Language, Speech, and Hearing Services in Schools, Volume 24, 10–18, January 1993

Speech Normalization in Developmental Phonological Disorders: A Retrospective Study of Capability-Focus Theory

Joan Kwiatkowski
Lawrence D. Shriberg
University of Wisconsin-Madison

A two-factor theory is proposed to explain individual differences in intervention outcomes for children with speech delays. Indices of *Capability* include linguistic measures of a child's comprehension and production phonology and risk factors. Indices of *Focus* include clinical responses to children's motivation for speech change and level of effort. Retrospective data from clinical records of 75 children who received intervention services in a phonology clinic provide a preliminary test of the proposed two-factor theory. Discriminant function analyses suggest that correlates of Focus are sensitive to factors associated with failure to make progress during intervention. Implications of these findings for prospective predictive research are discussed.

KEY WORDS: phonology, prediction, assessment, intervention, normalization

Currently, there is no comprehensive explanation for the individual differences in outcomes and rates of progress of young children receiving services for developmental speech delays. Despite over 50 years of research studying the predictive power of pre-intervention variables—such as age, gender, severity of involvement, intelligibility, productive error patterns, presumed underlying phonological representations, and putative etiological constraints—no one demographic, linguistic, etiologic, or risk factor has been able to predict rates of target acquisition or generalization (see reviews in Bernthal & Bankson, 1988; Newman, Creaghead, & Secord, 1985; Stoel-Gammon & Dunn, 1985; Weiss, Gordon, & Lillywhite, 1987; see also Dinnsen & Elbert, 1984; Olswang & Bain, 1985; Shriberg & Kwiatkowski, 1982a, 1987; Tyler, Edwards, & Saxman, 1990; Williams, 1991). In lieu of psychometrically reliable predictive instruments, clinicians continue to base intervention decisions on two classes of nonstandardized speech tasks: various analyses of a child's error pattern and sound-by-sound stimulability testing.

A relevant variable that has not been well studied in the prediction literature is the domain of individual differences associated with level of motivation or effort. If status on speech-language measures and all case history data reflect a child's current capability for speech change, what can be said about a child's typical and momentary disposition toward effecting that change? In practice and as represented in most clinical models (e.g., Shriberg et al., 1975), much of a clinician's intervention activities and manifest skill appears to be directed toward interpersonal factors. In our phonology clinic, for example, we have seen this variable domain addressed in clinician reports by such concerns as whether a child is "attentive," "motivated," "trying," "concentrating," "picking up on cues," "tuned in," "making the best possible effort," and so forth. Rather than dismiss the relevant processes underlying such subjective observations as beyond reliable measurement, we initiated a study series to develop a metric of this trait/state domain. The approach is termed *two-factor theory,* and the central research assumption is that a child's *Capability* and a construct termed *Focus* determine intervention outcomes.

Two-Factor Framework

Figure 1 is a representation of the two-factor framework. All elements relevant to phonological learning are subsumed under two variable domains, Capability and Focus. Phonological learning is operationally defined as the documented acquisition of phonological targets and evidence of stimulus or response generalization. As shown in this simple representation, some minimal level of both capability and focus are assumed to be necessary for learning to occur; that is, neither alone is sufficient.

Figure 2 includes the list of variables available in a speech-language assessment protocol that are used to index a child's capability and focus. Capability variables are divided into *linguistic variables* and *risk factors.*

0161-1461/93/2401-0010$01.00/0

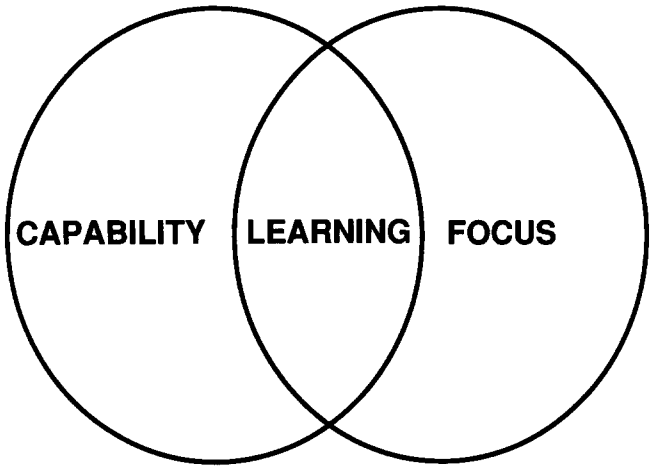

FIGURE 1. A two-factor framework for learning.

