

Language-Based Intervention for Phonological Disorders

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ABSTRACT

Children with phonological disorders often display difficulty in other domains of language. Language-based approaches focus on all aspects of language; therefore, little attention may be drawn to sound errors and these may not be specific targets of intervention. These approaches involve a variety of naturalistic, conversationally based techniques such as focused stimulation in the form of expansions and recasts, scaffolding narratives, and elicited production devices such as forced choice questions, cloze tasks, and preparatory sets. Results from well-controlled group studies are inconclusive regarding the cross-domain effects of morphosyntax approaches on phonology. There are, however, individual children whose phonology improves with a language-based approach. Preliminary evidence suggests that such an approach may be an appropriate choice for children with both speech and language impairments whose phonological systems are highly inconsistent. One advantage of a language-based approach is that it may lead to simultaneous improvements in both speech and language for children with difficulty in both these domains. It is also a viable option when service delivery dictates classroom and collaborative settings. When a language-based approach is chosen for children with phonological disorders, it is imperative that the practitioner monitor phonological progress closely to ensure its effectiveness.

KEYWORDS: Language intervention, phonology, naturalistic techniques

Learning Outcomes: As a result of this activity, the reader will be able to (1) describe language-based approaches and appraise their effectiveness and (2) determine for which clients a language-based approach is appropriate and implement such an approach.

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Children with phonological disorders often display difficulty in other domains of language, particularly in morphosyntax. Estimates of the co-occurrence of specific language impairment (SLI), as identified primarily by morphosyntactic deficits, and phonological disorder range from as low as 9% to as high as 77% with many estimates in the range of 40–60% of preschool children who are diagnosed with either one of these disorders.^{1–6} Even early in development, children identified as “late talkers” for their slow lexical acquisition have also been shown to have limited phonological inventories and syllable shapes.^{7–10} Impairments in multiple domains of language suggest that children experience difficulty with the language learning process in general or that some broad language learning mechanism is compromised. Although the exact nature of interactions among linguistic domains is not fully understood, the fact that phonology necessarily interacts with the other domains of language cannot be overlooked. This has led some researchers to suggest that phonological deficits should not be viewed independently of other aspects of linguistic behavior for intervention purposes.^{11,12} As a result, language-based approaches have been suggested as a means of targeting aspects of phonology as well as other linguistic behaviors when children have deficits in multiple domains of language.

WHAT ARE LANGUAGE-BASED APPROACHES?

Language-based approaches described here focus on all aspects of language; thus, little attention may be drawn to sound errors and these may not be specific targets of intervention. These approaches are differentiated from the use of naturalistic treatment techniques applied in phonological intervention,¹³ which are discussed later in this article. The basic assumptions underlying a language-based approach are: (1) that the focus in intervention should be on targeting all linguistic domains, of which phonology is just one; (2) that models of language processing can be employed to hypothesize why changes in phonology might re-

sult from language-based intervention; and (3) that the pragmatic limitations of unintelligible speech and an emphasis on the function of the phonological system to clarify communication will positively affect phonological output.

Historically, language-based approaches in phonological intervention are relatively recent,^{14–17} although Backus and Beasley¹⁸ suggested working first on language as a whole, then on its specific components, and then returning to focus on language for communication in a social context. Shriberg¹⁹ also suggested programming for the language component displayed in many developmental phonological disorders by careful selection of target responses (e.g., /s/ because of its morphemic role) and training stimuli (e.g., syntactically varied phrases).

Norris and Hoffman¹⁵ suggest that treatment improvements across all linguistic domains can be attributed to a process called “whole to part learning” in which children organize their knowledge of events into parts and create relationships among those parts. Syllables and phonemes are parts of larger wholes of words, phrases, and sentences that describe an event. Thus, as predicted by a top-down processing model, organizational changes in higher linguistic levels simultaneously might effect improvements in lower levels. Norris and Hoffman¹⁵ hypothesize that phonological performance improves as a result of their narrative intervention due to the numerous opportunities the child has to hear and produce the same sounds and syllable sequences in repeated story retellings. Presumably, in a narrative-focused intervention, phonological changes might occur because speech sounds are learned as part of the script for an entire event.

