Phonological Awareness Intervention: Beyond the Basics

C. Melanie Schuele
Vanderbilt University, Nashville, TN

Donna Boudreau
Portland State University, Portland, OR

A large body of research has linked deficient phono-logical awareness, specifically phonemic awareness, in kindergarten and the early grades with poor read-ing achievement (Blachman, 1997). Although not all children with poor phonological awareness have difficulties learning to read, most do. Torgesen, Wagner, and Rashotte (1994) reported that chil-dren who began first grade with phonological awareness skills below the 20th percentile lagged behind their peers in word iden-tification and word decoding throughout elementary school. In fifth grade, their average grade-level attainment for word decoding skills was 2.3 (i.e., second grade, third month), as compared to 5.9 for children who scored above the 20th percentile in phonological awareness at the beginning of first grade. Children with communi-cation disorders are often among children identified with poor phonological awareness (Boudreau & Hedberg, 1999; Kamhi & Koenig, 1985; Kamhi, Lee, & Nelson, 1985).

Several critical reviews of the general efficacy of phonological awareness instruction and intervention have provided conclusive evidence that phonological awareness can be improved through instruction and intervention, and improvement in phonological awareness leads to improvement in word decoding (Bus &

Van IJzendoorn, 1999; Ehri et al., 2001; National Institute of Child Health and Human Development [NICHD], 2000a, 2000b; Troia, 1999). As a result, in addition to the inclusion of phonological awareness instruction in preschool and kindergarten general educa-tion curricula, reading researchers have called on practitioners to provide intervention to children with poor phonological awareness as early as kindergarten. At the same time, practitioners often are asked to provide phonological awareness intervention to older students who demonstrate poor reading achievement in word de-coding skills.

To bridge the gap between research and practice, and ensure benefit for all children, intervention practices that have been shown to be efficacious under ideal circumstances must be applied in everyday practice settings. The challenge facing speech-language pathologists (SLPs) and teachers as they seek to implement research-based practices should not be underestimated (Carnine, 1997; Gersten, 2001), and neither should the potential positive impact on children's literacy achievement. Practitioners need concise infor-mation on the characteristics of intervention that are associated with successful outcomes for children (cf. Smith, Simmons, & Kame'enui, 1998). Fortunately, the extant literature provides much

ABSTRACT: **Purpose:** The purpose of this article is to advance practitioners' knowledge base of best practices in phonological awareness intervention to facilitate the implementation of evidence- or research-based practices in everyday clinical prac-tice. Although most speech-language pathologists (SLPs) have a basic knowledge of phonological awareness, this article provides additional information on the variables to consider in the design and implementation of phonological awareness intervention; access to this information has a clear impact on practitioners' efforts to move research to practice.
Method: We reviewed the relevant literature on the nature and development of phonological awareness and phonological

awareness intervention to identify evidence-based intervention prac-tices. We draw on clinical experience to supplement the research literature, particularly where the research literature provides limited direction.
Implications: SLPs have a unique contribution to make in school-based teams' efforts to facilitate literacy development in children, particularly children who are at risk for reading disability. Research provides much information to guide clinicians in the design and implementation of phonological awareness intervention.

KEY WORDS: phonological awareness, phonemic awareness, intervention, early literacy, speech-language pathologist

information on the variables that influence children's success in phonological awareness intervention. At present, research findings can guide the design of intervention protocols, the selection of instructional materials, the sequencing of instructional stimuli, and the use of teaching strategies and scaffolds. Access to this knowledge base has a clear impact on practitioners' ability to move research to practice and to provide intervention that meets the individual learning needs of a specific child.

The purpose of this article is to advance practitioners' knowledge base of best practices in phonological awareness intervention to facilitate implementation of evidence-based practices in everyday clinical practice. In this article, we consider (a) the role of SLPs in teaching phonological awareness; (b) definitions of phonological awareness, phonemic awareness, and phonics; (c) the timing, duration, intensity, and scope and sequence of intervention; and (d) the myriad details to address in the implementation of phonological awareness intervention.

THE SLP's ROLE

The language basis of reading has been clearly established, with oral language skills predictive of at least some of the variability in performance on measures of literacy acquisition (Griffin, Hemphill, Camp, & Wolf, 2004; Snowling, 2005; Speece, Roth, Cooper, & De La Pax, 1999; Spira, Bracken, & Fischel, 2005; Whitehurst & Lonigan, 1998). Research 2 decades ago established that early speech and/or language impairments relate to later poor literacy achievement (e.g., Aram, Ekelman, & Nation, 1984; King, Jones, & Lasky, 1982). More recent studies have clarified the risk of reading disability among young children with speech and/or language impairments (see review in Schuele, 2004).

Some researchers (Catts, 1993; Lewis & Freebairn, 1992; Lewis, Freebairn, & Taylor, 2000, 2002; Lewis, O'Donnell, Freebairn, & Taylor, 1998) have concluded that although children with isolated speech difficulties are at elevated risk for spelling disabilities as compared to the general population, they are not at elevated risk for reading disability. In contrast, these same researchers concluded that children with speech difficulties and language impairments are at elevated risk for reading disability. Other researchers recently argued that isolated speech impairments can place children at risk for literacy difficulties (Hesketh, Adams, & Nightingale, 2000; Leitão & Fletcher, 2004; Leitão, Hogben, & Fletcher, 1997; Raitano, Pennington, Tunick, Boada, & Shriberg, 2004). Risk status may be elevated by nondevelopmental speech errors as compared to developmental errors (Leitão & Fletcher, 2004; see also Nathan, Stackhouse, Goulandris, & Snowling, 2004). Hesketh et al. (2000) did not find risk severity of speech impairments to predict performance on phonological awareness tasks. Bishop and Adams' (1990) critical age hypothesis may reconcile discrepant findings; the greatest risk may be realized when speech difficulties persist to the point at which phonological skills are needed for literacy learning.

Children with language impairments (some with concomitant speech difficulties) are at far greater risk for reading disability than the general population (Boudreau & Hedberg, 1999; Catts, Fey, Tomblin, & Zhang, 2002; Lewis et al., 2000, 2002). In population-based samples, 40% to 65% of children with language impairments may be diagnosed in the early grades with a reading disability

(Catts et al., 2002). In clinic-referred samples of children with language impairments, the rate of reading disability may be as great as 75% (e.g., Stark et al., 1984). There is ample evidence that these early literacy deficits will persist throughout the school years (Johnson et al., 1999; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998). Although reading comprehension often is compromised, the early reading difficulties (i.e., word decoding) of children with language impairments typically are linked to poor phonological awareness abilities. The relationship between language and literacy, as well as the high prevalence of reading disability in children with language impairments, provides a clear rationale for SLPs' participation in the literacy learning of young children (Catts, 1991; Catts & Kamhi, 1986; Fey, Catts, & Larrivee, 1995; Kamhi & Catts, 1989).

The professional role of SLPs in addressing the literacy needs of children includes efforts of prevention, assessment, and intervention (American Speech-Language-Hearing Association [ASHA], 2001, 2002). SLPs may participate in phonological awareness intervention within a number of different models. First, they may provide phonological awareness intervention to the children on their caseloads, either embedded within other language goals or as an explicit intervention target. Second, SLPs may provide explicit intervention to small groups of at-risk children (e.g., Schuele et al., in press). The Individuals With Disabilities Education Act (IDEA) Amendments of 1997 and the IDEA Improvement Act of 2004 support special education personnel providing prereferral interventions or early intervening services to prevent reading disabilities (e.g., Tier 2 interventions, Kovaleski, 2003). Third, SLPs may consult or collaborate with classroom teachers and reading specialists on phonological awareness instruction and/or intervention for children on their caseload as well as for children within the general education curriculum.

As it is unlikely that there is a one-size-fits-all role for SLPs in phonological awareness training (cf. Ukrainetz & Fresquez, 2003), each SLP must define his or her role within the educational team or job setting. Specification of roles will depend on the SLP's skills and knowledge as well as the skills and knowledge of colleagues (International Reading Association, 2000; Schuele & Larrivee, 2004).

SLPs have distinct and extensive content knowledge related to phonological awareness that differs from teachers' knowledge base; this knowledge can be a critical asset for educational teams (Cunningham, Perry, Stanovich, & Stanovich, 2004; Moats & Foorman, 2003; Moats & Lyon, 1996; Spencer, Schuele, Guillot, & Lee, 2007). For example, SLPs' knowledge base includes the developmental sequence of phoneme acquisition, the complexity of phoneme production, the categorization and structure of speech sounds within and across words, the relationship of phonological awareness to other areas of phonological processing, and appreciating the complexity of mapping speech to print (Boudreau & Larsen, 2004). In addition, SLPs are educated to consider the many factors that influence the successes and failures of individual children: assessing individual performance to identify individual child needs, linking individual assessment to instruction and intervention efforts, engaging children in dynamic assessment or diagnostic teaching to identify effective teaching strategies, scaffolding child success, and differentiating instruction across children.

