

**They Say You Can Do Phonemic Awareness Instruction “In the Dark”, But Should You? A
Critical Evaluation of the Trend Toward Advanced Phonemic Awareness Training**

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Abstract

Purpose: A trend has emerged across schools in the United States in which phonemic awareness is viewed as much more than a component of beginning reading instruction. This perspective argues that “phonemic proficiency”, evidenced by mastery with skills such as phoneme elision or substitution, is an important target for assessment and instruction well beyond initial grades. Daily phonemic awareness instruction outside of print are hallmarks of the perspective, which has influenced state policies on reading instruction.

Method: This paper evaluated the empirical and theoretical basis for advanced phonemic awareness training.

Results and Conclusion: Although promoted as evidence-based, proficiency on so-called advanced phonemic skills is not more strongly related to reading or more discriminative of difficulties than other phoneme-level skills, not necessary for skilled reading, and is more likely a product of learning to read and spell than a cause. Additionally, reading outcomes are stronger when phonemic awareness is taught with print, there is no evidence that advanced phonemic awareness training benefits reading instruction or intervention, and prominent theories of reading development do not align with the claims. We conclude with implications for policy-makers and educators, and discuss how experimental research could address open questions about phonemic awareness instruction.

Keywords: phonemic awareness, word reading, instruction, intervention

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The importance of phonological awareness in learning to read is one of the most well-established findings across all of language and literacy research (e.g., Melby-Lervag et al., 2012; Wagner & Torgesen, 1987). Representing a range of skills in recognizing and manipulating sounds in words, phonological awareness involves perceiving rhyme and the ability to segment words into syllables, and increases in sophistication to include the perception of the smallest units of speech (i.e., phonemes) in words. *Phonemic awareness* –the ability to isolate, segment, blend, and manipulate phonemes – is believed to facilitate a child’s ability to link speech sounds to printed letters and letter combinations, thereby forming the basis for word reading and spelling. In addition to elucidating its role in reading development, research has revealed the importance of instruction in phonemic awareness for students in the early stages of reading acquisition (Bus & Van IJzendoorn, 1999; Ehri et al., 2001; Phillips et al., 2008).

A convergence of evidence has resulted in two evidence-based recommendations. First, variability in students’ ability to process words in terms of their phonemes, at the start of reading instruction, has implications for early identification of risk for reading difficulties (e.g., Good et al., 2001; Melby-Lervag et al., 2012). Second, it is important to teach children to recognize the sound structure of words, link those sounds to letters (i.e., the alphabetic principle), and segment and blend sounds as part of print-based instruction that teaches students to read and spell words (e.g., National Reading Panel [NRP], 2000; Foorman et al., 2016; Torgesen, 2004). Much like how a catalyst increases the rate of a biochemical reaction, phonemic awareness increases the rate at which decoding skills are acquired.

Perspectives have recently emerged that view phonemic awareness as not just a skill that facilitates word reading, but as a specific foci of instruction that should extend well beyond the first two years of school. These perspectives, exemplified in popular programs and recommendations (Heggerty & VanHekken, 2020; Kilpatrick, 2015, 2018, 2020; Kilpatrick & O'Brien, 2019), advocate devoting instructional time to phonemic awareness activities beyond first grade, and into upper elementary grades for students with reading difficulties. Instruction is often presented using oral exercises without print (Heggerty & VanHekken, 2020). Instruction is aimed at developing students' proficiency with oral phoneme manipulation tasks that are considered to represent the most sophisticated end of the phonemic skill continuum. Tasks viewed as "more challenging" (Kilpatrick & O'Brien, 2019) or requiring "advanced" phonemic awareness include phoneme elision (i.e., phoneme deletion, "say 'cat' without /k/"), phoneme replacement (e.g., "say 'cat'. Now change the /k/ to /p/") including medial sounds or sounds in blends (e.g., "say 'bat'. Now change the /a/ to /i/"; or, "say 'stop'. Now change /t/ to /l/"). Advocates of these perspectives contend that advanced phonemic manipulation skills are critical for reading proficiency, as opposed to limiting instruction to "basic" skills such as phonemic segmentation (e.g., "tell me each sound you hear in 'cat'") or phoneme blending (e.g., "what word do these sounds make: /k/-/a/-/t/"). We refer to this type of instruction and related recommendations as *advanced phonemic awareness training*, given the way it has been referred to by educators across the United States.

