

Explicit versus Implicit Instruction in Phonemic Awareness

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Kindergarten and first-grade children received two forms of instruction in phonemic awareness: (1) a "skill and drill" approach where the procedural knowledge of segmentation and blending of phonemes were taught versus (2) a "metalevel" approach that explicitly emphasized the application, value, and utility of phonemic awareness for the activity of reading in addition to teaching the procedural knowledge of segmentation and blending. Forty-two kindergarten and 42 first-grade children (14 children each in the experimental groups or control group) received training twice a week for 10 weeks. The results of this training study supported the growing evidence that phonemic awareness is causally related to reading achievement at the beginning stages of reading development. Furthermore, although a significant improvement in reading achievement was observed for both experimental groups in kindergarten and first-grade children, the degree of improvement in reading ability of the first-grade children depended strongly upon the type of instruction received. That is, the children who reflected upon and discussed the value, application, and utility of phonemic awareness for the activity of reading at an explicit level performed significantly better on a transfer measure of reading achievement than the skill and drill experimental group. The implications of a metalevel or metacognitive form of instruction are discussed. © 1990 Academic Press, Inc.

Learning how to read is a complex process that requires multiple capabilities. One of those capabilities is phonemic awareness. Phonemic awareness is the ability to explicitly manipulate speech segments at the phoneme level. The study reported herein examined the role phonemic awareness plays in reading development and different methods of instruction in phonemic awareness.

Phonemic awareness has been shown to be strongly related to reading achievement (e.g., Bradley & Bryant, 1978; Jorm & Share, 1983; Juel,

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Griffith, & Gough, 1986; Liberman, 1973; Lundberg, Olofsson, & Wall, 1980; Stanovich, Cunningham, & Freeman, 1984b; Williams, 1980), but the precise role it plays in reading development and the methods involved in teaching phonemic awareness are not fully understood. Undoubtedly, children do not need complete understanding and facility with linguistic structure to begin to read, but it may be that a minimal level is necessary at the beginning stages of reading development (Stanovich, Cunningham, & Cramer, 1984a). Recent experimental studies (Bradley & Bryant, 1983; Lundberg, Frost, & Peterson, 1988; Olofsson & Lundberg, 1985; Treiman & Baron, 1983; Vellutino & Scanlon, 1987) have demonstrated that training in phonemic awareness improves the reading ability of preschool and early elementary age children. These findings suggest that phonemic awareness is causally related to reading ability. Nevertheless, children do gain additional knowledge of linguistic structure as they learn to read. Interaction with print provides further experience and exposure to the structure of language. Therefore, one might conclude from a number of other studies (e.g., Ehri, 1979, 1983; Morais, Cary, Algeria, & Bertelson, 1979) that the direction of causality lies instead from reading development to phonemic awareness. The third, and perhaps most likely possibility, that phonemic awareness and learning to read are mutually supportive (see, for example, Perfetti, Beck, & Hughes, 1987), has hitherto received more theoretical (e.g., Alegria, Pignot, & Morais, 1982; Ehri, 1979; Lundberg et al., 1988; Torneus, 1984; Wagner & Torgesen, 1987) than empirical support.

The true nature of this relationship cannot be determined on the basis of correlational findings. Despite the attention phonemic awareness has received as a correlate, consequent, or determinant of reading ability, the ratio of correlational studies to experimental studies remains quite high. Additional experimental studies are needed in order to provide the necessary convergence of evidence to specify the initial direction of causality. Only through the convergence of multiple experimental studies will we be able to answer the critical question, does training in phonemic awareness affect reading ability? That is, do children benefit from instruction in segmentation and blending skills and does proficiency in these skills transfer to the reading situation? It is important to determine, as Morais, Alegria, and Content (1987) have pointed out, ". . . whether it is necessary for or at least beneficial to the acquisition of reading and writing in the alphabetic system, to be trained previously on segmental analysis of speech." (p. 63). The resolution of this question has important implications for theory and practice.