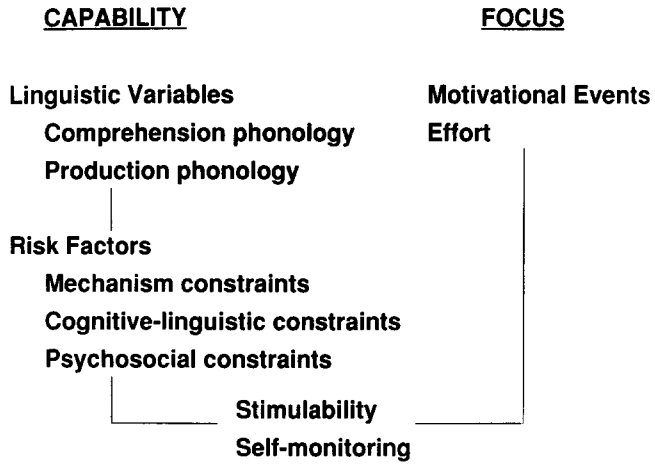

FIGURE 2. Capability and Focus domains in the two-factor framework.

Linguistic variables subsume two subdomains: the status of the child's comprehension phonology, as reflected in speech discrimination status and other tasks, and the content and consistency of the child's production phonology. Production phonology includes both segmental variables (such as the pattern of word shapes, phonetic inventory, and phonemic inventory) and suprasegmental variables divided into Phrasing, Rate, and Stress (Shriberg, Kwiatkowski, Rasmussen, Lof, & Miller, 1992). Capability also includes Risk factors associated with constraints in the structure or function of the hearing and speech mechanisms, cognitive-linguistic processes, and psychosocial functioning (Shriberg & Kwiatkowski, 1982a; Shriberg, Kwiatkowski, Best, Hengst, & Terselic-Weber, 1986). For example, fluctuating hearing levels associated with episodes of otitis media with effusion is a mechanism constraint; poor auditory memory is a cognitive-linguistic constraint; and an adverse child-rearing environment is a psychosocial constraint.

The two variables that index Focus are *motivational events* and *effort*. Although typically viewed as being in the realm of subjective, interpersonal information, these domains are familiar and central to the speech-language clinician, who must constantly observe the client's focus and manipulate tasks to maintain it. As described in Shriberg and Kwiatkowski (1982b) and operationally defined in the present study, motivational events are those reinforcers for speech change that occur within the child's natural environment or that are provided by the clinician during intervention. Effort is operationally defined as the degree to which the child works for speech change under different levels of motivational events. Currently, the cues used to determine the child's need for more powerful motivational events are determined from live and videotaped observational scoring of discrete behaviors subsumed in the four categories of eye gaze, facial expression/oral gestures, verbal behaviors, and motor/postural behaviors (Shriberg, Kwiatkowski, & Snyder, 1989, 1990). Note that in the current perspective on two-factor theory shown in Figure 2, *stimulability* and *self-monitoring* are presumed to reflect components of both Capability and Focus. Capability defines the potential for demonstrating stimulability or self-monitoring; access to this potential presumably requires some threshold level of Focus.

Two-factor theory generates testable hypotheses that can be assessed in linear and nonlinear statistical models. For example, children may have the necessary motivation for change at a particular step in an intervention program, but lack the capability for change; they may have the required capability, but lack the motivation for change; or they may have or lack both. For two children with similar levels of capability, their level of focus may determine whether progress is slow or rapid. As suggested in studies of self-repairs (Clark & Andersen, 1979; Gallagher, 1977), focus presumably impels a child to make the effort to note and correct differences in his or her production in relation to the ambient language.

The current retrospective study was conducted to test only the general question of whether the Focus construct can be shown to be a statistically significant predictor of intervention outcome. If support were found for the two-factor framework using case record measures in a fairly large database, it would warrant the development of observational measures and methods for prospective studies.

METHOD

Clinical records were reviewed for 164 children seen in a university phonology clinic during the 7-year period between September 1984 and May 1991. Children seen during this period were candidates for selection because the content and form of their intervention programs were variants of the same basic management paradigm (Shriberg & Kwiatkowski, 1982b, 1990), because the graduate students who provided intervention services were supervised by the same clinical supervisor, and because the same reporting format was used for generating clinical records. Demographic data recorded for all subjects in-

cluded gender, chronological age at time of referral, and classification on a preliminary version of the 10-category Speech Disorders Classification System (SDCS) (Shriberg, in press). This latter measure was used to categorize subjects into one of 10 classifications based on the speech data from conversational samples obtained when first enrolled in the clinic. The categories essentially differentiated children with *questionable* speech delay from those with *nonquestionable* delay and subdivided both groups into those with *common* versus *uncommon* distortion errors (e.g., Shriberg, 1986; Smit, Hand, Freilinger, Bernthal, & Bird, 1990; Smit, 1991).

