

# The Changing Picture of Childhood Apraxia of Speech

Diane Garcia, M.S., CCC-SLP  
University of Redlands  
Jacqueline Bauman-Waengler, Ph.D., CCC-SLP  
Pleasant Valley School District

## Method & Purpose

This case study documents changes in diagnostic hypotheses, observable characteristics, standardized test results, and therapeutic modifications over the course of treatment.

This case study highlights:

- The need to consider alternative diagnostic hypotheses over time
- The relationship between diagnostic hypotheses and therapeutic approaches
- The limitations of standardized assessments as progress-monitoring tools
- The importance of parent input into clinical decision making throughout the therapeutic process

## Introduction to the Case Study

- Matthew, age 3;1 was evaluated at a university clinic
- He was referred by parents due to poor speech intelligibility
- Positive family history of speech difficulties (father and paternal uncle)
- No relevant health concerns; hearing and vision normal
- Developmentally typical, with the exception of speech
- First words at 9 to 10 months; combined words at 18 months
- Verbalizations difficult to understand from beginning word attempts

## Initial Evaluation Results

Test	Score	Standard Score	Percentile Rank/ Percentage
GF: 2	Error Score = 60	68	5
HAPP-3	Total Occurrence of Major Phonological Deviations = 131	Ability Score = <55	<1= Severe
ROWPVT	Raw Score = 34	96	39
Speech Sample	6/25 completely intelligible responses		24% completely intelligible responses

## Initial Hypothesis: Childhood Apraxia of Speech (CAS)

Characteristics of CAS demonstrated by Matthew

- \* Oral apraxia
- \* Minimal intelligibility
- \* Frequent assimilation errors
- \* Vowel substitutions
- \* Epenthesis
- \* Inconsistent productions
- \* Severely limited consonant inventory
- \* Difficulty imitating speech sounds with no oral motor weakness

- \* Frequency of errors increased in longer words
  - \* Occasional initial consonant deletion
- (Caruso & Strand, 1999; Flahive, Velleman, & Hodson, 2005; Smit, 2004)

## Phase 1 of Intervention

### Hodson & Paden's Cycles Approach

Overview of Cycles Therapy Session (Hodson & Paden, 1991)

1. Review	Child reviews previous session's word cards.
2. Auditory Bombardment	Amplified stimulation for 1-2 minutes of clinician reading approximately 12 words with target sound.
3. Target Word Cards	Three to five target word cards are prepared. Client repeats words modeled by the clinician.
4. Production Practice	Games are used as the clinician and child take turns naming the pictures. Clinician provides models and/or tactile cues so that the child achieves 100% success on target patterns.
5. Stimulability Probes	Child's stimulability is assessed for potential targets for the next session. Child should be able to accurately model selected words.
6. Auditory Bombardment	Step 2 is repeated.
7. Home Program	Parent or school aide participates in a two minute per day home program. Words are read from the week's auditory bombardment (Step 2) and the child names word cards from Step 3.

Targets for Cycles Approach with Matthew

PATTERN	EXEMPLAR
Initial glide deficiency	Initial /w/
Initial nasal deficiency	Initial /m/
Final consonant deletion	Final /p/
Final consonant deletion	Final /t/
Final consonant deletion and anterior-posterior contrasts	Final /k/
Anterior-posterior contrasts	Initial /k/
s-clusters	Initial /sn/
s-clusters	Initial /st/
Liquids	Initial /l/

### Recommended modifications for CAS

1. Integral Stimulation
  - Continuum of temporal relationships between stimulus & response
  - Simultaneous production; Immediate repetition; Delayed repetition
  - Hierarchy of cues; faded systematically
2. Conditions of Practice
  - Mass practice (many repetitions of a few targets) initially
  - Move to distributed practice (repetitions of more targets)
3. Rate of Production
  - Slow rate initially; rate slowly increased
4. Attention to Phonetic Complexity

Targets with simple word shapes initially (e.g. CV)

Consideration of co-articulatory effects

5. Increase number of sessions per target

3 hours per target, rather than 1-2 hours

6. Use of multi-modality cueing

Visual, auditory, tactile, and kinesthetic cues

(ASHA, 2007b; Bauman-Waengler, 2008; Flahive, Velleman, & Hodson, 2005; Gildersleeve-Neumann, 2007; Hodson and Paden, 1991; Smit, 2004; Strand & Skinner, 1999)

## **Progress after Phase 1**

HAPP-3: Decrease of TOMPD from 131 to 95

Decrease from “severe” to “moderate”

Phonemic Inventory: Increase in /s/ blends, initial & final

Increase in /k/, final

Increase in /w/ and /j/, initial

Continued Concerns:

Parents concerned regarding slow progress

Speech highly unintelligible to unfamiliar listeners

Strong preference for alveolar sounds, particularly /d/

## **Modified Hypothesis**

### **Diminishing Evidence for Childhood Apraxia of Speech**

Initial consonant deletion and epenthesis no longer were present

Vowel errors restricted to rhotic vowels

Improvement of imitation skills in both non-speech and speech contexts

Expansion of phonemic inventory to include most age-appropriate phonemes utilizing imitation

Did not demonstrate the three characteristics identified by ASHA (2007b):

1. Inconsistency of errors
2. Difficulty transitioning between sounds and syllables
3. Prosodic difficulties

### **New Hypothesis: Phonological Disorder**

Inability to utilize the contrastive features of sounds to create meaning

Production of frequent homonyms that do not exist in adult lexicon

Example: “do” for “two,” “shoe,” “flu,” and “stew”