The content knowledge and professional skill set of SLPs enable them to contribute to their school teams' efforts to enhance

children's phonological awareness acquisition in several ways. First, to boost other team members' knowledge, SLPs can share their content knowledge. Second, SLPs can provide their perspective in assessment decisions. They might provide input on the validity and adequacy of various phonological awareness instruments to meet the myriad goals of assessment (e.g., screening, instructional planning, progress monitoring). For example, criterion-referenced measures (e.g., Robertson & Salter, 1995) aim to provide instructionally relevant information. To separate out the influence of memorized print knowledge, phonological awareness assessment with older children may need to include nonsense words. Individual test items or tasks may be less informative than others. Deletion or elision tasks are often reliable and valid indicators of which children are weakest in phonological awareness (Catts, Fey, Zhang, & Tomblin, 2001), but these types of tasks are not recommended as instruction or intervention tasks (NICHD, 2000b). Test items with unfamiliar words (Metsala, 1999), words with later developing phonemes, or words with complex word shapes (e.g., CCVCC; Treiman & Weatherston, 1992) may underestimate a child's phonological awareness.

Third, SLPs can collaborate with classroom teachers to enhance phonological awareness instruction within the general education curriculum. They can identify phonological awareness curricula that are developmentally appropriate and developmentally sequenced (see Smith et al., 2001; Wanzek, Dickson, Bursuck, & White, 2000). For example, do initial instructional tasks target surface levels of awareness? Are tasks requiring deeper levels of awareness gradually introduced? Many early literacy instructional curricula rely on a letter-of-the-week framework and expect children to display phonological awareness in simple and complex tasks from the outset of the school year (e.g., Scholastic Inc., 2000). SLPs also can assist teachers in providing differentiated classroom instruction that better meets children's varying learning needs (cf. Fuchs et al., 2002).

Fourth, SLPs may be the school team member who is most suited to provide small-group phonological awareness intervention to struggling students. Alternatively, it may be important for the SLP to collaborate with a reading teacher who provides such intervention. Adequate progress for at-risk children may rely heavily on the interventionist's ability to consider children's individual cognitive–linguistic strengths and needs. SLPs' expertise can be particularly beneficial in the choice of intervention programs, the sequential arrangement of intervention targets, the selection and sequencing of instructional stimuli, and the planning of scaffolds and supports that respond to children's errors (Vigil & van Kleeck, 1996; Wanzek et al., 2000). These tasks may be difficult for educators because they require careful consideration of cognitive–linguistic demands (especially phonological; cf. Moats, 2000). In addition, SLPs can contribute their expertise to making sense of the difficulties that children experience in developing phonological awareness. For example, errors that may appear at first glance to be random instead may be informative as to the level of emerging knowledge or to the source of difficulty (Treiman, 1991). We have found that whereas SLPs readily recognize the logic of a child's spelling "skate" as *SGAT* or "truck" as *CHUK,* teachers often do not (see Moats, 2000).

This unique knowledge and skill set distinguishes SLPs' facilitation of phonological awareness from classroom phonological awareness instruction in important ways. Seeking to differentiate and clarify professional roles, Ehren (2000) provided a framework for identifying the difference between *instruction,* in which classroom teachers are primarily engaged, and *intervention,* or therapy, which is the primary role of the SLP.[1] Instruction and intervention vary most significantly with respect to individualized support, that is, the extent to which a child's skill level and responses drive the strategies and pace of teaching. In instruction, phonological awareness teaching serves to establish new knowledge in children, with the sequence of normal development or typical learning as a guide. An a priori planned sequence of activities (i.e., the adopted curriculum) is implemented by the classroom teacher, who has a basic understanding of language and literacy. The curricular activities promote most children's achievement of specific benchmarks or outcomes. In contrast, in intervention, phonological awareness teaching serves to address the learning needs of children who have not achieved the desired outcome from classroom instruction. The SLP brings detailed knowledge of not only typical development, but also the learning problems experienced by children with language impairments and/or poor phonological awareness. In intervention, the sequence of activities is customized based on the child's (or the small group's) current level of performance. The pattern of interaction between clinician and child(ren) is driven by the child(ren)'s performance and response to treatment; scaffolding and support are contingent on the child(ren)'s errors and success. Teaching persists (support is provided) until children achieve mastery. Hence, from a conceptual standpoint, instruction and intervention are clearly differentiated.

WHAT IS PHONOLOGICAL AWARENESS? WHAT IS PHONEMIC AWARENESS? ARE PHONOLOGICAL AWARENESS AND PHONICS THE SAME?

Metalinguistic ability enables a child to think about language as an object of thought that is distinct from word meaning (Hakes, 1980, 1982; van Kleeck, 1994). Phonological awareness, one type of metalinguistic skill, enables a child to analyze the sound structure of language (Mattingly, 1972). Some authors have referred to this ability as *phonological sensitivity* (Lonigan, Burgess, Anthony, & Barker, 1998; Stanovich, 1992), particularly when addressing the earliest emergence of phonological awareness (e.g., rhyme). Phonological awareness also has been classified as one type of phonological processing skill, along with phonological memory and rapid serial naming or rapid automatized naming (Catts & Kamhi, 2005; Wagner & Torgesen, 1987; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993). (For additional background information, see Gillon, 2004; International Reading Association, 1998; Justice & Schuele, 2004; Scarborough & Brady, 2002; Torgesen, Al Otaiba, & Grek, 2005; Torgesen & Mathes, 2000).

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[1]In the discussion of Ehren's perspective, we use *instruction* to refer to general education classroom teaching that is conducted by a teacher and *intervention* to refer to individualized or small-group teaching that is conducted by an SLP. Throughout this article, we have limited our use of the word instruction to situations of classroom instruction. However, we note here that in intervention, SLPs *instruct* children, and hence, instruct is synonymous with teach. So when considering issues of teaching phonological awareness, we use *instruct* and *instructional* materials in a broader sense than is implied in our use of instruction.

Phonological awareness encompasses a variety of skills. Some skills are indicative of simple, shallow-level phonological awareness; others are indicative of complex, deep-level phonological awareness (Justice & Schuele, 2004). However, all of these skills appear to draw on the same underlying knowledge base (Anthony & Lonigan, 2004; Anthony et al., 2002; Schatschneider, Francis, Foorman, Fletcher, & Mehta, 1999). At its simplest level, phonological awareness manifests as the ability to attend to and make judgments about the general sound structure of language. For example, dividing words into syllables, identifying and generating rhymes, and matching words with the same beginning sound, are considered simple phonological awareness tasks indicative of shallow-level knowledge. At more complex or deep levels, the ability to isolate and manipulate individual sounds or phonemes is involved; skill at this level of phonological awareness is called *phonemic awareness* (see Figure 1). It is this deeper level of phonological awareness, that is, phonemic awareness, that has been linked causally to early word decoding skill (Anthony & Lonigan, 2004; Ball & Blachman, 1991; Torgesen, Morgan, & Davis, 1992; Wagner & Torgesen, 1987; Wagner, Torgesen, Laughon, Simmons, & Rashotte, 1993).

Phonological awareness, often confused with phonics, is quite different from phonics. A child who demonstrates phonological awareness has the ability to analyze the sound structure of oral language. In pure form, phonological awareness tasks do not involve print. Phonological awareness tasks require a child to analyze, make judgments about, or manipulate *sounds* in spoken words. Thus, only spoken stimuli are needed. In contrast, in phonics,

children work with *print* symbols (i.e., letters) that represent the sounds of oral language. Access to phonics grows out of the acquisition of the alphabetic principle, the insight that language is composed of sounds *and* that letter symbols can be used to represent those sounds. Decoding an alphabetic script and becoming proficient in phonics requires phonological awareness (Beck & Juel, 1995; Cunningham, 1999; Torgesen et al., 1994). However, proficiency in phonological awareness can be displayed with limited or no understanding of sound–symbol correspondences. For many children, though, knowledge of the alphabetic principle promotes continued growth in phonological awareness (Foorman et al., 2003), and the development of other literacy skills influences children's performance on phonological awareness tasks (Castles & Coltheart, 2004). Unfortunately, varying disciplinary use of these terms— phonological awareness, phonemic awareness, and phonics—as well as misapplication in some assessment and instructional materials, may cause confusion for practitioners (for further clarification, see Scarborough & Brady, 2002).

It is important to recognize that phonological awareness is a necessary but insufficient foundation for proficient decoding. The critical importance of phonological awareness is seen in the realization that an alphabetic script makes little sense to a child who does not appreciate that words are composed of sounds (Beck & Juel, 1995). However, once phonological awareness is established, orthographic knowledge must be acquired. That is, children must come to appreciate the intricate and systematic nature of the representation of speech sounds in print (Stanovich, West, & Cunningham, 1991).

