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A test for assessing phonemic awareness in young children

The Yopp-Singer Test of Phoneme Segmentation provides teachers with a new tool for assessing children's phonemic awareness and identifying those children who may experience difficulty in reading and spelling.

Two decades ago few educational researchers and practitioners were familiar with the concept of phonemic awareness. In the last several years, however, phonemic awareness has captured the attention of many individuals in both the research community and elementary classrooms, and this interest is likely to continue for some time. What is this concept that has attracted so much attention? Phonemic awareness, as the term suggests, is the awareness of phonemes, or sounds, in the speech stream. It is the awareness that speech consists of a series of sounds.

Most youngsters enter kindergarten lacking phonemic awareness. Indeed, few are conscious that sentences are made up of individual words, let alone that words can be segmented into phonemes.

By the end of first grade, however, many (but not all) children have gained this aware-

ness and can manipulate phonemes in their speech. For example, they can break spoken words into their constituent sounds, saying “/d/-/i/-/g/” when presented with *dig*; they can remove a sound from a spoken word, saying “rake” when asked to take the /b/ off the beginning of the word *break*; and they can isolate the sound they hear at the beginning, middle, or end of a word. [Parallel lines surrounding a letter (e.g., /z/) are used to represent the sound rather than the name of the letter. For the ease of the reader, typical spellings of sounds will be used within these lines rather than the symbols used in phonetic transcriptions.]

Research has demonstrated that phonemic awareness is a very important ability. There is substantial evidence that phonemic awareness is strongly related to success in reading and spelling acquisition (Ball & Blachman, 1991; Liberman, Shankweiler, Fischer, & Carter, 1974; Perfetti, Beck, Bell, & Hughes, 1987; Share, Jorm, Maclean, & Matthews, 1984; Treiman & Baron, 1983; Yopp, 1992a). In a review of the research, Stanovich (1986) concluded that phonemic awareness is a more potent predictor of reading achievement than nonverbal intelligence, vocabulary, and listening comprehension, and that it often correlates more highly with reading acquisition than tests of general intelligence or reading readiness. He restated this conclusion recently in the pages of *The Reading Teacher*: “Most importantly, [phonemic awareness tasks] are the best predictors of the ease of early reading acqui-

sition—better than anything else that we know of, including IQ” (Stanovich, 1994, p. 284).

A growing number of studies indicate that phonemic awareness is not simply a strong predictor, but that it is a necessary prerequisite for success in learning to read (Bradley & Bryant, 1983, 1985; Tunmer, Herriman, & Nesdale, 1988; see also Stanovich’s 1994 discussion). For instance, Juel and Leavell (1988) determined that children who enter first grade lacking phonemic awareness are unable to induce spelling-sound correspondences from print exposure or to benefit from phonics instruction. Likewise, in her comprehensive survey of the research on learning to read, Adams (1990) concluded that children who fail to acquire phonemic awareness “are severely handicapped in their ability to master print” (p. 412).

The importance of phonemic awareness appears to cut across instructional approaches, as evidenced by the work of Griffith, Klesius, and Kromrey (1992), who found that phonemic awareness is a significant variable in both whole language and traditional classrooms. Few now would argue with the claim that this ability is essential for reading progress.

Given the evidence that phonemic awareness is necessary for success in reading development, many researchers are sounding the call for teachers of young children to include experiences in their curriculum that facilitate the development of phonemic awareness (Griffith & Olson, 1992; Juel, 1988; Lundberg, Frost, & Petersen, 1988; Mattingly, 1984). Particular attention needs to be given to those children lacking this ability. How, then, can teachers determine which students have this critical ability?

Any assessment instrument used to identify those students needing more activities that facilitate phonemic awareness must be both reliable and valid. The purpose of this article is to provide teachers with a tool for assessing phonemic awareness, and to offer evidence of its reliability and validity. The Yopp-Singer Test of Phoneme Segmentation is easy to administer, score, and interpret.