The core of the argument is that "phonemic proficiency" (i.e., well-developed phonemic segmentation skills, best reflected by performance on challenging phoneme-level tasks such as phoneme deletion and manipulation; Kilpatrick, 2020; Kilpatrick & O'Brien, 2019) is necessary for establishing links between letter strings and pronunciations (i.e., orthographic mapping), and

that an absence of such proficiency explains difficulties progressing beyond beginning stages of word-reading (Kilpatrick, 2019a,b). These perspectives and recommendations have been disseminated as being evidence-based and consistent with the “science of reading,” and may be being used by states in the US for crafting policy on reading instruction and evaluating reading programs.

The recent positions about advanced phonemic awareness have sparked debate in the field. Scholars have argued that advanced phonemic awareness training is inconsistent with reading research, and related recommendations lack evidence (Brown et al., 2021; Shanahan, 2021). Additional examination of the current research base is needed to reconcile these divergent perspectives.

The purpose of this paper is to evaluate the validity of recommendations for advanced phonemic awareness training, and the phonemic proficiency hypothesis, from empirical and theoretical viewpoints. This paper does not refute the role of phonemic awareness in reading development and instruction. We strongly support the conclusions of the NRP (2000) and the What Works Clearinghouse (Foorman et al., 2016) that young students benefit from phonemic awareness instruction to learn to read and spell words. We do, however, question the evidentiary basis for spending instructional time on *advanced* phonemic manipulation skills beyond segmentation and blending, implementing phonemic awareness instruction outside of print for students that have learned print-based skills, and the claim that these skills are important for reading proficiency or remediating word-reading difficulties.

We are particularly concerned about what might be omitted in the classroom while oral-only advanced phonemic awareness exercises are taking place, as well as the instructional implications if teachers view phonemic awareness as a central objective of reading instruction.

Limited time and resources demand a prioritization of activities that are most beneficial to students' acquisition of reading skills. Given the limited window for early intervention and prevention (Torgesen, 2004) and the "tyranny of time" (Kame'enui, 1993), it is necessary to question the validity of the phonemic proficiency hypothesis and the use of 10 to 15 min per day of instructional time for teaching advanced phonemic awareness. We contend, particularly for students with or at risk for reading difficulties, spending 50-75 minutes per week (4-6 hours per month, 36-54 hours per year) on advanced phonemic awareness training that could have been used for explicit instruction and supported practice opportunities to read and spell, could represent, at minimum, a tremendous missed opportunity for children.

Theoretical and Empirical Bases for Specific Phonemic Awareness Instruction and Phonemic Proficiency

Across the remainder of this paper, we examine whether evidence and theory support allocating instructional time to advanced phonemic awareness training, and the assumed importance of achieving phonemic proficiency. We consider evidence surrounding the explicit and implied assumptions advocates make in promoting advanced phonemic awareness instruction, including (a) the uniqueness and separability of "advanced" phonemic awareness skills from other phoneme-level skills, (b) that performance on advanced phonemic manipulation tasks discriminates skilled from struggling readers; (c) that phonemic proficiency is necessary for proficient reading; (d) that advanced phonemic awareness plays a causal role in reading development rather than simply being a consequence of it; (e) that specific, advanced phonemic awareness training results in improved reading outcomes over approaches without such a focus, and (f) the extent to which advanced phonemic awareness training aligns with theories of reading acquisition that have been used to promote the idea.

Are “Advanced” Phonemic Awareness Skills Meaningfully Distinct from Other Phonemic Awareness Skills?

