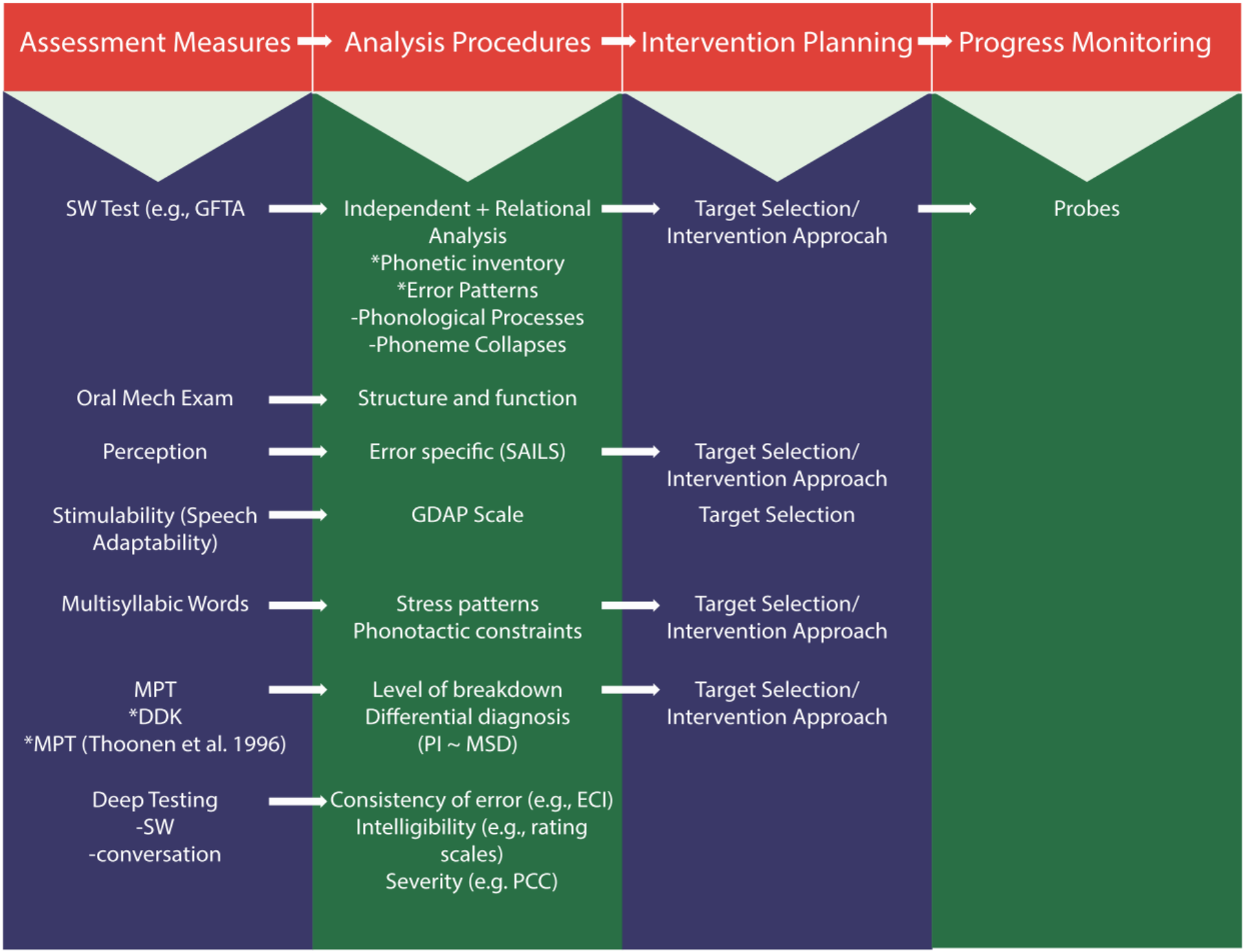
Assessment and Analysis

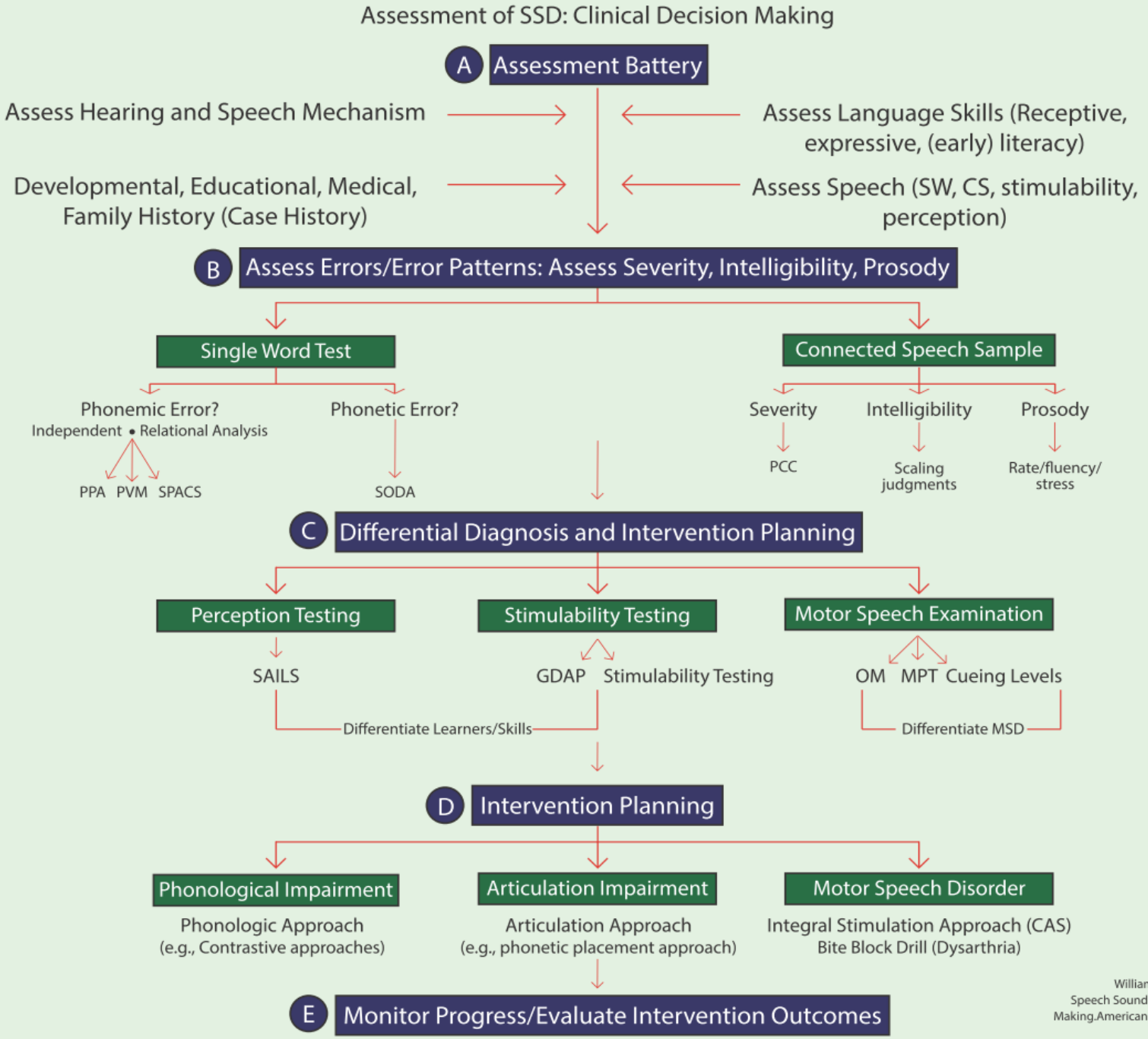
Principles to Assessment of SSD

- **System**
  - Symmetrical inventory of sounds that function contrastively in all word positions
- **Structure**
  - Rules and organization of the system that specify the distribution and combinations of sounds
- **Stability**
  - Predictability of a sound system; “order in the disorder”

Assessment as problem solving

- We will consider different types of information that can be gathered, as well as each how each piece of information links to intervention planning
- Assessment is a process of solving problems (Miccio, 2002)


Assessment Measures
Analysis Procedures
Intervention Planning
Progress Monitoring
SW Test (e.g., GFTA
Independent + Relational Analysis
*Phonetic inventory
*Error Patterns
-Phonological Processes
-Phoneme Collapses
Target Selection/ Intervention Approcah
Probes
Oral Mech Exam
Structure and function
Perception
Error specific (SAILS)
Target Selection/ Intervention Approach
Stimulability (Speech Adaptability)
GDAP Scale
Target Selection
Multisyllabic Words
Stress patterns
Phonotactic constraints
Target Selection/ Intervention Approach
MPT
*DDK
*MPT (Thoonen et al. 1996)
Level of breakdown
Differential diagnosis
(PI ~ MSD)
Target Selection/ Intervention Approach
Deep Testing
-SW
-conversation
Consistency of error (e.g., ECI)
Intelligibility (e.g., rating scales)
Severity (e.g. PCC)



William, A.L. (2013) Assessment of Speech Sound Disorders: Clinical Decision Making.American Speech-Language-Hearing Association, Chicago, IL.

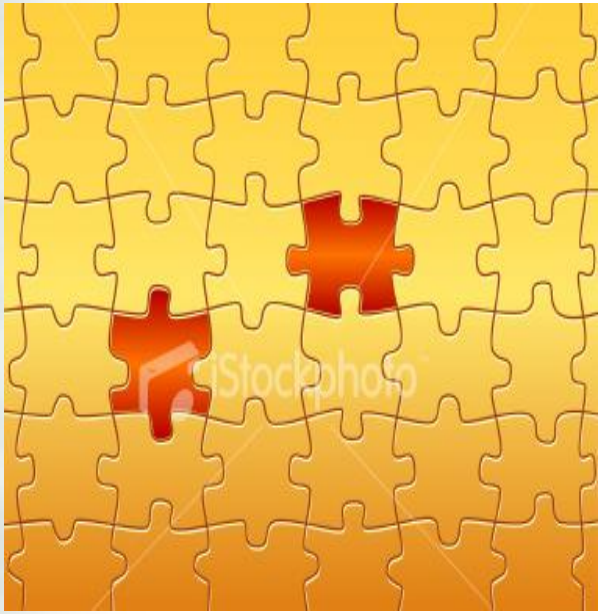
Basic speech assessment

- When a phonologic disorder is suspected, an accurate characterization of the child's speech sound production problem is the most essential component of the assessment.
- The first step typically includes a single-word assessment test, e.g., GFTA-2
- Although SW tests elicit a representative sample of all English consonants, they are limited in size of the sample
  - They provide comparison to normative sample, but they don't give sufficient information about systematic nature of child's errors

Why Complete a Basic Speech Assessment?