The instrument

The Yopp-Singer Test of Phoneme Segmentation measures a child’s ability to separately articulate the sounds of a spoken word in order. For example, given the orally presented

word *sat*, the child should respond with three separate sounds: /s/-/a/-/t/. Note that sounds, not letter names, are the appropriate response. Thus, given the four-letter word *fish*, the child should respond with three sounds: /f/-/i/-/sh/ (see the 22-item Test). Words were selected for inclusion on the basis of feature analysis and word familiarity. (For a complete discussion of the word list rationale, see Yopp, 1988.) The test is administered individually and requires about 5 to 10 minutes per child.

There is substantial evidence that phonemic awareness is strongly related to success in reading and spelling acquisition.

Children are given the following directions upon administration of the test :

Today we’re going to play a word game. I’m going to say a word and I want you to break the word apart. You are going to tell me each sound in the word in order. For example, if I say “old,” you should say “/o/-/l/-/d/” (The administrator says the sounds, not the letters.) Let’s try a few words together.

The practice items are *ride*, *go*, and *man*. The examiner should help the child with each sample item—segmenting the item for the child if necessary and encouraging the child to repeat the segmented sounds. Then the child is given the 22-item test. Feedback is given to the child as he or she progresses through the list. If the child responds correctly, the examiner nods or says, “That’s right.” If the child gives an incorrect response, he or she is corrected. The examiner provides the appropriate response.

A child’s score is the number of items correctly segmented into all constituent phonemes. No partial credit is given. For instance, if a child says “/c/-/at/” instead of “/c/-/a/-/t/,” the response may be noted on the blank line following the item but is considered incorrect for purposes of scoring. Correct responses are only those that involve articulation of each phoneme

Yopp-Singer Test of Phoneme Segmentation

Student's name _____ Date _____

Score (number correct) _____

Directions: Today we're going to play a word game. I'm going to say a word and I want you to break the word apart. You are going to tell me each sound in the word in order. For example, if I say "old," you should say /o/-/l/-/d/. (Administrator: Be sure to say the sounds, not the letters, in the word.) Let's try a few together.

Practice items: (Assist the child in segmenting these items as necessary.) ride, go, man

Test items: (Circle those items that the student correctly segments; incorrect responses may be recorded on the blank line following the item.)

- | | |
|---------------|-----------------|
| 1. dog _____ | 12. lay _____ |
| 2. keep _____ | 13. race _____ |
| 3. fine _____ | 14. zoo _____ |
| 4. no _____ | 15. three _____ |
| 5. she _____ | 16. job _____ |
| 6. wave _____ | 17. in _____ |
| 7. grew _____ | 18. ice _____ |
| 8. that _____ | 19. at _____ |
| 9. red _____ | 20. top _____ |
| 10. me _____ | 21. by _____ |
| 11. sat _____ | 22. do _____ |

The author, Hallie Kay Yopp, California State University, Fullerton, grants permission for this test to be reproduced. The author acknowledges the contribution of the late Harry Singer to the development of this test.

those that involve articulation of each phoneme in the target word.

A blend contains two or three phonemes and each of these should be articulated separately. Hence, item 7 on the test, *grew*, has three phonemes: /g/-/r/-/ew/. Digraphs, such as /sh/ in item 5, *she*, and /th/ in item 15, *three*, are single phonemes. Item 5, therefore, has two phonemes and item 15 has three phonemes. If a child responds with letter names instead of sounds, the response is coded as incorrect, and the type of error is noted on the test.

Teachers of young children should expect a wide range of performance on this test. A sample of kindergarteners drawn from the public schools in a west coast city in the United States obtained scores ranging from 0 to 22 correct (0% to 100%) during their second semester. The mean (average) score was 11.78, with a standard deviation of 7.66 (Yopp, 1988, see below). Similar findings from a sample of kindergarteners on the east coast of the United States were reported by Spector (1992): the mean score was 11.39 with a standard deviation of 8.18.

Students who obtain high scores (segmenting all or nearly all of the items correctly) may be considered phonemically aware. Students who correctly segment some items are displaying emerging phonemic awareness. Students who are able to segment only a few items or none at all lack appropriate levels of phonemic awareness. Without intervention, those students scoring very low on the test are likely to experience difficulty with reading and spelling.

