

1. Is Syllable Structure Level a meaningful statistic for this sample? Why or why not?

SSL is meaningful. There are no words in the sample whose target forms are at Level 1 and only 2 words at Level 2 (shoe and yoyo). However, Harry has a total of 15 forms at these levels, showing that he is simplifying syllable structures to some extent. As his syllable structures mature, that maturation will be reflected by an increase in the size of his SSL.

2. How does Harry compare in his phoneme mastery to other American boys his age (36 months)?

Applying the standard criteria for mastery (2 occurrences and 90% accuracy in initial and, if relevant, final positions), Harry shows mastery of the nasal /m/ and mastery in initial position of the stops /b,k,g/, the nasal /n/, the glide /w/, and the simple cluster /mj/. The only phoneme mastered in final position is the stop /t/. His American peers show a similar level of mastery overall, though position varies, Harry showing more mastery in initial position and his peers in final. The greatest difference between Harry and his peers is that Harry shows no mastery of glottal /h/. Indeed, the omission of /h/ targets is one of Harry's idiosyncratic error patterns.

3. What, if anything, do the vowel and consonant inventories indicate about possible motor constraints operating on Harry's phonology?

Other than a lack of rhotic vowels, the vowel inventory shows no motor constraints. All vowel monophthongs appear (except *ʊ*, which was never a target in the sample) as well as the phonemic diphthongs. Other nonphonemic diphthongs (*ao*, *εou*, *εə*) are formed as a result of liquid deletion/vocalization. The consonant inventory shows:

- ◆ Only a single fricative, /f/ in final position. The oral-motor skill to control airflow for fricatives seems to be just emerging and not yet with lingual sounds.
- ◆ Although fricatives are lacking, Harry produces both affricates and the stop-fricative cluster /ts/ in final position. Thus, there is some evidence that he can generate turbulent airflow with his tongue in an arresting/postvocalic gesture.
- ◆ No liquids in any position. Harry has not yet figured out the relatively complex gestures required for these sounds.
- ◆ Consonant sequences are mostly homorganic (/mp/, /ts/) and are all comprised of stops, nasals, and glides.

4. Is there any evidence of metrical constraints in the target analyses for word shapes and syllable stress?

In two of the four words of more than two syllables (music box, television) Harry deletes a word-medial weak syllable. Though the sample is small, this suggests a metrical constraint in the production of weak syllables that precede strong ones.

5. Are the vowel errors in the sample significant? Do they represent lack of vowel mastery or are they attributable to something else?

Harry derhotacizes all rhotic vowel targets in both weak and strong syllables. Most of his other vowels "errors" are due to changes in syllable structure (syllable deletion, liquid deletion) or could be viewed as normal variations ($\text{æ} \rightarrow \text{ε}$). The only errors that may be significant involve diphthongs either as targets or as replacements for monophthong targets.

6. How do you interpret the PCC analysis? Does it show a developmental pattern? Does it show particular strength or weakness in certain phonetic classes?

Overall, Harry's PCC is extremely low (26.5%) and thus corresponds to a severity rating of Severe. There is a clear developmental pattern to Harry's consonant errors: his PCC declines systematically from the early mastered phonemes to the later mastered ones. He has no correct

productions within the fricative, affricate, and liquid manner classes. Clusters are rarely produced correctly and relatively few (23.3%) cluster elements are produced correctly. Surprisingly, he has a low PCC (40.0%) for nasals. Further investigation reveals that the problem consists mainly of the deletion of final nasal phonemes.

7. What do you make of the PMLU and PWP values? What does their size tell you about the sample and about Harry's phonology?

The PMLU value is quite small (4.16). It reflects the fact that, on average, Harry's word productions are likely to consist of 2-4 segments with 1-2 consonants produced correctly; for example, a CVC word shape with one of the two consonants produced accurately. Both the sample and Harry's phonology play a role in producing the small PMLU value. Two thirds of the words in the sample are monosyllabic and only four words are more than two syllables. The maximum possible PMLU of 7.46 reveals this feature of the sample. Harry also contributes to the low PMLU through his substitution errors, mainly stopping, and even more so through his deletion of segments, including liquids, nasals, and glottal singletons as well as cluster elements. WSD also occurs in two instances. Harry's PWP of 55.76 is also a reflection of his numerous errors and suggests that there will be significant problems of intelligibility.