- To determine eligibility
- To identify predominant error patterns
- To find the “order” in the “disorder”
- To make a differential diagnosis
- To evaluate severity and intelligibility
- To determine if additional in-depth probing is needed
- To establish intervention goals and objectives
- To design appropriate intervention
- To evaluate treatment outcomes and monitor intervention progress

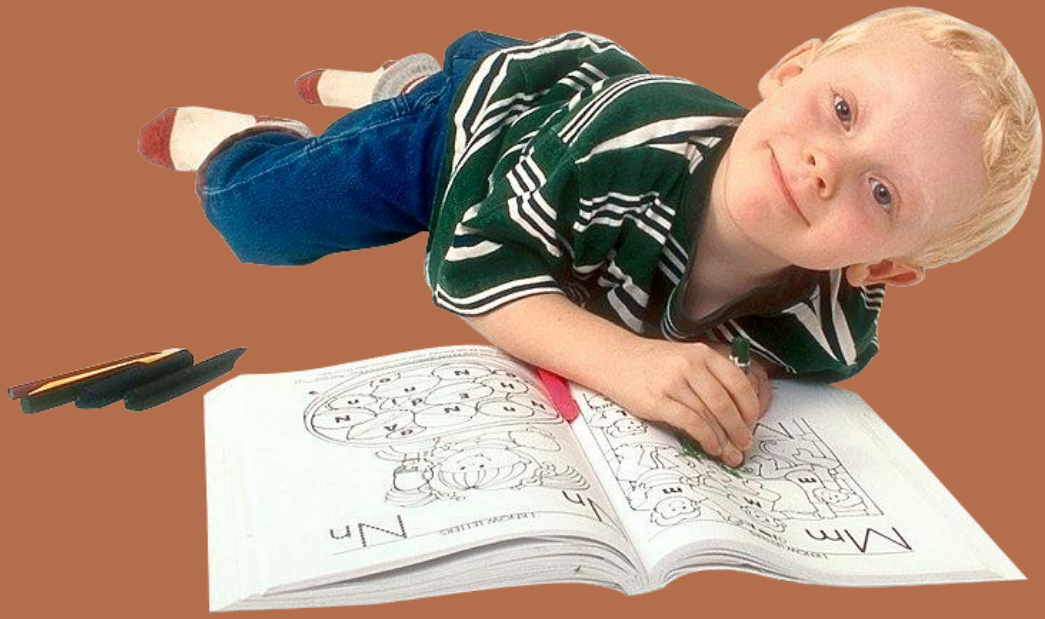
Beyond basic assessment



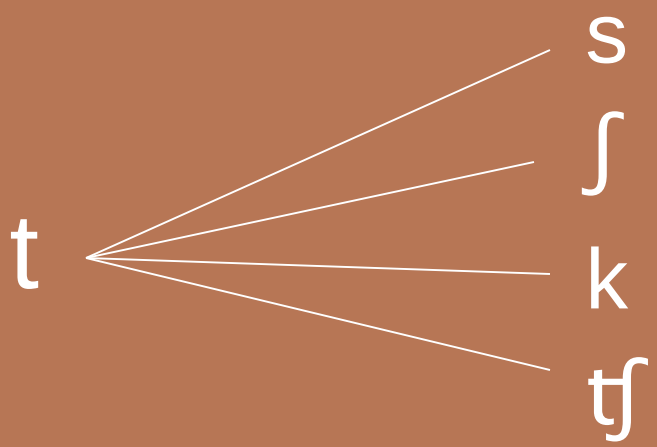
- “Although phonological problems are relatively easy to identify at the outset, the nature and severity of the disorder and any underlying cause or contributing factors must be determined before appropriate recommendations can be made regarding treatment or prognosis for change” (Miccio, 2002)
  - What are the child’s perception skills?
  - What are the child’s stimulability skills?
  - What are the child’s motor speech skills?

Characteristics of a Phonological Disability

- Child's system is smaller than the adult system
- One-to-many correspondence between child: adult systems

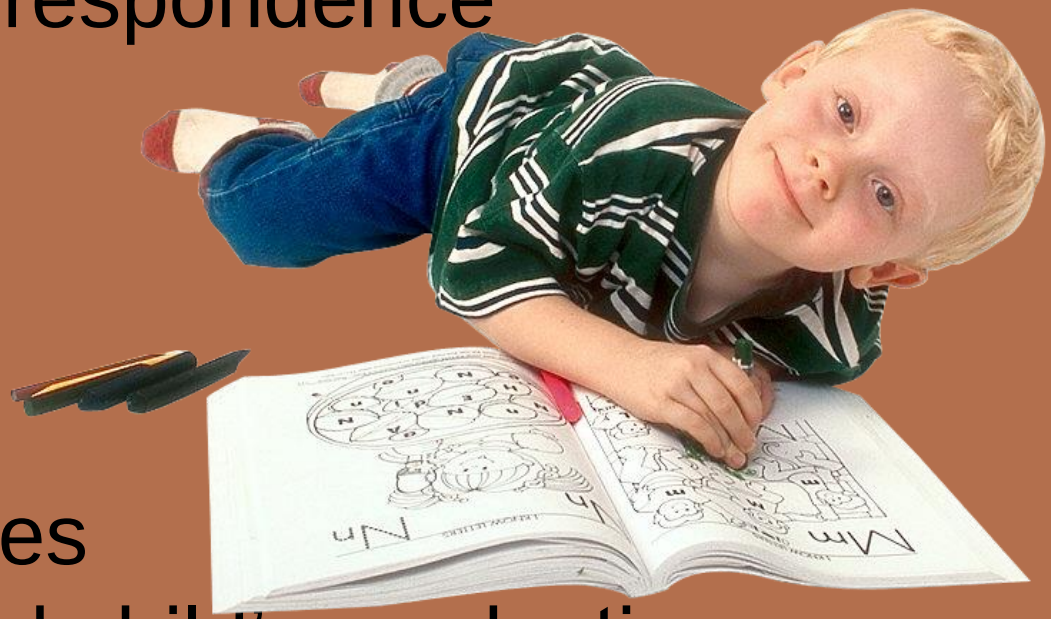


One To Many Correspondence

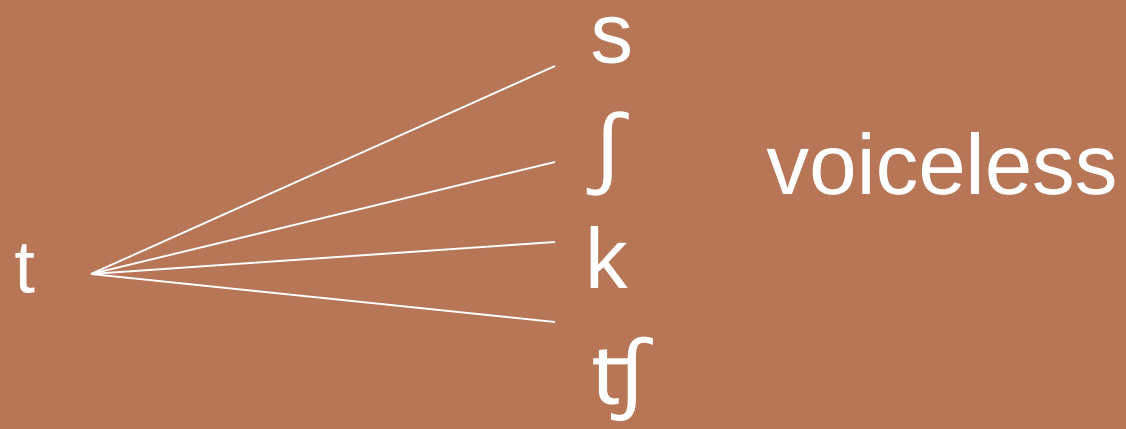


Characteristics of a Phonological Disability

- Child's system is smaller than the adult system
- One-to-many correspondence between child: adult systems
- Relationship between the phonetic properties of adult target and child's production

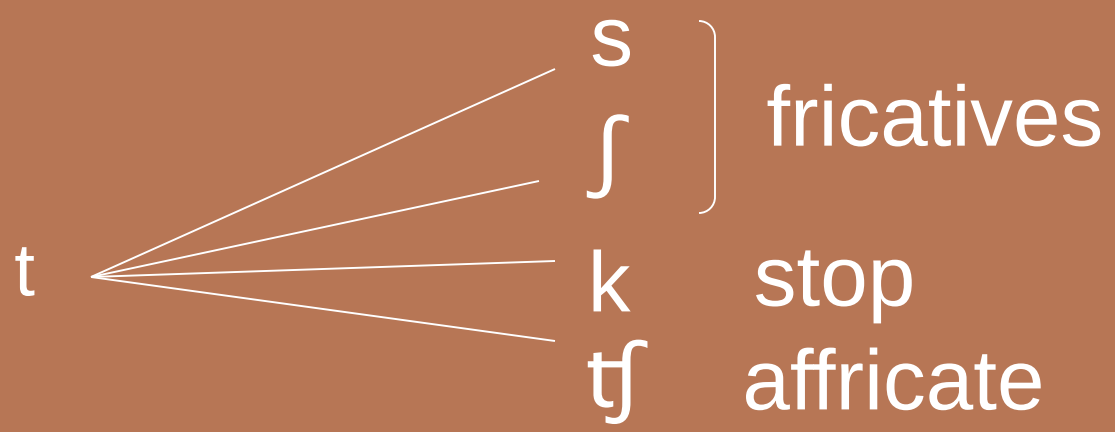


Phonetic Resemblance between Targets and Child's Production



1:4 phoneme collapse

Phonetic Resemblance Between Targets and Child's Production



voiceless obstruents

Systemic Phonological Analysis of Child Speech *(SPACS)*

- Child's ENTIRE system is examined as a unique, independent system ("own language")
- Views child as ACTIVE and CREATIVE learner of the sound system
- Compares SYSTEM to SYSTEM (child:adult)
- Maps child:adult system in terms of phoneme collapses (one-to-many correspondence)
- Child-based rather than adult-based

Systemic Phonological Analysis of Child Speech *(SPACS)*

- Describes idiosyncratic errors not captured by common phonological processes
- Provides a holistic assessment of child's speech
- Phoneme collapses (phonological rules) are seen as compensatory strategies that child uses to accommodate a limited sound system to the larger adult sound system
  - these compensatory strategies are organized according to particular aspects of adult system in terms of PLACE, MANNER, VOICE
- There is "order" in the "disorder"

GFTA-2 Data Set

(Adam)

Place - Voice - Manner
Error Pattern Analysis

Name: _____

Date: _____

Transcriber: _____

	m	n	ŋ	p	b	t	d	k	g	θ	ð	f	v	s	z	ʃ	ʒ	h	tʃ	dʒ	l	r	w	j
#__ Prevocalic																								
V__V Intervocalic																								
__# Postvocalic																								
	Nasals			Stops						Fricatives									Affricates		Liquids		Glides	

nasal clusters	/l/ clusters	/r/ clusters	/w/ clusters	/s/ clusters	Phonetic Inventory	P.V.M. Error Patterns
nt·nd·nʤ·mp	pl·bl·kl·gl fl·sl	pr·br·tr·dr kr·gr·fr· ʃr·θr	tw dw·kw·gw·sw	sm·sn·sp·st·sk		

Place - Voice - Manner
Error Pattern Analysis

Name: _____ 30

Date: _____

Transcriber: _____

	m	n	ŋ	p	b	t	d	k	g	θ	ð	f	v	s	z	ʃ	ʒ	h	tʃ	dʒ	l	r	w	j
#__ Prevocalic				m k																				
V__V Intervocalic				l																				
__# Postvocalic				l																				
	Nasals			Stops						Fricatives									Affricates		Liquids		Glides	

nasal clusters	/l/ clusters	/r/ clusters	/w/ clusters	/s/ clusters	Phonetic Inventory	P.V.M. Error Patterns
nt·nd·ndʒ·mp	pl·bl·kl·gl fl·sl	pr·br·tr·dr kr·gr·fr· ʃr·θr	tw dw·kw·gw·sw	sm·sn·sp·st·sk		

Place - Voice - Manner Error Pattern Analysis

Name: Adam

Date:

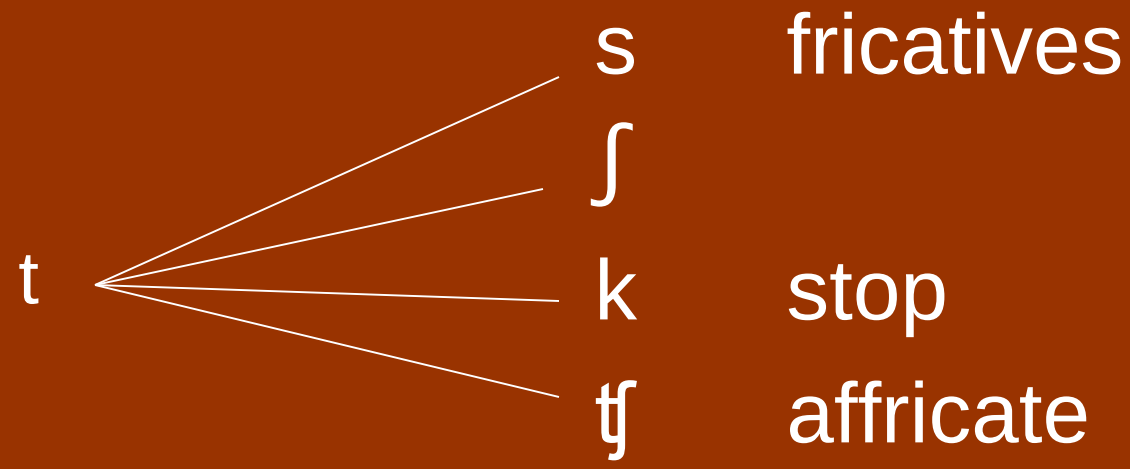
Transcriber: Katharine B.