Phonemic proficiency perspectives carry an assumption that successfully completing advanced phonemic manipulation tasks (i.e., phoneme deletion, replacement, reversal) represents a meaningfully distinct extension of phoneme awareness that is important to word reading development above and beyond segmentation and blending of phonemes, and therefore represents an important assessment target for evaluating reading difficulties and planning instruction. To examine this assumption, studies can be considered that have investigated the dimensionality of phonemic processing and separability of performance on specific types of tasks.

Factor analytic studies have found that performance on a range of phonemic awareness tasks, including first-sound comparison, phoneme segmentation, phoneme blending, phoneme deletion (i.e., elision), and phoneme replacement, are best represented by one factor (Anthony & Lonigan, 2004; Runge & Watkins, 2006; Schatschneider et al., 1999; Stanovich et al., 1984). The results suggest that phonemic processing is unidimensional; success on tasks like phoneme deletion does not appear to be indicative of a skill set unique from phoneme-level processing more generally. To be clear, these results do not suggest an absence of a continuum of skill complexity in phonemic awareness. Rather, factor-analytic findings indicate that completing phoneme-level tasks, regardless of complexity, are best viewed as part of a single skill, and that performance on so-called “advanced” tasks are not a meaningfully distinct skill set.

Other studies have examined differential relations of phonemic awareness task performance to word-reading. With first and second graders, Kilpatrick (2012) administered tests of word reading and the Blending Words, Segmenting Words, and Elision subtests of the

Comprehensive Test of Phonological Processing (Wagner et al., 1999). Correlations among the phonological awareness and word reading subtests ranged from .31 to .67 (all were statistically significant). Correlations with the Segmentation subtests were relatively lower, and in stepwise regression models, Segmentation often did not account for unique variance in predicting word reading when the Blending and Elision subtests were included. Kilpatrick interpreted the results as evidence that segmentation measures are less important than elision measures for understanding a students' phonemic processing skills. However, correlations between the Blending subtest (considered "basic" under phonemic proficiency perspective) and word reading were equivalent or stronger in magnitude compared to the Elision subtest, and both the Blending and Elision subtests remained statistically significant in all regression models predicting word reading. Additionally, the score range on the Segmentation subtest was lower compared to the Blending and Elision tests, which may have explained its lower relations to word reading. Regardless, the fact that Blending was just as predictive of word reading as Elision conflicts with the argument that performance on advanced phonemic manipulation tasks is more important for reading or assessment.

Casting additional doubt on the uniqueness of phonemic manipulation tasks, Choi et al. (2017) analyzed students' (ages 4 to 19) errors on rhyming, sound matching, phoneme blending, phoneme segmenting, and deleting measures. A principal components analysis found that student errors were best summarized by two error-type factors: A "basic" factor involving errors on blending, rhyming, and sound matching tasks, and an "advanced" factor involving errors on phoneme segmenting and phoneme deletion. The basic and advanced factors explained a sizable portion of variance in students' scores on tests of reading, writing, and oral language, with the advanced error factor accounting for slightly more variance. However, contrary to phoneme

proficiency perspectives, students exhibited more errors in phonemic segmentation than in phoneme deletion. Phoneme deletion did not appear to require greater sophistication in phonemic processing than phonemic segmentation.

Does Performance on Advanced Phonemic Awareness Tasks Discriminate Good and Poor Readers?

A lack of phonemic proficiency is viewed as a reason for word-reading difficulties (e.g., Kilpatrick, 2019a,b, 2020). Hence, it is assumed that stronger and weaker word readers can be better differentiated by assessments that involve more advanced phonemic manipulation tasks (phoneme deletion or replacement), compared to measures that are viewed as more “basic” such as phoneme segmenting or blending.