For the Capability and Focus variables, a three-level ordinal scale was developed to code behaviors in the clinical records that reflected status at the time of referral and throughout management. A *0* represented normal or high performance; *1* represented moderate status or intermediate performance between *0* and *2;* and *2* represented nonnormal or low performance (cf., Shriberg & Kwiatkowski, 1982a; Shriberg et al., 1986). Capability variables available in the clinical records included measures of word forms, consonant inventory at the level of sound classes, vowel production, stimulability, self-monitoring skills, and the three risk-factor domains. Focus variables included information on the level of motivational events required to maintain attention and optimum performance, and the degree to which the child's effort was a significant issue in modifying the basic management plans during acquisition and generalization phases of intervention.

The dependent or outcome variable was a measure of speech change progress at the end of one semester for children seen for at least one university semester or at the end of the diagnostic teaching period for children who were seen only for shorter periods. Specific response definitions to code intervention progress as *minimal, moderate,* or *maximal* were developed based upon linguistic level per target at the beginning versus the end of the intervention period and the proportion of targets showing each described change in linguistic level. The Appendix provides the codes and response definitions for all SDCS classifications, and for the Capability, Focus, and outcome variables.

All coding was completed by the first author. An intrajudge point-to-point reliability estimate was obtained on a 15% randomly selected sample of records recoded 3 months following the original coding. Intrajudge agreement ranged from 80% to 85% for all Capability, Focus, and outcome variables combined and from 93% to 97% for the three variables included in the discriminant function analyses. A randomly selected 10% point-to-point interjudge reliability check provided by a clinically-experienced research assistant yielded an overall percentage of agreement of 93% to 96% for the combined variables and from 91% to 96% for the three variables selected for the discriminant function analyses. The ranges in reliability percentages were a function of the stringency of the criteria used for identifying coding agreements, with the higher percentages obtained when comparisons involving a code and an asterisk (to indicate that the variable could not be coded) were not counted as disagreements.

RESULTS AND DISCUSSION

Statistical analyses proceeded in three steps. First, a series of preliminary analyses tested whether age, gender, or SDCS classification was associated with degree of progress on the outcome variable. Next, discriminant function analyses assessed the power of Capability and Focus variables to discriminate minimal versus maximal progress. Finally, a descriptive analysis inspected individual subject profiles.

Age, Gender, and SDCS Classification

The general findings from the preliminary analyses of age and gender were that neither were statistically associated with intervention outcomes. A t test of the mean ages at referral of the 164 boys (56.5 months; $SD = 24.9$) and girls (59.3 months; $SD = 22.3$) who received only assessment and/or intervention services was nonsignificant [$t(112) = .28, p < .78$]. Also, for the 134 boys and girls from the total sample who received intervention services, divided into those who made minimal, moderate, and maximal progress in treatment, a chi-square test of proportions was not significant [$\chi^2(2) = 4.16, p < .20$]. As shown in Figure 3, however, some possible trends in the percentages are notable for future studies, with the overall proportions suggesting that fewer boys than girls made maximal progress.

Finally, Figure 4 is a display of intervention progress in relation to the mean ages of the 134 boys and girls who received intervention services. Analysis of variance by regression indicated that the means were not significantly different [$F(2) = 12, p < .89$]. Again, however, some possibly interesting trends suggest that compared to the means for boys, which were consistent with developmental predictions of increased progress with an increase in age, the age X intervention progress means for girls were not orderly.

A statistical analysis for possible differences in the classification of boys and girls was also nonsignificant. Figure 5 is a display of the outcome data for the two more speech-involved categories in the preliminary version of the Speech Disorders Classification System (SDCS) (Shriberg, in press). The speech errors of children designated *speech-delayed* in the left set of bars included only common distortions in addition to deletion and substitution errors. In contrast, the speech errors of children designated *speech-delayed+* in the right set of bars included at least 20% distortion errors considered uncommon (e.g., imprecise speech sounds, notably lengthened speech sounds). Chi-square tests of the proportion of children in each group who made minimal, moderate, and maximal progress were nonsignificant, although trends in the data suggest that compared to the speech-delayed children, proportionally more of the speech-delayed+ children made moderate rather