30

	m	n	ŋ	p	b	t	d	k	g	θ	ð	f	v	s	z	ʃ	ʒ	h	tʃ	dʒ	l	r	w	j
#__ Prevocalic	l	l		m k	g	K	g	l	l	n	g	g	g	g	g	g		l	g	g	w	w	l	w
V__V Intervocalic	l	l	l	l	l	K	V	l	l	ø	V	l	l	K	V	ʔ		l	g		l	w	l	
__# Postvocalic	l	l	l	l	l	ø	l	l	l	ø	l	l	l	ʔ	l	l			ʔ	ø	l	l		
	Nasals			Stops						Fricatives									Affricates		Liquids		Glides	

nasal clusters	/l/ clusters	/r/ clusters	/w/ clusters	/s/ clusters	Phonetic Inventory	P.V.M. Error Patterns
	p/bl w/fl g/gl n/kl m/pl w/sl	b/br g/dr g/fr g/gr g/tr	g/kw w/sw	m/sp		
nt·nd·ndʒ·mp	pl·bl·kl·gl fl·sl	pr·br·tr·dr kr·gr·fr· ʃr·θr	tw dw·kw·gw·sw	sm·sn·sp·st·sk		

Phoneme Collapse



voiceless obstruents

Phoneme Collapse Worksheet

Child: _____ Date: _____

Word-Initial: Phoneme Collapse

CHILD	ADULT		
		p	stops
		b	
		t	
		d	
		k	
		g	
		f	fricatives
		v	
		θ	
		ð	
		s	
		z	
		ʃ	
		tʃ	affricates
		dʒ	
		m	nasals
		n	
		w	glides
		j	
		h	
		l	liquids
		r	
			clusters

Obstruents

Sonorants

CHILD	ADULT		
		p	stops
		b	
		t	
		d	
		k	
		g	
		f	fricatives
		v	
		θ	
		ð	
		s	
		z	
		ʃ	
		tʃ	affricates
		dʒ	
		m	nasals
		n	
		w	glides
		j	
		h	
		l	liquids
		r	
			clusters

Obstruents

Sonorants

Phoneme Collapse Worksheet

Child: Adam

Date: _____

Word-Initial: Phoneme Collapse

CHILD	ADULT		
	p		
b	b		
	t	stops	
	d		
	k		
	g		
	f		Obstruents
	v		
	θ		
	ð	fricatives	
	s		
	z		
	ʃ		
g			
	tʃ	affricates	
	dʒ		
	m	nasals	Sonorants
	n		
	w	glides	
	j		
	h		
	l	liquids	
	r		
		clusters	

CHILD	ADULT		
	p		
	b		
	t	stops	
	d		
	k		
	g		
	f		Obstruents
	v		
	θ		
	ð	fricatives	
	s		
	z		
	ʃ		
	tʃ	affricates	
	dʒ		
	m	nasals	Sonorants
	n		
	w	glides	
	j		
	h		
	l	liquids	
	r		
		clusters	

Phoneme Collapse Worksheet

Child: Adam

Date: 4-09-07

Word-Initial: Phoneme Collapse

CHILD	ADULT			
		p		
	b	b		
		t	stops	
	d	d		
		k		
		g		
	f	f		Obstruents
	v	v		
		θ		
	ð	ð	fricatives	
	s	s		
	z	z		
g	ʃ	ʃ		
	tʃ	tʃ	affricates	
	dʒ	dʒ		
		m	nasals	Sonorants
		n		
		w	glides	
		j		
		h		
		l	liquids	
		r		
	dr		clusters	
	fr	kw		
	gl	st		
	gr	tr		

CHILD	ADULT			
		p		
		b		
		t	stops	
		d		
		k		
		g		
		f		Obstruents
		v		
		θ		
		ð	fricatives	
		s		
		z		
w		ʃ		
		tʃ	affricates	
		dʒ		
		m	nasals	Sonorants
		n		
		w	glides	
	j	j		
		h		
	l	l	liquids	
	r	r		
	fl		clusters	
	sl			
	sw			

Phoneme Collapse Worksheet

Child: Jane Date: 4-09-07

Word-Initial: Phoneme Collapse

CHILD	ADULT		
	p		
	b		
	t	stops	
	d		
k	k		
	g		
f	f		Obstruents
	v		
	θ		
	ð	fricatives	
s	s		
	z		
ʃ	ʃ		
tʃ	tʃ	affricates	
	dʒ		
	m	nasals	
	n		
	w	glides	
	j		Sonorants
	h		
	l	liquids	
	r		
		clusters	

t

CHILD	ADULT		
	p		
	b		
	t	stops	
	d		
	k		
g	g		
	f		Obstruents
	v		
θ	θ		
ð	ð	fricatives	
	s		
z	z		
	ʃ		
	tʃ	affricates	
dʒ	dʒ		
	m	nasals	
	n		
	w	glides	
	j		Sonorants
	h		
	l	liquids	
	r		
		clusters	

d

Phoneme Collapse Worksheet

Child: [redacted] Jane Date: 4-

Word-Initial: Phoneme Collapse

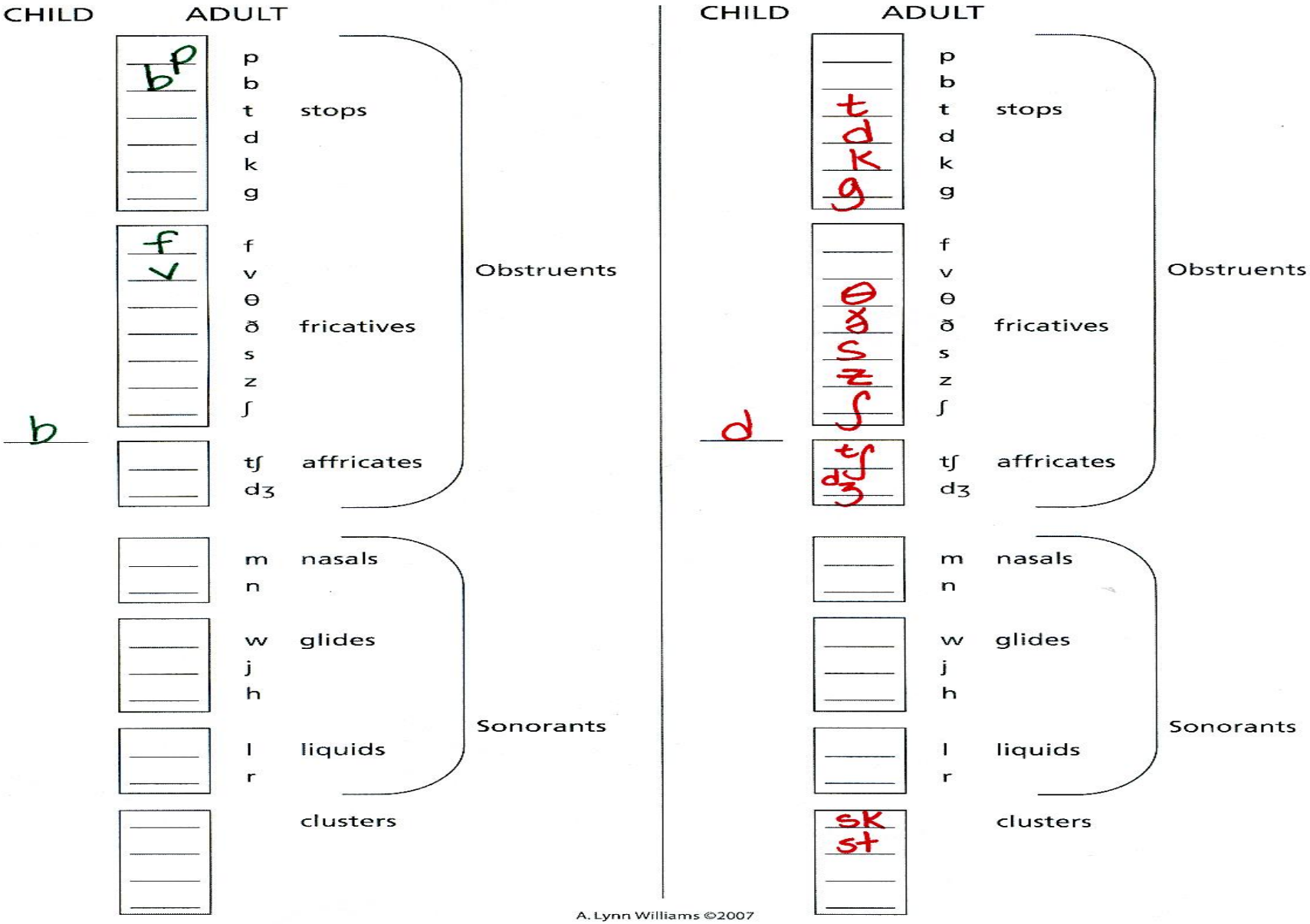
CHILD	ADULT			
		p	stops	Obstruents
		b		
		t		
		d		
		k		
		g		
		f	fricatives	
		v		
		θ		
		ð		
		s		
		z		
w		ʃ		
		tʃ	affricates	
		dʒ		
		m	nasals	Sonorants
		n		
		w	glides	
		j		
		h		
	l	l	liquids	
	r	r		
			clusters	

CHILD	ADULT			
		p	stops	Obstruents
		b		
		t		
		d		
		k		
		g		
		f	fricatives	
		v		
		θ		
		ð		
		s		
		z		
		ʃ		
		tʃ	affricates	
		dʒ		
		m	nasals	Sonorants
		n		
		w	glides	
		j		
		h		
		l	liquids	
		r		
			clusters	

