Phonology: A Process Analysis

An Honors Thesis (ID 499)

By

Larry J. Hill

Mrs. Betty Harmon   CCC-SP

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Ball State University

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INCIDENCE OF ARTICULATION DISORDERS

Articulation, one's ability to use "the speech sounds of the language spoken around him . . ." (Weston & Leonard, 1976) has been a widely studied subject. The reason for this is that "three percent of the population within the ages of five and twenty-one have functional articulatory defects." This percentage is higher than for all the other speech difficulties combined; in fact, in this population, about three fifths of all speech defects are of an articulatory nature." (Eisenson & Ogilvie, 1977).

DEVELOPMENT OF NORMS

Traditional Method

When considering the traditional method, it must first be realized that the traditional method is concerned with development or acquisition of each phoneme (sound), whether acquired at the same time as other phonemes or individually. There are many developmental charts in use today. Examples may be found in Speech Correction in the Schools, 4th ed., (Eisenson & Ogilvie, 1977), but there is one that is of particular interest to the author because of its practicality for the school clinician. The developmental schedule is school-grade oriented for simplicity of use. "This schedule (Sax, 1972) is based on the criterion that ninety-three percent of the children produce the sound accurately.

Grade	Males	Females
Beginning Kindergarten	/p/, /b/, /m/, /w/, /j/, /h/, /t/, /d/, /n/, /k/, /g/, /ŋ/	/p/, /b/, /m/, /w/, /j/, /h/, /t/, /d/, /n/, /k/, /g/, /ŋ/, /f/
Beginning First Grade	/f/	───────────
End First Grade	/v/	/v/, /ð/
End Second Grade	/ʒ/	/θ/, /l/
End Third Grade	/θ/	/r/
End Fourth Grade	/ʃ/, /ʒ/, /tʃ/, /dʒ/	/ʃ/, /ʒ/, /tʃ/, /dʒ/
End Fifth Grade	/l/	───────────

(Eisenson & Ogilvie, 1977)

Phonological Method

The phonological method goes back twenty-eight years to the development of the distinctive feature theory. Jakobsen, Fant, and Halle identified features as ". . . the smallest individual characteristic of a particular phoneme that can determine a difference between phonemes . . ." (Standle, Gardner, & Hannah, 1970). This theory came about because in ". . . recent years linguists have argued that the speech sound, or phoneme, should not be regarded as the primary unit of linguistic analysis. Rather, each phoneme should be described as a bundle of phonetic features, each of which assumes a value of either + or - (Chomsky and Halle, 1968)."

Distinctive feature theory was the first theory to incorporate the study of linguistics into phonological development. Yet, many researchers thought that more could be derived from

linguistic theories, and so the study continued until Stampe
(1969) proposed a theory developed from generative (distinctive
feature) phonology." Stampe's 'Natural Phonology' stressed the
rule behavior of young children (Ingram, 1976)." The following
is what he tried to prove, and what his theory is based upon.

> Stampe emphasized that the child is constantly
> attempting an adult word. The child is said to
> have a set of innate processes that simplify the
> adult target word. The child does not say $\overline{ma}$
> for any adult word, but only one such as <u>mother</u>,
> where the simplifying process would delete the
> unstressed syllable and reduce the vowel to $\overline{a}$
> (Ingram, 1976).

Another reason why this theory was developed was that the
theories based on substitution rules were thought to be too
shallow. "Substitution rules are segment- and place-specific;
they claim that a particular segment is replaced by another
segment in either word-initial, -medial, or - final, or a
combination of these . . . (Walsh, 1979)." As a result of that
phonotactic, rules were designed because they ". . . are not
typically segment- and place-specific. They claim that a segment
which would otherwise appear does not because of the influence
of a neighbouring sound. Consequently, they are not context
sensitive. (Walsh, 1979)". Alone, these two sets of rules
can provide a comprehensive analysis of a child's actual
phonological development.

Yet, what makes the phonological method even more compre-
hensive is aside from substitution rules (SR) and phonotactic
rules (PR), this method also compares and contrasts the adult

pronounced form (APF); the child's perceived form (CPF); the
child's underlying form (CUF); and the child's spoken form
(CSF) (Walsh, 1979).