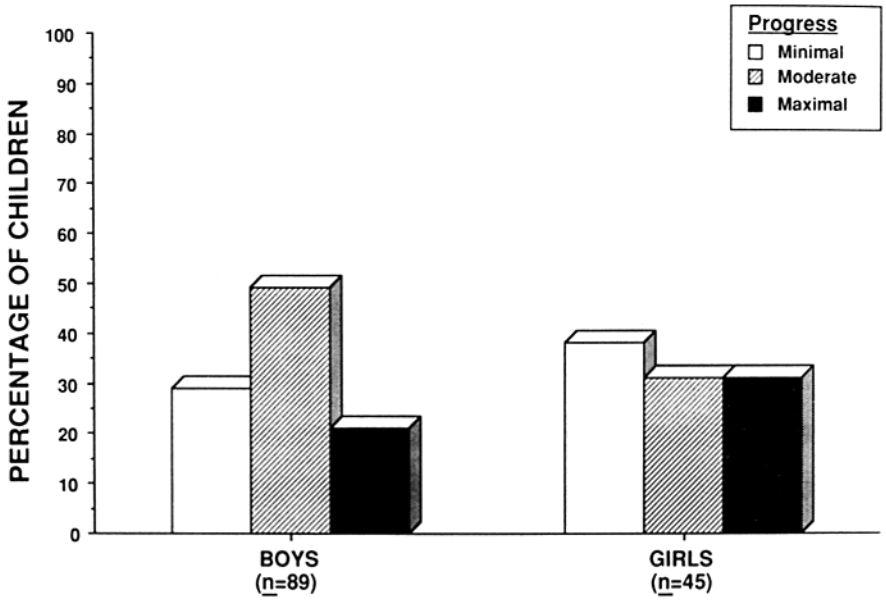

FIGURE 3. Percentage of boys and girls who made minimal, moderate, and maximal intervention progress.

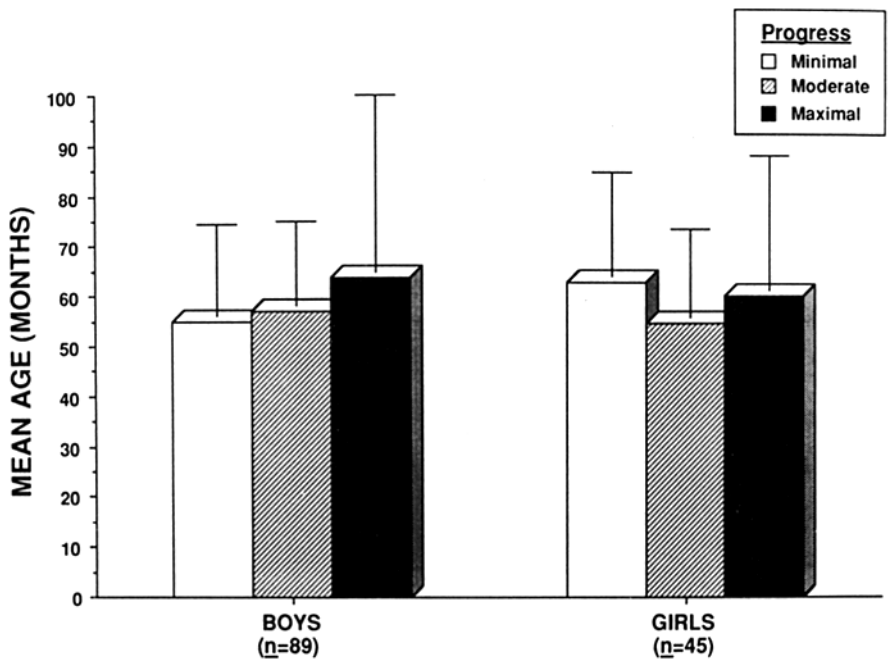

FIGURE 4. Intervention progress in relation to boys' and girls' ages at the onset of intervention.

than maximal progress. As before, given the methodological limitations of these retrospective data, such trends are notable for prospective study.

Discriminant Function Analyses

On the basis of the nonsignificant demographic and speech-severity findings in the first set of preliminary analyses, discriminant function analyses were collapsed over age, gender, and SDCS classification. Two technical constraints had to be met to run discriminant analyses on the available data using the SPSS Discriminant program running in the VAX environment (SPSS Inc., 1991). First, the intervention outcome data had to be represented dichotomously. To meet this requirement, all subjects making moderate progress were eliminated. Second, it was necessary to reduce the variables-to-subjects ratio to avoid singularity that resulted from having fewer than the required number of subjects in the equation. A series of