Other mechanisms might be responsible for change in phonological performance as a result of language-based intervention. Both interactive and connectionist models of language processing propose that levels reflecting domains such as syntax, the lexicon, and phonological elements are linked and processing occurs either in parallel or simultaneously.^{20–22} Interactions among phonological and syntactic levels can lead to trade-offs in either component.^{23,24} For example, it has been shown by Panagos et al²⁵ that increased syntactic and syl-

labic complexity leads to phonological breakdown in children with speech-language impairments. Improvements in language may increase automaticity and indirectly provide increased processing capacity for focusing on phonological forms, as predicted by interactive models of language processing.

Another factor that may contribute to change in phonological performance during language intervention is the nature of surface-level interactions in the English language. For example, production of the plural requires the addition of /s, z/, or /əz/ to a singular noun, depending on the final sound of the word. If a child does not produce consonants or consonant sequences in final position, plural endings are likely to be omitted from his or her productions. If, however, language intervention involves a focus on morphosyntax, it is possible that improvements in children's production of grammatical morphemes has occurred due to the improved ability to produce final phonemes or phoneme sequences.

Examples of Approaches

Both naturalistic and direct procedures have been shown to be effective in teaching new linguistic forms to children with language impairments.²⁶⁻³⁰ Norris and Hoffman's language-based approach^{15,16,31} focuses primarily on scaffolding narratives. The intervention is structured to enhance whole-to-part learning through storytelling at increasingly higher levels of discourse structure and semantic complexity. Discourse structure refers to the organization of parts of a cohesive narrative; semantic complexity refers to the level of abstractness in the language used to discuss a sequence of events. Pictures are provided from which the child can construct a temporal sequence of events with causal relationships among the events. The clinician then uses scaffolding in the form of comprehension questions to help the child talk about the picture with higher levels of discourse and semantic complexity. First the discussion is scaffolded from lower to higher levels of semantic complexity for each of the events depicted in the

picture. For example, at the lowest level, the clinician helps the child label objects and actions, then describe them, and finally, at the highest level, interpret the feelings and motivations related to the people and actions.

Next, the clinician scaffolds the discussion for each of the events in the picture. For example, the clinician helps the child to talk about temporal sequences at the lowest level of discourse complexity, then cause-effect relationships, and, at the highest level of complexity, internal plans and reactions of characters. In subsequent treatment sessions, pictures are repeated so that a child can retell a familiar story at higher levels of discourse and semantic complexity. Scaffolding can take the form of expansions for syntactically incomplete utterances, expatiation of a topic at a lower semantic level if the child appeared to misunderstand, and turn assistance devices. Turn assistance devices are used to facilitate the child's next utterance in a sequence and consist of a forced choice (e.g., "You could say _____ or _____"), a cloze procedure (e.g., "Now, the boy . . ."), or a preparatory set (e.g., "You could talk about what the girl is doing."). Comprehension questions are used throughout the procedure to review and assess the child's ability to talk about the information at higher discourse and semantic levels.

Focused stimulation is a common naturalistic language intervention technique that can be contrasted with more structured, clinician-directed elicitation or imitation procedures. Focused stimulation is designed to provide the child with multiple models of target morphosyntactic structures in a natural communicative context. The procedure involves recasts and expansions of the child's utterances and opportunities to use target forms in response to contextually relevant questions or prompts in pragmatically appropriate contexts. For example, Cleave and Fey³² describe the following different types of recasts that can be used when a child attempts a target structure: (1) expansions in which errors in the child's utterance are corrected, (2) recasts that involve changing the modality of utterance (e.g., from a declarative to a yes/no question), and (3) buildups and breakdowns whereby one or more

child utterances are modeled as complete sentences or broken down into their constituents. Cleave and Fey³² also describe procedures used in their experimental interventions to encourage children's attempts to use sentences requiring the target structure. These involve manipulating the environmental and linguistic contexts to create opportunities for the children to produce targets using techniques such as false assertions, forced choice questions, feigned misunderstandings, requests for elaboration, and withholding objects and turns.

