

# Phonological/Traditional Approaches to Articulation Therapy: A Retrospective Group Comparison

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Over the last 15 years, a substantial shift has occurred in the methodology of choice for analyzing the speech of children with multiple phonological disorders. Instead of focusing on each specific sound error as a distinct entity, separate from all other sound errors, there has been an attempt to find underlying patterns of production that might account for several sound errors at one time. This recent methodology has variously been referred to as phonological process analysis (Edwards, 1992; Hodson, 1980; Ingram, 1981; Shriberg & Kwiatkowski, 1980; Weiner, 1979), phonological rule analysis (Fey, 1985), or simply, phonological analysis (Bernthal & Bankson, 1993; Dyson & Robinson, 1987; Khan & Lewis, 1986).

Concurrent with the development of procedures for phonological analysis, there has been a change in the preferred focus of therapy for these children with speech disorders. In short, there has been a growing tendency to de-emphasize traditional therapeutic approaches stressing motoric manipulation of the articulators, usually for one target sound at a time (McDonald, 1964; Van Riper, 1972), in favor of more conceptually based programs that tend to focus on groups of sounds (e.g., Ferrier & Davis, 1973; Fey, 1985; Klein, 1985; Weiner, 1981; Young, 1983).

**ABSTRACT:** A retrospective design was used to compare the relative efficacy of traditional and phonological approaches in the treatment of children with multiple articulation disorders. Nineteen children received evaluation and therapy based on a traditional paradigm and 17 children received phonologically based evaluation and treatment procedures. Results indicated that children in the phonological group showed significantly greater improvement in a significantly shorter period of time than children in the traditional group.

**KEY WORDS:** articulation, phonology, treatment, therapy

For several years now, proponents of phonological analysis and intervention have reported remarkable results for their clients who have undergone therapy based on this newer approach. Specifically, numerous children have been described who previously might have been in therapy for many years, given the severity of their speech disorders, but have been dismissed in 12 to 18 months after undergoing phonologically based therapy (Hodson, 1992; Hodson & Paden, 1983; Monahan, 1986; Weiner, 1981; Young, 1983).

Given the plethora of reports supporting the greater effectiveness and efficiency of phonologically based approaches to the treatment of children with speech disorders, one might imagine that most practicing clinicians would now be using at least large parts of this newer methodology. Surprisingly, this seems not to be the case.

McCluggage (1983) surveyed public school clinicians across the state of California and found that less than 10% claimed to be using a phonological approach with their children with multiple articulation disorders. Close to 10 years later, Hodson (1992) reported her observations that less than 10% of the practicing clinicians across the United States and Canada were using any concepts of clinical phonology in their work. Finally, Fey (1985) lamented his observation that the concept of phonology continued to be a source of "bewilderment" to many clinicians in the field.

In short, although many leading scholars in the field now agree that a phonological approach is preferred in the analysis and/or treatment of individuals with multiple articulation disorders, the methodology is not yet filtering down to the very people who serve the bulk of individuals with communication disorders. Two reasons are hypothesized for this failure: first, the methodology takes time to learn. Several skills frequently unused for many years (phonetic transcription, ability to classify speech sounds according to place, manner, and voicing parameters) must be relearned. Other skills (performing a phonological analysis, setting up a therapy program based on the

analysis) must be learned for the first time. Finally, a theoretical framework tying together traditional and phonological approaches to articulation intervention must be understood in order to fully appreciate the relationship between the two approaches. Most practicing clinicians have not had the administrative support necessary to take the large amount of time needed to fully learn and master clinical phonology.

The second hypothesized reason for the failure of dissemination is the lack of a sufficient research base documenting the greater efficacy of phonological approaches to analysis and intervention. Although case studies, case presentations, and informal reports documenting remarkably quick speech improvement have been frequently cited by users of the newer approaches (e.g., Hodson, 1992; Hodson & Paden, 1983; or Monahan, 1986), there have been no group data to support these claims, despite frequent calls for this type of data (e.g., Edwards, 1992; Elbert, 1992; Hodson, 1992).

Of course, one reason for the lack of comparative group data is ethical: If one believed that using a phonological approach would accelerate the therapy process, it would be unethical to withhold this treatment from a control group. And yet, without group documentation of the efficacy of phonologically based therapy, any impetus for new program implementation on the part of field-based clinicians is less than compelling.