Figure 1. Sequence of phonological awareness instruction and intervention.
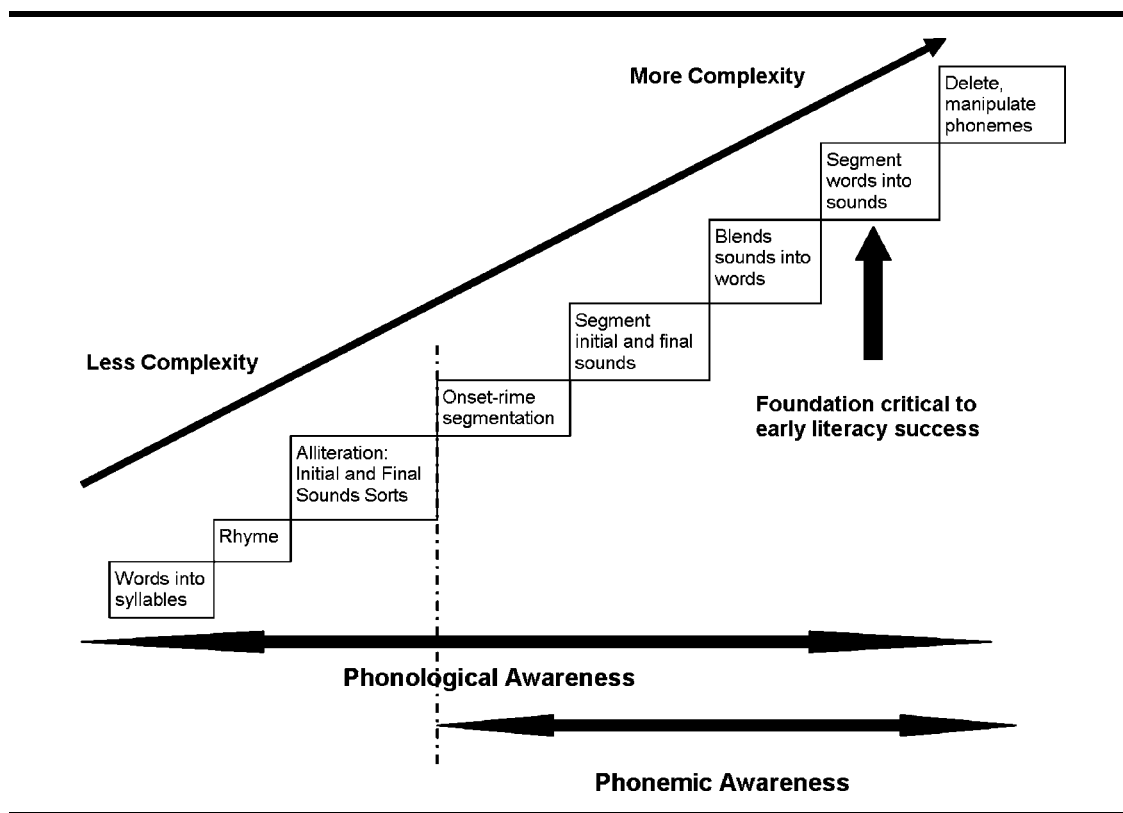
EVIDENCED-BASED PRACTICES IN PHONOLOGICAL AWARENESS: DEFINING THE PARAMETERS OF INTERVENTION

Phonological awareness instruction and intervention are provided to children for one purpose: to facilitate the acquisition of reading and writing, specifically, decoding words and spelling words. Proficient decoding is necessary if children are to comprehend what they read. The report of the National Reading Panel, "Teaching Children to Read" (NICHD, 2000a, 2000b), which included a critical review of the treatment literature, noted several key findings on phonemic awareness, as shown in Table 1. Given the importance of the report in driving current literacy practices and policy, SLPs will want to familiarize themselves with this document (available at www.nationalreadingpanel.org).

In consideration of these key findings, there are some important caveats that SLPs will want to consider. First, the panel reviewed only evidence on phonemic awareness, generally beginning at kindergarten age, and reviewed studies had to include reading outcomes. Thus, intervention to facilitate the earliest stages of phonological awareness, to establish a foundation on which to later build phonemic awareness (Hindson et al., 2005), may need to be more broadbased than was implied in the report.[2] Ultimately though, as noted in the report, to have an impact on reading and spelling, segmenting and blending must be targeted. Second, many of the phonemic awareness studies reviewed were conducted more than a decade ago when kindergarten curricula in many school districts were very limited in explicit literacy instruction (e.g., Ball & Blachman, 1988, 1991; Torgesen et al., 1992). Kindergarten curricula in place today, such as basal reading series (e.g., Scholastic Inc., 2000) or focused curricula (Simmons, 2006), typically provide very explicit letter sound instruction in kindergarten (Smith et al., 2001). Thus, when choosing or designing a phonological awareness intervention program, the SLP must consider what is taught in the classroom. Third, letter sound representations should be introduced in phonological awareness intervention after segmentation and blending skills are established (Ball & Blachman, 1988, 1991; Blachman, Tangel, Ball, Black, & McGraw, 1999). Inclusion of letter sound representations too soon, before the child appreciates that words are composed of sounds, can lead to confusion (Spector, 1995).

Classroom-based phonological awareness instruction should be provided to all preschool and kindergarten children; this instruction aims to establish a foundation of ability on which to build decoding and spelling skills in the early elementary grades. (For an informative critique on phonological awareness instruction presented in basal reading series, see Smith et al., 2001). However, even when good classroom instruction is provided in preschool and kindergarten, approximately 20% of children fail to acquire an adequate foundation of phonological awareness (Torgesen, 2000). These children need explicit phonological awareness intervention in late kindergarten or early first grade. In planning effective intervention, the research literature provides much guidance as to the timing, duration, and intensity, as well as scope and sequence, of intervention.

Table 1. Phonemic awareness: Key findings from the report of the National Reading Panel, "Teaching Children to Read" (NICHD, 2000b; see also Armbruster, Lehr, & Osborn, 2003).

- Phonemic awareness can be taught and learned.
- Phonemic awareness instruction helps children learn to read.
- Phonemic awareness instruction helps children learn to spell.
- Phonemic awareness instruction is most effective when it focuses on only one or two types of phonemic manipulation rather than several types; **segmenting and blending are critical skills**.
- Phonemic awareness instruction is most effective when children are **eventually** taught to manipulate phonemes by using alphabet letters.

Note. Words in bold were added by authors; see text for explanation.

Timing: When to Provide Phonological Awareness Intervention?

Questions arise about whether there is an optimal time to provide phonological awareness intervention, when children might be developmentally most prepared to benefit from direct intervention. Specifically, for children with speech and/or language impairments, can we be premature in our offering of phonological awareness intervention? Are there prerequisite skills that children must have in order to benefit from phonological awareness intervention? With respect to older children, is there evidence that phonological awareness intervention makes a difference beyond the early grades?

As noted previously, there is broad support for the inclusion of phonological awareness instruction in preschool and kindergarten curricula. Phonological awareness emerges in preschool if children are engaged in systematic, developmentally appropriate activities that are aimed at facilitating shallow levels of phonological awareness (Hindson et al., 2005; Lonigan, Phillips, Cantor, Anthony, & Goldstein, 2003). For most children, by midyear of kindergarten, classroom instruction will lead to mastery of tasks that tap into shallow levels of awareness (e.g., rhyme, alliteration tasks), and by late kindergarten or early first grade of tasks that tap into deep levels of awareness (e.g., segmenting and blending) (Good & Kaminski, 2002; Invernizzi, Meier, Swank, & Juel, 2001). Mastery is defined here as the ability to perform tasks independently with consistency but not necessarily proficiency on all types of word stimuli (cf. Treiman & Weatherston, 1992). Thus, in mid to late kindergarten, it becomes possible to identify children who have not benefited adequately from classroom instruction, who are not moving toward mastery of phonological awareness, and thus, who may need more explicit intervention (Schuele et al., in press).

Greater change in phonological awareness (i.e., larger effect sizes) is realized when instruction or intervention is provided in preschool or kindergarten rather than in the early elementary years (Blachman, 1997; Bus & Van IJzendoorn, 1999; Troia, 1999). This finding, however, may be a measurement artifact. Preschool children have fewer phonological awareness skills than kindergarten children, and kindergarten children have fewer skills than first graders. Thus, younger children have a wider range in which to grow, and children in first grade may begin to reach ceiling on research tasks. What seems most important with respect to timing is that intervention is provided before children lag too far behind their peers (Blachman, 1994; Torgesen, 2000) and that intervention relates to curricular demands or expectations. Our experience with

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[2]To complement the work of the National Reading Panel, the National Early Literacy Panel (NELP) was formed to synthesize the literature on the development of early literacy skills in children up to 5 years of age. A report of this synthesis should be forthcoming. Interested readers can explore the efforts of the NELP at www.famlit.org.

kindergarten and first-grade curricula today suggests that in many schools, children are expected to show emerging reading and spelling ability by the end of kindergarten (e.g., decode simple words, use invented spelling in journal writing). Thus, curricular expectations support phonemic awareness intervention as early as kindergarten.