Tyler et al³³ used elicited production procedures in addition to focused stimulation to increase opportunities for production of morphosyntactic targets. These elicited production activities, also used in the scaffolding provided by Hoffman and colleagues, were sequenced hierarchically from most to least amount of clinician support as follows: (1) forced choice tasks (e.g., "The man jumps, or runs?"), (2) cloze tasks (e.g., "What does the man do? He _____"), and (3) preparatory sets (e.g., clinician provides syntactic organization/indirect model and then gives child a turn to form own similar production: "I wonder how the boy is going to find them. Can you ask him?").

EFFICACY OF LANGUAGE-BASED APPROACHES FOR PHONOLOGY

A number of studies have examined the effects of language-based intervention on phonological performance. Matheny and Panagos³⁴ examined the effect of intervention focused on syntax versus intervention focused on articulation in 5- to 6-year-old children with problems in both domains compared with a control group. Each group made the greatest gains in the treated domain but also made improvements in the untreated domain. Thus, a language-based intervention focused on the development of complex sentence structure led to improved phonological performance. Hoffman et al¹⁴ contrasted their scaffolded narrative approach with a phonological process approach for two brothers with comparable phonological

and language deficits. They found that the narrative intervention facilitated greater gains in syntactic, semantic, and pragmatic performance as compared with the process approach, as well as gains in phonology that were to similar to those made by the brother who received phonological intervention. These results suggest that language intervention can indirectly facilitate improvement in phonology.

Recently, Tyler et al³³ investigated the efficacy and cross-domain effects of both a morphosyntax and a phonological intervention. Ten preschool children with both phonological and language impairments were assigned at random to an intervention of two 12-week blocks beginning with either a block focused on phonology first or a block focused on morphosyntax first. A control group of seven children did not receive intervention for a 12-week period. Treatment efficacy was evaluated after one block in the sequence was applied. Language goals addressed primarily finite morphemes, which mark tense and agreement, as these have been shown to be especially vulnerable in children with SLI.³⁵⁻³⁷ Tyler et al³³ found that the morphosyntax intervention was effective in facilitating change in a finite morpheme composite (FMC³⁸) after 12 weeks, in comparison with the control group. The FMC represented the combined percent correct usage of past tense -ed, third person singular regular -s, and contractible and uncontractible copula and auxiliary *to be* (BE) in obligatory contexts. In addition, the morphosyntax intervention led to improvement in phonology that was similar to that achieved by the phonology intervention. Thus, for children who received language intervention, the amount of phonology change was significantly greater than that observed for the control group. It should be noted that although the targeted morphemes were phonetically complex (e.g., CC#), phonological gains were not primarily a result of change in these forms as most children did not delete final consonants or clusters at the beginning of the study.

In contrast, additional studies have found that language intervention facilitated no change in phonological performance. Fey et al³⁹ exam-

ined the effects of language intervention involving focused stimulation and sentence recasts for 25 children with moderate to severe language and phonological impairments. Children were randomly assigned to a clinician treatment group, a parent treatment group, or a delayed treatment (control) group. Improvement was measured by developmental sentence scores (DSS⁴⁰) and percent consonants correct (PCC⁴¹), which is the total number of consonants produced correctly out of the total number of consonants attempted in a speech sample. The treatment groups made large gains in grammar after 5 months of intervention but did not improve in phonology. Further, gains in DSS were not correlated with gains in PCC. Goals for each child focused on forms such as the copula and auxiliary *to be*, negatives, and nominative case pronouns and were cycled over 4 weeks. Tyler and Sandoval¹⁷ also found that two children who received language intervention showed improvements in language but negligible improvement in phonology. Tyler and Sandoval examined the effects of treatment focused only on phonology, only on language, and on both domains for six preschool children with moderate to severe impairments in both language and phonology. Children who received the combined intervention approach showed marked improvement in both domains.