It was felt that the ethical considerations addressed earlier could be overcome by the use of a retrospective research design. Although use of this design would introduce some threats to internal validity, hopefully these could be controlled through strict procedures for data inclusion and interpretation. The purpose of this study, then, was to compare children with multiple articulation disorders who received traditional programs of therapy with similar children who received phonologically based intervention. It was hypothesized that the group of children undergoing programs of phonological analysis and intervention would need significantly fewer therapy sessions and significantly less time (months) in therapy before they are dismissed with essentially normal speech than those children treated in a traditional manner. Specifically, the following hypotheses were originally developed:

#### *Hypothesis #1:*

Children in the traditional treatment group will have undergone significantly more therapy sessions before dismissal than children in the phonological treatment group.

#### *Hypothesis #2:*

Children in the traditional group will have spent significantly more time (measured in months) in therapy before dismissal than children in the phonological group.

The above hypotheses would have been sufficient to compare the effectiveness and efficiency of the two therapy procedures if not for a previously unknown artifact of the data, noted during initial perusal of the clients' files. This initial study of the data yielded the information that very few of the traditional treatment group subjects were ever

formally "dismissed" from therapy after sufficient speech improvement. Instead, most of these subjects discontinued therapy before being formally dismissed, usually to embark on several additional years of speech therapy services in the public schools. This factor necessitated that several additional pieces of data be gathered, and resulted in some changes in the formulation of *a priori* hypotheses. First, some minimal wording changes were made in the first two hypotheses, as follows:

#### *Hypothesis #1 (Revised):*

Children in the traditional treatment group will have undergone significantly more therapy sessions before *discontinuing services* than children in the phonological treatment group.

#### *Hypothesis #2 (Revised):*

Children in the traditional group will have spent significantly more time (measured in months) in therapy before *discontinuing services* than children in the phonological group.

Second, a speech disorder severity rating would now be calculated at the *end* of intervention for each client in both groups, in addition to the previously planned pre-intervention severity rating. This additional data allowed for an objective, quantitative measure of speech status for both groups at the time services were discontinued and led to the third hypothesis.

#### *Hypothesis #3:*

Children in the traditional treatment group will demonstrate significantly higher speech disorder severity ratings at the end of therapy provision than children in the phonological group.

Finally, the significance of the difference between the two groups in the number of children who finished treatment (i.e., demonstrated essentially normal speech by the end of therapy provision) would have to be investigated.

#### *Hypothesis #4:*

Children in the phonological treatment group will show significantly more positive therapy outcomes than children in the traditional group.

## METHOD

### Subjects

The traditional treatment group consisted of 19 children (5 girls, 14 boys) and the phonological group consisted of 17 children (5 girls, 12 boys). No significant differences existed between the two groups with regard to average age of first therapy session ( $t = .13$ ,  $df = 34$ ). Children in the traditional group ranged from 36 to 67 months ( $M = 52.74$ ;  $SD = 10.14$ ) at the time of their first therapy sessions, whereas children in the phonological group at the time of initial therapy ranged from 39 to 70 months ( $M = 52.29$ ;  $SD = 11.8$ ). See Appendices A and B for an age breakdown for all subjects.

In order for inclusion in the study, children from both groups had to meet the following criteria:

- Must have been judged to have reduced intelligibility during initial evaluation findings, as determined by clinician perceptual judgments.
- Must have received a speech disorder severity rating on the Arizona Articulation Proficiency Scale (AAPS) (Fudala, 1970) of 16.5 or greater.
- Must have had no concomitant organic dysfunction. Thus, children with cleft palate, cerebral palsy, or other organic disorders were disqualified.
- Must not have received any other speech therapy before first admission.
- Must have received at least 50 hours of speech therapy or have been dismissed with essentially normal speech. (This criterion was arranged to avoid inclusion of subjects who might not have had sufficient intervention in order to fairly judge the efficacy of the treatment procedure.)
- Must have had an overall absentee rate of no more than 25%.
- Must have received either a traditional or a phonological program of intervention during his or her clinic tenure, but not both.