Reports of phonological awareness intervention outcomes have to date focused mostly on group effects. Despite reported positive group findings, though, some children have shown minimal growth after phonological awareness intervention (O'Connor, Jenkins, Leicester, & Slocum, 1993; Torgesen & Davis, 1996; Torgesen et al., 1992). As Blachman (1994) noted, even with intervention, phonological awareness is a relatively stable skill inasmuch as children with the lowest skill level at the outset of intervention still tend to have the lowest skill level at the close of intervention. With children who fail to attain a sufficient foundation of phonological awareness, it is critical to explore the factors, including timing of intervention, that may facilitate phonological awareness growth for these children (Blachman, 1994; Torgesen, 2000). For some of the young children who SLPs encounter—for example, children with cognitive deficits, hearing impairments, or severe communication impairments—timing of phonological awareness intervention should perhaps be later than what is typical for same-age peers (cf. Blachman, 1997).

Beyond the elementary school years, without a clear direction from research, SLPs and educators must decide the value of phonological awareness training. Many school-aged children with reading disabilities demonstrate substantial deficits in phonological awareness, even when compared to younger children who have been matched for reading abilities (Fawcett & Nicholson, 1994). Yet others earn unexpectedly high scores on phonological awareness measures (Olson, Forsberg, & Wise, 1994). In addition, some adolescents who successfully compensate for reading disability have difficulties in phonological processing (Gallagher, Laxon, Armstrong, & Frith, 1996). Phonological awareness performance accounts for a large portion of variance on reading measures for adult poor readers (Pratt & Brady, 1988); it is unclear, however, the extent to which phonological awareness is a cause or a consequence of limited reading ability. Hence, with older poor readers, the complex relationship between phonological awareness and reading makes decisions about phonological awareness intervention difficult.

There is clear evidence that beyond elementary school, teaching phonological awareness results in improved performance on phonological awareness and decoding tasks (Alexander, Anderson, Voeller, & Torgesen, 1991; Gillon & Dodd, 1995; Kennedy & Backman, 1993; NICHD, 2000b; Pokorni, Worthington, & Jamison, 2004; Swanson, Hodson, & Schommer-Aikins, 2005; Williams, 1980); the question is the degree to which phonological awareness skills should be addressed within limited instructional time. Some educators argue that once children have reached a degree of competence in word reading, intervention should focus on students' ability to read texts of individual high interest because phonological awareness or phonics instruction provided independently of authentic reading and writing activities is unlikely to improve reading performance (Ivey & Baker, 2004; Ivey & Broaddus, 2001; Pokorni et al., 2004). However, there are several counterpoints to this perspective that practitioners should consider.

Acquisition of sufficient word decoding that allows for reading high-interest materials may hinge on systematic remediation of phonological awareness and word decoding deficits. A growing body of evidence supports intervention that includes but is not limited to a focus on word analysis and structure and single word decoding for older children with reading impairments (Abbott & Berninger, 1999; Bhattacharya & Ehri, 2004; Cunningham, 1990; Fowler & Scarborough, 1993; Guyer & Sabbatino, 1989; Hatcher, Hulme, & Ellis, 1994; Oakland, Black, Stanford, Nussbaum, & Balise, 1998; Swanson et al., 2005; Torgesen, Rashotte, Alexander, Alexander, & McPhee, 2003; Torgesen, Wagner, Rashotte, Alexander, & Conway, 1997). Attention to structural components of words (e.g., syllabic analysis, phonemic segmentation) is more effective than other treatment conditions, such as whole word reading or classroom basal reading instruction (Bhattacharya & Ehri, 2004; Oakland et al., 1998, Swanson et al., 2005). Thus, to decide whether to provide phonological awareness practice to older children within a broader literacy program, one must consider the nature of the reading deficit and the level of phonological awareness knowledge. Because blending and segmenting skills are critical to decoding unfamiliar written words, a student must have at least a foundation of these skills to improve decoding; these areas may be notably absent in the individualized education plans of older children (Catone & Brady, 2005).

Duration and Intensity: How Much Intervention Is Necessary?

In addition to the timing of intervention, consideration must be given to the intensity and duration of intervention. *Duration* is defined as the total length of intervention (e.g., 12 weeks) and *intensity* as the frequency of intervention (e.g., twice a week for 20 min). Duration and intensity can be viewed from a cost/benefit perspective. What is the minimal amount of intervention necessary to establish a foundation of phonological awareness on which to build word decoding skills?

In general, a little seems to go a long way. The National Reading Panel (NICHD, 2000a) found that 5 to 18 hr of instruction or intervention provided substantial benefit, with longer programs not necessarily leading to greater benefit. Typical intervention programs (e.g., Ball & Blachman, 1991) have been spread over 7 to 12 weeks, with 3 to 5 sessions per week, 15 to 30 min in length. Application of this finding to the most challenged learners may not be warranted, however. Most intervention studies have included children with widely varying abilities, and in some studies, children with the greatest potential literacy needs were excluded (e.g., see participant criteria in Ball & Blachman, 1991; Torgesen et al., 1992). Also, intervention studies generally have quantified group progress but not whether individual children attained a prespecified outcome (e.g., mastery of segmentation and blending). Thus, the duration and intensity guidelines from the National Reading Panel may not be relevant for children who are at greatest risk for reading disability, who may require more (or different) intervention than other children to attain critical skills (Blachman, 1994; Torgesen, 2004; Torgesen et al., 1994). Because so few studies have examined phonological awareness intervention outcomes, especially the impact on reading outcomes, for children with disabilities, including speech/language impairments, or children with the lowest literacy achievement (Fuchs et al., 2002; O'Connor et al., 1993; van Kleeck, Gillam, & McFadden, 1998; Warrick, Rubin, & Rowe-Walsh, 1993), little is known about the duration and intensity of interventions that will be sufficient for the lowest achievers (Blachman, 1994).

To address issues of duration and intensity, the response to intervention (RTI) framework provides promise for understanding individual child needs and outcomes (McMaster, Fuchs, Fuchs, & Compton, 2005; Vaughn & Fuchs, 2003; Vaughn, Linan-Thompson, & Hickman, 2003). RTI is viewed as a means to prevent reading disabilities (Vellutino et al., 1996) and identify children with true reading disabilities (Justice, 2006). Within the RTI paradigm, instruction and intervention are conceptualized in tiers. With the first tier, all children receive research-based classroom instruction. Progress is evaluated to identify those children who have not made adequate progress from the first tier and require a second tier of intervention, typically small-group intervention (Kovaleski, 2003; Vaughn & Fuchs, 2003). Children who continue to struggle despite Tier 2 intervention might be provided extended Tier 2 intervention (Vaughn et al., 2003) or they may be referred for special education services (identified by Kovaleski as a third tier of intervention). RTI investigations with children with speech/language impairments likely will be informative to SLPs' clinical practice decisions.

Scope: In What Order Should Phonological Awareness Skills be Targeted? What Are the Critical Achievements? When Should Children Attain These Critical Skills?

Initial phonological awareness typically arises from children's participation in daily experiences that draw their attention to the structure of speech and print (e.g., parents reading nursery rhymes). However, for the majority of children, greater proficiency on phonological awareness skills results from specific, explicit instructional experiences that they encounter in kindergarten and first grade. Thus, delineation of the scope and sequence of instruction or intervention follows from a consideration of what preschool children learn and how kindergarten and early elementary children respond to phonological awareness instruction or intervention.

There is general agreement that the sequence of phonological awareness development or learning proceeds from rhyme and the segmentation of words into syllables to the awareness of individual sounds, with the highest level of phonological awareness being the deletion and manipulation of phonemes, as illustrated in Figure 1 (e.g., Adams, Foorman, Lundberg, & Beeler, 1998; Anthony et al., 2002; Lewkowicz, 1980). However, some authors (Macmillan, 2002; Stuart, 2005) have questioned whether instruction in rhyme facilitates more complex phonological awareness skills (cf. Hindson et al., 2005). Regardless, segmenting and blending are recognized as critical skill achievements, with lower level skills important in instruction or intervention to the extent that they facilitate subsequent development of blending and segmenting. From a developmental perspective, it is best to view the steps of the sequence not as discrete, sequential stages, but rather as overlapping stages. Anthony and his colleagues (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003) characterized phonological awareness development as a "quasi-parallel progression" (p. 470), that is, improvement at one step leads to improvement at the next step. Once a child has some skill at one step, he or she can begin to develop skill at the next step. Mastery at one step is not a prerequisite to the next step. Thus, along the instructional sequence, "children learn and refine a variety of phonological [awareness] skills simultaneously" (Anthony et al., 2003, p. 482).

To date, researchers have not defined the endpoint for phonological awareness intervention specifically, that is, the phonemic awareness skill level that children must attain in order to benefit from word decoding instruction, what Torgesen (2000) referred to as "absolute performance standards" (p. 59). Two criterion-referenced instruments, the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002) and the Phonological Awareness Literacy Screening (PALS; Invernizzi & Meier, 2002–2003; Invernizzi et al., 2001), have begun to address this issue with empirically derived grade-level benchmarks on their screening and progress monitoring tasks.