Findings regarding the effects of language intervention on phonology are equivocal. Although some results suggest that language intervention can facilitate improvements in phonology,^{14,33,34} results from Fey et al³⁹ suggest that treatment of morphosyntax does not facilitate developmental change in the phonological system. The Hoffman et al¹⁴ results should be interpreted with caution because of the small number of subjects and the fact that both subjects' language performance was in the low to normal range. Methodologically, the studies by Fey et al³⁹ and Tyler et al³³ had larger sample sizes and control groups. Results from these studies with experimental control are conflicting, perhaps because of the different measures used for phonological change. Fey et al³⁹ used a general measure, PCC, whereas Tyler et al³³ used a more discrete

measure of target and generalization phoneme accuracy.

NATURALISTIC INTERVENTION FOR PHONOLOGICAL DISORDERS

Naturalistic intervention for phonological disorders refers to the systematic use of facilitation strategies to target the increased accuracy of specific sounds/words and the elimination of error patterns. Camarata¹³ provides considerable discussion of a theoretical model for naturalistic intervention with speech sound disorders. Just as naturalistic language intervention approaches developed as an alternative to direct approaches in order to resemble more closely the normal language acquisition process, phonological intervention could more closely resemble normal phonological acquisition, namely an auditory-perceptually based process. Such models of normal speech and language acquisition recognize the importance of linguistic input and hypothesize the need for concentrated and/or focused input for children with developmental speech and language problems. Wilcox and Morris⁴² suggest that the "concentrated normative model,"⁴³ which has been successfully applied in the Language Acquisition Preschool (LAP) at the University of Kansas to facilitate growth in other linguistic domains, should facilitate growth in phonology as well. The guidelines for this model highlight the meaningful social context of language, the role of the child, the opportunity for passive learning, and the functional value of verbal interaction.

Naturalistic intervention for phonology is accomplished within natural conversational interactions by using frequent models and recasts, few direct elicitations, and no direct reinforcement while at the same time providing opportunities for verbal interaction. Goals focus on specific phonemes and/or error patterns, and activities are designed to highlight these. Recasts as applied to phonological errors consist of a model that immediately follows a child's utterance containing a sound error.

Camarata¹³ suggests that recasts be in the form of single-word utterances to highlight the correct sound production. For example, if a child says, "I see the tun (sun)," the recast would be simply, "sun." In the LAP at Kansas, appropriate phonological input in the form of focused contrasts is embedded in conversational interactions as they arise and present opportunities to draw attention to target sounds. For example, if a child requesting to have a turn fanning herself in a dramatic play activity says, "I want the pan," the teacher might respond by saying, "You want the fan. I don't think we have a pan. A fan makes us nice and cool. Ask Susie for the fan."

Results of Wilcox and Morris⁴⁴ from the application of naturalistic techniques for phonological problems in the Language Acquisition Preschool suggest that they were effective for the children enrolled. These children were diagnosed with SLI; however, 81% of the 32 children with sufficient data also had phonological difficulties. Comparison of Goldman-Fristoe Test of Articulation⁴⁵ raw scores and percentile ranks from program entry to exit indicated that the children with SLI made considerable gains that reflected a greater rate of growth than that of their normally developing peers. Wilcox and Morris⁴⁴ interpreted these results as support for application of conversationally based naturalistic techniques to phonological intervention.

