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, Tom has a total of 29 forms at these levels, showing that he is simplifying syllable structures to a large extent. As his syllable structures mature, that maturation will be reflected by an increase in the size of his SSL.

2. **How does Tom 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), Tom shows mastery in initial position of the stop /b/, nasals /m/ and /n/, glide /w/, and fricatives /f, ʃ, h/. He has also mastered final /p/. The only phoneme mastered in both positions is /s/. Compared to his American peers, Tom lags in the development of initial /d/ and final velars and nasals but is ahead in the development of fricatives, especially in initial position. Indeed, the lack of final nasals is one of Tom's idiosyncratic error patterns.

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

The lack of rhotic vowels is not surprising in a child of Tom's age due to the oral-motor precision they require. What is surprising is the absence of the low front lax vowels /ɛ/ and /æ/. Perhaps he lacks sufficient tongue-jaw coordination. His inventory lacks the diphthong /ɔɪ/, but it was targeted only once in the sample. His one nonphonemic diphthongs (ɛə) was formed as a result of liquid deletion/ vocalization. The consonant inventory shows:

- A reduced inventory in medial position and absence of alveolar stops.
- Lack of nasals in medial and final position.
- Total absence of liquids, affricates and clusters.

The first two of these seem to be positional constraints and should be compared with his performance on syllable repetition tasks, to see if he struggles with the latter also. The absence of liquids, affricates, and clusters is more common and shows a general lack of oral-motor precision.

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

There are a total of six metrical mismatches in the sample. In one, Tom appears to change the syllable structure of the word "jumping," where he omits the –ing suffix. This could well be a morphological error or just a failure to elicit the desired verb form with the test picture. The other five instances are cases where he replaces /ə/ or /ɚ/ with /ɑ/. In all five words he is either derhotacizing the vowel or he omits the consonant that follows it. That and the fact that he produces weak vowels correctly elsewhere in the sample suggest that there is no systematic metrical constraint operating.

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

Tom derhotacizes all rhotic vowel targets in both weak and strong syllables. More noteworthy is a fairly strong pattern of terminating words with the vowel /ɑ/. This occurs in nearly half (16/33) of his vowel errors in the sample. He is much more likely to produce errors on lax vowels. While his overall PVC was 52%, it was 26% for lax vowels and 68% for all others, including rhotic vowels and diphthongs.

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, Tom's PCC is extremely low (25.8%) and thus corresponds to a severity rating of Severe. There is a clear developmental pattern to Tom's consonant errors: his PCC declines systematically from the early mastered phonemes to the later mastered ones. His has no correct productions within the affricate and liquid manner classes. Clusters are never produced correctly and very few (13.7%) cluster elements are produced correctly. Surprisingly, he has a low PCC for stops (45%) and even lower (26.7%) for nasals. Further investigation reveals that the problem consists mainly of the deletion of final phonemes in both of these classes.

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

The PMLU value is very small (3.80). It reflects the fact that, on average, Tom's word productions are likely to consist of 2-3 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 Tom'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. Tom also contributes to the low PMLU through his substitution errors, mainly gliding, and even more so through his deletion of singletons in all three positions as well as his deletion of cluster elements. Tom's PWP of 50.94 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 Tom'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 cluster omission rather than reduction. No distortion errors occur, showing that Tom's problems are 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 Tom is beginning to suppress certain processes?

Clinically significant phonological processes for Tom that are normal (developmentally common) are VF, FCD, CSV, CR, GL, LSt, FS, DA, and LD. Those that are atypical are GF, ICD, FND, and MCD. At 36 months of age, we would generally expect Tom to be close to suppressing VF, FCD, and CSV. There is some evidence that he is doing that with VF and CSV but the frequency of FCD indicates that it is still very strong. The other normal processes Tom exhibits can be regarded as still age-appropriate. The atypical process are of course not age-appropriate.

Process bleeding is occurring in several instances. ICD and FCD are both very strong and bleed all substitution processes in both positions. CR eliminates mostly fricative or liquid elements that might otherwise be stopped or glided (i.e., in CS).

There is strong evidence that Tom is beginning to suppress VF in final position where /k/ has emerged. CSV shows signs of suppression with the emergence of some voiced cognates but bleeding from omission processes is interfering. FCD is still very strong but Tom is producing voiceless stops in that position at four different places of articulation. ICD is also strong though Tom has a diverse phonetic inventory in that position. All other processes were consistently applied to the targets in this sample.

Treatment Goals Worksheet

Phonological Process/ Error Pattern	Velar Fronting (VF)	Final Consonant Deletion (FCD)	Context Sensitive Voicing (CSV)	Cluster Reduction (CR)	Gliding (GL)	Fricative Simplification (FS)	Deaffrication (DA)	Liquid Deletion (LD)	Gliding of Fricatives (GF)	Initial Consonant Deletion (ICD)	Final Nasal Deletion (FND)	Medial Consonant Deletion (MCD)
	initial /g/ singletons & clusters	/d, z/	/v, z, p/		initial /r/, medial /l/	initial /θ/	initial /dʒ, ʧ/	initial /l/, final /l, r/	medial /θ, s, z, ʒ/	initial /t, k, j, sCC, kC/	final singletons	/b, mp/
Frequency of Target Sound(s)	Low	Low	Low	High	Low	Low	Low	Low	High	High	High	Low
Consistency of Error	36* High	54 High	9 Low	53 High	75 High	33 Low	50 High	63 High	20* High	89 High	100 High	10 Low
Logical Teaching Order	High	High	High	Low	High	Low	Low	High	High	High	High	High
Contribution to Homonymy	Low	High	Low	High	Low	Low	Low	Low	Low	High	High	Low
Feature Distance	Low	High	Low	High	Low	Low	Low	High	High	High	High	High
Number of Positions Affected	1/3* High	1/1 High	2/3 High	3/3 High	2/2 High	1/3 Low	1/3 Low	Low	1/3 Low	1/1 High	1/1 High	1/1 High
Order of Acquisition	High	High	Low	Low	Low	Low	Low	Low	Low	High	High	High
Stimulability	High	High	High	Low	Low	Low	Low	Low	High	High	High	High
Ease of Teaching	High	High	High	Low	Low	High	Low	Low	High	Low	High	High
Morphological status	Low	Low	Low	Low	High	Low	Low	High	Low	Low	Low	Low
Phonological knowledge	High	High	High	High	Low	High	High	Low	High	High	High	High
Resources available	Low	Low	Low	Low	High	Low	Low	Low	Low	Low	Low	Low
"High" Count	7	9	5	6	5	2	2	4	7	9	10	7
Order of Treatment	5	2	8	7	8	11	11	10	5	2	1	5

Discussion

FND should be targeted first in treatment because it is a completely consistent error pattern involving all nasal singletons. Moreover, Tom is able to perceive when nasals are present or absent postvocalically and is stimulable for both /m/ and /n/. If Tom can master final nasal singletons, we may hope to see some generalization to suppression of FCD (especially of /d/, which is homorganic with /n/) and MCD (which affects a nasal cluster). FCD and MCD are the next two patterns to be targeted, anyway. After that GF, an idiosyncratic pattern, should be addressed. Work on VF will then aim to generalize final /k/ to other positions and to the other velar phonemes. CR would come next. It is chosen based on its frequency and impact on intelligibility but it will be a challenge because of the lack of stimulability. Work would begin with sC(C) and C+glide clusters, since those elements are present in his consonant repertoire.