In light of the absence of absolute performance standards, we have derived a working specification of an endpoint for phonological awareness intervention—what children should have achieved as they approach conventional literacy instruction (Schuele & Dayton, 2000). A child should acquire a foundation of phonological awareness that enables him or her to benefit from general education decoding instruction. This involves the understanding that language is composed of syllables and sounds. This understanding is operationalized as the ability to segment and blend CV, VC, and CVC (C = consonant, V = vowel) words with some consistency and independence and an emerging ability to segment and blend words with consonant clusters or blends (CCVC, CVCC) (cf. Schatschneider et al., 1999; Stahl & Murray, 1994).

Although the instructional sequence set out in Figure 1 is appropriate for all children, a timeline for achievement of outcomes likely should be specified on a local level. Some states and school districts have full-day kindergarten, whereas others have half-day. The length of the instructional day likely has a substantial impact on what kindergartners will achieve (Baskett, Bryant, White, & Rhoads, 2005; Plucker & Zapf, 2005). In addition, preschool educational experience can vary widely across children and across communities. The content standards for individual states may vary as well. Thus, expectations for early literacy achievement are best based on the individual school's curricular expectations of children. SLPs need to become thoroughly familiar with their schools' kindergarten and first-grade state standards for literacy achievement and the expectations of the adopted literacy curriculum (e.g., the basal reading series). This knowledge can guide practitioners as they set expectations for achievement in phonological awareness and determine the scope of phonological awareness intervention protocols.

Likely, SLPs also will have to decide the extent to which they will address decoding in the context of phonological awareness intervention. Once blending and segmenting is established, children may benefit from some intervention practice that facilitates the application of phonemic awareness knowledge to spelling and decoding words. In this way, the SLP seeks to provide a link between the phonological awareness skills of intervention with classroom decoding and spelling instruction (Blachman, Ball, Black, & Tangel, 2000; Clay, 1975). What appears critical is that the SLP defines the purpose of these links within the intervention context (i.e., teaching decoding and spelling is not the purpose) and chooses stimuli that are clear exemplars of mapping speech to print (i.e., one-to-one correspondence of sounds and letters, for example, *red* but not *read*). The amount of this spelling and decoding practice within intervention can be driven by the extent to which the child encounters explicit decoding and spelling instruction. To be sure, children who fail to make adequate decoding and spelling progress in the classroom curriculum will need intervention. Likely, though, in

most contexts, this intervention will be provided by the reading specialist or a special education teacher.

To summarize, children should be expected to achieve the critical skills of segmenting and blending by the time these skills are needed for success in the general education curriculum. In most of the elementary schools with which we are familiar, children are expected to begin first grade ready to learn to decode words and to spell simple words. This is true for schools where children enter kindergarten with strong emergent literacy skills as well as schools where children enter kindergarten with minimal emergent literacy skills. Given this expectation, Table 2 illustrates a proposed timeline for benchmarks or outcomes in phonological awareness. These expectations appear consistent with the developmental and instructional literatures (e.g., Adams et al., 1998; Lonigan, 1998). However, our performance expectations seem more advanced than what some have outlined (cf. Moats, 2000; Torgesen & Mathes, 2000). Differences in expectations may reflect variability in the level of independence at which a child is successful. It is critical that phonological awareness interventions with low literacy achievers proceed until children gain proficiency at the phonemic awareness level (segmenting and blending phonemes). Intervention that is limited to shallow-level tasks of phonological awareness (e.g., rhyme) will not be sufficient to have a positive impact on the reading achievement of the children who are most at risk to fail (O'Connor et al., 1993). Depending on the extent to which explicit decoding instruction is provided in the classroom, SLPs will want to assist children in applying their newly established phonological awareness knowledge to decoding and spelling words.

PROVIDING HIGHLY EFFECTIVE INTERVENTION

Considerations of timing, intensity, duration, and scope provide a framework for intervention. However, providing highly effective intervention, which is critical for children who are at greatest risk for reading disabilities, requires careful attention to and execution of the details of instructional design, for example, the sequence of teaching within each step of the instructional sequence, organization of instructional stimuli, strategies for teaching, and

Table 2. Benchmarks for phonological awareness achievement.

Age/Grade	Skill or ability
Preschool	Some rhyming ability (e.g., match rhymes)
	Some beginning sound ability (e.g., beginning sound sorts)
	Segment words into syllables
Early kindergarten	Judge and match rhyming words
	Generate rhyming words
Middle kindergarten	Match words with same beginning sounds
	Match words with same final sounds
	Segment initial sounds and final sounds
Late kindergarten	Segment and blend two and three sound words that are consonant-vowel (e.g., go), vowel-consonant (e.g., up), consonant-vowel-consonant (e.g., cat, moon)
Early first grade	Segment and blend sounds in words with consonant blends (e.g., skate, jump)

responding to children's errors and/or correct responses (Smith et al., 2001; Vigil & van Kleeck, 1996). A challenge for SLPs as well as teachers is that instructional materials provide far more guidance on *what* to teach than *how* to teach (Wanzek et al., 2000). Careful attention to how to teach "could make the difference in whether or not [learners at risk for reading disabilities] benefit from the very instruction they need in order to learn to read successfully" (Smith et al., 2001, p. 47). The published literature has provided some direction in this regard, but much of our commentary in this section derives from clinical experience. Having said this, we look for future published studies to explore the critical elements of effective phonological awareness instruction and intervention.

Our discussion of the details of instructional design is organized around three critical points.

- *Teach. Don't test:* Demonstrate repeatedly the process by which one "solves" phonological awareness tasks.
- *Plan strategic instruction:* Carefully order instructional activities within each step of the instructional sequence (and instructional stimuli within activities).
- *Scaffold children's success:* Respond strategically to children's errors and correct responses. Consider also that accurate responses or answers may not always reflect successful learning.

Teach, Don't Test

Practitioners need to *teach* children. Often, however, our teaching looks more like testing. For example, we ask a child a question. When the child does not provide the correct answer, we direct the question to another child, who provides a correct answer. In this scenario, the child who responded incorrectly does not receive feedback that will help him or her figure out the answer. Instead, we assume that the correct answer from the second child helps the first child learn. But does it? The child who responded incorrectly now knows the correct answer, but he or she does not know how to get from the question to the correct answer. Only feedback and scaffolding—teaching—will help the child figure out how to get to the right answer (Schneider & Watkins, 1996; Ukrainetz, 2006).

Teaching involves helping a child do something that he or she was not able to do previously, or helping a child do something better or more independently (Vigil & van Kleeck, 1996). Thus, a teacher or clinician does not just ask, but explains, models, highlights critical concepts, carefully sequences teaching, provides sufficient practice, and scaffolds, contingent on the child's current level of performance. At the outset of learning, the adult literally carries the child through the task. The adult controls the learning situation, provides ample input, and shows the child how to move from question to answer. The child's role may be quite minimal, perhaps just repeating the correct answer. Over time, the adult gradually yields control; the adult guides the child to successfully complete the pieces of the task, providing support when needed. As the child gains skill and independence, the adult provides less and less support (van Kleeck, 1994; Vigil & van Kleeck, 1996). Learning is best characterized not by moving a child from 20% correct to 50% correct to 100% correct, but by moving a child from successful performance with maximal support to successful performance with little or no support. At each step along the way, the teacher or clinician must be proficient at providing the appropriate

amount and type of support (Blank, Rose, & Berlin, 1978). Unfortunately, within phonological awareness intervention studies, the quality of scaffolding and instructional dialogue, which are critically important for the most challenged learners, has not been addressed adequately (Smith et al., 2001; Torgesen, Wagner, & Rashotte, 1997).

Perhaps the most challenging aspect of teaching phonological awareness is that one cannot *make* a child analyze the sound structure of language. Rather, the clinician must repeatedly model analysis, using a think-aloud strategy, showing the child how to solve the problem (Ukrainetz & McGee, 2005). The clinician's repeated modeling of multiple exemplars and guided practice leads to or triggers the child's critical insights that make possible independent analysis of the sound structure of language. Importantly, different types of models will be appropriate at the various stages of learning; see Table 3 for an illustration of four types of models.

Teaching may be more successful if the clinician sets up tasks in a way that requires the child to move through a consistent set of steps in arriving at and verifying responses. You may recall doing this in elementary school when learning long division. Table 4 illustrates some steps that we have found effective in guiding children's analysis of the sound structure of language.

Plan Strategic Instruction: Sequence Instructional Tasks and Instructional Stimuli

The sequence of Figure 1 provides an overall plan for phonological awareness instruction or intervention. To effectively teach, however, the clinician also must plan how intervention will proceed at each step of the sequence. In doing so, clinicians must consider (a) the operation or cognitive tasks to be performed (e.g., rhyme, blending, segmenting, manipulation), (b) the nature of the tasks (e.g., judge, match, sort), (c) the unit to be analyzed (e.g., phrase, word, syllable), and (d) the linguistic characteristics of stimuli (e.g., number of phonemes, number of syllables, syllable shape, whether phonemes are continuing sounds or stop sounds) (Anthony et al., 2003; Smith et al., 1998).