All subjects in both groups were provided therapy by graduate students under direct supervision by certified speech-language pathologists in the Department of Communication Disorders at Whittier College. In accordance with in-house clinic procedures, at least 33% of the therapy was supervised; however, the exact supervision rate for each client is unavailable. Therapy sessions lasted 50 minutes and were provided either twice or three times weekly. No intervention took place during semester breaks or college holidays. Children in the traditional group were seen during the time period between 1975 and 1981, and children in the phonological group received their therapy between 1982 and 1988.

## Data Collection Procedure

Files of all clients first seen for speech/language intervention at the Lester L. Harris Speech and Hearing Clinic at Whittier College between January 1975 and August 1986 were subjected to three levels of culling to arrive at the final figures of 19 standard group and 17 experimental group participants. These numbers represented all children seen at this clinic who met the inclusion criteria specified in the previous section. (Twelve additional children seen between 1979 and 1983 were disqualified from the current study after evaluation of their records indicated that they received both traditional and phonological programs of intervention at different times during their therapy tenures.)

As stated earlier, the AAPS was used in order to determine an objective measure of speech disorder severity for each child. If the AAPS had been administered at the time of initial evaluation, data were gathered from that administration. If the AAPS had not been administered, data available from the administration of equivalent tests

(e.g., The Goldman-Fristoe Test of Articulation, Goldman & Fristoe, 1986) were used to compute projected AAPS speech disorder severity ratings. The same procedures were used in computing final speech disorder severity ratings. In all, two parameters were calculated: *speech severity rating before intervention* and *speech severity rating after final therapy session*.

In addition to the severity ratings, several other factors were quantified for each child. In order to help test the basic hypotheses, *total number of therapy sessions* and *total number of months of therapy provision* were calculated. Both factors were studied because some children were seen more intensively (more times per week) than others. Finally, *age at the time of first intervention* was also determined for each child in order to find out whether that factor related to any of the other factors under study.

The retrospective review of each child's file was undertaken twice, once by a graduate student in Communication Disorders and once by the author of this article. (All names, dates, and other identifying data in the records had previously been erased by another graduate student.) The two reviewers independently performed the activities enumerated above. Additionally, each reviewer was responsible for reading the daily therapy reports and/or end of semester summaries in order to label the intervention provided to the child as traditional or phonological, according to criteria essentially identical to those specified in the section "Intervention Procedures." Inter-observer agreement was 100% on all tabulated data and group placement judgments.

## Explanation of AAPS Speech Disorder Severity Ratings

The AAPS was developed by Fudala (1970) to allow for a "more objective measure of articulation ability" than the typical subjective judgments of severity made by clinicians, usually on the basis of the total number of misarticulated sounds. This is done by means of a numerical index of speech disorder severity, which weighs each speech sound differentially according to its frequency of occurrence in the English language. Many investigators have viewed the AAPS as a "useful tool" (Bernthal & Bankson, 1993) because of this attempt to quantify the notoriously difficult area of speech intelligibility.

The AAPS evaluates both consonants and vowels. For purposes of this research, only the consonants were studied for each client. This modification in the typical scoring procedure was made for two reasons. First, many clinicians tend to focus their observations during initial evaluations on the child's consonant production; vowels are generally overlooked unless the child's speech is so primitive that only one or two different vowels exist. Second, vowels are the least reliably transcribed speech sounds, partially due to the lack of attention noted earlier, and partially due to the less precise nature of vowel production as compared to consonant production. In short, the inclusion of vowels would introduce some random error into the calculation, and to avoid this, vowels were eliminated from the study.

Consonants on the AAPS have a cumulative value of 54.5. The speech disorder severity score was calculated by adding together the values of the specific consonants misarticulated by each child. Thus, the severity score was an *error score*; a score of 0 would indicate that a child had perfect articulation, whereas a score of 54 would indicate that a child misarticulated all consonant sounds. (It should be noted that the normal procedure for the AAPS is to calculate a *correct score*, rather than the *error score* used in this study; this slight alteration was made to increase the ease of interpretation as well as to simplify calculations.)

The figure of 16.5 was chosen as the minimal severity score for inclusion in this study because it represented approximately 31% of the total score, which, according to the AAPS interpretation, meant "speech intelligibility (was) difficult."