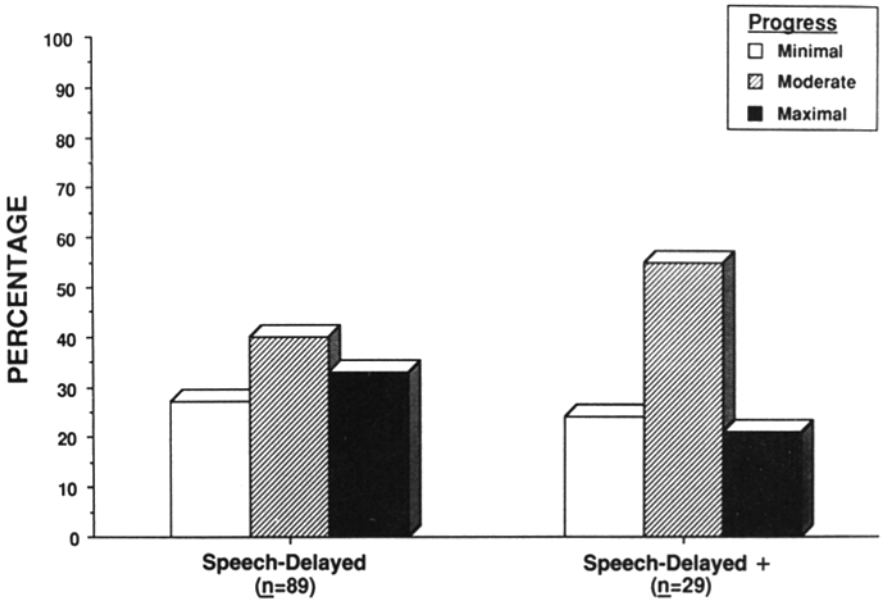

FIGURE 5. Intervention progress in relation to classification as *speech-delayed* and *speech-delayed+*.

discriminant functions were run to test different models, including inspection of the results of intercorrelation matrices and univariate *F* tests to remove highly intercorrelated and noncontributing variables. Also, variables for which coding validity was questionable due to the absence of supportive notations in the clinical record were eliminated. The results of these procedures suggested that the retention of one variable in each of the two construct domains provided the optimum configuration for discriminant function analyses. The variable selected for Capability was consonant inventory. The variable selected for Focus in this retrospective study was termed *focus*, reflecting the degree to which motivation/effort was an issue that consistently needed to be addressed during the acquisition phase of intervention.

Table 1 is a summary of the results of the discriminant function analyses using the 75 to 76 subjects for whom adequate case records data for all relevant variables were available. As indicated in the first row of the table, the attempt to discriminate intervention progress solely with the Capability variable—consonant inventory—yielded statistically and clinically significant correct discrimination of 100% of the children who made maximal progress. However, measures of consonant inventory at the outset of intervention correctly predicted only 33% of those children classified as making only minimal progress. The results of a second discriminant function using both consonant inventory and focus yielded a 91% correct classification of children making maximal progress. The percentage of correct outcome classifications among children making only minimal progress increased from 33% to 59%. Thus, when these preliminary, ordinal measures of Capability and Focus were used, correlates of Focus appeared to be most sensitive to factors associated with the failure to make significant progress during intervention.

Subject Analysis

To examine the Capability-Focus status of children who made minimal versus maximal progress, each child was assigned to one of four subgroups. The results are displayed in Figure 6. Status on each of the predictor variables, Capability and Focus, is indicated along the bottom of the figure as *good* (i.e., received a 0 on the variable) or *problem* (i.e., received a 2 or a 1 on the

TABLE 1. Discriminant function analyses.

Variables in the equation	*Number of subjects*	*Percentage Correctly Classified*		*Discriminant function*		
		Minimal progress	*Maximal progress*	χ^2	*df*	*p*
Capability only consonant inventory	76	33	100	20.35	1	<.0001
Capability and Focus consonant inventory focus	75	59	91	31.04	2	<.0001