## **Phase 2 of Intervention**

### **Multiple Oppositions Approach**

Emphasizes the linguistic function of sounds

Reduces homonymy by increasing phonemic contrasts

Facilitates phonological reorganization and generalization to untreated phonemes

Step 1: Identification of phonemic collapses within child’s productions

Step 2: Selection of target phonemes that represent maximal distinctions (& major class differences)

Initial targets: /p/, /k/, /st/, "sh"

Expanded list of targets: /p/, /w/, /g/, /s/, /l/, "sh" & /s/ blends (e.g., /st/, /sk/)

Step 3: Creation of families of words produced as homonyms, containing target phonemes (Williams, 2000; Williams, 2005)

CV & CCV families:

day    pay    way    say    lay    stay  
die    pie    why    lie    shy    sky  
doe    go    low    sew    show    snow

CVC & CCVC families:

date    wait    late    gate    skate

## Progress after Phase 2

HAPP-3	TOMPD	Severity	CCDS	Ability Score	Percentile
Initial CA: 3-2	131	Severe	87	<55	<1
Phase 1 CA: 3-6	118	Severe	81	<55	<1
Phase 1 CA: 4-0	95	Moderate	64	<55	<1
Phase 2 CA: 4-5	84	Moderate	56	<55	<1

GF-2	Error Score	Standard Score	Percentile
Initial CA: 3-2	60	68	5
Phase 1 CA: 3-6	58	58	4
Phase 1 CA: 4-0	53	64	4
Phase 2 CA: 4-6	48	65	5

## Limitations of Standardized Assessments

Vowel errors not measured by HAPP-3 or GF-2

Voicing errors not measured by HAPP-3

Increase in substitution errors, with corresponding decrease in omission errors not reflected by GF-2 scores (e.g. "tup" for "cup," replaces "up" for "cup", for example)

Did not reflect parents' perception of progress

Note intelligibility percentages in table below

Speech Samples	Completely Intelligible	Partially Intelligible	Unintelligible	Completely or Partially Intelligible
Initial CA: 3-2	24%	24%	52%	48%
Phase 1 CA: 3-6	48%	24%	28%	72%
Phase 1 CA: 4-0	44%	36%	20%	80%
Phase 2 CA: 4-6	64%	36%	0%	100%

## Conclusions

Phase 2 of treatment resulted in faster progress than Phase 1. Change of intervention program based upon change of diagnosis was probably a factor. Informal, subjective measurement (through speech intelligibility samples) appeared to be a more valid measurement of progress than standardized assessments.

## References

- American Speech-Language-Hearing Association (2007a). *Childhood apraxia of speech: Position Statement*. Retrieved April, 2007 from <http://asha.org>.
- American Speech-Language-Hearing Association (2007b). *Childhood apraxia of speech: Technical Report*. Retrieved January 5, 2008 from <http://asha.org>.
- Bauman-Waengler, J. (2008). *Articulatory and phonological impairments: A clinical focus* (3<sup>rd</sup> ed.). Boston: Allyn & Bacon.
- Caruso, A. & Strand, E. (1999). Motor speech disorders in children: Definitions, background, and a theoretical framework. In Caruso, A. & Strand, E. (Eds.) *Clinical management of motor speech disorders in children* (pp. 1-28). New York: Thieme.
- Flahive, L., Velleman, S. & Hodson, B. (November, 2005). *Apraxia AND Phonology*. Seminar. American Speech-Language-Hearing Association. San Diego, CA.
- Gildersleeve-Neumann (2007, Nov. 6). Treatment for childhood apraxia of speech: A description of integral stimulation and motor learning. *The ASHA Leader*, 12 (15), 10-13, 30.
- Goldman, R., & Fristoe, M. (2000). *Goldman-Fristoe test of articulation* (2<sup>nd</sup> ed.). Circle Pines, MN: American Guidance Service.
- Hodson, B. (2004). Hodson assessment of phonological patterns (HAPP-3). Greenville, SC: Super Duper.
- Hodson, B. & Paden, E. (1991). *Targeting intelligible speech: A phonological approach to remediation*. San Diego: College-Hill Press.
- Smit, A. (2004). *Articulation and phonology resource guide for school-age children and adults*. New York: Thomson Delmar Learning.
- Strand, E. & Skinder, A. (1999). Treatment of developmental apraxia of speech: Integral stimulation methods. In Caruso, A. & Strand, E. (Eds.), *Clinical management of motor speech disorders in children* (pp. 109-147). New York: Thieme.
- Williams, A. (2000). Multiple oppositions: Theoretical foundations for an alternative contrastive intervention approach. *American Journal of Speech-Language Pathology*, 9, 282-288.
- Williams, A. (2005). From developmental norms to distance metrics: Past, present, and future directions for target selection practices. In Kamhi, A. & Pollock, K. (Eds.) *Phonological Disorders in Children: Clinical Decision Making in Assessment and Intervention*. Baltimore: Brookes.

## Acknowledgements

The authors would like to acknowledge all those who contributed to Matthew's therapy, including his parents, his clinicians (Nancy Alyssa McFall, Larissa Lapine, Gina Tashjian, Lisa Iland, and Nicole Clark), and his other clinical supervisor, Cynthia Wineinger. This project was reviewed and accepted by the IRB board at the University of Redlands, IRB # 21-06.