Teachers' notes on the blank lines of the test will be helpful in understanding each child. Some children may partially segment—perhaps dividing words into chunks larger than phonemes. These children are beginning to have an insight into the nature of speech. Others may simply repeat the stimulus item or provide nonsense responses regardless of the amount of feedback and practice given. They have very little insight into the phonemic basis of their speech. Still others may simply offer letter names.

If the letter names are random (e.g., given *red* the child responds “n-b-d-o”), the teacher learns that the child lacks phonemic awareness but knows some letter names. If the letter

names are close approximations to the conventional spelling of the words (e.g., given *red* the child responds “r-a-d”), the teacher knows that either the child has memorized the spellings of some words or that he or she is phonemically aware and has mentally segmented the items, then verbally provided the examiner with the letters corresponding to those sounds—an impressive feat! The examiner should repeat the instructions in this case to make sure the child fully understands the task.

Data on the instrument

A number of years ago I undertook a study to compare tests of phonemic awareness that appeared in the literature and to examine the reliability and validity of each (Yopp, 1988). Nearly 100 second-semester kindergarten youngsters drawn from three public elementary schools in a southern California school district that serves children from a lower middle to an upper middle class population were each administered 10 different phonemic awareness tests over a period of several weeks. Children ranged in age from 64 to 80 months with an average age of 70 months, and were predominantly White, with 1% Black, 2% Asian, and 15% with Spanish surnames. All children were fluent English speakers.

Performance on the phonemic awareness tests was compared, the reliability of each test was calculated, and a factor analysis was conducted to determine validity. One of the tests in the battery, the Yopp-Singer Test of Phoneme Segmentation, had a reliability score (Cronbach's alpha) of .95, indicating that it can be appropriately used in the assessment of individuals. Experts in tests and measurement tell us that instruments should have reliability coefficients above .85 (Hills, 1981) or even .90 (Jensen, 1980) if they are to be used to make decisions about individuals.

Analyses also indicated that the Yopp-Singer Test is a valid measure of phonemic awareness. Construct validity was determined through a factor analysis (for details see Yopp, 1988). Predictive validity was determined by collecting data on the reading achievement of the same students each year beginning in kindergarten and concluding when the students were in sixth grade; spelling achievement data were obtained in Grades 2 to 6. Thus, 7 years of longitudinal data are available. (See Yopp, 1992a for details on this study.) A test of non-

Table 1
Descriptions of reading and spelling tests used to determine predictive validity

Nonword Reading Test

The nonword reading test was administered for the purpose of determining each child's ability to use sound-symbol correspondences to decode nonwords. Children were assessed on their ability to sound and blend printed nonwords such as *paz* and *kov*. Administered in kindergarten.

CTBS Word Attack Subtest

The word attack section requires students to identify letters corresponding to the initial or final single consonant, cluster, or digraph sounds or the medial vowels heard in orally presented words. Recognition of sight words is also measured in this subtest. Administered during Grades 1 through 3.

CTBS Vocabulary Subtest*

The vocabulary section measures children's ability to identify a word associated with an orally presented category or definition, in addition to identifying same-meaning words or unfamiliar words in context. Administered during Grades 1 through 6.

CTBS Reading Comprehension Subtest*

The reading comprehension section is used to measure children's comprehension of both sentences and stories. Children are asked to respond to objective questions after reading each selection. Administered during Grades 1 through 6.

CTBS Spelling Subtest

The spelling section measures children's ability to recognize correctly spelled words. Administered during Grades 2 through 6.

*A "total" reading scores is generated for each child that combines the vocabulary and comprehension subtests.

word decoding was administered in kindergarten. In order to determine reading and spelling achievement in Grades 1 through 6, records of the students' performance on the Comprehensive Test of Basic Skills (CTBS, 1973), a timed, norm-referenced, objectives based test, were obtained. This standardized test, widely used by school districts as part of their regular testing program, includes word attack, vocabulary, comprehension, and spelling subtests in the reading and spelling achievement battery. These tests are described in Table 1.