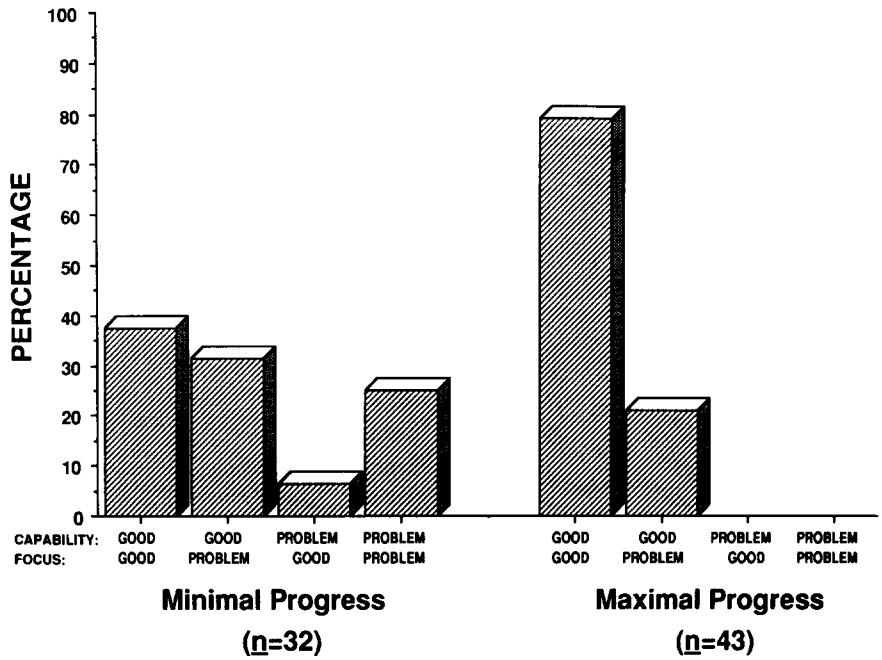

FIGURE 6. Subject analysis of Capability-Focus status in relation to intervention progress.

variable). Three aspects of these percentage data are of interest. First, within the maximal progress group on the right side of Figure 6 there were no children coded as *problem* on both Capability and Focus, or *problem* on just Capability. In comparison, a total of 31% of children in the minimal progress group on the left side had a problem in Capability or a problem with both Capability and Focus. Second, almost 80% of children making maximal progress were those coded as *good* on both Capability and Focus, whereas only approximately 38% of the minimal progress group were coded as *good* on both variables. Finally, it is noteworthy that within the group of children making maximal progress, approximately 21% had problems in Focus. In these cases in which Focus was a significant issue addressed during intervention, the clinical records included statements such as "lack of motivation for speech change," "highly distractable," "fear of failure," "unwilling to risk being incorrect," "easily frustrated and discouraged if not immediately successful," and "unwilling to attempt difficult speech tasks." Most generally, these individual subject data are consistent with the implications of the discriminant function analyses, placing Capability as the more significant, but not sufficient predictor of intervention outcome. It is not clear, however, why some children coded *good* on both the Capability and Focus variables made minimal progress.

CONCLUSIONS

As with all retrospective data, the findings from this study reflect limitations in measurement sensitivity. Moreover, no data were available on possible individual differences in clinician style and caregiver inputs that might have enhanced or possibly constrained intervention progress. Notwithstanding these methodological caveats, information from this retrospective study appears to provide preliminary support for the two-factor learning framework. The finding that some children who are linguistically capable and who made maximal progress required clinicians to make significant manipulations of tasks and reinforcers to achieve focus suggests that focus constraints might be crucial to eventual speech change. Conversely, findings for the children with speech delays who made minimal progress suggest that some threshold level of capability might be required for a child to be self-focused without the clinician's manipulation of teaching tasks and reinforcers to motivate attention and effort.

More generally, study findings suggest that predictive models of speech change that include only linguistic capability and risk variables—however well developed linguistically or statistically—will not be sufficient to predict the progress of individual children. Rather, as in other areas of communicative disorders in which predictive measures include a variety of individual difference variables, an effective predictive measure for children with speech delays might need to account for individual differences in motivation and effort. A series of prospective studies to assess the predictive power of the Capability-Focus framework for short-term and long-term speech normalization have been initiated (Shriberg, Kwiatkowski, & Gruber, 1992).

ACKNOWLEDGMENTS

The authors thank all the student clinicians whose clinical reports in the phonology clinic at the University of Wisconsin-

Madison between September 1984 and May 1991 provided the data for this study. They also thank Doris Kistler for steady statistical guidance and Dorothy Rorick for excellent editorial assistance. Research was supported by the Public Health Service, National Institute on Deafness and Other Communication Disorders, Grant DC-00496.

REFERENCES

BERNTHAL, J. E., & BANKSON, N. W. (1988). *Articulation and phonological disorders* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

CLARK, E. V., & ANDERSEN, E. S. (1979). Spontaneous repairs: Awareness in the process of acquiring language. *Papers and Reports on Child Language Development, Stanford University, 16,* 1–13.

DINNSEN, D. A., & ELBERT, M. (1984). On the relationship between phonology and learning. In M. Elbert, D. A. Dinnsen, & G. Weismer (Eds.), *Phonological theory and the misarticulating child. ASHA Monographs, 22,* 59–68.

GALLAGHER, T. (1977). Revision behaviors in the speech of normal children developing language. *Journal of Speech and Hearing Research, 20,* 303–318.

NEWMAN, P. W., CREAGHEAD, N. A., & SECORD, W. (1985). *Assessment and remediation of articulatory and phonological disorders.* Columbus, OH: Charles E. Merrill.

OLSWANG, L. B., & BAIN, B. A. (1985). The natural occurrence of generalization during articulation treatment. *Journal of Communication Disorders, 18,* 109–129.