The APF is basically the way words are pronounced on the
adult level. The CPF is the way that the adult form is perceived
by the child. The CUF is the underlying phonotactic rules
that act to sustain or change the child's perceived form. Finally,
the CSF is the way the child actually says the word.

These forms used in conjunction with the phonotactic and
substitution rules form the norms by which the phonological
method functions.

DIAGNOSTICS

Traditional Method

Photo Articulation Test (PAT, 1969)

The Photo Articulation Test is administered by presenting
the client with pictures and having him name each picture.
There is also a set of sequence pictures for the client to
make into a story for a conversational assessment. The entire
test takes approximately ten to fifteen minutes to administer.
The test divides the sounds into consonants that involve the
tongue, consonants that involve the lips and vowels. After
the actual test is completed, it is also possible for further
information to test for stimulability; i.e. whether or not the
client can correctly imitate an incorrect sound.

Results of this test are categorized into omissions, substi-
tutions, and distortions o sounds in the initial, medial, and
final position of words.

Phonological Method

Phonological Process Analysis (PPA)

The Phonological Process Analysis is divided into categories which are actually phonetic processes. These sections include:

Syllable Structure Process

1. Deletion of Final Consonants

2. Cluster Reduction: Initial Stop & Liquid

3. Cluster Reduction: Initial Fricative & Liquid

4. Cluster Reduction: Initial /s/ Clusters

5. Cluster Reduction: Final /s/ & Stop

6. Cluster Reduction: Final Liquid & Stop

7. Cluster Reduction: Final Nasal & Stop

8. Weak Syllable Deletion

9. Glottal Replacement

Harmony Processes

1. Labial Assimilation

2. Alveolar Assimilation

3. Velar Assimilation

4. Final Consonant Devoicing

Feature Contrast Processes

15. Stopping or Gliding of Fricatives

16. Affrication

17. Fronting

18. Denasalization

19. Gliding of Liquids

2C. Vocalization

(Weiner, 1979)

The word level response in this test is called "delayed imitation response" (Weiner, 1979) because the desired response is given first by the examiner in this manner; "This is a fish (point to fish). Uncle Fred is catching a _____." (Weiner, 1979). At this point, the client should respond with the word "fish". The sentence response is a recall response presented in the following manner. "What is Uncle Fred doing? . . . the expected response is; catching a fish" (Weiner, 1979). If the task cannot be managed, although it is less desirable, direct imitation can be used. To promote familiarity to the task, the "Uncle Fred" character is used throughout the test. Responses are transcribed into phonetics and placed on the response sheet according to the process that is being tested. There is also room on the response sheet to allow for what is referred to as; "Prediction of Other Processes" (Weiner, 1979) which will be added to the final data for a more comprehensive analysis. There is a separate response sheet for each process and then for easier application and analysis, there is a "Process Profile" at the end in which all the information is brought together and categorized on one sheet. The administration of this analysis should take between forty-five and fifty minutes depending upon the length of training time that is necessary.

Compton - Hutton Phonological Assessment (CHPA)

The Compton - Hutton Phonological Assessment is also a picture identification test based on phonological rules. It takes between forty-five to sixty minutes to administer. The client is asked to say the name of the picture twice in succession

as naturally as possible. Shouting and whispering are inappropriate because either one will affect natural articulation, thus affecting the results of the assessment. Each response is transcribed into phonetics on the first part of the three part test blank.

Categorization of the results starts with part one of the test blank entitled "Responses." The responses are then tallied in part two, the "Pattern Analysis" section. Error responses are recorded in red and correct responses in black or blue. (Compton & Hutton, 1978). This provides the clinician with a convenient visual display of errors. Part two is cross-referenced with the "Phonological Rule Analysis" section, part three. Consequently, all the clinician has to do is read the rule number in part two and circle the corresponding rule in part three.