If children do benefit from training in phonemic awareness, the type of instruction may be a factor in their understanding of the structure of language and in their ability to transfer this knowledge to the reading situation. Previous studies have not examined the conditions in which

children learn how to manipulate phonemes and utilize this knowledge in their reading. The majority of training and instructional programs have provided children with the procedural knowledge of how to segment and blend sounds of words, but have not emphasized the metalevel or conditional knowledge of when and where to utilize this knowledge (Paris, Lipson, & Wixson, 1983). In general, instructional programs which emphasize conceptual or metalevel rather than simply procedural knowledge appear to provide a stronger base for the retention and transfer of information across situations (see, for example, Case, Sandieson, & Dennis, 1987). It therefore seems reasonable to expect that providing children with a metalevel framework of how language can be examined independently of meaning, how segmentation and blending are involved in decoding, why it is helpful to employ these skills, and when segmentation and blending of phonemes should be utilized may affect the broad transfer of phonemic awareness to reading. Metacognitive instruction of this type has been shown to influence older children's understanding of task demands and their ability to learn component skills in reading comprehension (Garner, 1987; Palincsar & Brown, 1986; Paris, Cross, & Lipson, 1984). Furthermore, when children have been shown when and why to use various cognitive strategies, their reading performance has been improved (Paris & Jacobs, 1984). Beginning readers may not be cognizant of how segmentation and blending skills are involved in the activity of decoding new words. They may be capable of segmenting and blending constituent sounds of words, but may also require explicit instruction and practice with appropriate tactics for deploying this ability. It is unclear whether instruction that emphasizes the metalevel nature of the task is a factor in younger children's ability to transfer their knowledge of linguistic structure to the reading situation.

In the present study we were interested in (1) determining whether training in phonemic awareness influence kindergarten and first-grade children's subsequent reading ability and (2) specifying the components of instruction that would affect the acquisition of phonemic awareness. We compared kindergarten and first-grade children's learning of phonemic awareness via two instructional programs. In the first program, the children received the necessary procedural knowledge of how to segment and blend the sounds of words. Whereas in the second program, the children received the same procedural knowledge as well as a metalevel knowledge of when, where, how, and why to use phonemic awareness within the reading context.

METHOD

Subjects

Forty-eight kindergarten and 48 first-grade subjects were recruited from a predominantly middle-class elementary school in a Midwest suburban-

metropolitan area. The kindergarten and first-grade subjects were administered age appropriate forms of the Metropolitan Achievement Test. The children within each grade were then matched in groups of three on the basis of their chronological age and Metropolitan pretest scores and randomly assigned to either a control condition or one of two experimental groups. Initial discrepancies in the tasks of phonemic awareness, however, necessitated the removal of extreme scores (two in each group) for the subsequent analysis. Thus, 42 kindergarten-age subjects (20 males and 22 females) with a mean age of 5 years, 11 months in April (age range of 5 years, 4 months to 6 years, 5 months) and 42 first graders (22 males and 26 females) with a mean age of 7 years, 2 months (age range of 6 years, 3 months to 8 years, 1 month) were included in the analysis. This resulted in 14 subjects in each of the experimental and control groups. There were no significant sex differences on the measures of phonemic awareness or reading ability.

Prior to training, the kindergarten-age subjects had received no formal prereading instruction. The first-grade subjects were receiving formal reading and spelling instruction in a basal reading series that emphasized phonics, word recognition, and reading comprehension.

Tasks and Procedure

A series of tests were administered twice, once in the Fall (October/early November) and again in the spring (February/early March). These tests consisted of a reading achievement test and three measures of phonemic awareness. An aptitude measure was administered once in October. In between the pre- and posttests, each child received 10 weeks of training.

Achievement and aptitude tests. An achievement test of reading ability (Metropolitan Reading Achievement Test, Readiness Level 1, 1976 and Primer, 1978) and an aptitude test (Otis-Lennon School Ability Test, Primary 1, 1979) was administered in October. The Metropolitan Achievement Tests (Readiness Level 2, Form J, 1976 and Primary, Form JS, 1978) were administered again in late March. The Readiness Levels of the Metropolitan assess children's knowledge of letters, sound-symbol correspondence, patterns, and school language. The Primer and Primary levels of the Metropolitan measure sound-symbol correspondence, word recognition, and reading comprehension. The Metropolitan and Otis-Lennon tests were administered to each class on separate days. These sessions never lasted more than 1 h. The total raw score for each test was then converted to a scaled score for further analyses.