8. What does the error breakdown say about Harry's phonological development?

The error breakdown confirms that omissions are the most common error type but that numerous substitution errors also occur. Inspection of the consonant target analysis shows omission errors of two kinds: developmentally common ones, as with liquid singleton and cluster targets; and atypical ones, such as deletion of nasals and glottals. Very few (2) distortion errors occur, showing that Harry's problems are almost exclusively phonological in nature. Given the quantity of omission and substitution errors, we would expect intelligibility problems to be severe.

9. Summarize the results of the phonological process analysis. Which processes are clinically significant? Do these represent persisting normal processes, age-appropriate processes, or atypical processes? Is there evidence of process bleeding? Do you see evidence that Harry is beginning to suppress certain processes?

Clinically significant phonological processes for Harry that are normal (developmentally common) are VF, Est, FCD, CR, GL, LSt, LD, and WSD. Those that are atypical are initial glottal deletion, final nasal deletion, and affrication of final fricatives. He also shows a handful of substitution errors that, based on this sample, do not form a pattern. At 36 months of age, we would generally expect Harry to be on the cusp of suppressing Est but the other normal processes can be regarded as still age-appropriate. The atypical processes are of course not age-appropriate.

Process bleeding is occurring in several instances. WSD obscures the occurrence of other error patterns in those syllables that are deleted. CR eliminates mostly fricative or liquid elements that might otherwise be stopped or glided (i.e., in CS). ES and LS affect palatal consonants that might otherwise be fronted (i.e., in PF).

There is strong evidence that Harry is beginning to suppress VF in initial and final positions where both voiced and voiceless velar stops are occurring. FCD is mainly suppressed although other errors have taken its place in many instances. CR is still very strong although a couple of phonetically simple consonant sequences have appeared. All other processes were consistently applied to the targets in this sample.

Treatment Goals Worksheet

Phonological Process/ Error Pattern	Velar Fronting (VF)	Early Stopping (ESt)	Final Consonant Deletion (FCD)	Cluster Reduction (CR)	Gliding (GL)	Later Stopping (LSt)	Liquid Deletion (LD)	Weak Syllable Deletion (WSD)	initial glottal deletion	final nasal deletion	affrication of final fricatives
	/k/ singletons & clusters	/f, s, ʃ, θ/	/d, z/	except clusters with nasals	initial /r, l/	/v, ð, z, ʒ, tʃ, dʒ/	final /r/	word-medial	initial /h/	final /n, ŋ/	final /s, z, ʃ/
Frequency of Target Sound(s)	Low	High	Low	High	Low	High	Low	High	Low	Low	High
Consistency of Error	Low	High	Low	High	High	High	High	High	High	High	Low
Logical Teaching Order	High	High	High	Low	High	Low	High	High	High	High	High
Contribution to Homonymy	Low	High	Low	High	Low	Low	Low	Low	Low	Low	Low
Feature Distance	Low	Low	High	High	Low	Low	High	High	High	High	Low
Number of Positions Affected	High	High	High	High	Low	High	Low	High	Low	Low	Low
Order of Acquisition	High	High	High	Low	Low	Low	Low	High	High	High	High
Stimulability	High	High	High	Low	Low	Low	Low	Low	Low	Low	High
Ease of Teaching	Low	High	High	Low	Low	High	Low	High	High	High	High
Morphological status	Low	High	Low	Low	High	Low	High	High	High	High	Low
Phonological knowledge	High	High	High	High	Low	High	Low	High	High	High	High
Resources available	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
"High" Count	5	10	7	6	4	5	4	9	7	7	6
Order of Treatment	6	1	3	9	10	7	11	2	4	5	8

Discussion

Early Stopping should be targeted first in treatment because it is a consistent error pattern involving four fricative phonemes in all positions. Moreover, Harry is able to perceive stop-fricative contrasts and is stimutable for both /f/ and /s/, the phonemes that are most statistically frequent within the ESt group. By teaching /s/ to Harry, he will be prepared for later work on bimorphemic sounds and on /s/ clusters. The next target should be WSD that is occurring word-medially. The consistency of this error should be confirmed with a larger sample of multisyllabic words but it occurred on half of the words of more than 2 syllables in this sample. Harry can perceive the difference between words with and without their weak syllables and he should be phonetically capable of marking the needed syllable with at least a vowel. FCD is targeted third. Improvement is the ability to consistently produce final /d/ will also hopefully generalize to the production of final /n/--one of Harry's idiosyncratic patterns—as the two phonemes have little feature distance.