## Intervention Procedures

The problem of delineating between traditional and phonological paradigms for intervention has been cited frequently in the literature (see Fey, 1992). This problem has been exacerbated by the fact that even some of the greatest advocates of a phonological paradigm resort to some use of more traditional motor-oriented approaches when discussing therapy. So Hodson and Paden (1983), in their section on therapy, recommend that the clinician use "whatever cues...are required for correct utterance (sic)" (p. 67), including, presumably, phonetic placement or other traditional techniques. In fact, Creaghead (1989) went so far as to say, "...the choice of targets for therapy is the primary distinction between these (phonological) approaches and the traditional ones. To some extent, any approach may be used for teaching the target sounds." (p. 204).

This tendency to embrace traditional motor-oriented therapy techniques even while proclaiming the importance of a phonological framework for working with individuals with speech disorders has created a serious dilemma for clinicians attempting to understand clearly the differences between the alternative models. For purposes of greater clarity, a description follows of the essential elements of both the phonological and traditional paradigms used by clinicians in the current study.

The following elements were included in all the phonologically based therapy conducted during the course of the current study. (It should be noted that many of these factors correspond to unique principles of phonologically based therapy as delineated by Fey [1985] or Creaghead [1989].)

- The child was given absolutely no instruction at any time regarding how to produce a given sound; that is, there was *no* use of phonetic placement or any other motor-oriented approach.
- There was no need for direct imitation on the part of the child (although some delayed imitation was found to be unavoidable in certain cases.)
- The basic unit of concern was *not* the sound, but instead was the phonological rule. Therefore, the goal of therapy was not to get the child to produce certain

idealized sounds, but to get the child to change his or her rule system. As such, specific sound errors were sometimes reinforced if the correct rule was demonstrated by the child. Also, in most circumstances, several sounds were being worked on simultaneously.

- Semantic identification and rule production activities began at the nonsense syllable level, then progressed to single word and higher levels only after a criterion of 100% was reached at lower levels.
- Every rule was taught in the context of its contrast. So, if the child's rule was *stopping of fricatives* and the operating semantic image used was *blowing* and *popping*, blowing sounds *and* popping sounds were presented by the clinician and then produced by the child, at every level of therapy, from nonsense syllable to conversational speech, until the child demonstrated difficulty producing the sound in his or her old incorrect manner, at which time the incorrect manner of production was quietly dropped.
- No value judgments were made regarding correct or incorrect production of a given sound. The contrast pairs were presented as equal alternatives rather than one right and the other wrong.
- No more than one simplification rule was expected to be changed in a given word at one time. This again led to frequent reinforcement by the clinicians of interim errors on the part of the children.
- The actual procedures used were either a variation of the minimal pairs approach (Ferrier & Davis, 1973; Weiner, 1981; Young, 1983) or, most frequently, the imagery approach (Klein, 1985, 1996).

The imagery approach (Klein, 1985, 1996) is a cognitively based procedure that attempts to help the client learn a phonological contrast through presentation of numerous semantic prompts or images. A label, or semantic referent, is attached to each side of the feature contrast being worked on—the goal being to give the sounds or gestures being worked on an identity that the client can learn (e.g., "tippies" and "throatics" for alveolars and velars, respectively, if working on fronting of velars). The semantic referents become code words, allowing for communication between the clinician and client regarding the particular feature contrast. The images are learned initially in nonsense syllables in order to attempt to bypass the client's already established semanto-phonological system during early learning stages.

Certainly the use of imagery has been used previously in the history of speech therapy provision (see Scott, 1952). What is different regarding the approach used in the current study is the merging of imagery usage with the principles of phonologically based therapy noted earlier. Additionally, images are based on correct and incorrect patterns of sound production rather than on individual sounds.