For each step in the sequence, a variety of tasks can be targeted (Adams et al., 1998; Anthony et al., 2003; Lewkowicz, 1980; Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988). For example, with rhyme, one can judge rhymes, choose one of three words that does not rhyme, match rhymes, and generate rhymes.

Table 3. A framework of models described in Wanzek et al. (2000, p.12).

Type of models	Example
Model only	Listen to the word bear. The first sound in bear is /b/.
Model–Lead	Listen to the word bear. The first sound in bear is /b/. Say the first sound in bear with me, /b/.
Model–Lead–Test	Listen to the word bear. The first sound in bear is /b/. Say the first sound in bear with me, /b/. What's the first sound in bear? /b/.
Model–Test	Listen to the word bear. The first sound in bear is /b/. What's the first sound in bear? /b/.

Note. Model = teacher demonstrates skill; lead = students repeat model with teacher; test = student completes example independently.

Table 4. Steps for teaching phonological awareness skills.

Task	Steps to solve the problem
Rhyme	1. Say the words aloud.
	2. Does my mouth do the same thing at the end?
	3. Do they sound the same at the end?
Initial and final sounds	1. Say the words aloud.
	2. Stretch (continuing) or iterate (stops) initial or final sound.
	3. Segment the initial or final sound.
Blend sounds into words	1. Repeat the sounds, stretching the continuing sounds.
	2. Blend sounds together, stretching the continuing sounds, including vowels.
	3. Say the word with natural prosody.
Segment words into sounds	1. Repeat the word.
	2. Stretch the continuing sounds and iterate the stop sounds.
	3. Segment the words into sounds, saying each phoneme with distinct pauses between phonemes.

Sequencing of tasks on each step should be driven by task complexity so that simple tasks are targeted before complex tasks and earlier tasks lead to success on later tasks. Earlier tasks need to target emergence and initial establishment of a skill. Often, earlier tasks have a high probability of chance success. For example, in a two-choice task (e.g., *Do cat and bat rhyme?*), the child has a 50% chance of success regardless of his or her knowledge base. Later tasks solidify a skill and require increasing command of the target skill (e.g., *Tell me a word that rhymes with cat.*). In addition, earlier tasks may be subcomponents of later tasks, for example, segmenting *ape* before *cape* and *top* before *stop* (Blachman et al., 2000). Table 5 illustrates an instructional sequence derived from the developmental sequence in Figure 1.

Once the overall instructional sequence (e.g., Figure 1) and the sequence of teaching on each step of the sequence (e.g., Table 5) are established, clinicians then must select and sequence instructional stimuli for each instructional task. Attention to the linguistic characteristics of stimuli can increase the likelihood that children will "catch on," expand their skills beyond the current level, and achieve critical insights and skills (Treiman & Weatherston, 1992). Some examples may clarify and illustrate this point. In the segmentation of multisyllabic words, a two-syllable compound word such as *cupcake* is probably easier to segment than two- or three-syllable words such as *feather* or *elephant,* because the segmented components in *cupcake* are familiar words. Rhymes may be more salient to children when articulation of the final sounds can be visible. Thus, when initially learning about rhymes, *top* and *mop* may provide more information than *duck* and *luck*. Rhymes also may be more salient when words end in consonants rather than vowels in that the final point of articulation of a consonant has specific placement cues that can provide feedback to the child. Thus, *duck* and *luck,* with the rime ending in a consonant, may be more accessible to a child than *boy* and *toy,* with the rime including only a vowel.

Consonants are easier to segment than vowels (Stage & Wagner, 1992), and initial sounds are easier to segment than final sounds

Table 5. Instructional sequence for phonological awareness intervention (Schuele & Dayton, 2000).

Step in sequence	Instructional sequence within each step
Segment words into syllables	■ Segment sentences of monosyllabic words (e.g., *Bob likes his bike*) ■ Segment two-syllable compound words (e.g., *cupcake, hotdog*) ■ Segment two-syllable words (e.g., *pillow, carpet*) ■ Segment multisyllabic words (e.g., *basketball, tomato*)
Rhyme	■ Judge rhymes (e.g., *Do cat and bat rhyme? Do cat and show rhyme?*) ■ Odd-one-out rhymes (e.g., *Which does not rhyme? cat, ball, hat?*) ■ Match rhymes (e.g., *Find the one that rhymes with hat. bell, cat, top*) ■ Generate rhymes (e.g., *Tell me a word that rhymes with cat.*)
Initial and final sounds (monosyllabic words)	Target initial continuing sounds before stop sounds, and likewise for final sounds ■ Judge initial sounds (e.g., *Do cat and ball start with the same sound?*) ■ Odd-one-out initial sounds (e.g., *Which one does not have the same sound at the beginning? cat, ball, cup, king*) ■ Match initial sounds (e.g., *Which one begins with the same sound as fan?*) ■ Initial sound sorts (e.g., *Which ones start like fish and which ones start like sun?*) ■ Judge final sounds ■ Odd-one-out final sounds ■ Match final sounds ■ Final sounds sorts
Onset-rime segmentation; Segment initial and final sounds	■ Segment initial continuing sounds (e.g*., What's the first sound in fish?)* ■ Segment initial stop sounds (e.g., *What's the first sound in bat?*) ■ Segment final continuing sounds (e.g., *What's the last sound in bus?*) ■ Segment final stop sounds (e.g., *What's the last sound in cat?*)
Blend sounds into words and segment words into sounds	Target blending and segmenting as reciprocal tasks, in this sequence: ■ CV and VC words with continuants (e.g., *no, us*) ■ CV and VC words with stops (e.g., *two, up*) ■ CVC words with continuants (e.g., *moon, fish*) ■ CVC words with stops (and continuants) (e.g., *cat, dish*) ■ CCVC words, begin with blends with dissimilar articulatory placement (e.g., *small, flip*) ■ CVCC words, targeting nasal blends last (e.g., *fast, jump*) ■ Words with continuants and stops in varying word shapes

(Skjelfjord, 1987; Stage & Wagner, 1992; Zhurova, 1963–64). Some phonemes should perhaps be avoided in teaching phonological awareness (e.g., /r/ in syllable final position; Lewkowicz, 1980). Analysis of continuing phonemes seems to be easier than analysis of stop phonemes (Lewkowicz, 1980; Marsh & Mineo, 1977; Skjelfjord, 1976; Treiman & Baron, 1981). Because it is possible to elongate continuing sounds, the increased length of production may make the sounds more salient to the child. Thus, it may be easier for a child initially to judge whether *moon* and *mat* begin with the same sound than *boy* and *box,* or it may be easier for a child to segment *fun* into its component sounds than *cat*. Shorter words are easier to segment than longer words (e.g., CV easier than CVC), but syllable shape is critical. It is easier to segment an initial sound in a CVC word than in a CCV word (Treiman & Weatherston, 1992).

Analysis of consonant clusters into constituent phonemes is a particular developmental challenge, indicating that syllable shape is more important than number of phonemes (Treiman, 1991). For example, *seek* is easier to segment than *ski,* despite that each word has three phonemes and the same phonemes comprise each word, /s/, /i/, /k/ (Stahl & Murray, 1994; Treiman, 1991). Treiman found no evidence in developmental spelling measures that a particular cluster type was easier to segment and represent. But, Stahl and Murray suggested that liquid clusters may be easier than other clusters. Interestingly, some clusters have phonemes with identical articulatory placement; in s<u>t</u>amp, for example, both phonemes are alveolars, and in ju<u>m</u>p, both phonemes are bilabials. Perhaps clusters with dissimilar articulatory placement, such as <u>sp</u>ot or <u>fl</u>ip,

may be easier to segment than clusters with similar articulatory placement.

Consideration of other characteristics of instructional stimuli may influence children's phonological awareness success as well. Research has documented that children who have knowledge of letter sounds perform better on phonemic awareness tasks (Mann & Wimmer, 2002) and that the inclusion of letters representing sounds being manipulated generalizes to reading and spelling better than comparison interventions (Bradley & Bryant, 1985). Metsala's (1999) work also suggests that phonological awareness may be more readily displayed on words that are firmly established in the child's lexicon. Redundancy might also facilitate children's learning and success. Segmenting a word into phonemes may be easier if the child has encountered that word in generating rhymes, in matching initial sounds, and in segmenting final sounds, for example. The prior tasks will have provided the child with much practice analyzing the sounds of the word, though the child has never been asked to segment the word into all of its component sounds. Segmenting words with blends may be easier when the child has had practice segmenting a subunit of that word. Thus, segmenting *stop* may be easier if the child previously practiced segmenting *top* (Blachman et al., 2000).

Scaffold Children's Success: Respond to Errors

Highly effective intervention is contingent on adult responses to child errors (and in fact, all child responses) that consistently

facilitate growth toward more independent, more complex performance (Juel, 1996; Vigil & van Kleeck, 1996). Each child response provides information on what the child knows or does not know. The nature of the child's errors, as well as successes, indicates the type of scaffolding a child needs.