Phoneme Collapse Worksheet

Child: Ivan Date: 4-09-07

Word-Initial: Phoneme Collapse



Phoneme Collapse Worksheet

Child: Ivan Date: 4-09-07

Word-Initial: Phoneme Collapse

CHILD	ADULT			
		p	stops	Obstruents
		b		
		t		
		d		
		k		
		g		
		f	fricatives	
		v		
		θ		
		ð		
		s		
		z		
		ʃ		
w				
		tʃ	affricates	
		dʒ		
		m	nasals	Sonorants
		n		
	w	w	glides	
		j		
		h		
	l	l	liquids	
		r		
	kl		clusters	
	kw			
	gl			
	sw			
	sl			

CHILD	ADULT			
		p	stops	Obstruents
		b		
		t		
		d		
		k		
		g		
		f	fricatives	
		v		
		θ		
		ð		
		s		
		z		
		ʃ		
		tʃ	affricates	
		dʒ		
		m	nasals	Sonorants
		n		
		w	glides	
		j		
		h		
		l	liquids	
		r		
			clusters	

Principles of Assessment

- Did we identify the:
  - System
  - Structure
  - Stability

Target Selection

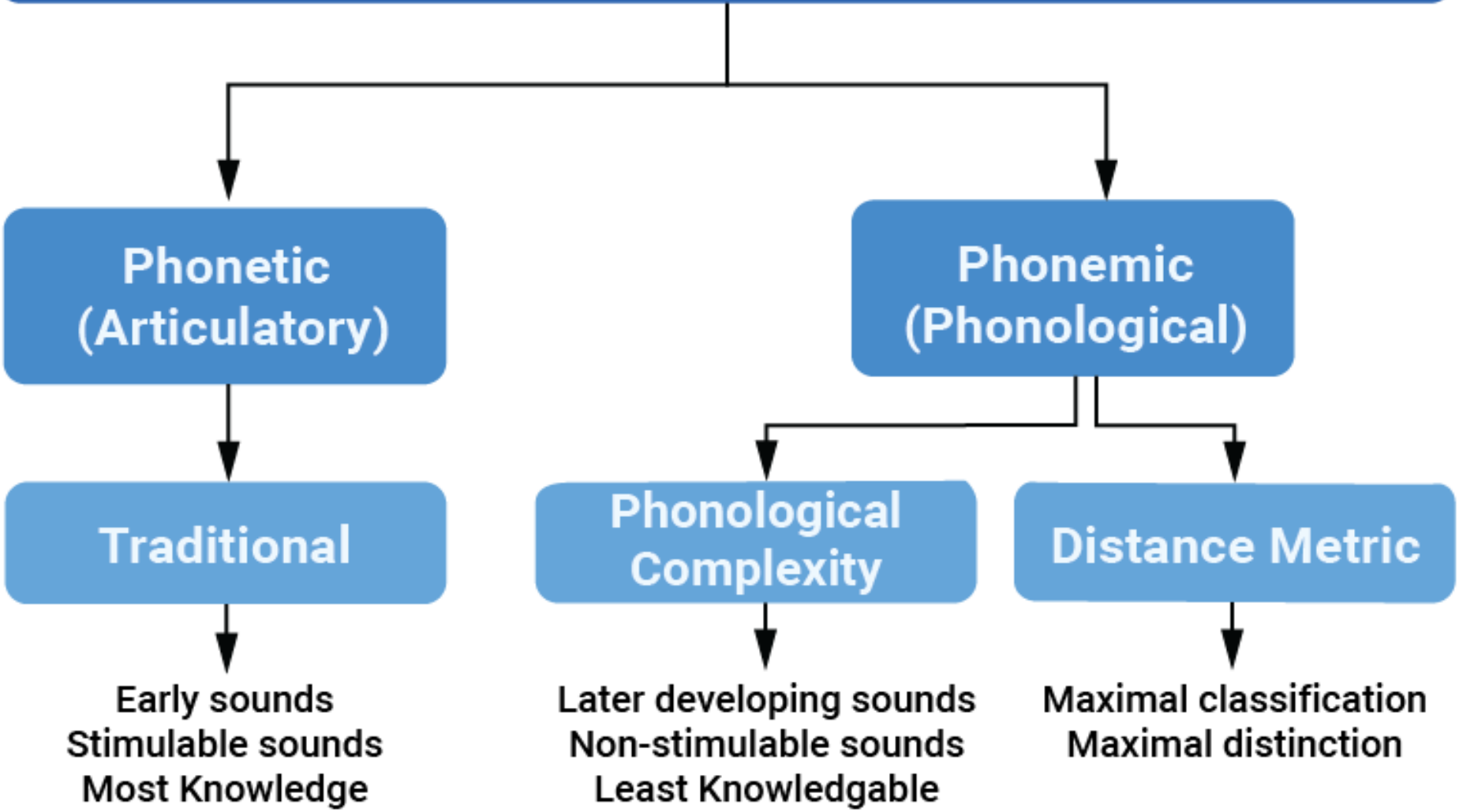
Goals are the driving force behind intervention.

Selecting Targets for Intervention

- Target selection is the *link* between assessment and intervention
- Is an important variable in treatment efficacy
- The therapy goal, rather than the exact treatment approach employed in the therapy session, **may be the instrument of change**

(Gierut, 2005; Kamhi, 2006)

Target Selection Options



Characteristics of the Sound	Characteristics of the Sound	Function of the Sound

Principles of Target Selection

- **System-wide change**
  - Choose later developing, non-stimulable sounds (complexity)
  - Choose sounds that enlarge the frame of learning that needs to be achieved (distance metric)
- **Sound-learning**
  - Choose early developing, stimulable sounds (traditional)

Traditional vs Phonological Approaches to Target Selection

Traditional

- Based on *phonetic (subordinate)* factors
  - developmental norms
  - stimulability
  - consistency of error
- Assumptions
  - motoric basis of sound learning
  - ease of acquisition
  - sequential order of acquisition

Phonological

- Based on *phonemic (superordinate)* factors
  - phonological complexity
  - distance metric (will discuss as third option)
- Assumptions
  - learnability is enhanced with the greatest amount of change occurring in the least amount of time

Influence of Phonological Complexity in Management Decisions

- Shift in traditional methods of target selection
  - Traditionally, select sounds that were assumed to be easier to produce and followed a developmental sequence
  - *Early, stimulable, and inconsistent sounds*
- Currently, new methods of target selection examine the role phonological complexity has on learnability
  - Specifically, select sounds that are more complex (later, non-stimulable, and absent sounds)
  - Shift from “sound learning” to “system shifting”

A Third Option for Target Selection

- The distance metric represents a different perspective to target selection that doesn't rely on the dichotomous characterization of targets as early ~ late; stimulable ~ non-stimulable; known ~ unknown, etc.

A Third Option for Target Selection

- Rather, it is based on the *function* a particular sound has within a given child's system
  - Using phoneme collapses that represent compensatory strategies developed by the child to accommodate a limited phonetic inventory, we can use a distance metric to select those targets that will result in the greatest amount of change in the least amount of time

Distance Metric

Williams (2003, 2005)

- Select up to 4 different target sounds from one rule set based on two parameters:
  - Maximal Distinction:

    select targets that are maximally different from child's error in terms of PVM
  - Maximal Classification:

    select targets from each of the following:

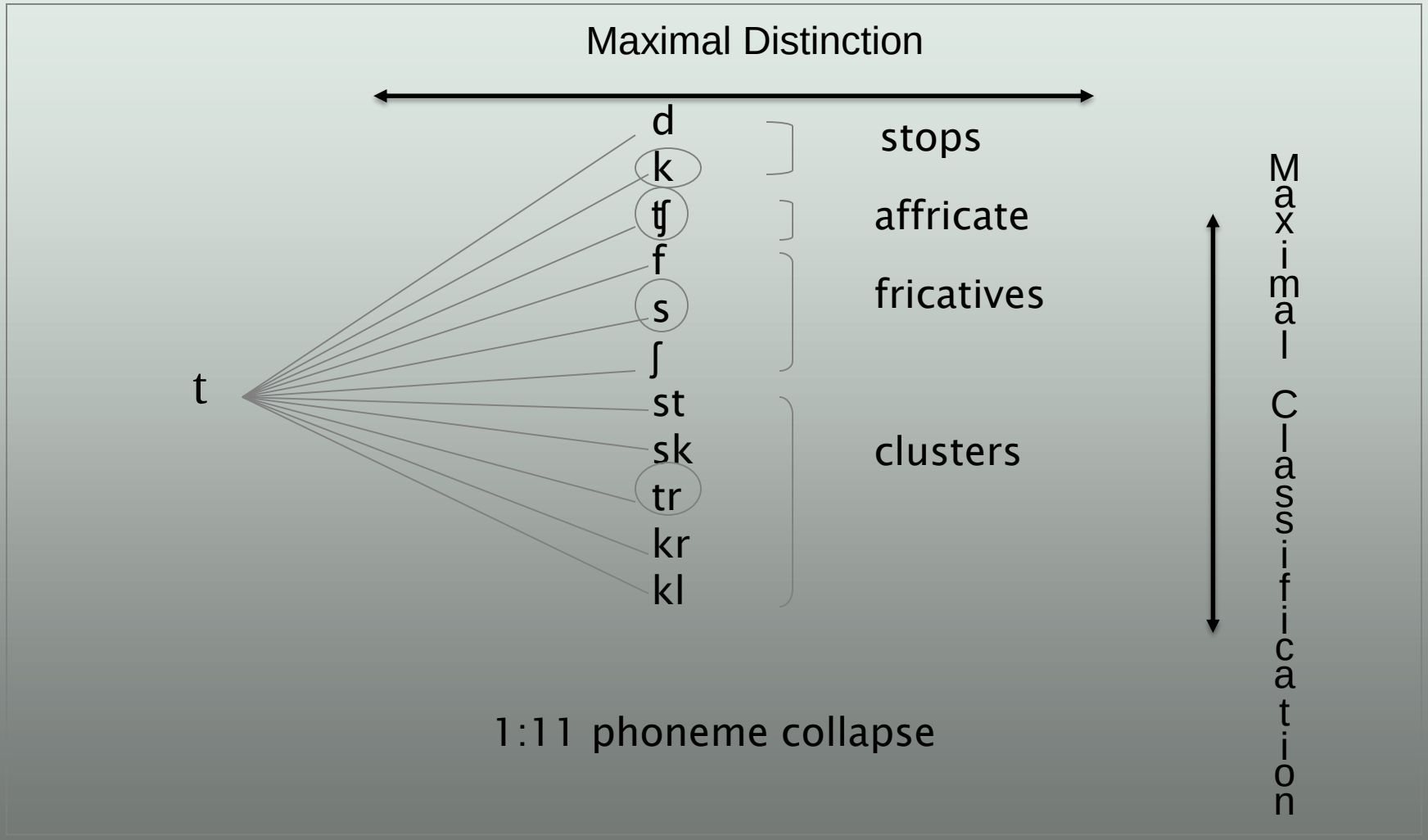
    (a) different manner classes

    (b) different places of production

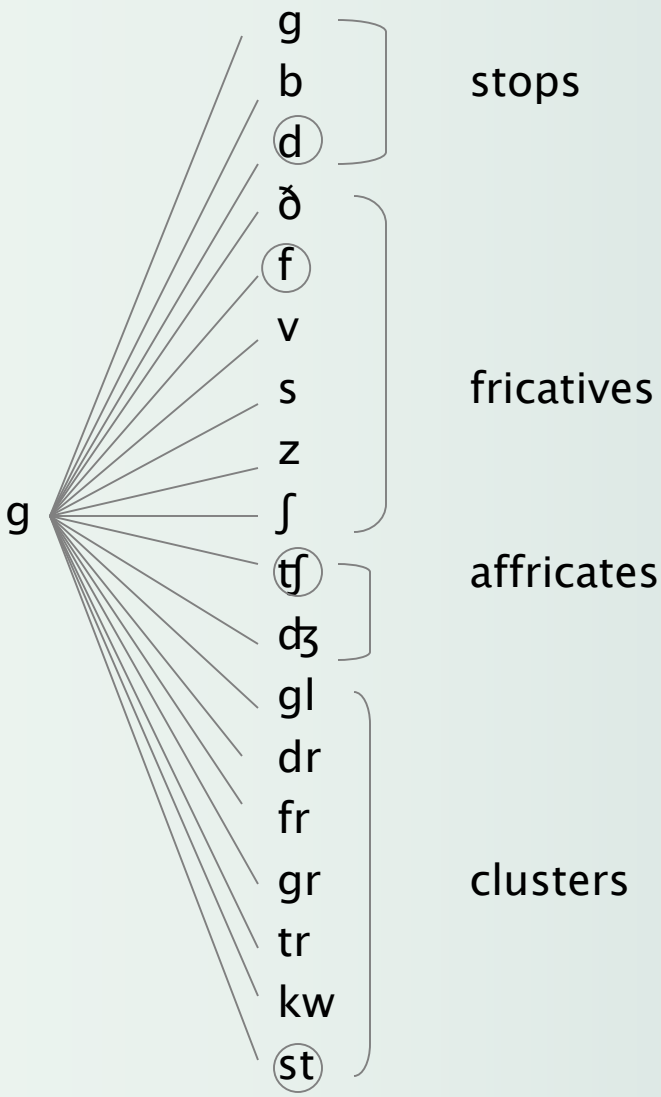
    (c) different voicing

    (d) different linguistic units

Target Selection Using Distance Metric



Targets Selected for Adam

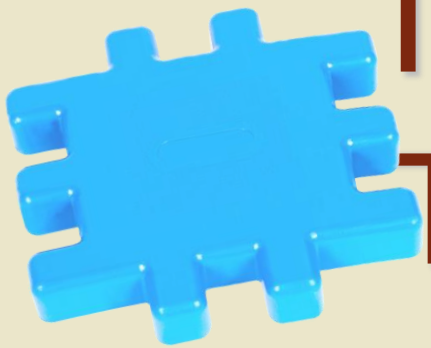


1:18 phoneme collapse

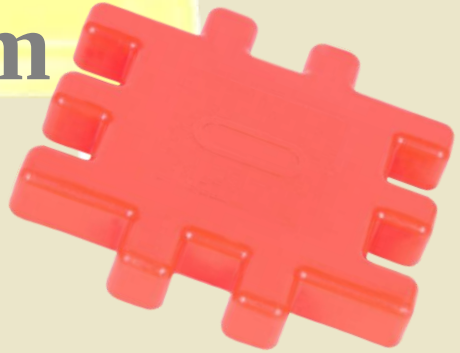
Distance Metric

By selecting targets that are more distinct
from the child's error
(maximal distinction)
and are representative
of the sound classes
collapsed across a phoneme collapse
(maximal classification),
the target sounds are more salient
and therefore predicted
to be more learnable.

Target Selection: The BIG Picture

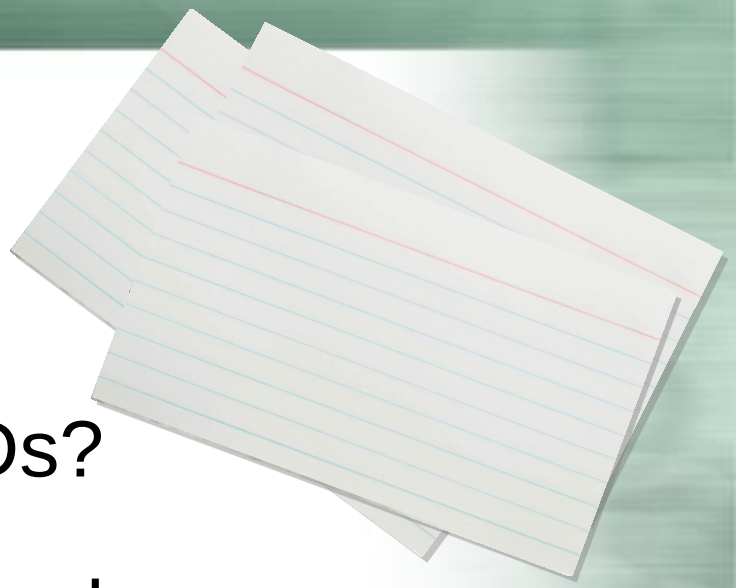


With the distance metric, targets are the salient *"corner puzzle pieces"* that help the child put together the big picture of the adult sound system



Intervention

Considerations: Intervention



- What intervention approaches do you typically implement with children on your caseload who have SSDs?
- What factors do you consider when selecting a treatment approach?
  - Match diagnosis with treatment

Principles of Intervention (Bowen, 2011)

1. Intervention is based on the systemic nature of phonology (order in disorder)
2. Intervention is characterized by conceptual rather than motor activities
3. Intervention has generalization as its ultimate goal, promoting intelligibility

Goal of Intervention

Goal is to align clinical characteristics of SSD to approach that has a strong evidence base that best meets the client's needs.

- Match diagnosis with treatment

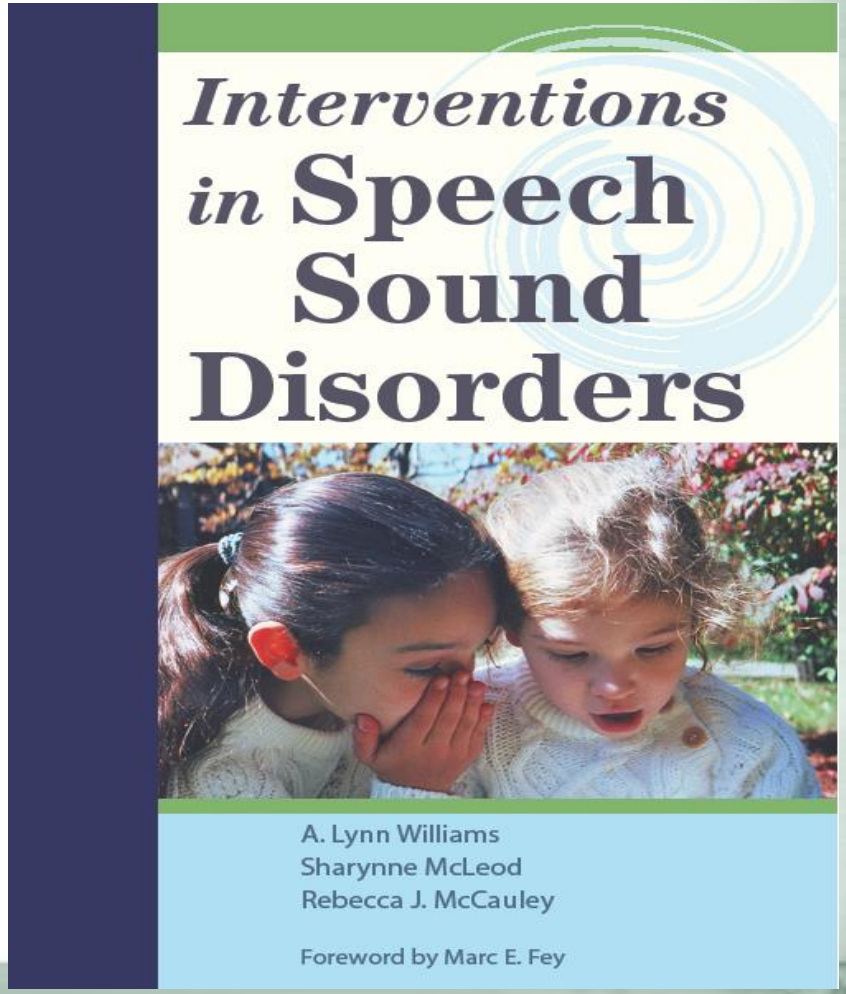
Interventions for Speech Sound Disorders in Children

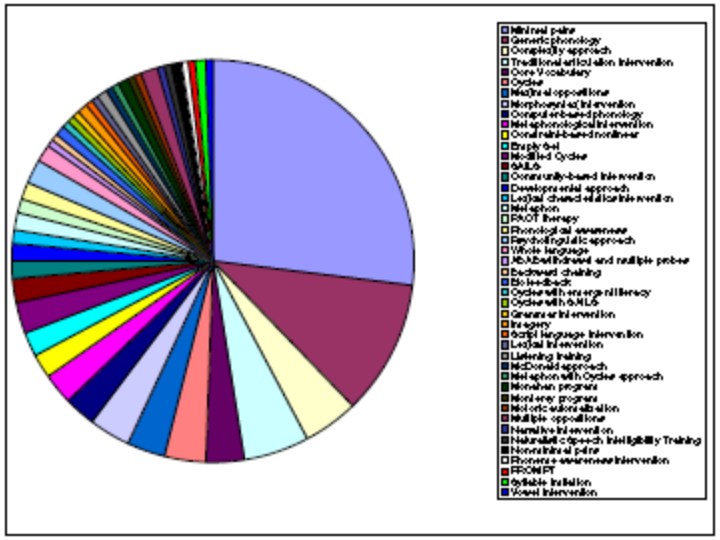
Our Book:

Lynn Williams

Sharynne McLeod

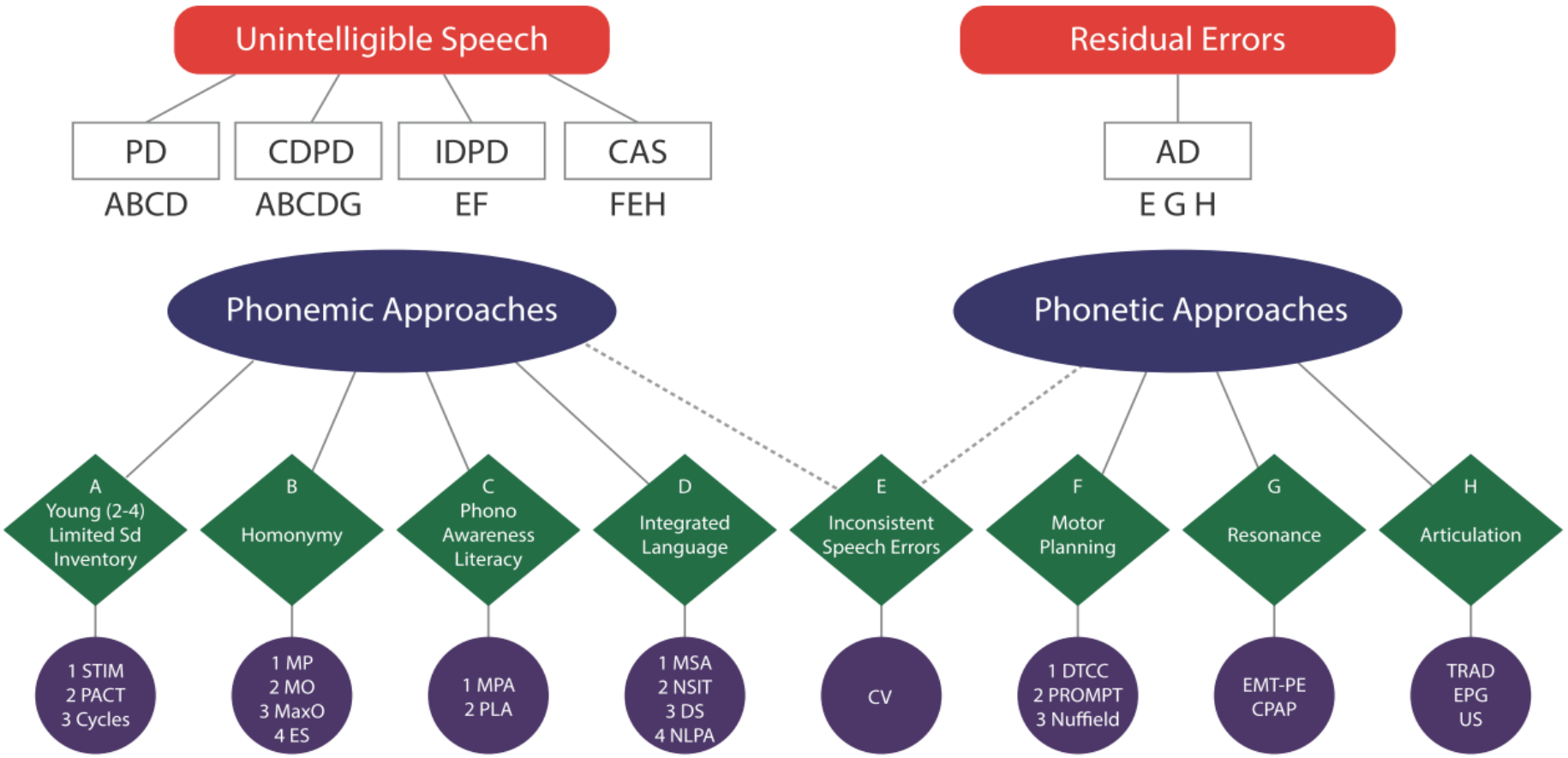
Rebecca McCauley




Minimal pairs
Generative phonology
Complexity approach
Traditional articulation intervention
Core Vocabulary
Cycles
Maximal oppositions
Morphosyntactic intervention
Computer-based phonology
Metaphonological intervention
Oral motor-based nonspeech
Empty set
Modified Cycles
HANDS
Community-based intervention
Developmental approach
Lexical based articulation intervention
Metaphon
PROMPT therapy
Phonological awareness
Psycholinguistic approach
Whole language
ABA with trained and untrained probes
Backward chaining
Biofeedback
Cycles with emergent literacy
Cycles with HANDS
Grammar intervention
Inquiry
Lexical language intervention
Lexical intervention
Listening training
McDonald approach
Metaphon with Cycles approach
Nonsalient program
Nonlinear programs
Holistic oral rehabilitation
Multiple oppositions
Narrative intervention
Naturalistic speech Intelligibility Training
Nonverbal oral
Phonemic awareness intervention
PROMPT
Syllable initiation
Vowel intervention


Which one do you select?

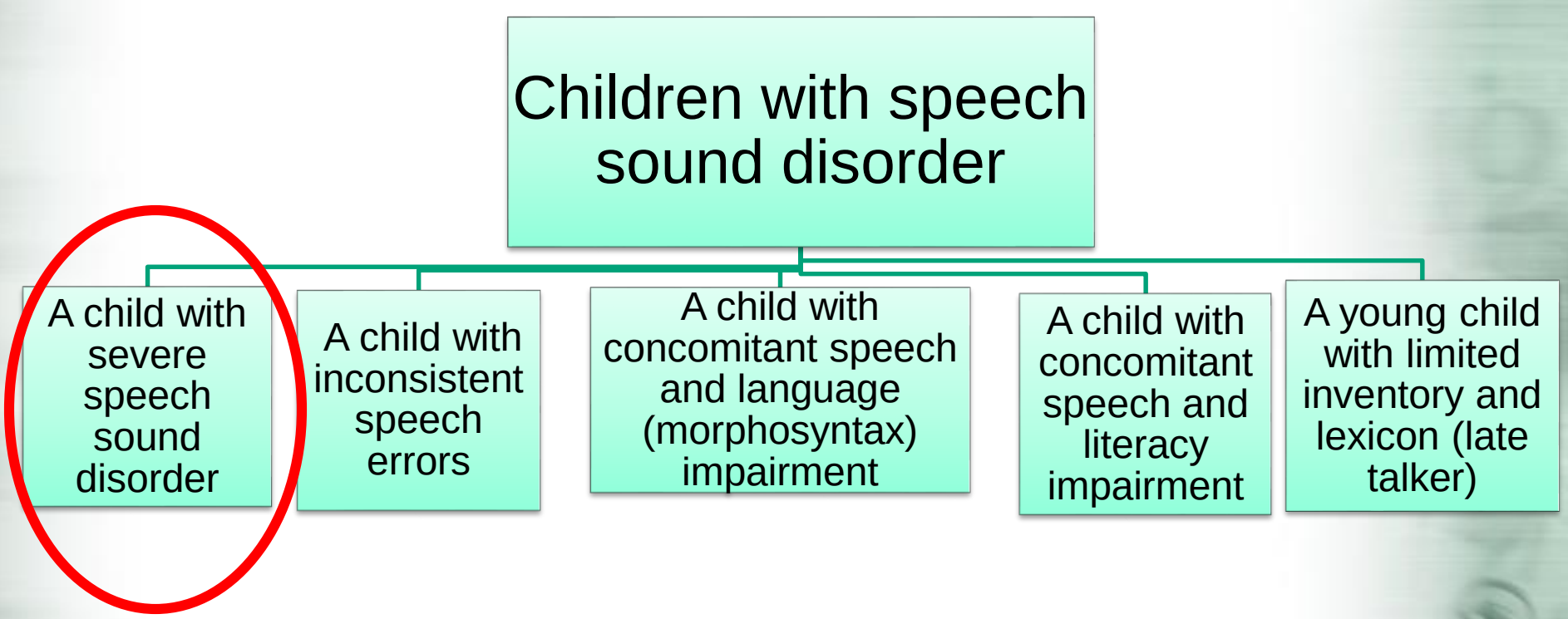
Intervention Options Decision Tree



STIM: Stimulability Treatment
PACT: Parents and Children Together
MP: Minimal Pairs
MO: Multiple Oppositions
MaxO: Maximal Oppositions
ES: Empty Set
MPA: Metaphonological Approach
PLA: Psycholinguistic Approach
MSA: Morphosyntax Approach

NSIT: Naturalistic Speech Intelligibility Training
DS: Dynamic Systems
NLPA: Nonlinear Phonological Approach
DTTC: Dynamic Tactile and Temporal Cueing
EMT-PE: Enhanced Milieu Therapy - Phonology Emphasis
CPAP: Continuous Positive Air Pressure
TRAD: Traditional Articulation (Van Riper)
EPG: Electropalatography
US: Ultrasound

Diversity of SSD



Children with Homonymy: Contrastive Approaches

Approach	Classification	Characteristics	Population
Minimal Pairs	Unintelligible Speech/Homonymy	Contrastive word pairs (error ~ target)	Preschool-school-age children with mild to moderate SSD (common phonological errors)
Multiple Oppositions	Unintelligible Speech/Extensive Homonymy resulting from phoneme collapses	Contrastive word pairs (error~targets)	Preschool-school-age children with moderate to severe SSD
Maximal Oppositions	Unintelligible Speech/Gaps in inventory	Contrastive word pairs (known~unknown)	Preschool-aged children with moderate to severe SSD
Empty Set	Unintelligible Speech/Gaps in inventory	Contrastive word pairs (unknown~unknown)	Preschool-aged children with moderate to severe SSD

Designing Treatment for Adam

Minimal Pairs: contrasts the child's error with the target sound

error ~ target

example: g ~ d / #____

go ~ doe

gate ~ date

gown ~ down

Guy ~ dye

game ~ dame

Notes on MP

- Pace: Model – Response – FB (focused and succinct)
- Keep pairs together – BRANCH steps
- Exaggerated models
- Switch order of presentation -- automaticity

Designing Treatment for Adam

Maximal Oppositions: Contrasts a "known", independent, and maximally different sound with the target sound

correct ~ target

Example: m ~ d / #

moo ~ dew
more ~ door
mate ~ date
May ~ day
me ~ Dee

Designing Treatment for Adam

Empty Set: Contrasts two target sounds that are unknown, independent, and maximally different from each other

Target 1 ~ Target 2

Example: r ~ d / # ____

row ~ doe

ray ~ day

rye ~ dye

ran ~ Dan

ram ~ dam

Notes on MaxO / ES

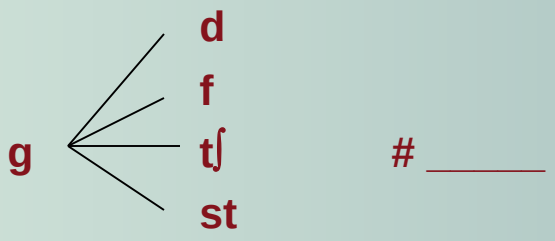
- Shaping/approximation
- 5 word pairs

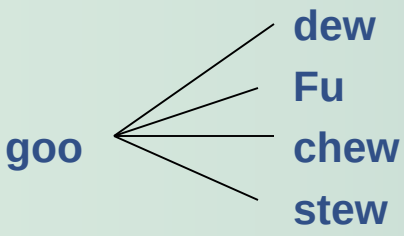
- ES: REMEMBER to give f/b on both targets
- Use set-ups/shadowing/physical prompts
- Add-on sounds

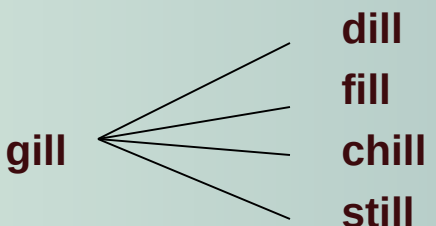
Designing Treatment for Adam

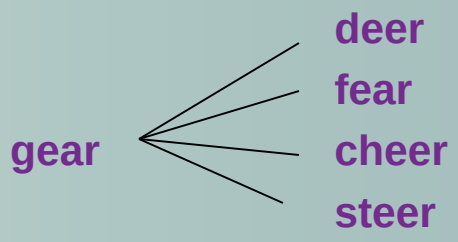
Multiple Oppositions: Contrasts child's error with several target sounds from across an entire rule set.