SHRIBERG, L. D. (1986). *PEPPER: Programs to examine phonetic and phonologic evaluation records.* Hillsdale, NJ: Lawrence Erlbaum.

SHRIBERG, L. D. (in press). Four new speech and prosody measures for genetics research and other studies in developmental phonological disorders. *Journal of Speech and Hearing Research.*

SHRIBERG, L. D., FILLEY, F. S., HAYES, D. M., KWIATKOWSKI, J., SCHATZ, J. A., SIMMONS, K. M., & SMITH, M. E. (1975, March). The Wisconsin Procedure for Appraisal of Clinical Competence (W-PACC): Model and data. *Asha,* pp. 158–165.

SHRIBERG, L. D., & KWIATKOWSKI, J. (1982a). Phonological disorders I: A diagnostic classification system. *Journal of Speech and Hearing Disorders, 47,* 226–241.

SHRIBERG, L. D., & KWIATKOWSKI, J. (1982b). Phonological disorders II: A conceptual framework for management. *Journal of Speech and Hearing Disorders, 47,* 242–255.

SHRIBERG, L. D., & KWIATKOWSKI, J. (1987). A retrospective study of spontaneous generalization in speech-delayed children. *Language, Speech, and Hearing Services in Schools, 18,* 144–157.

SHRIBERG, L. D., & KWIATKOWSKI, J. (1990). Self-monitoring and generalization in preschool speech-delayed children. *Language, Speech, and Hearing Services in Schools, 21,* 157–170.

SHRIBERG, L. D., KWIATKOWSKI, J., BEST, S., HENGST, J., & TERSELIC-WEBER, B. (1986). Characteristics of children with phonologic disorders of unknown origin. *Journal of Speech and Hearing Disorders, 51,* 140–161.

SHRIBERG, L. D., KWIATKOWSKI, J., & GRUBER, F. A. (1992). *Short-term and long-term normalization in developmental phonological disorders.* Paper presented at the American Speech-Language-Hearing Association Annual Convention, San Antonio, TX.

SHRIBERG, L. D., KWIATKOWSKI, J., RASMUSSEN, C., LOF, G. L., & MILLER, J. F. (1992). *The Prosody-Voice Screening Profile (PVSP): Psychometric findings and reference data for young children* (Tech. Rep. No. 1). Tucson, AZ: Communication Skill Builders.

SHRIBERG, L. D., KWIATKOWSKI, J., & SNYDER, T. (1989). Tabletop versus microcomputer-assisted speech management: Stabilization phase. *Journal of Speech and Hearing Disorders, 54,* 233–248.

SHRIBERG, L. D., KWIATKOWSKI, J., & SNYDER, T. (1990). Tabletop versus microcomputer-assisted speech management: Response evocation phase. *Journal of Speech and Hearing Disorders, 54,* 635–655.

SMIT, A. B. (1991). *Children's error responses in the Iowa-Nebraska articulation norms project.* Paper presented at the Child Phonology Conference, Iowa City, IA.

SMIT, A. B., HAND, L., FREILINGER, J. J., BERNTHAL, J. E., & BIRD, A. (1990). The Iowa articulation norms project and its Nebraska replication. *Journal of Speech and Hearing Disorders, 55,* 779–798.

SPSS INC. (1991). *SPSS advanced statistics: User's guide.* Chicago, IL: SPSS Inc.

STOEL-GAMMON, C., & DUNN, C. (1985). *Normal and disordered phonology in children.* Baltimore, MD: University Park Press.

TYLER, A. A., EDWARDS, M. L., & SAXMAN, J. H. (1990). Acoustic validation of phonological knowledge and its relationship to treatment. *Journal of Speech and Hearing Disorders, 55,* 251–261.

WEISS, C. E., GORDON, M. E., & LILLYWHITE, H. S. (1987). *Clinical management of articulation and phonologic disorders* (2nd ed.). Baltimore, MD: Williams & Wilkins.

WILLIAMS, A. L. (1991). Generalization patterns associated with training least phonological knowledge. *Journal of Speech and Hearing Research, 34,* 722–733.

Received March 10, 1992
Accepted May 15, 1992

Contact authors: Joan Kwiatkowski or Lawrence D. Shriberg, The Phonology Project, Waisman Center on Mental Retardation and Human Development, University of Wisconsin-Madison, 1500 Highland Avenue, Madison, WI 53705.

APPENDIX

Classification categories for the *Speech Disorders Classification System (SDCS)*, and descriptors for Capability, Focus, and Outcome variables. Variables for which there is no information or for which a code cannot be assigned from the available information are coded "*" for missing data.