To aid clinicians in responding to children's errors, Vigil and van Kleeck (1996) described five operating principles; four of these principles provide a helpful framework for thinking about phonological awareness intervention.

To formulate a response to a child's error, the clinician considers the reason for the child's error. Some incorrect responses, for example, indicate a lack of attention to the task, whereas other responses indicate a lack of conceptual understanding. Table 6, adapted from Vigil and van Kleeck, provides examples of error types and possible response strategies.

The point in the learning process will provide direction in responding to errors. When a child is early in the learning process, an error usually indicates a need for maximal support. The child probably would benefit from modeling and repeating the adult's response. For example, asked to segment a word into sounds, the child would imitate the clinician's model of the response. Hints or subtle cues are unlikely to be helpful early in the learning process. In contrast, when the child is further along in the learning process, hints and subtle cues can help the child focus on key information that will lead to successful performance. In an illustration of a dynamic assessment segmentation task, Spector (1992) provided a sequence of instructor scaffolds that may be quite informative to clinicians (see Table 7).

The adult must respond to the child's error in a way that facilitates achievement of the teaching goal. Feedback must focus the child on the critical elements of the task so that the target skill remains in focus. Off-target or irrelevant child responses can elicit adult feedback that is also irrelevant. For example, in generating rhymes (e.g., *Tell me a word that rhymes with dog.*), the child may provide an associated word (e.g., *cat*) rather than a rhyme. The child needs feedback that focuses him or her on the sounds of words (e.g., *Listen to the sounds in the word; watch what my mouth does at the end of the words*.). In contrast, an explanation of the nature of the child's error (e.g., *Dog and cat belong together*

because they are pets.) would not help the child focus on the sounds in the word.

The stated operating principles can be applied to correct responses as well. Clinicians will want to consider whether the child's accurate response truly indicates knowledge or perhaps just chance or random success. For example, in testing a first grader who had minimal phonological awareness, we attempted a rhyme task. When asked what rhymes with *cat,* the child responded with *hat.* Initially, we were thrilled to have discovered that the child had at least this shallow level of awareness. On the next trial, however, when asked what rhymes with *dog*, the child paused, looked thoughtful, and then responded, "Hmm. I don't know. My mama hasn't told me that one yet." Of course, the child had memorized the rhyme pair of *cat* and *hat* but had no knowledge of what a rhyme really was, and thus could not move beyond memorized exemplars.

Experiences such as the one above highlight the value of responding to children's errors and correct responses in a similar manner. For example, when asked, *Do cat and fish rhyme?,* the child can be guided through the steps of solving the problem (see the rhyme steps in Table 4) whether he answered yes or no. In the case of a *no* answer, the steps serve to verify, whereas in the case of a *yes* answer, the steps serve to identify the child's mistake and provide an opportunity for the clinician to scaffold an accurate response from the child.

To illustrate the application of these principles in responding to errors, Tables 8 and 9 provide different responses to a child's error, contingent on the clinician's hypothesis as to why the child failed to provide the correct answer.

To Vigil and van Kleeck's discussion on errors, we add one more point: *Teaching is enhanced when clinicians anticipate the types of skill errors that children are likely to make and a priori plan scaffolding strategies.* Often, far more effort in planning treatment goes into the execution of the treatment activity than into linking anticipated skill errors with appropriate scaffolding. To be fair, when a clinician first begins to train phonological awareness, he or she may not know the types of skill errors that children will make; this knowledge may come only with experience. We have found that it helps to keep a log of skill errors that children make. Equally

Table 6. Examples of types of errors and how to respond (Vigil & van Kleeck, 1996).

Type of error	How to respond
Skill error	Present a simpler but related task that the child has shown success on.
	Break the task into smaller steps and guide the child's response through those steps.
	Shift roles. The adult can respond to the task to model the correct response for the child. Use a think-aloud strategy.
	Provide cues and prompts to assist the child in focusing on the critical elements that lead to a correct response.
Situationally induced error	Simplify or repeat the instructions. Model the response and then repeat with a similar question/request.
	Shift to a familiar task. Then return to the unfamiliar task.
	Model the task and then repeat with the child several times to establish familiarity.
Emotionally induced error	Provide emotional support and encourage the child to give his or her "best try."
	Provide some scaffolding that gets the child started in the right direction and motivates the child to take the risk of responding.
	Help the child achieve success and point out that the child has accomplished a task that was previously very difficult.

Table 7. Scaffolding phonemic segmentation.

Successive prompts to scaffold a child's segmentation of words into phonemes

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Prompt 1	*Listen while I say the word very slowly.* Model slow pronunciation. *Now can you tell me each sound?*
Prompt 2	*What's the first sound you hear in _____?*
	If first sound is correct: *Now can you tell me each of the sounds?*
	If incorrect or no response: *Try to tell me just a little bit of the word.*
	If child still does not isolate first sound, skip Prompts 3 and 4. Go to Prompt 5.
Prompt 3	If child correctly identified first sound but not next sound(s):
	____ *is the first sound in _____.*
	What sound comes next?
	Now can you tell me each sound?
Prompt 4	*There are 2 [or 3] sounds in _____. What are they?*
Prompt 5	*Watch me.* Model segmentation of word: Place a token in a square as each sound is spoken, then repeat word as a whole. After demo say the following: *Try to do what I just did.*
	Score response as correct if child can imitate correct segmentation.
Prompt 6	*Let's try together.* Model segmentation of word with child. Work hand-over-hand with child and ask child to pronounce segments along with you.
	Now try to do it yourself. Do what we just did together.
Prompt 7	Model again with child (as in Prompt 6). *Now try again to do it yourself.*

Note. From "Predicting Progress in Beginning Reading: Dynamic Assessment of Phonemic Awareness," by J. Spector, 1992, *Journal of Educational Psychology, 84,* p. 363. Copyright 1992 by American Psychiatric Association. Reprinted with permission.

important in that log is noting scaffolding that was successful, as well as unsuccessful. Planning for subsequent treatment sessions then involves an analysis of skill errors and consideration of appropriate scaffolding. Revisiting skill errors and the success of scaffolding after each session is quite productive as clinicians consider the details of teaching (e.g., careful planning of scaffolding) outside the confines of the treatment session. In doing this, we have found that the skill errors are quite predictable across children,

Table 8. Example dialogue of rhyme instruction and response to possible child errors.

Initial instructional dialogue

Adult: We are going to think of words that rhyme. Remember rhyming words are words that sound the same at the end, like pop and top. Pop. Top. They rhyme. Pop. Top. They sound the same at the end. Pop, Top (*emphasizing the final sound and articulation of the final /p/*). My mouth does the same thing. Now, tell me a word that rhymes with cat.

Child: Dog.

Adult: Cat, dog. *Emphasizing the rime portion of each word by saying with onset-rime segmentation (e.g., c – at, d – og).* You say those words.

Child: Cat, dog.

Adult: Cat, dog. *Again emphasizing the rime portion of each word.* I don't think those rhyme. They don't sound the same to me. My mouth does not do the same thing. /k/ /æt/, /d/ /ɔg/. My mouth does not do the same thing at the end. /k/ /æt/, /d/ /ɔg/. They don't sound the same at the end.

Adult: Let's think of a word that rhymes with *cat.*

Point in learning process and hypothesis for error

Point: Initial introduction of skill	Point: Occasionally generates rhyme, can judge rhymes.	Point: Child is close to mastery on rhymes.
Hypothesis: Little or no understanding of rhyme.	Hypothesis: Child failed to employ knowledge base.	Hypothesis: Lack of attention, impulsive answer.

Clinician response to error

Let's try bat. Cat, Bat. You say those words with me. Cat. Bat. Do those words rhyme? Does your mouth do the same thing? Cat, bat. Yes. Do they sound the same? Cat, bat. Yes. Cat and Bat rhyme! *The clinician would emphasize the rime portion of each word and perhaps segment the words into onset-rime to further draw attention to the rime segment of each word. The clinician would ask the question, answer the question, then re-ask each question and have the child repeat the answer.*	Let's think of a word that rhymes with cat. I am thinking of something you use when you play baseball. It rhymes with cat. *Child might say bat or ball. The clinician would then make the task a rhyme judgment task with cat-bat or cat-ball.* CAT BAT. Let's say those words together. CAT BAT. Does your mouth do the same thing? Yep, my mouth does the same thing. Do they sound the same? /k/ AT /b/ AT. Yep, those words rhyme. *If the child said BALL, then the clinician would go through these steps to illustrate that CAT and BALL do not rhyme and then proceed with helping the child to think of a word to rhyme, perhaps providing additional semantic cues.*	Cat and dog don't rhyme. But I bet that you can think of a word that does rhyme with cat. Let me give you a little help. Let's think of a word that rhymes with cat. Cat. /k/ /æt/. What rhymes with cat? /mmmmmm/~ Child: mat! Adult: Cat. Mat. You say those words. Child: Cat. Mat. Adult: Does your mouth do the same thing? Child: Yes. Adult: Cat. Mat. Do they sound the same? Child: Yep!