Phonemic awareness. Three measures of phonemic awareness were administered; a phoneme deletion, phoneme oddity, and a phoneme discrimination test (Lindamood Auditory Conceptualization Test, 1979). These tasks were selected from previous studies (Bradley & Bryant,

1978, 1983; Calfee, Lindamood, & Lindamood, 1973; Stanovich et al., 1984a) where aspects of phonemic awareness were examined. The three measures of phonemic awareness were individually administered on separate days. These sessions lasted approximately 10 to 20 min.

The phoneme-deletion task had three practice (cat, tend, cape) and 10 experimental (pink, man, nice, win, bus, pitch, told, car, hit, pout) trials. This type of task was originally employed by Bruce (1964) and Calfee, Chapman, and Venezky (1972). The subjects were instructed to listen closely to each word after which the experimenter described how the first sound could be taken off and a different word would be left. The subjects were given examples and instructed to report what word was left after they stripped off the first sound. This first sound was always a consonant.

A phoneme discrimination task, the Lindamood Auditory Conceptualization Test (1979), was administered next. This task measures the ability to discriminate one sound from another as well as the ability to perceive the number and order of sounds within a spoken pattern. Colored wooden blocks are used to represent individual sounds. The child performs the task by placing the colored blocks in a row from left to right. Different sounds within a pattern are shown by using different colored blocks and there is no constant relation between a color and a sound.

A brief precheck was administered to determine if the child understood the concepts of same and different, number concepts to four, left to right order, and first and last. The children were then shown how to use the colored blocks to represent sounds. A stimulus sound pattern was then presented once and the child was required to represent the pattern visually using the colored blocks. Category I measured isolated sounds in sequence such as /s/s/t/ or /p/m/ and had 16 trials, whereas Category II measured sounds within syllable patterns and had 12 trials. Category II begins with a single phoneme such as /a/ then asks the child to show the experimenter /a/p/ followed by /p/a/ and so on until a pseudoword consisting of 6 phonemes is constructed. The total raw score for the Lindamood Auditory Conceptualization Test is 28. This score is then converted to a normalized score on a scale from 0 to 100.

A third measure of phonological awareness was a phonological oddity rhyme task developed by Bradley and Bryant (1978). Initial, medial, and final sounds of words were compared in this task. Initially a memory task was administered to ensure that the child was capable of retaining three words in memory. All of the subjects were capable of retaining three words in memory. The children were then instructed to listen closely to three words, two of the words contained a common sound that the third word lacked (e.g., rock, tack, sock). Their task was to identify the "odd word" or one that sounded different in that set. Three

practice trials preceded the experimental trials. Each set contained six trials, for a total of 18 trials. The first block compared initial sounds of words, the second block compared final sounds, and the third block compared medial sounds of words. At the beginning of each set, the subjects were told where they should listen for the odd sound, (i.e., initial, medial, or final sound).

Training and Control Groups

In this study there were two experimental groups (skill and drill, metalevel) and one control group. The training sessions for all three groups lasted 10 weeks. Training began in early November and ended in late February. There was a 2-week break after the 5th week. The training sessions were conducted in small groups of 4 to 5 students twice a week for both the experimental and control groups. The training time for each of the three groups was identical, each training session lasted approximately 15 to 20 min. Training was conducted by an experienced teacher. The experimental groups focused on phonemic awareness and the core of each program was identical in regard to the acquisition of phonemic awareness, whereas the control group received a different form of instruction described below.

Experimental Groups: Skill and Drill and Metalevel

A modified version of Williams' (1979) program, "The ABD's of Reading," was used as the basis for instruction. This program was designed to teach phonemic awareness and decoding skills as a supplement to the regular reading curriculum for first- and second-grade learning disabled readers. Each instructional unit began with a story demonstrating one particular skill. Afterwards, a teacher modeled the skill, had the student copy her example, and provided an example which the student independently modeled. This basic model was applied in both experimental groups, and thus each group was taught the same skill and received the same stories, games, and worksheets.