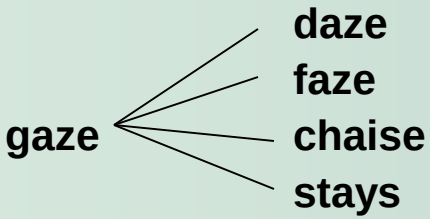
error ~ targets

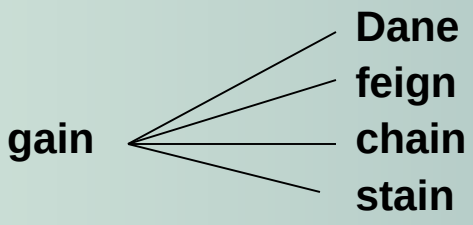












Notes on MO

- Slower models / exaggerated models
- Physical prompts
- Shaping / approximations
- One-to-one contrasts
- VISUAL: imagery important in motor learning
- Seating arrangement

Multiple Oppositions

- **Assumes learning is facilitated by the size and nature of linguistic "chunks" presented to the child *(learning of the whole is greater than the sum of its parts)***
- **Assumes learning is a dynamic interaction between child's unique sound system and intervention**
- **Predicts learning will be generalized across a rule set *(i.e., learning will generalize to obstruents and clusters collapsed to [g] in the 1:17 phoneme collapse)* and result in system-wide restructuring.**

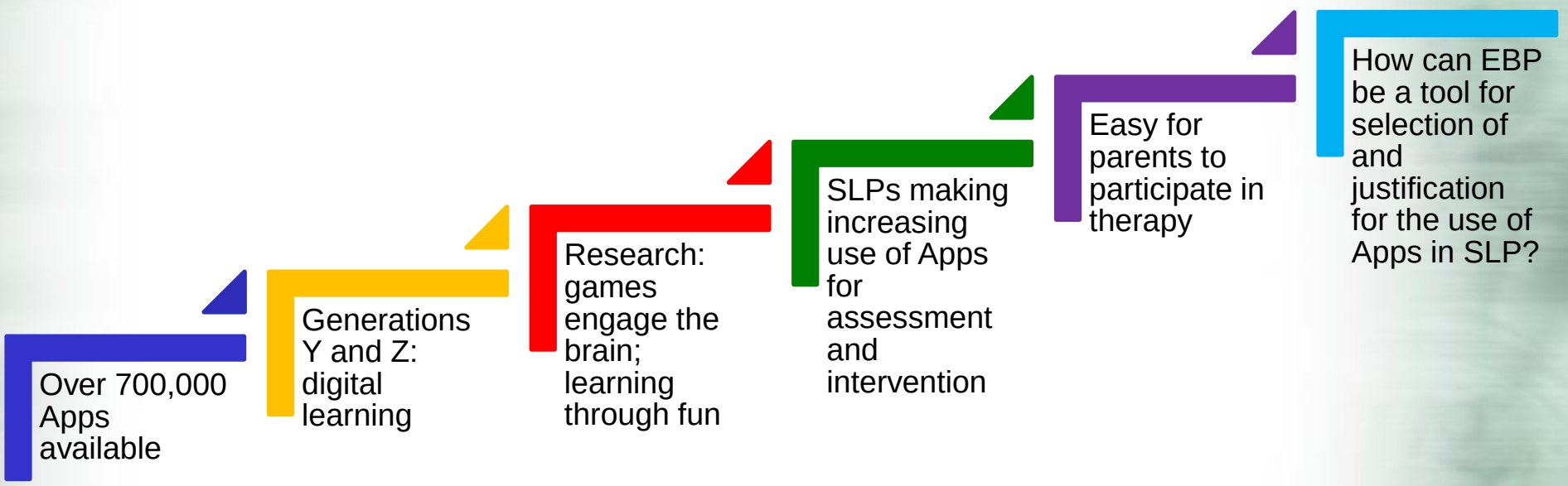
Characteristics/Population for MO

Comparative Factors	Specifications
Age	3;0-6;0
Population	Multiple speech errors and unintelligible speech
Intervention Agents	SLP; supplemental parental support
Key Components	Direct and focused intervention using meaningful words • Some NSW that are given meaning
Broad Goals	Increase speech intelligibility • Reduce homonymy
Target Selection	• Linguistic: distance metric
Level of Focus	• Speech output
Session Type	• Generally individual, but also group (30-45 min 2x/wk)
Technology	• Illustrations; *SCIP ™*

Intervention for Adam: Multiple Oppositions

Concept	Rationale	Specification
Part-Whole Learning	Phonologic learning is facilitated by enlarging the relevant frame of learning defined by a more diverse range of input structures from across a rule set (i.e., phoneme collapse)	2-4 target sounds are selected from a phoneme collapse and contrasted in larger contrastive word sets (i.e., multiple oppositions) with the child's error substitute.
Systemic (Re)Organization	1. Compensatory Strategies: phoneme collapses are viewed as compensatory strategies developed by child to accommodate adult sound system with limited child system. 2. Phonetic Resemblance: the collapses reflect child's attempt to "match" his/her limited system to adult system along a particular phonetic dimension.	• Intervention is directed at phonological reorganization through manipulation of the child's phoneme collapses. • The phoneme collapses become a "means to an end" in achieving phonological reorganization. • Targets are selected from across the phoneme collapse using a Distance Metric to create the greatest amount of change in the least amount of time.
Child-Based Approach	Intervention is directed to child's phonologic strategies rather than to an a priori set of rules or processes, which will result in more efficient phonological change.	• Intervention is based on reduction/elimination of phoneme collapses • RESTRUCTURE sound system based on new and diverse set of linguistic input ("chunks") presented to child.

EBP and Apps


Over 700,000 Apps available
Generations Y and Z: digital learning
Research: games engage the brain; learning through fun
SLPs making increasing use of Apps for assessment and intervention
Easy for parents to participate in therapy
How can EBP be a tool for selection of and justification for the use of Apps in SLP?

- Wakefield & Schaber (2012) APP-titude: Use the Evidence to choose a Treatment App. *ASHA Leader, July 31.*
- Edwards & Dukhovny (2017). Technology training in speech-language pathology: A focus on tablets and apps. *SIG 10, 2(1),* 33-48.

EBP model provides strategies for selecting Apps.

How SLPs Select Apps

- Suggestions by other SLPs
- App Reviews by bloggers, lists, twitter, App store reviews, colleagues and parents' opinions
- Descriptions by developers
- Trial and error

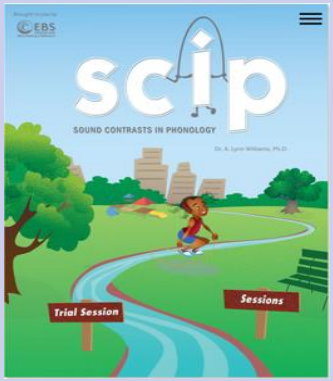
Schaber & Wakefield (2012)

What SLPs Want

- Single robust resource
- Comprehensive
- Critically examined
- Minimize biases

Schaber & Wakefield (2012)

Phonology Apps

Minimal Pairs Academy	Minimal Pairs for Speech	SCIP	SLP Minimal Pairs
			

Williams, 2017

Williams (2017): Critical APPraisal

Rating Chart for Speech/Language/Education Apps

	MP Academy	MP for Speech	SCIP	SLP MP Full
General Info	4.1	4.7	4.9	3.6
Features	5.8	3.7	6.0	5.3
App Design	3.2	2.4	2.9	2.3
Speech/Language Use	2.7	2.7	3.3	2.6
AVERAGE	15.8	13.5	17.1	13.8
Star Rating	4	4	5	4

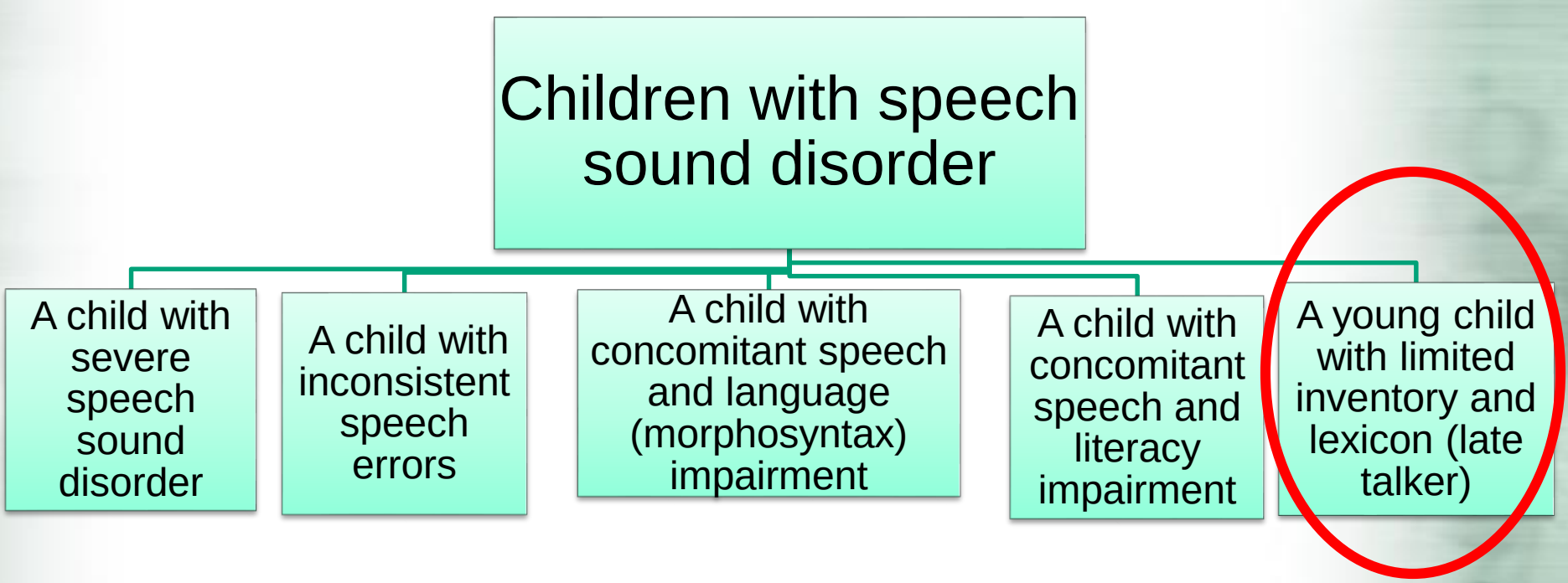
Evaluation Rubric for iPad Apps

	MP Academy	MP for Speech	SCIP	SLP MP Full
Curriculum connection	7	7	7	7
Authenticity	6	7	7	6
Feedback	6	4	6	4
Differentiation	7	5	7	6
User friendliness	6	5	5	4
Student motivation	7	6	6	5
Reporting	7	4	7	7
Sound	6	7	4	6
Instructions	7	5	6	5
Support	7	5	7	5
AVERAGE	6.6	5.5	6.2	5.5

Unique features of app-based interventions (ABI)

- apps = ‘tool’ not a ‘type of intervention’
- Assists in *delivery* of intervention
- Consistent and controlled presentation of stimuli
- Reliable recording of performance
- Supports attention
- Can deliver a range of types of interventions
- Can be customized to child’s specific needs