Whereas children in the phonological group received fairly homogeneous programs of intervention based on the guidelines outlined earlier, children in the traditional group were provided with more varied courses of intervention, albeit all arising from a traditional motor-oriented framework. At least

one of the following components had to be included in order for a program of intervention to be designated as traditional:

- Direct instruction in the mechanism of phoneme production, using techniques such as phonetic placement or successive approximation (Van Riper, 1972), and prompts such as mirror, tongue depressor, peanut butter, pictures of the mechanism, or motor posturing.
- Use of motor exercises (e.g., Scripture & Jackson, 1927), sensory-motor training (i.e., McDonald, 1964), or a comparable strategy, with a goal of increased motor control.
- Use of speech sound discrimination training (e.g., Winitz, 1975) in order to remediate a supposed underlying auditory discrimination problem.

Additionally, all children in the traditional group were exposed to the following therapeutic strategies throughout their treatment:

- Extensive use of modeling and subsequent requests for direct imitation on the part of the children.
- In all cases, except when the sensory motor approach (McDonald, 1964) was used, production began at the isolated sound level and then progressed through syllables and higher levels of production. During use of the McDonald (1964) program, therapy began at the syllable level.
- Therapy was undertaken on one or at most, two incorrect sounds at a given time in a given child.

Finally, one other variable that was controlled for children in the phonological group was not controlled for traditional group children. Specifically, in 13 of the 19 children provided with a traditional therapeutic framework, a parent was directly involved in the therapy process for at least part of their time in therapy. Conversely, no parent involvement occurred for children in the phonological group.

## Research Design

The traditional and phonological treatment groups were compared on each of five variables. All comparisons were conducted by use of a *t*-test for independent measures. The following variables were studied:

- Speech disorder severity rating before intervention.
- Speech disorder severity rating after final therapy session.
- Total number of session (hours) of intervention.
- Total number of months elapsed between first and last sessions.
- Child's age at the time of the first therapy session.

In a second analysis, subjects were designated as either "dismissed, no further intervention necessary" or "further intervention needed," as per the recommendations of the clinicians after the final therapy session at this clinic. A Chi-square procedure was then performed in order to find out whether the differences observed between the groups in this area were significant.

Finally, Pearson product moment correlations were performed in order to test several post-hoc questions of relationship. Specifically, correlations between number of sessions and amount of improvement, between age at first therapy and number of months in therapy, and between hours per month (intensity of therapy provision) and amount of improvement were calculated for each group separately and for both groups as one entity.

## FINDINGS

Table 1 contains the age at first therapy, mean severity scores, number of sessions, and number of months, as well as the standard deviations for each of the two groups. In addition, results of *t*-tests comparing the two groups on each of the variables are included. Raw data for all subjects are included in Appendices A and B.

### Speech Disorder Severity Score at Beginning of Intervention

No significant differences were observed between the standard and experimental groups in their calculated mean severity scores before intervention ( $t(34) = 1.44$ , NS). Thus, the two groups demonstrated essentially equivalent levels of articulation disorder before intervention.

### Speech Disorder Severity Score at End of Intervention

At the end of intervention, the traditional group demonstrated a mean severity score of 12.84 ( $SD = 5.40$ ), which was significantly higher than the mean severity score of 1.53 ( $SD = 1.90$ ) exhibited by the phonological group ( $t(34) = 8.57$ ,  $p < .001$ ). This significant difference in end severity level indicated substantially greater improvement in the phonological group children than was observed in children treated in a traditional manner.

### Number of Sessions

Children in the traditional group demonstrated no significant differences from children in the phonological group in the mean number of sessions of speech therapy

**Table 1.** Means and standard deviations for each factor, by group.

	Traditional		Phonological			
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>SIG</i>
Age at first therapy	52.74	10.14	52.29	11.81	.13	NS
Severity score-beginning	25.95	5.20	23.76	3.94	1.44	NS
Severity score-end	12.84	5.40	1.53	1.90	8.57	$p < .001$
Number of sessions	100.95	44.40	81.88	28.20	1.56	NS
Number of months	22.32	10.28	13.47	5.15	3.32	$p < .005$

undertaken to arrive at the final severity levels ( $t(34) = 1.56$ , NS). However, despite the inability to achieve statistical significance, the mean number of therapy sessions engaged in by the traditional group ( $M = 100.95$ ,  $SD = 44.40$ ) was almost 25% greater than those engaged in by the phonological group ( $M = 81.88$ ,  $SD = 28.20$ ). Also, the substantially smaller standard deviation in the phonological group indicated that that group demonstrated a greater homogeneity in its response to therapy than did the standard group.