Table 9. Example dialogue of phoneme segmentation instruction and response to possible child errors.

Initial instructional dialogue

Adult: Today we are going to take words apart. We are going to break words down into their sounds. Remember last week we worked on saying the last sound in the word. And a few weeks ago we worked on saying the first sound in the word. Today we are going to say all the sounds in the word. We are going to start with words that are easy to stretch. Stretching the word will help us figure out what the sounds are. Let's start with *fish*. Everyone say that word with me.

Children: Fish.

Adult: Now let's stretch the word. Say it just like I do – fffffffiiiiiishshshsh. *Adult says the word by elongating all of the sounds. All the sounds in fish are continuing sounds.*

Children: ffffiiiiiishshshsh.

Adult: Now let's break the word into its sounds. I'll do it first and then you can do it with me. Put your squares in front of you. *Each person has panel with three squares on it.* Fish has three sounds. Fish — fffffiiiishshshsh – ffffff *(said while pointing to first square)* – pause – iiiiii *(points to second square)* – pause – shshshsh *(points to the third square)*. Yep, there are three sounds in fish – /f/ – /ɪ/ – /ʃ/ *(adult points to a square as each sound is produced, placing a clear pause between each sound)*. Okay, now let's all do it together. We'll say the word, then stretch the word, and then say the three sounds.

Children and Adult: fish – fffffiiiiishshshsh – fff – iii – shsh *(in unison, children and adult point to square for each sound while elongating the production of the individual phonemes, pausing after each phoneme).*

Adult: Great. Everyone did it just like I did. Now each person can have their own turn. Anne, how about you first. I'll do it and you do it after me. Fish – fffiiiishshshsh – /f/ – pause – /ɪ/ – pause – /ʃ/ *(points to one square as each sound is produced)*. Now you show me the sounds for fish.

Child: fish – fffiiiiishshshsh. – /f/ – pause – /ɪ/ – pause – /ʃ/ *(Child points to a square as each sound is produced).*

Adult. Great. You got all three sounds in fish. Now, Chip, it's your turn. Tell me the sounds in fish. Remember to say the word and stretch it before you show me the sounds.

Child response and point in learning process and hypothesis for error

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Response: fish – fffffiiiiishshshsh – /f/ *(points to the first square)* – pause – /ɪʃ/ *(points to the second square)* – pause – (and then points to the third square but says nothing).*	Response: fffiiiishshshsh *(drags finger across squares in one continuous motion).*	Response: fish – fffiiiishshshsh. – /f/ *(points to first square)* – pause – /ʃ/ *(points to second square). Looks bewildered that there is one more square.*
Point: Child is only able to segment the word at the juncture of the onset and rime.	Point: Child has difficulty segmenting words into individual sounds, even when provided a model.	Point: Child can segment initial and final sounds.
Hypothesis: Child needs guided practice to focus on sounds comprising rime segment. The child understands that he should have produced three sounds, but only came up with two parts.	Hypothesis: Child has limited awareness of individual sounds but knows that he is supposed to be pointing to each square. Child would benefit from guided imitation of segmentation and repeated practice on this exemplar.	Hypothesis: Child has some segmentation ability but isolation of vowels is challenging. The lack of defined articulatory placement may make identifying the vowel difficult.

Clinician response to error

Good try! You got the first sound. /f/ is the first sound in fish. Let's say the word again. Fish. Now let's stretch it. You stretch it with me. Fffiiiishshshsh. There are three sounds in fish. We need to figure out all three. We got the first one, /f/ and that goes with the blue square here. Let's figure out the last sound next. Put your finger on the red square. Now, stretch the word with me and tell me what the last sound is in fish. Fffiiiishshshsh. *While the adult is stretching the word, she points to the first square while saying /f/ and the second sound while saying /i/ and then keeps producing the /sh/ sound and points with the child to the last box.* Yep, you got it. What's the last sound in fish? What sound did we say when we got to this box? You are right /ʃ/. So we know the first sound /f/ and the last sound /ʃ/. Let's figure out the sound that is in the middle. Put your finger on the yellow square. That is where the middle sound will go. I'll say the word and stretch it. When you hear the middle sound, you tell me what it is. *Adult says the word, stretches it, and then begins to produce the individual sounds.* The clinician produces /f/ followed by a pause and then produces /ɪ/ until the child says the sound. You are right! That's the second sound in fish, /ɪ/. Now, let's have you try that again, all by yourself. Tell me the three sounds in fish. Say the word, stretch the word, and then tell me the sounds.	We need to break the words into sounds. You just stretched the word. How many sounds are in the word? How many squares are there? Three. That's right and that's how many sounds are in the word. Let's do it together. You say the word with me, stretch it and then say the sounds just like I say them. I'll help you point. Fish – fffffiiiiishshshsh. /f/ *(points to first square)* – pause – /ɪ/ *(points to second square)* – pause – /ʃ/ *(points to third square). Adult uses hand over hand assistance to help child point to each square as each sound is produced. Adult elongates each sound as it is produced. Typically the child will chime in with the sound after the adult begins to produce it. Adult will continue to produce each individual sound until child chimes in. If child does not chime in, adult can ask the child to repeat each sound as the adult produces it and points with the child to each square.* Now I'll do it again. *Adult segments fish again, providing another model to the child.* Anne, you show me the sounds in fish. *The target child, Chip, gets another model from the peer's segmentation.* Okay, let's do it again together Chip *(repeat above one more time).* Chip, now you try by yourself. Show me the sounds in fish. Remember, say the word, stretch the word, and then show me the three sounds.	Great, you got two sounds! We need three sounds though, right? Let's figure it out. You said fish – ffiiishsh – /f/ – pause – /ʃ/. You got the first sound /f/ and that goes here *(pointing to the first square).* And you got the last sound /ʃ/ and that goes here *(pointing to the last square).* I'll put my hands on each of those squares. Now you try to figure out what goes here, in the middle *(points to the middle square).* How about if I say the word with you? *When stretching the word, the adult taps hand on first square when producing the first sound, and the last square when producing the last sound.* We have the first sound and the last sound. Let's figure out the middle sound, the sound that goes here *(pointing to middle square).* Now let's do it together. Say it along with me: /f/ *(both point to first square while saying sound)* – pause /ɪ/ *(Adult says sound and continues to produce it [i.e., iiiiii] until child chimes in and both point to the middle square)* – pause /ʃ/ *(both point to last square while saying sound).* Great, we got the three sounds in fish. Fish. /f/ – pause – /ɪ/ – pause – /ʃ/. Fish. Now you do it by yourself. Tell me the three sounds in fish. Say the word and then stretch it. And then tell me the three sounds in fish. *Adult would provide assistance to the child as needed as the child attempts to segment fish on his own.*

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and knowing the types of errors that children are likely to make enables us to structure our teaching more efficiently from the outset.

CONCLUSION

Research during the past several decades has provided a great deal of insight into the variables that contribute to success in learning to read and write. Phonological awareness is a critical skill that contributes to literacy acquisition, and the integration of this knowledge in educational settings can be witnessed in the inclusion of phonological awareness instruction in preschool and kindergarten curricula. For children who are not able to develop levels of mastery in phonological awareness skills through exposure to classroom curricula only, intervention that targets these skills is critical. SLPs are well positioned to contribute to these efforts, particularly for children with speech and/or language impairments who are known to be at risk for reading and writing failure. Research with phonological awareness intervention during the past several decades has provided important insight into issues of timing, duration, intensity, scope, and sequence, as well as teaching practices that contribute to highly effective intervention. For SLPs working with children with language impairments, it is important to design and implement phonological awareness intervention that draws on best practice evidence to date. However, it should also be noted that limited research to date has addressed phonological awareness intervention specific to children with language impairments; thus, generalization of broader research findings should be completed with caution. In light of the particular linguistic difficulties experienced by this population, for example, it may be that the amount of support needed to effect change will be greater than that for children without language impairments. In light of the lack of specific evidence, it is critical that SLPs integrate best practice evidence with sound clinical judgment, an in-depth understanding of the language difficulties experienced by children with language impairments, and consideration of the individual characteristics of children. If we have learned anything in the last decades from emergent literacy research, it is that literacy acquisition is a complex phenomenon; the attainment of literacy is ongoing, gradual, and in some ways, uniquely specified for individual children. In conclusion, phonological awareness intervention is an important component of the support that SLPs provide to children with language difficulties, with growth in this area of development likely to have broad and longlasting effects if the scope of phonological awareness intervention is sufficient.

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Contact author: Melanie Schuele, Vanderbilt University Medical Center, Department of Hearing and Speech Sciences, 1215 21st Avenue South, Room 8310, Medical Center East, South Tower, Nashville, TN 37232-8242. E-mail: melanie.schuele@vanderbilt.edu.