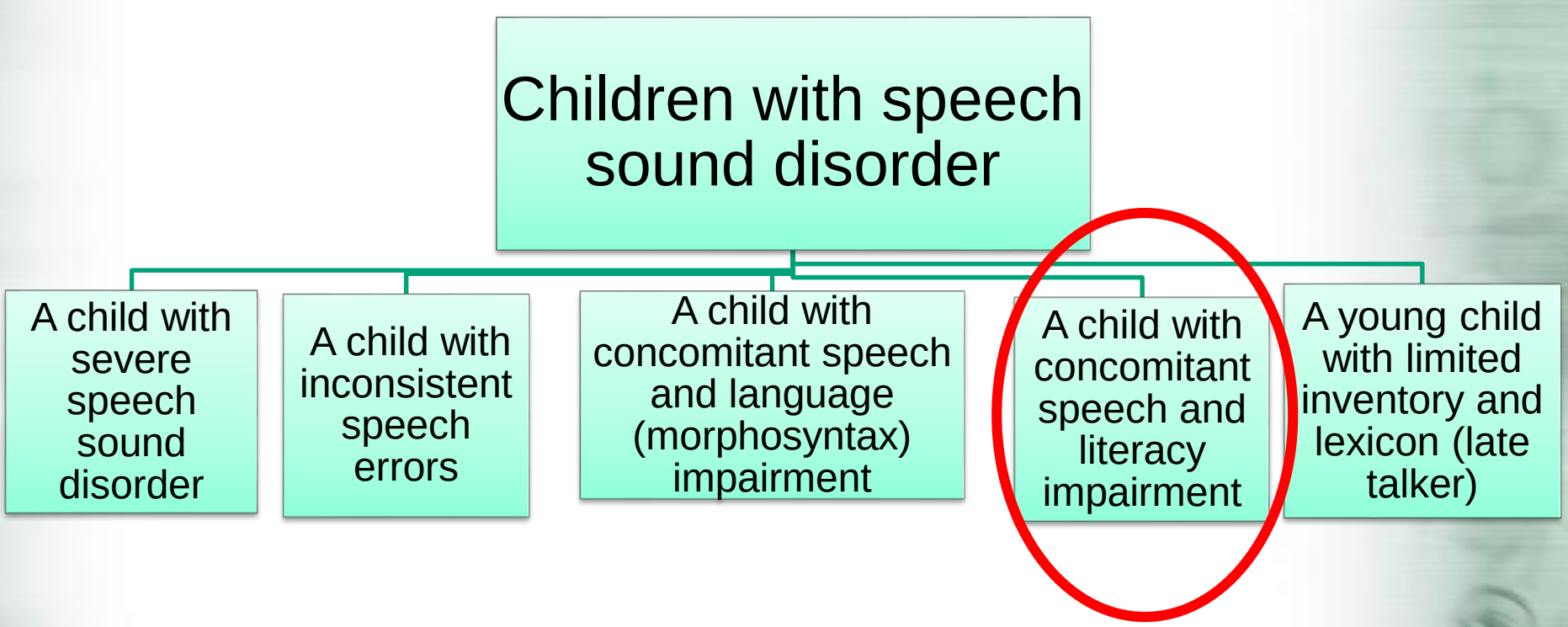
Diversity of SSD



Intervention Approaches for Young Children: Limited Sound Inventory

Approach	Classification	Characteristics	Population
Stimulability Approach	Limited Sound System	Increase inventory by making sound stimulable	Young children (2-4 years) with limited sound inventory
EMT-PE	Limited Sound System	Increase vocabulary and speech sound production using phonological recasting	Young children (18 mo-3 years) with limited sound inventory; cleft palate
PACT	Unintelligible Speech	Parent/family education; metalinguistic training; contrastive intervention	Preschool-aged children with moderate to severe SSD
Cycles	Unintelligible Speech	Address several goals in cyclical manner	Young children with limited sound inventory

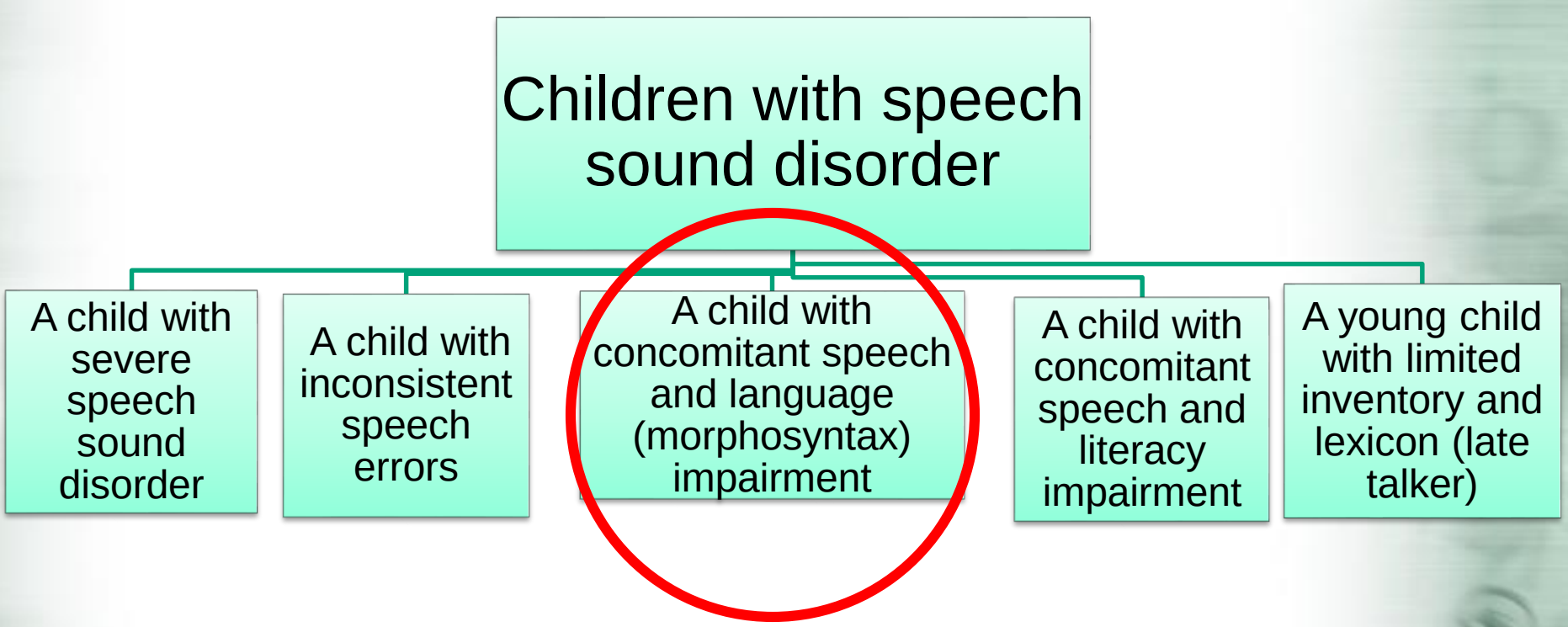
Diversity of SSD



Approaches Addressing Phonological Awareness/Literacy

Approach	Classification	Characteristics	Population
Metaphonological Approach	Speech and phonological awareness difficulties	Includes phonological awareness activities in addition to production activities	Preschool-aged children with moderate to severe SSD and phonological awareness weaknesses
Psycholinguistic Approach	Speech and literacy difficulties	Processing model: Input-Representations-Output	Preschool and School-aged children with moderate to severe SSD and literacy difficulties

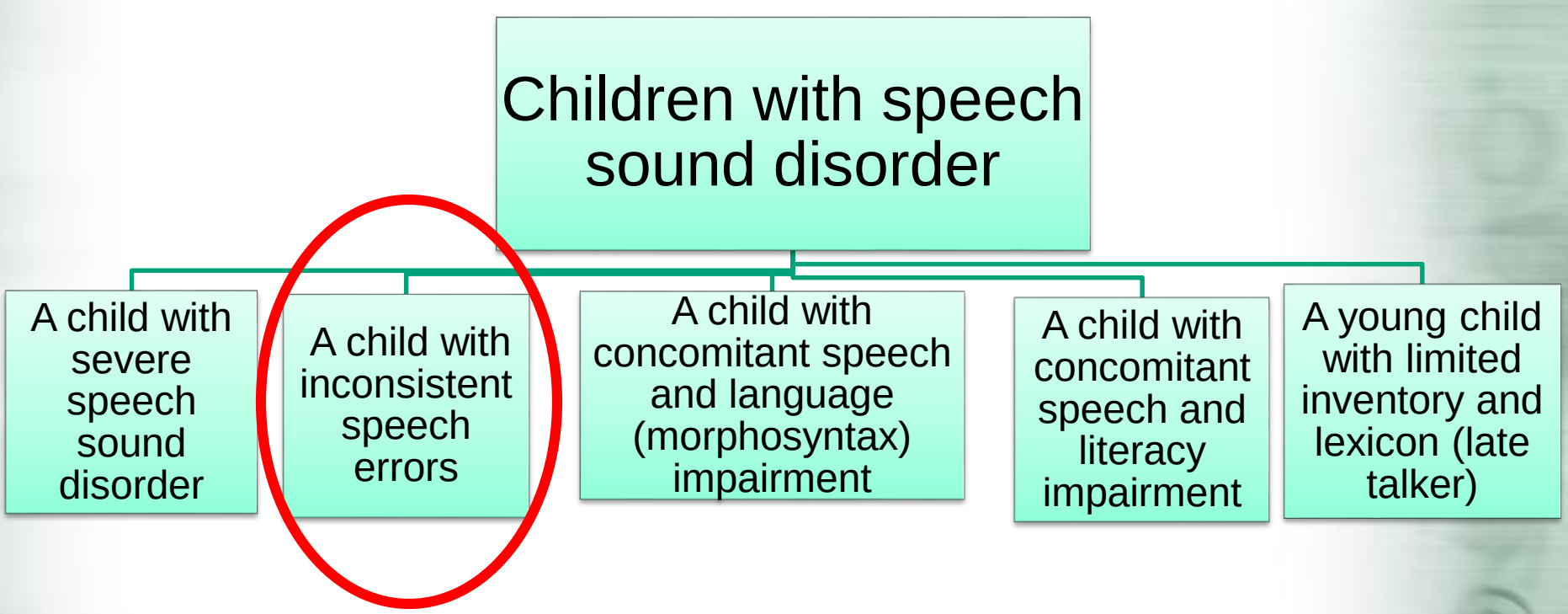
Diversity of SSD



Integrated Intervention Approaches: Language and Phonology

Approach	Classification	Characteristics	Population
Morphosyntax Approach	Phonological and morphological difficulties	Cycles that target speech sounds and grammatical morphemes	Preschool children with mild to moderate SSD and morphological errors
Naturalistic Speech Intelligibility Training	Phonological and language impairments	Recasts of child productions during naturalistic activities	Preschool children with moderate SSD and language; also secondary populations of Down syndrome, ASD
Dynamic Systems (Whole Language)	Phonological and language impairments	Addresses discourse structure, semantic, syntactic, morphological, and letter-sound knowledge	Preschool children with concomitant speech and language impairment
Non-linear Phonological Approach	Phonological impairment	Addresses speech within syllable and phrase level	Preschool children with mild to moderate SSD

Diversity of SSD



Motor Planning Approaches

Approach	Classification	Characteristics	Population
Core Vocabulary	Inconsistent speech errors; CAS	Consistent production of 50-70 functionally powerful words; sound-by-sound and syllable-by-syllable dense response drill	Preschool children with moderate to severe SSD
Dynamic Tactile and Temporal Cueing	Unintelligible speech; CAS	Addresses motor planning and programming	Preschool children with moderate to severe CAS
PROMPT	SSD; CAS	Addresses motor phonemes via auditory-tactual input	Preschool to school-age children with moderate to severe SSD; CAS; Dysarthria
Nuffield Centre Dyspraxia Programme	Unintelligible speech; CAS	Focuses on bulding speech processing skills from bottom up through establishment of motor programs for single sounds in isolation and increasing phonotactic complexity	Preschool to school-age children children with moderate to severe SSD; CAS
Developmental Dysarthria Intervention	Unintelligible speech: dysarthria	Bite block use followed by phonemic practice; voice intervention; EMG	Preschool to school-age children children with moderate to severe SSD and dysarthria

Wrap Up: Intervention

- What is the time investment for the SLP?
- What are the benefits for the client?
- Is one approach best?

Let's Revolutionize Therapy!

- Hodson (1998) indicated that only about 10% of SLPs were incorporating phonological principles in their practice
- We can bridge the gap between research and practice with access to newer models of intervention
- And … decrease the time that children are on our caseloads

Sound Evidence:

Updates in Treating Speech Sound Disorders in Children

A. Lynn Williams, Ph.D.
Associate Dean and Professor
East Tennessee State University
williamL@etsu.edu