Table 2 presents the correlations between performance on the Yopp-Singer Test of Phoneme Segmentation administered in kindergarten and all subtests on the reading and spelling achievement battery throughout the grade levels as well as the kindergarten nonword reading measure. Each of the correlations is significant: performance on the Yopp-Singer Test of Phoneme Segmentation has a moderate to strong relationship with performance on the

nonword reading test given in kindergarten and with the subtests of the CTBS—word attack, vocabulary, comprehension, and spelling (and the total score)—through Grade 6. Thus, the phonemic awareness test has significant predictive validity.

Because reading and spelling achievement are related to phonemic awareness and to future reading and spelling achievement, these impressive correlations (as high as .78) do not address the question of whether a measure of phonemic awareness truly contributes to the prediction of reading and spelling performance years later, independent of previous reading and spelling achievement. For instance, a significant correlation between phonemic awareness in kindergarten and reading in Grade 1 might be obtained because reading performance in kindergarten and Grade 1 are highly correlated, and reading performance in kindergarten and phonemic awareness in kindergarten are highly correlated.

Table 2
Correlation of performance on phonemic awareness task administered in Grade K
with performance on reading and spelling subtests, Grades K-6

Grade level	Subtests					
	Nonword	Word Attack	Vocabulary	Comprehension	Total	Spelling
K	.67**					
1		.46**	.66**	.38**	.62**	
2		.62**	.72**	.55**	.67**	.53**
3		.56**	.66**	.62**	.67**	.44**
4			.51**	.62**	.58**	.60**
5			.56**	.57**	.59**	.55**
6			.78**	.66**	.74**	.46**

* $p < .05$ ** $p < .01$

Thus, the relationship between phonemic awareness in kindergarten and reading in first grade might simply be a byproduct of these other relationships. We want to know whether a measure of phonemic awareness obtained in kindergarten contributes to the prediction of future reading and spelling achievement above and beyond the contribution that past reading and spelling achievement makes on future achievement in reading and spelling. Does performance on a measure of phonemic awareness offer us any unique insights into future performance in reading and spelling?

In order to rule out the effect of reading and spelling achievement over the years on

subsequent reading and spelling performance, partial time-lag correlations were also conducted. These correlations are “partial” in that they partial out, or eliminate, the effects of one variable (in this case, past reading or spelling performance) on another (in this case, later reading or spelling performance); they are “time-lag” in that they examine the relationship between two variables over time (earlier phonemic awareness performance and later reading or spelling achievement). The partial time-lag correlations are presented in Table 3.

Each correlation coefficient indicates the strength of the relationship between performance on the phonemic awareness test in

Table 3
Partial time-lag correlation of performance on phonemic awareness task
administered in Grade K with performance on reading and spelling subtests,
Grades 1-6, controlling for performance on reading and spelling subtests
administered the previous year

Grade level	Subtests				
	Word Attack	Vocabulary	Comprehension	Total	Spelling
1	.33**	.55**	.08	.43**	
2	.51**	.36**	.43**	.32**	
3	.20	.19	.43**	.33**	.11
4		-.05	.38**	.10	.43**
5		.54**	.18	.36*	.26
6		.51**	.45**	.47**	-.05

* $p < .05$ ** $p < .01$

kindergarten and performance on reading and spelling subtests in Grades 1–6 when the previous year's achievement in these areas has been controlled. Thus, the .54 correlation found in Table 3 between phonemic awareness in kindergarten and vocabulary in Grade 5 is the strength of the relationship after fourth-grade vocabulary performance has been accounted for.

Table 3 reveals that most of the correlations remain significant, some as high as .51, .54, and .55. Thus, they reveal that scores on the Yopp-Singer Test of Phoneme Segmentation make a unique contribution to predicting students' reading and spelling achievement above and beyond their previous achievement in these areas.

We can [use this instrument to] identify children quite early who are likely to experience difficulty in reading and spelling and give them appropriate instructional support.

The power of a 5- to 10-minute, 22-item test administered in kindergarten to predict students' performance in reading and spelling achievement years later, even after controlling for previous reading and spelling achievement, is quite surprising. In his review of the research on phonemic awareness, Stanovich (1994) noted the strong relationship between performance on a number of simple, short phonemic awareness tasks and reading acquisition and suggests that the power of such simple tasks to predict reading acquisition is one of the reasons for the tremendous research energy currently devoted to this line of inquiry.