Among the various types of phonemic awareness tasks, phonemic segmentation and blending are the most closely associated with reading (Lewkowicz, 1980) and were, therefore, the focus of this training program. The concept of analysis, that language is comprised of sounds that can be broken down into component parts, was introduced initially. Following this discussion of segmentation, a puppet asked the subjects to help him count the number of words he said in a sentence. Once the subjects appeared comfortable with the notion that language can be examined independent of meaning and manipulated, segmentation of phonemes began. Training began with a limited number and a circumscribed set of phonemes. One-syllable words and pseudowords were segmented, using wooden chips to represent each phoneme. The puppet would say

a word, segment each sound from the remaining part and then ask the subjects to do the same with their row of wooden chips. Initial sounds were segmented first, followed by final sounds and medial sounds. Following training in analysis, the subjects were instructed in synthesis skills. For example, the puppet would say the first sound and then the remaining part of the word, and finally would blend the sounds together to make a word. The puppet would ask the subjects to tell him what word had been blended. Initial phonemes were separated and then blended with remaining parts followed by final phonemes. Later, all phonemes were presented separately and subjects were required to blend the component sounds. The letter-sound correspondences were specifically *not* included in the training sessions for either of the experimental groups, instead subjects always used the wooden chips to represent each sound.

The core of the two instructional programs were identical, but they differed with regard to the emphasis placed on the relation between phonemic awareness and the activity of reading. The skill and drill group received instruction in phonemic awareness in a decontextualized manner. That is, only segmentation and blending were taught. The program was absent of explicit reference to their direct use or application. As a result, the skill and drill group received proportionately more time learning segmentation and blending per se, because the amount of instructional time was identical for both experimental groups.

The second instructional program provided students with a metalevel knowledge of phonemic awareness. In this program, the children were directed to reflect upon their own thinking regarding phonemic awareness and explicit discussion of the goals and purposes of learning phonemic awareness to improve overall reading ability were emphasized. For example, children may be told that when they came upon a word they did not know, a good strategy would be to "cut the word up" into its smallest pieces, think about what that word sounds like, and then think if they know any words that resemble that combination of sounds. Or the children were told to think about the story they were reading and decide if /b/a/t/ fits into their story of a baseball player. Thus, a more contextualized approach was provided whereby the skill was taught and linked explicitly to earlier lessons and the activity of reading. The value and utility of this skill for future reading was explicitly emphasized by providing readers with an appreciation of task requirements and an awareness of the utility of their actions.

In summary, the second experimental program provided a metalevel knowledge that was missing in the skill and drill program. In the metalevel program: (1) the specific goals and purpose of the lesson were stated explicitly at the beginning of each session and discussed; (2) the previous lesson was reviewed and its relation to the present lesson was made

explicit; (3) the children were shown how the skill should be applied, along with examples of when and where the skill should be used in a reading situation; (4) the utility of the skill for reading activities was demonstrated and practiced; and (5) the teacher modeled the skill in a hypothetical reading context, whereafter the child had an opportunity to perform the skill under her tutelage. The feedback the subject received was explicit and corrective in nature.¹

The Control Group's Training

In the control group, the children listened to a story and answered a series of questions about each story. At the end of each session, the teacher summarized the story and the children discussed what they liked least and most about the story. The control groups followed the same schedule as the experimental groups, receiving the same amount of training over the 10-week period with an experienced teacher.

RESULTS

Phonemic Awareness Measures

The means and standard deviations with respect to the three measures of phonemic awareness are displayed in Table 1. A 2(grade: K,1) × 3(treatment: metalevel, skill and drill, and control) × 2(test: pretest, posttest) analysis of variance was performed on each of the three tasks.

The analysis of variance revealed a significant effect of treatment for the three measures of phonemic awareness: phonemic-deletion, $F(2, 77) = 4.04, p < .05$, phonemic-oddity, $F(2, 77) = 6.34, p < .01$, and the Lindamood Auditory Conceptualization Test, $F(2, 77) = 15.25, p < .01$. There was a significant effect of time as well: phoneme deletion, $F(1, 77) = 65.82, p < .01$, phoneme oddity, $F(1, 77) = 98.15, p < .01$, and the Lindamood Auditory Conceptualization Test $F(1, 77) = 38.85, p < .01$. The two-way interactions of treatment × time were significant for all three measures: phoneme deletion, $F(2, 77) = 21.42, p < .01$, phoneme oddity, $F(2, 77) = 27.99, p < .01$, and the Lindamood Auditory Conceptualization Test, $F(2, 77) = 44.26, p < .01$. A planned comparison (Kerlinger & Pedhazur, 1973) demonstrated that the experimental groups performed significantly better than the control groups in both grades for all three measures of phonemic awareness ($p < .01$).