<div align="center">THERAPY</div>

Traditional Method

Photo Articulation Test

When applying the information received from the PAT to a therapy situation, these questions must first be answered:

1. Which of the error phonemes will be the easiest to correct?

2. Which error phonemes have the greatest frequency of occurrence in the language?

To answer question one, the clinician must consider many factors. First, he must find out whether the error phoneme is a consistent error or if the client can produce the sound correctly in some words or syllables. Also, the maturity level

of the error must be considered. Eisenson & Ogilvie (1977)
say that the most immature of all sound errors is the omission
of a sound; next is the substitution of one sound for another;
and the least immature is the distortion of a sound. Another
way to determine the ease of correction is whether or not the
sound is stimulable; i.e. can be correctly imitated.

To answer question two, the clinician must determine
whether or not an error phoneme is frequently used. The more
frequent the sound, the greater it will affect the intelligibil-
ity of the client. Consequently, it is of great importance to
try to correct a frequently used sound.

If a young client is involved, the clinician should pick
one or more sounds that he predicts should both be easy to
correct and frequently used. If that is done, the client will
most likely realize quick success. This will help to maintain
the client's interest in therapy.

One of the possible methods of therapy is to pair sounds
together that are similar in nature. For instance, almost every
consonant that requires vocalization i.e. /d/, /z/, /v/, and
/g/ (vibrations from the larynx) is paired with a sound that
is produced in the same way except without voice i.e. /t/, /s/,
/f/, /k/. So if the client misarticulates the /t/ sound and
correctly produces /d/, the clinician can show through different
activities the meaning of voiced sound and voiceless sound and
then incorporate the same concept in a /t/ and /d/ contrast of
syllables and words.

Phonological Method

Phonological Process Analysis

As yet, there has not been a standardized system which helps to determine which processes should be taught as a result of the administration of the analysis. This decision has been routinely left up to the individual clinician. Yet there are some things to look for when making the selection, for instance: the frequency in which the process occurs, and how much the occurrence of a process affects the speaker's intelligibility (Weiner, 1979).

Once the processes have been categorized, and a decision has been made on which processes to teach to, therapy can begin. The author has chosen to discuss the therapy procedures for only two of the main processes, syllable structure and features contrast processes because according to Weiner (1979) disorders in harmony processes are very rare.

Syllable Structure Processes

There are two main approaches to teach syllable structure processes. "The first approach is a sorting task, termed conceptualization by LaRiviere . . . (Weiner, 1979)." This approach is based on the recognition of minimal pairs. To illustrate, say a client omits /s/ in /s/ clusters ". . . the clinician would present groups of minimal pairs like spool-pool or spill-pill. (Weiner, 1979)." The client is then required to differentiate the /s/ blends from the single phonemes with the raise of a hand or some other appropriate signal. Weiner (1979) has experienced ". . . that once children can conceptualize these two categories, production of /s/ clusters improves."

Another approach is the ". . . lexical approach (Ferrier
and Davis, 1973). This approach is based on the premise that
changes in sound production will reflect changes in meaning
(Weiner, 1979)." To illustrate the client says /su/ for /ʃu/.
In this case, the clinician shows the client a picture of a
girl and tells the client that the girl's name is Sue. The
clinician also presents the client with a picture of a shoe.
The clinician places the pictures in front of the client and
tells the client that the clinician will pick up the picture
that the client names. Consequently, if the client says /su/
when he wants the clinician to pick up the shoe, then the
clinician responds by picking up the picture of Sue. "In
this procedure, it is hoped that the child will realize that
an articulatory change will affect a change in meaning."
(Weiner, 1979)

Feature Contrast Processes

When teaching feature contrast processes, Weiner (1979)
has found that the distinctive feature approaches are appro-
priate. There are two main distinctive feature approaches to
consider. The first approach pairs a phoneme that contains a
+ target feature; i.e. the feature that is being taught with
one that has the same features except for a - target feature
(McReynolds and Bennett, 1972). These are contrasted in
minimal pairs and the client is first asked to determine the
presence versus absence of the feature. Gradually this task
is made more difficult by having the client imitate the sounds
in syllables and words, and then to the final steps of differen-
tiating the sound without verbal modeling from the clinician.