Implications

What do these findings mean for teachers? They mean that we now have a tool—one that is both valid and reliable as well as simple and quick to administer—that can be used to determine a child's phonemic awareness, and we have the knowledge that performance on this measure is significantly related to a child's

achievement in reading and spelling for years to come.

What can we do with this information? We can identify children quite early who are likely to experience difficulty in reading and spelling and give them appropriate instructional support. Fortunately, a growing body of evidence indicates that training of phonemic awareness is possible and that it can result in significant gains in subsequent reading and spelling achievement (Ball & Blachman, 1991; Bradley & Bryant, 1983; Cunningham, 1990; Lie, 1991; Lundberg et al., 1988). Thus, a child need not be labeled "phonemically unaware" and therefore inevitably a "poor" reader. Phonemic awareness is an ability that teachers and reading/language arts specialists can develop in many students.

Some researchers have argued that systematic training in phonemic awareness should be part of every youngster's education before the onset of formal reading instruction (Mattingly, 1984; Tunmer et al., 1988). The need for this, of course, depends upon the abilities of the individual children in the classroom. Further, in many classrooms the onset of formal reading will be difficult to identify—there is no onset of "formal" instruction and reading is not differentiated from prereading.

A growing number of teachers hold an emergent literacy perspective, viewing literacy as an evolving process that begins during infancy and they provide a wealth of valuable literacy experiences for children very early on. Certainly these experiences should not be withheld until children become phonemically aware!

However, it is important for teachers and other practitioners to appreciate that children will likely make little sense of the alphabetic principle without phonemic awareness, and so phonemic awareness should be developed as part of the larger literacy program for many children. Fortunately, phonemic awareness activities can be readily incorporated into preschool, kindergarten, and early primary grade classrooms. Recent articles in *The Reading Teacher* (Griffith & Olson, 1992; Yopp, 1992b) have provided suggestions for helping young children focus on the sounds of language through stories, songs, and games. A few suggestions will be highlighted here.

Griffith and Olson (1992) and I (Yopp, 1995) suggest that one simple means to draw

children's attention to the sound structure of language is through the use of read-aloud books. Many children's books emphasize speech sounds through rhyme, alliteration, assonance, phoneme substitution, or segmentation and offer play with language as a dominant feature. For instance, P. Cameron's *I Can't, Said the Ant* (1961) makes use of a simple rhyme scheme, Seuss's *Dr. Seuss's ABC* (1963) uses alliteration as each letter of the alphabet is introduced, and his *There's a Wocket in My Pocket* (1974) incorporates initial phoneme substitution to create a household of humorous nonsense creatures.

I have suggested (Yopp, 1995) that such books can be read and reread, their language can be enjoyed and explored in class discussions, predictions that focus on language can be encouraged, and additional verses or alternate versions of the texts can be created using the language patterns provided. (See Yopp, 1995, for an annotated bibliography of books to develop phonemic awareness.)

A guessing game that I have used successfully both with groups of children and in individualized settings is "What am I thinking of?" (Yopp, 1992b). This game encourages children to blend orally spoken sounds together. The teacher tells the children a category and then speaks in a segmented fashion the sounds of a particular item in that category. For instance, given the category "article of clothing," the teacher might say the following three sounds: "/h/-/a/-/t/." Children's attempts to blend the sounds together to say "hat" are applauded and the game continues. Eventually, children may become the leaders and take turns providing their peers with segmented words for blending.

Categories may be selected to relate to curriculum areas under investigation (e.g., "I'm thinking of one of the types of sea animals we have been learning about—it is a /c/-/t/-/a/-/b/") or as an extension of integrated literacy experiences. When teaching about bears and their habitats, teachers may encourage children to write about bears, listen to stories about bears, view films about bears, create art projects involving bears, and learn poems and songs about bears. After singing the song, "The bear went over the mountain," children may play the guessing game to hypothesize the kinds of things seen by the bear on his outing (*A Treasury of Literature*, 1995)—"he saw a /t/-/r/-/ee/."