Melby-Lervag et al. (2012) meta-analyzed 235 studies on the relation of phonological awareness to reading skills, and distinguished four types of phonemic processing tasks: Composite measures of phoneme and syllable tasks, phoneme deletion, spoonerisms (i.e., swapping phonemes between two words), and “other” phoneme-level tasks that included phoneme detection, phoneme segmentation, and phoneme blending. They also distinguished rhyming measures as distinct from the phoneme processing tasks. Results of the meta-analysis indicated that students with word-reading difficulties performed more poorly on tests involving phoneme-level processing compared to age-matched control students without reading difficulties, with a large and statistically significant effect ($d = -1.37$). However, there were no statistically significant effects for the type of phonemic processing test used; the effects were similar across composite syllable and phoneme, deletion, spoonerisms, and segmentation/detection/blending measures.

In comparing students with word-level reading difficulties to younger students without reading difficulties, Melby-Lervag et al. (2012) found that poor word readers again performed lower on tests of phonemic processing ($d = -0.57$), but there was still no statistically significant effect of task type. Poor readers demonstrated similar deficits in performance across *all* phonemic processing tasks, including those considered “basic” (phoneme segmentation, blending) and those deemed “advanced” (phoneme deletion, spoonerisms) under the phonemic proficiency perspective.

In summary, the Melby-Lervag et al. (2012) meta-analysis indicated that measures that involve phoneme-level processing discriminate students with word-level reading difficulties from typically-achieving readers. However, there was no evidence that phonemic processing tasks can be subdivided in ways that offer unique, meaningful information for evaluating reading achievement or reading difficulties.

Is Advanced Phonemic Awareness Necessary for Skilled Reading?

If teachers are to invest time on advanced phonemic awareness training, it is important to know if this investment is necessary for proficient reading. Scarborough et al. (1998), with adolescents representing a range of reading abilities, observed a significant range in accuracy on phoneme deletion tasks among students *without* reading difficulties: Only 33% made no errors deleting consonant cluster phonemes, and 31% made four or more errors on the eight items of the task. A second study by Scarborough et al. (1998), with data from students between 2nd and 12th grades, revealed an asymptotic function in phonemic awareness (including phoneme deletion, specifically), in which score growth leveled off for higher-achieving readers around 7th grade, even when not completely mastered. The results suggested that poor performance on phonemic awareness tasks observed among some skilled readers was a result of reaching reading

proficiency without attaining mastery in phonemic awareness, *not* due to a deterioration of skills no longer used.

Other studies have reported that proficiency with phonological and phonemic tasks is not necessary for successful word-reading. Byrne and Fielding Barnsley (1993) found that 33% of students with decoding skills above the sample median scored very low on phoneme deletion tasks. Ozernov-Palchik et al. (2017) observed that 10% of kindergarten students who scored above the sample median in word reading demonstrated phonological awareness and non-word repetition scores more than 1 SD below the mean. Kilpatrick (2012), in his study with first- and second-graders, noted “there were numerous students who appear to be doing well in reading that had a comparatively weak score on the Elision subtest” (p. 159).

The findings that advanced phonemic awareness is not necessary for skilled reading coincide with evidence that low phonemic awareness is not the only skill deficit associated with word-reading disability (Snowling & Melby-Lervag, 2016). Rather than a consistent link between phonemic awareness deficits and reading disability, evidence reflects a multifactorial perspective in which reading disability is the result of an interaction among multiple environmental and genetic factors, and that low phonemic awareness is a major—but one of several—factors that lead to poor reading (Pennington, 2006).

Some level of phonemic processing is important for beginning reading instruction; studies have pointed to the ability to segment short words by phonemes as facilitative of reading acquisition (e.g., Ball & Blachman, 1988; Byrne & Fielding-Barnsley, 1989). The NRP (2000) found that interventions focused on blending and segmenting sounds demonstrated stronger effects ($d = 0.67$ for reading outcomes and $d = 0.79$ for spelling) than those that focused on other phonemic awareness skills, ($d = 0.27$ for reading outcomes and $d = 0.23$ for spelling). O’Connor

(2011) concluded that the ability to segment and blend three to four sounds in short words provides a sufficient foundation for word-reading and spelling instruction. We are unaware of evidence that continued instruction in increasingly sophisticated phonemic skills benefits reading outcomes, or that attaining proficiency with complex phonemic manipulation is necessary for introducing more advanced word-reading.