An examination of the means demonstrated that first-grade students performed significantly better than the kindergarten-age children on phonemic-deletion, $F(1, 77) = 26.25, p < .01$, phoneme oddity $F(1, 77) = 40.43, p < .01$, and the Lindamood Auditory Conceptualization Test, $F(1, 77) = 12.18, p < .01$. The two-way interaction of grade × treatment

¹ The two experimental programs are available from the author upon request.

TABLE 1
MEANS AND STANDARD DEVIATIONS FOR KINDERGARTEN AND FIRST GRADERS

Phoneme Deletion Task ^a	Group	Pretest		Posttest	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Kindergarten	Metalevel	1.92	2.06	9.15	1.67
	Skill & drill	1.71	2.67	7.21	3.38
	Control	2.00	2.96	2.43	3.86
First Grade	Metalevel	5.36	3.62	9.93	.27
	Skill & drill	2.77	3.26	9.64	1.08
	Control	5.43	4.44	8.14	2.88
Phoneme Oddity Task ^b					
Kindergarten	Metalevel	7.23	2.83	14.54	1.76
	Skill & drill	7.36	3.25	14.21	2.15
	Control	8.14	3.39	8.64	3.03
First Grade	Metalevel	11.43	2.24	14.86	2.96
	Skill & drill	10.36	2.06	15.14	1.91
	Control	10.57	3.32	12.14	3.57
Lindamood Auditory Conceptualization Task ^c					
Kindergarten	Metalevel	35.69	6.20	61.85	6.35
	Skill & drill	33.93	8.10	62.93	10.32
	Control	31.14	10.39	37.64	16.36
First Grade	Metalevel	47.21	10.91	81.43	11.09
	Skill & drill	43.64	13.57	72.88	10.11
	Control	45.29	11.58	55.21	14.13

^a Total correct is 10.

^b Total correct is 18.

^c Total correct is 100.

was significant for phonemic-deletion, $F(2, 77) = 3.27, p < .05$ and the three-way interaction of grade × treatment × time was significant for phoneme-deletion, $F(2, 77) = 3.81, p < .05$ and phoneme-oddity $F(2, 77) = 6.22, p < .01$, indicating that the treatment effect was larger for the kindergarten-age subjects. An inspection of the means, however, displayed a possible ceiling effect for the first-grade groups on these tasks.

General Reading Achievement

A 2(grade: K,1) × 3(treatment: metalevel, skill and drill, control) × 2(test: pretest, posttest) analysis of variance was performed on general reading ability. Training in phonemic awareness facilitated kindergarten

TABLE 2
MEANS AND STANDARD DEVIATIONS FOR KINDERGARTEN AND FIRST GRADERS ON THE METROPOLITAN ACHIEVEMENT TEST

	Group	Pretest		Posttest	
		M	SD	M	SD
Kindergarten	Metalevel	126.38	22.50	161.00	24.41
	Skill & drill	128.00	22.00	156.64	21.28
	Control	124.21	39.47	146.50	26.08
First Grade	Metalevel	351.36	90.92	553.79	101.60
	Skill & drill	361.36	72.28	510.07	73.85
	Control	372.21	94.71	503.00	90.45

Note. Scores represent scaled scores.

and first-grade subjects' performance as revealed by the significant effect of treatment, $F(2, 77) = 3.28, p < .05$. Means and standard deviations as well as percentile ranking on the Metropolitan for each grade level are displayed in Table 2. The significant interaction of treatment \times time, $F(2, 77) = 5.30, p < .05$, demonstrated that training in phonemic awareness facilitated reading performance. Furthermore, a planned comparison (Kerlinger & Pedhauzer, 1973) demonstrated that the experimental groups in both grades performed significantly better than the control groups ($p < .05$).