## Number of Months

Children in the traditional group remained in therapy for an average of 22.32 months ( $SD = 10.28$ , range = 9–41 months). Children in the phonological group averaged 13.47 months of therapy ( $SD = 5.15$ , range = 6–26 months). Thus, phonological group children underwent significantly shorter periods of therapy than children in the traditional group ( $t(34) = 3.32$ ,  $p < .005$ ).

## Dismissal Rates

Table 2 illustrates the results of the secondary analysis, whereby the proportion of subjects dismissed, needing no further intervention, was compared between the two groups. As can be seen, all children in the phonological group were dismissed with essentially normal speech by the time of their final sessions of therapy. On the other hand, only 2 of the 19 children treated in a traditional manner demonstrated essentially normal speech that no longer required therapy by the time they left this clinic. This difference was significant ( $\chi^2(1, N = 36) = 28.84$ ,  $p < .001$ ).

## Measure of Relationship Between Variables Studied

Several additional questions arose following the initial data analysis. For example, was the number of sessions/months of therapy related to the age at which a child began therapy? Also, was there a correlation between the time spent in therapy and the amount of improvement? Finally, as stated earlier, the intensity of therapy provision varied from child to child; some children were seen more or less frequently per week than others, and different rates of illness added to differences in how intensively therapy was provided. The question studied was whether improvement was related to this issue of the “density” of therapy provision.

**Table 2.** Number of subjects in both groups who did and did not need further therapy, at the end of intervention.

Status	Traditional ( $N = 19$ )	Phonological ( $N = 17$ )
Further therapy needed	17	0
No further therapy needed	2	17

Specifically, Pearson product moment correlation coefficients were computed separately for each group, and then for both groups combined, in order to assess relationships between the following variables:

- Age of first therapy and Number of therapy sessions provided
- Age of first therapy and Number of months of therapy provided
- Age of first therapy and Therapy session density (avg. hours/month)
- Improvement and Number of therapy sessions provided
- Improvement and Number of months of therapy provided
- Improvement and Therapy session density (avg. hours/month)

Only one correlation was found to be statistically significant for the traditional group only. A significant relationship was found for children in the traditional group between improvement and the number of months of therapy provided ( $t = 2.32$ ,  $df = 18$ ,  $p < .05$ ). No other significant correlations were found for either of the groups separately, or for the groups combined. Tables 3, 4, and 5 summarize these data.

## DISCUSSION

As predicted, the response of children in the traditional therapy group was substantially inferior to that of children in the phonological therapy group. The phonologically taught children not only showed more improvement, but

**Table 3.** Correlation coefficients between several factors studied—phonological group.

	Age began therapy	Severity score improvement
No. of sessions of therapy	.08	.09
No. of months of therapy	.21	.04
Avg. hours per month/therapy	.12	.12

**Table 4.** Correlation coefficients between several factors studied—traditional group.

	Age began therapy	Severity score improvement
No. of sessions of therapy	.13	.42
No. of months of therapy	.17	.49 <sup>a</sup>
Avg. hours per month/therapy	-.30	-.25

<sup>a</sup> Statistically significant,  $t(18) = 2.32$ ,  $p < .05$

**Table 5.** Correlation coefficients between several factors studied—traditional and phonological groups.

	<i>Age began therapy</i>	<i>Severity score improvement</i>
No. of sessions of therapy	.10	.13
No. of months of therapy	.16	.01
Avg. hours per month/therapy	.03	.28

they demonstrated this improvement in a significantly shorter period of time, after being provided with fewer sessions of therapy (though the latter comparison was not found to be significant). Only 2 of the 19 children given traditional therapy had essentially normal speech after an average of over 22 months of intervention, compared to all 17 of the phonological group who were dismissed with essentially normal speech after an average of 13 months. Even more striking, six of the traditional group had residual severity scores that remained above the cutoff point for inclusion in the present study *before* any intervention, despite the fact that an average of 21 months of intervention had occurred.

Despite these compelling findings, there are several limitations to the present study. First, because the research design was retrospective in nature, certain controls that might normally be undertaken for a comparison study of this type could not be arranged. For example, children in the traditional group saw different clinicians who were supervised by different supervisors than children in the phonological. Although both groups of supervisors maintained the program-imposed 33% minimum rate of observation and all were ASHA-certified with several years post master's degree, it is possible that one group of supervisors was better trained than the other.