Is Proficiency with Advanced Phonemic Awareness Tasks At Least Partly a Consequence of Reading Acquisition?

There is considerable evidence supporting a bi-directional relation between phonemic awareness and reading acquisition. At the start of reading instruction, phonemic awareness may have a causal role in helping children connect sounds to print (Melby-Lervag et al., 2012; Wagner & Torgesen, 1987). However, the acquisition of print-related skills, particularly letter knowledge (Foulin, 2005), is associated with further development of phonemic awareness (Burgess & Lonigan, 1998; Lerner & Lonigan, 2016; Wagner et al., 1997). Castles et al. (2011) observed that preschoolers' phoneme isolation skills were stronger on letter-sound correspondences they had learned in an intervention. Across studies, scholars have speculated that letter knowledge may influence phonemic awareness growth by (a) directing children's attention to smaller units of speech, thus promoting greater refinement in the perception of individual speech sounds, and (b) providing a concrete referent to sounds, which may reduce demands on phonological memory and improve performance on oral phonemic tasks.

Although Wagner et al. (1997) observed that word reading skills were not predictive of subsequent phonological awareness, other studies have observed that learning to read and spell words is associated with further development of phonemic awareness. Studies indicated that first-graders' phoneme blending skills enabled decoding, but gains in phoneme deletion were

influenced by improvements in word reading skills (Perfetti et al., 1987), phoneme deletion skills were likely a consequence of students' spelling knowledge and pseudoword decoding (Byrne & Fielding-Barnsley, 1993), and exposure to word spellings improved readers' ability to detect and identify phonemes in those words (see Ehri, 2020 for a review). Hogan et al. (2005) found that kindergarten phonological awareness predicted Grade 2 word reading, but word reading in second grade uniquely predicted fourth-grade phonological awareness, even when accounting for the predictive effects of Grade 2 phonological awareness.

Orthographic (i.e., spelling) knowledge appears to be particularly important for completing advanced phoneme manipulation tasks. Children and adults have been observed to invoke spelling knowledge on phoneme deletion measures, and stronger spelling skills are associated with stronger phoneme deletion (Castles et al., 2003). Adults with dyslexia reported visualizing the spelling of words, or “writing” the word with their finger when completing phoneme reversal assessments (Wilson et al., 2015).

Overall, research indicates that sophistication in phonemic awareness is, in part, a consequence of learning to read and spell. Initial phonemic awareness helps facilitate students' access to the alphabetic code. Subsequently, the acquisition of alphabetic knowledge, decoding, and spelling appears to facilitate the further development of phonemic awareness. As Perfetti et al. (1987) noted, “The two systems, orthographic and phonemic, are developing in mutual support” (p. 309). Orthographic knowledge, which can only develop through exposure to word spellings, appears to be particularly important for completing phoneme deletion and manipulation tasks. This work has also not revealed that a lack of proficiency with “advanced” phonemic manipulation skills is a cause of reading difficulty. Difficulties on advanced phonemic tasks may be due to under-developed code-related skills and lack of reading opportunities, not a

direct cause. By extension, the reciprocal relation means that assessments of alphabetic knowledge, decoding, and spelling involve access to phonological information, and that any assessment that involves printed letters will likely be a stronger predictor of reading skills than oral-only tasks (National Early Literacy Panel, 2008). These interactive, reciprocal relations have been known for quite some time, yet appear to be insufficiently acknowledged by advocates of advanced phonemic awareness training.

Does Instruction or Intervention Specifically Targeting Advanced Phonemic Awareness Improve Reading Skills?