The main objective of the second approach is to create awareness of the phonetic characteristics of the + and - aspects of the features in error (Weiner and Bankson, 1978). "Thus, + friction, for example, might be described as flowing, and - friction as popping (Weiner, 1979)."

<u>Compton - Hutton Phonological Assessment</u>

Applying this to therapy is similar to that of the PPA, however, instead of looking for the specific process, the clinician looks for the specific pattern (Compton and Hutton, 1978). Unusual patterns get a high priority, because they tend to affect speech intelligibility the most. "Patterns which affect the greatest number of words in the child's vocabulary . . ." is another high priority (Compton and Hutton, 1978). When selecting patterns for actual therapy, the clinician should choose the patterns appropriate for the child's age.

Question: Does the phonological method yield more information to the clinician than the traditional method?

CASE STUDY

Client: R

Date of Birth: December 16, 1973

Hearing: Normal, despite frequent ear infections at the age of four.

Linquistic Levels: <u>Peabody Picture Vocabulary Test</u>: R scored a 131 receptive vocabulary quotient and a receptive vocabulary age of 8 years, 0 months compared to his chronological age (at the time of testing) of 5 years, 0 months.

Traditional Method

Photo Articulation Test

R's test results were as follows:

Distortions: None

	Position in Word		
Type of Error	Initial	Medial	Final
Omissions:	/s/ blends		/s/
		/d/	/d/
	/l/ in /kl/ and /f / blends	/Ө/	/r/

	Initial	Medial	Final
Substitutions:		d/s	
		/z	
	s/ʃ	s/ʃ	t/ʃ
	t/tʃ	t/tʃ	
	g/d	d/d	
	k/t		
		w/l	
	bw/bl		
	t/Ө		t/Ө
	w/r	w/r	
	t/w		
		Ө/ʒ	

Vowel Errors: None

R was stimulable (could imitate) with /s/, /l/, /tʃ/, /t/ and /Ө/.

The conversation sample revealed the same errors as in the latter information plus the omission of all final consonants.

Phonetic Processing Analysis

The processes are divided into subcategories for specific testing data. R's results for this analysis are the following:

Process	Occurrence	Prediction of Other Processes
Syllable Structure:		
1. Deletion of Final Consonants	2/8	11
2. Cluster Reduction	18/26	1C
3. Weak Syllable Deletion	C/6	C
4. Glottal Replacement	3/8	2
Harmony		
1. Labial Assimilation	C/8	C
2. Alveolar Assimilation	C/6	C
3. Velar Assimilation	C/8	C
4. Prevocalic Voicing	C/8	C
5. Final Consonant Devoicing	1/8	2
Feature Contrast		
1. Stopping	1/8	6
2. Gliding of Fricatives	C/8	C
3. Affrication	C/8	C
4. Fronting	2/8	8
5. Denasalization	C/8	C
6. Gliding of Liquids	4/8	5
7. Vocalization	3/8	7

Final analysis revealed the following processes as the ones to be brought to the clinician's attention.

1. Deletion of Final Consonants

2. Cluster Reduction

3. Stopping

4. Gliding of Liquids

5. Vocalization

This list is in order of importance based upon information obtained from the PPA manual (Weiner, 1979).

Compton - Hutton Phonological Assessment

The results of this assessment are scored to reveal the same information for R as the PAT, however, part three of the response sheet translates those results into phonological rule based terms to provide the same information that was revealed by the PPA.

Conclusion

The answer to the question posed is a conditional yes, because after the clinician has completed either the PPA or the CHPA enough information is obtained for a firm basis on which to begin therapy. Whereas, to get such basis to begin therapy with the traditional method, the clinician must do further evaluation to establish fully the criteria needed to begin therapy (see Therapy: The Traditional Method, page 7). Nonetheless, the answer must be conditional because even though a single diagnostic tool based on the phonological method can provide enough information to begin therapy, each of the tools that were covered take between forty-five and fifty

minutes to administer, whereas the PAT can be administered in ten minutes. So the real question is which is the preferred method? That question, however, must be answered by each clinician as an individual.

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