Variable	*Code*	*Descriptor*
SDCS Classification		
First assessment	1	Normal Speech (NS)
	2	Normalized Speech (NSX)
	3	Questionable Speech Delay (QSD)
	4	Questionable Speech Delay+ (QSD+)
	5	Speech Delay (SD)
	6	Speech Delay+ (SD+)
	7	Questionable Residual Errors (QRE)
	8	Questionable Residual Errors+ (QRE+)
	9	Residual Errors (RE)
	10	Residual Errors+ (RE+)
Last assessment	(same as above)	
Capability		
Linguistic Variables		
Vowel errors	0	None
	1	One vowel consistently incorrect, inconsistent errors on one or more vowels, or word-specific errors.
	2	Two or more vowels consistently incorrect, or one or more vowels consistently incorrect combined with word-specific errors.
Consonant inventory	0	Representative sounds from each of the six manner classes (including lingual fricatives); liquids only if developmentally appropriate.
	1	Does not meet criteria for 0 or 2.
	2	Inventory limited to some nasals and stops, but may include one glide. NOTE: *Common* distortions (Shriberg, in press) are not considered errors.
Word shapes	0	Inventory includes CV, VC, CVC, CC_, _CC, 2+ syllable words.
	1	Does not meet criteria for 0 or 2.
	2	Does not include CVC, CC_, or _CC; deletes syllables in all 2+ syllable words.
Stimulability	0	Readily stimulable with only an auditory model at the sound level or higher on all developmentally appropriate error sounds.
	1	Does not meet criteria for 0 or 2.
	2	Not stimulable even with multiple cues on any error sounds that are developmentally appropriate.
Self-monitoring	0	Frequent spontaneous attempts to self-correct errors.
	1	Does not meet criteria for 0 or 2.
	2	Does not spontaneously attempt to self-correct errors.
Risk Factors		
Hearing mechanism	0	No constraints.
	1	More than one episode of otitis media with effusion, but no report of hearing problems and/or concerns.
	2	More than one episode of otitis media with effusion and report of hearing problems and/or concerns about hearing.
Speech mechanism	0	No constraints.
	1	Minor structural or functional problems.
	2	Significant structural (e.g., repaired cleft) or functional (e.g., dysarthria) problems.
Comprehension	0	No constraints.
	1	Equal to or less than 1-year delay.
	2	Greater than 1-year delay.
Language production	0	No constraints.
	1	Equal to or less than 1-year delay.
	2	Greater than 1-year delay.
Psychosocial behavior	0	No constraints.
	1	Minimal to moderate concerns regarding behavior (e.g., attention, manipulative behavior, avoidance of difficult speech tasks, or fear of failure).
	2	Significant concerns regarding behavior.

Variable	*Code*	*Descriptor*
Focus		
Level of motivational events	1	Requires normal schedule of social reinforcement for task maintenance.
	2	Requires clear task expectations and/or standard token reinforcement system for task maintenance.
	3	Requires special, individualized reinforcement system for task maintenance.
	4	Requires reinforcement specifically contingent on accurate production.
	5	Same as 4, with addition of response cost.
Focus during acquisition phase	0	Not an issue.
	1	A minimal issue. Clinical report must specify consistent need for the standard reinforcement system or variable need, depending on the target (e.g., 0 for easier speech targets and 2 for difficult targets).
	2	A significant issue. Clinical report must specify use of the standard reinforcement system plus the use of other reinforcement systems, the inclusion of provisions for providing the child with options to control treatment activities, and the use of different strategies to manipulate teaching tasks.
Focus during generalization phase	(same as above)	
Intervention Outcome		
Progress during first semester	0	*Maximal.* Best performance includes the following: for targets begun at the sound level, subject has mastered (≥ 75%) the carrier phrase level; for targets begun at the word/carrier phrase level, subject is at the generalization level or is generalizing correct production to spontaneous conversational speech. NOTE: Assign 0 only if most (> 50%) targets meet criteria. If there are only two targets, they both must meet criteria for 0.
	1	*Moderate.* Best performance includes the following: for targets begun at the sound level, subject has mastered the spontaneous word level; for targets begun at the word/carrier phrase level, subject has mastered that level or does not meet criteria for 0 or 2.
	2	*Minimal.* Best performance includes the following: for targets begun at the sound level, subject has not progressed to the word level (i.e., is still at the sound, syllable, or key word level); for targets begun at a higher linguistic level, subject is still at the same level.

Speech Normalization in Developmental Phonological Disorders: A Retrospective Study of Capability-Focus Theory

Joan Kwiatkowski, and Lawrence D. Shriberg
Lang Speech Hear Serv Sch 1993;24;10-18