Similarly, it can possibly be argued that clinicians who treated the phonological group children (receiving therapy from 1982–1988) were more skillful than clinicians treating children from the traditional group (who attended therapy from 1975–1981), just as a result of the more recent dates of their training. Finally, arguments could be made concerning the nature of the groups themselves. Because no systematic information was available on the language abilities of the two groups, the hearing of the two groups (both before and during therapy), the stimulability of the children involved, or their relative motivation for speech change, these factors could not be systematically controlled.

Despite these possible threats to validity, it should be remembered that both groups of children were assigned to their respective treatment groups only on the basis of when they were seen for therapy. Thus, because there is no reason to assume that one group chosen in 1975–1981 should have different language, hearing, stimulability, or motivational levels than a like group chosen during 1982–1988, these threats to validity should be reduced greatly as long as the selection criteria remained constant from group to group, which they did. Likewise, because supervisors and clinicians were designated for each of the two groups

only on the basis of when their clients were seen for therapy, unless one believes that the later dates of one group's interaction systematically resulted in more competent professionals than was available in the earlier group, this threat to validity should also have been reduced.

A second limitation to the current study revolved around the fact that all the children were reported on their intake evaluations to have had essentially normal intelligence. As such, generality of these findings to other populations of children with multiple phonological disorders, most notably the mentally retarded population, is questionable.

Nevertheless, children such as those who were part of the present study make up a large part of the caseloads of speech-language specialists in elementary and preschools. As such, the implications of these findings are great indeed. In fact, if anything, the results seen here tend to understate the extent of the differences between the two groups.

Although this claim might seem like hyperbole given that the data show that a phonological approach takes a shorter time period and fewer sessions to effect greater improvement, it should be remembered that most of the children in the traditional group still had substantial speech problems at the time they discontinued therapy at this setting. If it had been possible to trace the progress of children in the traditional group until achievement of essentially normal speech, the differing severity levels at the end of therapy would no longer be a factor, but the differences between the two groups, re: *months in therapy* and *total number of sessions*, would have been even more striking.

The significant relationship between *amount of improvement* and *number of months of therapy provision* observed only in the traditional treatment group deserves some comment. It is unsurprising that a relationship would be found between amount of improvement and the length of a child's tenure in therapy. After all, children with severe speech disorders do indeed demonstrate some speech improvement, or normalization, over time, with or without intervention (see Shriberg, Kwiatkowski, & Gruber, 1994). Whether this modest amount of improvement in the traditional group can be attributed to the intervention or just the passage of time, alas, cannot be determined from the present study.

What may be more surprising is the lack of relationship found for the same two variables for the phonological treatment group. Simply, with such substantial speech improvement demonstrated by children in the phonological group, why wasn't the same correlation found for those children between *amount of improvement* and *number of months of therapy provision*? The most likely explanation is a statistical one. Children in the phonological group, by approximating normal speech, had in essence reached a performance ceiling. Thus, the possibility for variance was limited. (Indeed, the standard deviation for this group was very low, post-intervention, compared to the rather high standard deviation remaining in the traditional group, post-intervention.) Without sufficient variance, a significant correlation coefficient would not be obtained.

Finally, the fact that no significant correlations were found between the *amount of therapy provision* (either

number of months or number of sessions) and *age of first therapy provision* contradicted some subjective impressions of this author and others, who have stated that younger children tend to respond more quickly to phonologically based therapy than older children. This question deserves further study.

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## IMPLICATIONS OF FINDINGS AND CONCLUSIONS

Speech-language pathologists have long had mixed feelings concerning the efficacy of traditional procedures in the analysis and treatment of children with multiple articulation disorders. Although these children have eventually improved, the therapy process has often been slow, frustrating, and ultimately expensive—costly both for the child psychologically and for the parents and school district financially.

The results of this study verify the protracted nature of traditional modes of articulation intervention, but more importantly, indicate some hope on the horizon for the many children with multiple phonological disorders seen by speech-language pathologists across the country. For more than 10 years, investigators have claimed that the use of phonological approaches in the analysis and treatment of multiple phonological disorders has yielded better, more efficient results. This study, the first of its kind, fully supports those claims.