Instruction and the Development of Phonemic Awareness and Reading Achievement

In general, the type of instruction did not make a significant difference in children's subsequent level of phonemic awareness. Subjects who received a metalevel approach did not perform significantly better than those receiving a skill and drill approach for either kindergarten or first-grade children on phoneme-oddity ($p > 1$) or the Lindamood Auditory Conceptualization Test ($p > 1$). A significant difference was found only for kindergarten-age children receiving a metalevel approach on the phoneme-deletion task ($p < .05$).

The type of instruction in phonemic awareness did, however, make a significant difference in the first-grade student's reading achievement as demonstrated by the significant three-way interaction of treatment \times grade \times time, $F(2, 77) = 3.20, p < .05$. A planned comparison (Kerlinger & Pedhauzer, 1973) demonstrated that the performance of the first-grade students receiving the metalevel approach to phonemic awareness was significantly better than the skill and drill group, indicating that the knowledge learned via a metalevel approach generalized to a more global measure of reading achievement. This relationship is clearly seen when

TABLE 3
CORRELATIONS BETWEEN PRETEST MEASURES FOR KINDERGARTEN AND FIRST-GRADE SUBJECTS

Measure	1	2	3	4	5
	Kindergarten				
1. Phoneme deletion					
2. Phoneme oddity	.27				
3. Lindamood	.36*	.50**			
4. Metropolitan	.21	.27	.44**		
5. Otis-Lennon	.20	.20	.41**	.67**	
	First grade				
1. Phoneme deletion					
2. Phoneme oddity	.53**				
3. Lindamood	.58**	.60**			
4. Metropolitan	.49**	.56**	.51**		
5. Otis-Lennon	.17	.51**	.24	.20	

* $p < .05$.

** $p < .01$.

one examines the percentile rankings for the first-grade children in Table 2. Even though the children began with similar scores on the Metropolitan Achievement Test, following training the metalevel group was performing at the 70th percentile rank, whereas the skill and drill group was reading at the 52nd percentile rank.

The Relation between Phonemic Awareness and Reading Achievement

The correlations among all of the major pretest variables are displayed in Table 3. Correlations are based on a sample size of 42 in each grade and are significant at the .05 level (two-tailed) if greater than .30 and significant at the .01 level (two-tailed) if greater than .40.

The relationship among the variables was explored via a series of hierarchical multiple regression analyses (Cohen & Cohen, 1975). The predictor variables were the pretest scores on the measure of reading ability, phoneme-deletion, phoneme-oddity, the Lindamood Auditory Conceptualization Test, and the IQ measure. These variables were entered in a series of hierarchical multiple regression analyses with posttest Metropolitan scores as the criterion variable.

Pretest scores for the Metropolitan Achievement Test and the Otis-Lennon were forced into the equation first and the three measures of phonemic awareness were each entered in a series of fixed orders. The pretest scores on the Metropolitan Achievement Test accounted for 32% of the variance in predicting posttest Metropolitan Achievement Test for kindergarten and 40% among the first-grade children. The Otis-Lennon accounted for an additional 10% of the variance among kindergarten and

9% in first-grade children. Each measure of phonemic awareness independently accounted for a significant amount of variance above and beyond the two global measures; Lindamood Auditory Conceptualization Test 14 and 4%, Oddity 3 and 10%, Deletion 3 and 4% for kindergarten and first-grade children, respectively. This additional contribution demonstrates that phonemic awareness is more than simply a subskill or component of reading.

When the three measures of phonemic awareness were entered first, subsequent analyses demonstrated that they accounted for 60% of the variance in kindergarten and 51% of the variance in first-grade children's reading achievement in the Spring. Thus we see that phonemic awareness is accounting for a significant amount of variance in later reading achievement and is equally as predictive of later reading achievement as more omnibus and lengthy measures of reading achievement (e.g., 63% for kindergarten and 49% for first-grade on the pretest Metropolitan). This finding illustrates the predictive power of this construct and is consistent with earlier research (e.g., Olofsson & Lundberg, 1985; Share, Jorm, Maclean, & Matthews, 1984; Stanovich et al., 1984a, 1984b) demonstrating that phonemic awareness accounts for a substantial amount of the variance in reading achievement.