The conflicting results from well-controlled group studies regarding improvements in phonology from morphosyntactically focused language interventions underscore the fact that individual children may respond differently from the group norms. Individual children in each of the group studies made marked improvements in phonology when receiving morphosyntactic intervention. Further, there is some evidence suggesting that phonological change results from the application of naturalistic intervention techniques aimed at specific target sounds in conversational contexts. We also cannot overlook the fact that language intervention may be the better choice for certain children who have phonological deficits in addition to deficits in other linguistic domains. Having discussed the possibilities and limitations of language intervention techniques for facilitating change in

phonological performance, in the remainder of this article we consider the following: (1) how to assess success and results to expect, as demonstrated through a case example; (2) characteristics of children with phonological impairment for whom a language-based approach may be a good choice; and (3) advantages of a language-based approach.

HOW TO ASSESS SUCCESS AND RESULTS TO EXPECT

If we are interested in phonological improvement resulting from a language-based intervention, we would want to assess overall changes in the phonological system. We can assess smaller changes only when we have specific sound targets on which to observe change or from which to predict generalization to other phonemes, features, and/or contexts. We would, however, want to consider aspects of the phonological system revealed by both independent and relational analyses. These analyses could be performed on words transcribed from a spontaneous speech sample or from a single word citation sample, obtained from a standard articulation test. For busy clinicians, our recommendation would be to use a citation sample as the basis for some simple analyses. First, determination of a phonetic inventory before and after intervention would be one important measure of change provided through independent analysis. From a relational analysis, PCC, percent word match, a substitution analysis, and process application could be determined.

Table 1 provides an analysis of PCC, percent word match, and phonological processes from a small sample. PCC is relatively easy to calculate and provides a severity metric of phonological disorder. In addition, an increase in PCC is an indicator of change across the entire phonological system, as the accuracy of all consonants attempted is represented in the measure. Percent word match refers to the percent match in syllable shape of a child's productions in comparison with the targets in a sample.⁴⁶ For example, if the target is a CVC shape and the child produces a CVC, there is a

Table 1 Sample Analysis of Percent Consonants Correct (PCC), Percent Word Match (PWM), and Phonological Process Analysis (PPA)

Target	Production	PCC	PWM	PPA
leaf	wip	0/2	CVC > CVC +	GL, St
bus	bʌs	2/2	CVC > CVC +	
seal	sio	1/2	CVC > CVV –	Voc
fish	sɪ	0/2	CVC > CV –	Assim. FCD
sun	nʌn	1/2	CVC > CVC +	Assim.
thumb	bʌm	1/2	CVC > CVC +	Assim.
fire	dawə	0/1	CVV > CVCV –	St, GL
clown	kaʊn	2/3	CCVC > CVC –	CR
sled	jəd	1/3	CCVC > CVC –	CR, GL
kangaroo	tewewu	0/4	CVCCVCV > CVCVCV –	VF, Assim. GL, CR
		8/23 = 35%	4/10 = 40%	

GL, gliding of liquids; St, stopping; Voc, vocalization; FCD, final consonant deletion; CR, cluster reduction; VF, velar fronting.

match in syllable shape regardless of the accuracy of individual phonemes, but a CV would not be a match. A substitution analysis performed through the use of a published grid⁴⁷ or chart such as that in Table 1 provides a quick reference point for scanning for phonological process usage. Consistency can be captured with a measure termed the Consistency Index (Table 2).⁴⁸ This is a measure of overall consistency defined as a raw number that reflects the combined total number of different substitutions for each of the 23 phonemes, across all word positions. An example of the calculation of the Consistency Index for a small set of phonemes is provided in the accompanying box. A low consistency score reflects fewer errors per phoneme, whereas a high consistency

score reflects a greater number of different errors for each phoneme throughout the system.

The consistency with which a child substitutes, omits, or adds a particular phoneme for a target phoneme across positions may be a variable that changes in language-based intervention. Meyer⁴⁸ found that system-wide consistency was the only variable related to PCC change from among phonetic inventory size, consistency, chronological age, and finite morpheme composite. Consistency accounted for approximately 30% of the change evidenced in 20 children who had received phonological intervention. A higher consistency score was a positive indicator of change.