Common children's songs can be easily altered to emphasize the sounds of language. For instance, the initial sounds of words can be substituted. Instead of "merrily, merrily, merrily, merrily" in "Row, Row, Row Your Boat," children can suggest other sounds to insert in the initial position—"jerrily, jerrily, jerrily, jerrily" or "terrily, terrily, terrily, terrily." Young children often find such manipulations of sounds amusing and are likely to be heard singing nonsensical lyrics on the playground.

Concrete objects may help children attend to the sounds in speech. Elkonin boxes have been used in Reading Recovery to help low achieving readers focus on the sounds in words (Clay, 1985). A series of connected boxes are drawn across a page. The number of boxes corresponds to the number of sounds in a target word. The word *chick*, for example, is represented by three boxes. As the teacher slowly says the word, he or she models moving an object such as a chip into each box (from left to right) as each sound is articulated. The child eventually takes over the process of articulating the word and moving the objects into place.

Ultimately, the moving of chips into the boxes is replaced by the writing of letters in the boxes. (In the case of *chick* two letters are written in the first box because two letters spell the first sound: *ch*. Likewise, two letters are written in the third and final box: *ck*.) This activity is purposeful in the larger context of literacy acquisition when used to support children as they attempt to record thoughts or communicate in writing. (For a similar activity to facilitate phonemic awareness and support invented spelling, see Cunningham & Cunningham, 1992.)

Note that these activities fit into a meaning-based framework. Phonemic awareness should not be addressed as an abstract isolated skill to be acquired through drill type activities. It can be a natural, functional part of literacy experiences throughout the day.

Use of the test

The Yopp-Singer Test of Phoneme Segmentation was designed for use with English speaking kindergarteners. It may be used as a general assessment tool in order for teachers to learn more about their students and so develop suitable experiences; or it may be used selec-

tively as teachers observe individual children experiencing difficulty with literacy-related tasks. Certainly, it need not be administered to the child who is already reading. Independent reading implies the existence of phonemic awareness. Further, phonemic awareness is not an end to itself—rather, it is one aspect of literacy development.

First-grade teachers, too, may wish to administer the test to students at the beginning of the school year in order to determine the phonemic awareness needs of the children in the classroom. Reading/language arts specialists or clinicians who work with children experiencing difficulty in literacy acquisition may also wish to assess their students' phonemic awareness as part of a larger diagnostic survey. And, although there are currently no data regarding the use of this particular test with older populations, we know that often older nonreaders lack phonemic awareness.

This instrument may be helpful to teachers of older individuals, including adult emerging readers, as they begin to build a profile of the strengths and needs of the individuals with whom they work. If phonemic awareness is poor, then it is appropriate to include activities that support its development in the larger picture of literacy experiences.

Should students who are limited in English proficiency be given this test? There are no data on using this test with an EL (English learner) population. Further, the issue is problematic since not only is there a potential problem with understanding task directions and familiarity with vocabulary (recall that the items on the test were selected, in part, on the basis of word familiarity), but there is also the possibility that performance on the test could be influenced by the fact that some speech sounds that exist in the English language may not exist in a student's dominant language.

Research does indicate that phonemic awareness is a critical variable in languages that have an alphabetic orthography (i.e., ones that map speech at the level of the phoneme rather than larger units). Therefore, the ideas presented in this article apply to children learning to read in an alphabetic script. The next step for educational researchers, therefore, is to develop reliable, valid assessment tools in other alphabetic languages to help

teachers working with populations of children who are reading in languages other than English.

Conclusion

One of many insights that individuals must gain along the path to literacy is phonemic awareness. Research has shown that phonemic awareness is a more potent predictor of success in reading than IQ or measures of vocabulary and listening comprehension, and that if it is lacking, emergent readers are unlikely to gain mastery over print. However, teachers can provide activities that facilitate the acquisition of phonemic awareness. With an assessment device readily available, practitioners can quickly identify those children who may benefit most from phonemic awareness activities and reduce the role that one factor—phonemic awareness—plays in inhibiting their success in reading and spelling.

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