DISCUSSION

The results of this study demonstrate that training in phonemic awareness improves children's reading ability and are consistent with previous experimental studies (Bradley & Bryant, 1983; Lundberg et al., 1988; Olofsson & Lundberg, 1985; Treiman & Baron, 1983; Vellutino & Scanlon, 1987). The results are inconsistent, however, with the hypothesis that phonemic awareness is just a consequence of learning to read (e.g., Ehri, 1979, 1983; Morais et al., 1979). If phonemic awareness was simply a by-product of reading ability, then training studies or prior knowledge would have no effect on the development of reading achievement. Clearly, it is not the case. The results of the present study do not, however, preclude the possibility that reading influences phonemic awareness. Moreover, phonemic awareness probably develops as children interact with print and acquire cipher knowledge. The convergence of results across the experimental studies demonstrates, however, that phonemic awareness is highly implicated in the beginning stages of reading development and may be a necessary component of reading achievement.

The Development of Phonemic Awareness

Kindergarten and first-grade children were compared in this study in order to examine whether instruction in phonemic awareness would have a larger impact on one age group over another. A difference in sensitivity

to training in phonemic awareness was not found. But an interesting relation between the experimental and control groups was observed. A comparison of the experimental kindergartener's scores after training with the first-grade control group's scores taken simultaneously, demonstrated that the trained kindergarteners performed markedly better on all three tasks of phonemic awareness. Kindergarten-age children are capable of displaying a certain level of proficiency in phonemic awareness, and when stimulated with training, perform better than a first-grade control group. This knowledge, however does not appear to develop fully without some impetus from the environment. The dramatic difference in growth in phonemic awareness between the untrained first graders and the trained kindergarteners illustrates this point. This comparison suggests that beyond a certain age, instruction may be more critical for the development of phonemic awareness than a child's developmental level.

Instruction in Phonemic Awareness

The type of instruction children received in phonemic awareness was an important factor for the first-grade children. A metalevel approach that explicitly emphasized the interrelations between phonemic awareness and the process of reading, motivation to use phonemic awareness in decoding, and specific strategic behaviors to implement phonemic awareness was a more effective program of instruction than a skill and drill approach that taught the component skill in isolation. Explicit instruction in how segmentation and blending are involved in the reading process helps children to transfer and apply component skills such as phonemic awareness to the activity of reading.

The type of instructional program was not an important factor in kindergarten-age children's transfer of phonemic awareness to a measure of reading achievement. These age differences may be due in large part to the reading environment the children participated in. The first-grade children were actively engaged in a formal reading program and had the opportunity to apply their knowledge of phonemic awareness on a daily basis. The kindergarten children, on the other hand, were not involved in a formal reading program, and thus did not have the same opportunities to utilize and apply this new knowledge. Indeed, the anecdotal records indicate that the first-grade children often reported that when they were in their reading groups or reading silently they reflected upon our discussions of the value of segmenting and blending to decode unknown words and attempted to utilize this knowledge.

As predicted, the significant difference between the first-grade experimental groups was in their subsequent reading achievement and not their performance on the measures of phonemic awareness. This result is not surprising, however, because both groups received similar programs of instruction in phonemic awareness. The critical instructional

distinction between the groups was the explicit versus implicit nature of the instruction in the bridging of segmentation and blending to process of learning how to read. And it was only on this dimension where a significant difference between the two experimental groups was observed. The specificity of these findings indicates that skill and drill programs of instruction are effective for teaching component skills, whereas, the utilization of these component skills may depend in part upon more elaborated instruction emphasizing their application as well. Similar results have been found in the domain of reading comprehension (e.g., O'Sullivan & Pressley, 1984) and have demonstrated that more elaborated instruction, focusing on the utility of a skill, promotes broader transfer of skills.

Concluding Remarks

This study examined how phonemic awareness is related to reading acquisition. The results of the study support the hypothesis that children can acquire phonemic awareness through direct instruction. Training in phonemic awareness improved kindergarten and first graders' ability to manipulate the sounds of language beyond its normal course of development and are consistent with previous experimental studies. As a result of training in phonemic awareness, a significant improvement in both kindergarten and first-grade children's reading performance was observed. However, the degree of improvement in the reading ability of the first-grade children depended strongly on the type of phonemic instruction received, although the level of phonemic performance achieved was the same.

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