Case Example

To demonstrate use of the preceding measures to assess phonological improvement during a language-based intervention, we provide a case example. Connor was a 4 year, 10 month old boy enrolled in an intervention project (NIDCD 03358) administered at his school district's early childhood program. He was diagnosed with both a phonological and morphosyntactic language impairment; his standard scores on the Bankson-Bernthal Test of Phonology (BBTOP⁴⁹) were <65 on the Consonant Inventory, <65 on the Word Inventory, and 67 on the Phonological Process Inventory,

Table 2 Calculation of the Consistency Index

Target	Substitutes			Total
	Initial	Medial	Final	
m	w, j		n	3
p			ə	1
tʃ	t, tw		ts	3
dʒ	d		ts, p	3
f	s, d, w	n	ə, p	6
v	m, b	b	b, p, ə	4
s	n, t	w	ə, ?	5
z	s		ə, ts	3
				Total = 28

Table 3 Connor's Preintervention Word-Initial and Word-Final Inventories

	Labial	Interdental	Alveolar	Palatal	Velar	Glottal
Initial position						
Stops	p, b		d, t		g, k	
Nasals	m		n			
Glides	w			j		
Fricatives			s	ʃ		h
Affricates						
Liquids			l			
Final position						
Stops	p, b		d, t		g, k	
Nasals			n		ŋ	
Glides						
Fricatives			s			
Affricates						

where scores of 85–115 represent the normal range. On the Preschool Language Scale–3 (PLS-3⁵⁰) he received a total score of 71 and his mean length of utterance (MLU) from a 200+ utterance sample was 1.94. He had normal nonverbal cognitive performance on the Columbia Mental Maturity Scale (CMMS⁵¹), as evidenced by a score of 98, and hearing within normal limits. Connor's use of finite morphemes, which mark tense and agreement, was calculated from the initial language sample and reported as a finite morpheme composite (FMC³⁸). Connor's FMC was 11.69%, indicating that he rarely used finite morphemes accurately.

Connor's phonological measures were taken from the BBTOP sample, which was supplemented with 15 additional words to provide a minimum of three opportunities for each consonant in word initial and final positions, according to English phonotactics. Connor's PCC from this citation sample was 49%, which corresponds to a severe rating. His percent word match was 56%. His word-initial inventory is displayed in Table 3 and contained primarily stops, nasals, glides, and a few fricatives. His word final inventory, also in Table 3, contained stops, nasals, and /s/. Connor's Consistency Index was 55, a high score in comparison with the mean of 31 for the 20 children Meyer studied.

After preintervention assessment, Connor received 12 weeks of language intervention focused on the morphemes third person singular regular, contractible and uncontractible copula BE, past tense -ed, and past tense irregular. Each goal was targeted for 1 week during a 4-week cycle. The cycle was repeated two times, so there was a total of three cycles (12 weeks) of intervention focused on morphosyntactic goals. Language intervention procedures involved language activities centered around a theme such as food, animals, or water. Each session included auditory awareness activities, focused stimulation activities, and elicited production activities. At the end of the 12-week intervention, a language sample was collected and the BBTOP and supplemental words were readministered. An independent analysis showed that /f, tʃ, dʒ/ had been added to the word-initial inventory and /f, v, m, z, r, tʃ, dʒ, ʃ/ had been added to the word-final inventory. Connor had added five new phonemes to his inventory: /f, v, z, tʃ, dʒ/.