Although it is unfortunate that the data did not allow for determination of the full course of therapy to dismissal for the traditional group, even these findings demonstrate that an average of 9 months of speech therapy provision can be avoided with the use of a phonological paradigm. Further, barring spontaneous speech improvement on the part of the traditional group children after the final data were gathered, it can be speculated that the true time differential between the two paradigms evaluated in the current study might have been as high as 2 years or more.

Currently, any simple comparison study, especially one that is retrospective in nature, cannot prove definitively the efficacy of phonological approaches to the treatment of children with multiple articulation disorders. However, when the results of this study are combined with the many case reports relating the efficacy of phonologically based procedures (e.g., Hodson, 1992; Hodson & Paden, 1983; Monahan, 1986), a compelling case can be made for the argument that all speech-language pathologists should be using these procedures in their work with children having speech disorders. Unfortunately, this is, by and large, still not occurring. Hopefully, this study will help to overcome one of the past problems—lack of any group data demonstrating the efficacy of phonological procedures. But, a second problem for clinicians in the field—the need for more than a typical 1- or 2-day in-service workshop in order to learn the procedures—still has not been addressed by our profession. It seems clear that some form of phonological analysis and intervention will be the norm for all children with speech disorders at some point in the

future. Unfortunately, given the complexity of the skills that must be relearned or learned for the first time by clinicians, it will be school administrators as well as leaders of our profession who will determine if that “future” will occur in 3 years or 30.

In summary, results of this study support the numerous claims of investigators that phonological approaches to the evaluation of and intervention with children demonstrating multiple articulation disorders are more effective and efficient than the more traditional treatment procedures that are still in use in most settings. Indeed, this has been the first group comparison reported in the literature. I hope this study will help to stimulate additional large group comparisons that will ultimately provide a greater impetus for the use of these more effective procedures in the clinical setting.

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## APPENDIX A. TRADITIONAL GROUP RAW DATA

<i>Client</i>	<i>Initial severity score</i>	<i>End severity score</i>	<i>Number of sessions</i>	<i>Number of months</i>	<i>Age at first sessions</i>
A	17.5	13	75	17	59
B	29.5	22.5	158	37	44
C	23.5	6.5	179	35	65
D	26	10	137	38	67
E	35.5	17.5	118	26	36
F <sup>a</sup>	39.5	0	172	41	48
G	28	20	93	25	42
H	27.5	12	64	14	67
I	24	12	78	23	60
J	20.5	10.5	112	23	60
K	22.5	8.5	157	27	60
L <sup>a</sup>	25	7	115	27	55
M	22.5	13	54	10	49
N	28	14.5	51	9	38
O	23	9.5	51	10	56
P	22.5	19	53	10	56
Q	21.5	16.5	127	20	39
R	29	15.5	72	21	59
S	27.5	16.5	52	11	42
Mean:	22.95	12.84	100.95	22.32	52.74
SD:	5.20	5.40	44.40	10.28	10.14

<sup>a</sup> Dismissed; speech essentially within normal limits.

## APPENDIX B. PHONOLOGICAL GROUP RAW DATA

<i>Client</i>	<i>Initial severity score</i>	<i>End severity score</i>	<i>Number of sessions</i>	<i>Number of months</i>	<i>Age at first sessions</i>
1	22.5	2	38.5	8	55
2	17.5	0	97	15	70
3	31	2.5	111	16	76
4	28	1	98	12	46
5	25	2	93	18	45
6	20	2	87	15	51
7	29.5	0	65.5	10	39
8	26.5	0	69	13	51
9	28	4.5	56	6	53
10	22	0	122	22	55
11	22.5	0	119	26	57
12	26.5	2	70	13	58
13	21.5	1	62	14	57
14	20	1	41	8	48
15	22	0	132	14	47
16	23	0	68	9	57
17	18.5	2	63	10	66
Mean:	23.76	1.53	81.88	13.47	52.29
SD:	3.94	1.90	28.2	5.15	11.81

**Note.** All children were dismissed; speech essentially within normal limits.