A summary of postintervention results is shown in Table 4. Connor's PCC improved by 20%, from 49% to 69%, placing him in the mild-moderate category; his PWM improved from 56% to 78%. Connor's Consistency Index decreased from 55 to 29, indicating that his productions of all phonemes across word positions became more consistent. Specific processes that

Table 4 Connor's Pre- and Postintervention Phonology and Language Measures

Measures*	Preintervention	Postintervention
Phonological measures		
PCC	49%	69%
PWM	56%	78%
CI	55%	29%
Stopping of fricatives	33%	18%
Stopping of affricates	58%	8%
Voicing	29%	14%
Cluster reduction	85%	26%
Language measures		
MLU	1.94	2.87
FMC	12%	41%
Third person singular	0%	33%
Contractible copula	13%	64%
Past tense /ed	0%	33%
Past tense irregular	57%	55%

*PCC, percent consonants correct; PWM, percent word match; CI, Consistency Index; MLU, mean length of utterance; FMC, finite morpheme composite.

Connor exhibited are also shown in Table 3. Cluster reduction in particular decreased markedly; however, stopping also decreased considerably. It is interesting to note that cluster occurrences on the BBTOP are primarily in the initial position and not final, which might hypothetically be affected by an intervention focused on grammatical morphemes such as third person singular regular and past tense -ed. Connor's language, as measured by MLU and the FMC, had also improved. Connor displayed an increased accuracy for some of his language targets in obligatory contexts, notably the contractible copula, which increased by 51%. Thus, both Connor's phonology and morphosyntax improved as a result of the language-based intervention.

WHICH CHILDREN ARE APPROPRIATE FOR A LANGUAGE-BASED APPROACH?

Language-based approaches clearly appear to be most appropriate as a possible intervention choice for the subgroup of children who display both speech *and* language impairments. These children's phonological performance is

below age-level expectations, as is their expressive language performance, at a minimum, and perhaps their receptive language performance as well. From this group of children, the difficulty is in determining which children will improve their phonology as a result of language-based intervention, because group study results suggest that many will not.

In an attempt to begin to answer this question, we examined phonological improvements for a group of 10 children who had both speech and language impairments and who had received morphosyntactic intervention as part of a large-scale intervention study (NIDCD 03358). The intervention described earlier in the case example was provided for a 12-week period. Table 4 displays the 10 children's preintervention phonology measures and PCC change scores. Using PCC change as an overall estimate of phonological improvement, it was determined that the four children who made rather marked change in PCC (04, 08, 15, 17) were also the children with the highest pretreatment Consistency Index scores. Children 4, 8, 15, and 17 had PCC change of 12%, 15%, 20%, and 13%, respectively, all of which were above the mean of 8% for the group of 10 children (see Table 5). The children's consistency

Table 5 Preintervention Phonology Measures and PCC Change for 10 Children Receiving 12 Weeks of a Language-Based Approach

Subject	PCC (%)	PWM (%)	Consistency Index	Inventory Size	FCD/CR	PCC (%) Δ_{1-2}
B4	35	49	47	11	17	12
B5	76	84	17	19	0	-2
B6	65	62	20	16	9	8
B8	62	60	34	17	4	15
B10	56	67	25	18	9	5
B15	49	56	55	14	13	20
B16	71	74	23	20	4	4
B17	56	64	32	17	3	13
B18	79	89	16	20	13	3
B20	71	73	21	20	4	6

PCC, percent consonants correct; PWM, percent word match; FCD/CR, final consonant deletion/cluster reduction.

scores were 47, 34, 55, and 32; these four were the only scores above the mean of 29 for the group. Thus, the children with the most inconsistent errors made the greatest change in phonology from a morphosyntactic intervention. These results correspond with Meyer's⁴⁸ finding that system-wide inconsistency was a moderately strong predictor of PCC change, which is a measure that reflects system-wide change. It is also interesting to note that two of the children's initial PCCs were in the severe range (35% and 49%) and two were in the moderate-severe (56% and 62%) range. Further, four of the six children who did *not* show as marked change in PCC had initial PCCs in the mild-moderate range.

It might be hypothesized then, that children with greater inconsistency in the use of phonemes across all positions, as well as a tendency toward greater severity as measured by pretreatment PCC, may be those most likely to demonstrate phonological improvements from a morphosyntactic intervention. This hypothesis remains to be empirically tested. Of note, Fey et al³⁹ examined the data for seven children with the lowest phonological deviancy scores on the Assessment of Phonological Processes—Revised (APP-R⁵²) to test the hypothesis that children with less severe phonological impairments should profit most from a language-based intervention.⁵³ Fey et al³⁹ found

that, for the most part, these children did not make marked improvements in PCC after 5 months of their grammatical intervention. In fact, the present results suggest just the opposite, that children with more severe phonological impairments may profit most from a morphosyntactic intervention. If consistency is an important variable related to phonological change, it is plausible that a highly inconsistent system might benefit from a language-based approach. Such an approach provides exposure to all phonemes across positions in the context of conversational speech. This, in turn, provides more diversified stimuli and more varied opportunities for productions than a purely phonological approach that is focused on specific phonemes.

In addition to children with both speech and language impairments, there are several other groups of children with concomitant deficits who may benefit from a language-based approach. Children who have phonological impairments and fluency concerns and children who have phonological impairments secondary to cognitive limitations may also be candidates for naturalistic language intervention as a vehicle for alleviating their phonological difficulties. Conture et al⁵⁴ suggest that naturalistic, conversationally based procedures circumvent attention focused on difficulties with speech sounds for children with fluency

concerns. Children with cognitive limitations, in contrast, may simply be resistant to the imitation procedures used in many phonological interventions.

WHAT ARE THE ADVANTAGES OF A LANGUAGE-BASED APPROACH?

There are several advantages of a language-based approach, particularly for children with both speech and language impairments. For these children, simultaneous improvements may occur in both domains as demonstrated in the case example. Several of the children in our group of 10 who received grammatical intervention and improved markedly in phonology also made improvements in their language measures. If gains can be made in both phonology and morphosyntax from a language-based approach, then greater overall gains should occur in a shorter time period.

Some children with both speech and language impairments may benefit from a language-based approach because their development of language is more protracted than their development of phonology. Results from long-term normalization studies suggest that the phonologies of children with a history of speech delay are typically within the normal range by the age of 8.^{55,56} Longitudinal studies of SLI, in contrast, suggest that morphosyntactic deficits remain at 8 years of age and even into adolescence.³³ Children with SLI have not caught up to their peers in finite morpheme usage and have error rates that are higher than those of their peers, even if they have received intervention. The phonological system may mature, without intervention, at a faster rate than the morphosyntactic system.

Naturalistic language-based approaches also have an advantage in that the focus is on speech for communication purposes, typically in conversational contexts. A clinician can highlight contexts in which the pragmatic limitations of unintelligible speech are readily apparent. Finally, language-based approaches are ideal for group, classroom, and collaborative settings. Service delivery options may not allow

individual or small group therapy focused on specific speech sounds. Further, because of eligibility criteria, phonological goals may not take precedence when there are both speech and language deficits.

CONCLUSION

Clearly, a language-based approach will not be an appropriate choice for all children with phonological impairments. There are children, however, for whom a language-based approach may be an ideal choice. Determining who these children are is difficult, although some preliminary data suggest that children with both speech and language impairments, whose phonological systems are highly inconsistent, may be good candidates for a trial morphosyntactic language-based approach. Service delivery restrictions and eligibility criteria may also dictate for which students a language-based approach may be used. If a clinician chooses a language-based approach focused primarily on morphosyntax for a child with phonological deficits as well as deficits in other domains, consideration could be given to incorporating goals for target sounds or error patterns. This could be achieved by designing activities around words containing target sounds and sabotaging the environment to increase the contexts for these words. The choice of a language-based approach presumes the responsibility of the practitioner to monitor closely phonological progress and to consider making adaptations in the approach should the client's progress suggest that this is necessary.

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