To date, only one experimental study investigated the Heggerty Phonological Awareness programs. Coyne et al. (2021) randomly assigned kindergarten and first-grade students by school to receive the Heggerty program or business-as-usual (BAU) reading instruction. Teachers in the Heggerty condition were trained and coached to implement it according to the publisher's guidelines. Year-end literacy measures indicated that students in the Heggerty condition outperformed students in the BAU condition on a measure of phoneme isolation, blending, segmenting, and manipulation, with an effect size of 0.55. However, there were no statistically significant differences between groups on measures of pseudoword decoding or oral reading fluency, with effect sizes $< .05$. The results did not reveal a benefit of developing students' advanced phonemic skills on their reading development.

Meta-Analyses

Meta-analyses have investigated the effects of phonemic awareness instruction and intervention (typically defined as instruction targeting phonemic awareness skills independent of print) on reading outcomes, and have contrasted effects with other foci of instruction. Suggate (2010) observed similar weighted effect sizes (d_w) for phonemic awareness interventions

compared to phonics interventions on reading outcomes ($d_w = .38$ and $d_w = .42$, respectively), but on follow-up assessments, weighted effect sizes for phonics interventions ($d_w = .32$) were almost twice that of phonemic awareness interventions ($d_w = .18$). Suggate (2016) observed similar weighted effect sizes comparing phonemic awareness and phonics interventions on reading outcomes at immediate post-test ($d_w = .32$ and $d_w = .26$, respectively), however effects remained for phonemic awareness interventions at follow-up ($d_w = .30$) compared to phonics interventions ($d_w = .07$). The unweighted effect size for phonics interventions at follow-up was .30. Suggate's use of sample-adjusted weighted effect sizes has been debated (Fletcher et al., 2021), as they likely attenuated effects of the phonics intervention studies that had average samples over twice as large as phonemic awareness studies.

Galushka et al. (2014) meta-analyzed randomized controlled trials of reading interventions. Three studies investigated phonemic awareness interventions, resulting in an average effect of $g = .28$ that was not statistically significant. Phonics interventions ($k = 29$) demonstrated an average effect of $g = .32$, and it was the only approach in which effects were statistically significant.

Gersten et al. (2020) conducted a meta-analysis of 33 intervention studies for students with reading difficulties in grades 1 to 3. The average effect of all interventions on reading skills was 0.39. Whether an intervention included focused on decoding, fluency, or comprehension did not result in differential effects from the overall average. However, interventions that included phonological awareness components were associated with statistically significant *smaller* effects than average on reading skills. In contrast, interventions that included spelling or writing were associated with stronger reading outcomes, compared to interventions with other elements.

A characteristic of advanced phonemic awareness training programs is an emphasis on oral-only instruction, rather than explicitly teaching segmenting, blending, and manipulation of phonemes connected to letters within words. What makes the rise of this perspective so perplexing is the long-standing evidence that reading outcomes are stronger when phonemic awareness is integrated with print (i.e., the hallmark of phonics instruction). A meta-analysis by Bus and Van Ijzendoorn (1999) found that combining phonological awareness training with print resulted in better reading outcomes compared to phonological awareness training alone. The NRP report (2000) observed effect sizes for interventions that integrated phonemic awareness activities with print ($d = 0.67$ for reading and 0.61 for spelling) were almost twice as large as phonemic awareness training without letters ($d = 0.38$ for reading and 0.34 for spelling). The panel unambiguously concluded, “Methods that teach children to manipulate phonemes with letters are more effective than methods limiting manipulation to spoken units” (p. 2-41).

Another characteristic of advanced phonemic awareness training is the simultaneous targeting of multiple phonological and phonemic awareness skills. The Heggerty programs, for instance, target rhyming, onset fluency, blending, initial/medial phoneme isolation, segmenting, adding, deletion, and substitution in the same lesson. In contrast, the NRP (2000) found that interventions that taught one or two phonemic skills ($d = 0.71$ to 0.79 for reading outcomes and $d = 0.74$ to 0.87 for spelling outcomes) were more effective than those that taught three or more skills ($d = 0.27$ for reading outcomes and $d = 0.23$ for spelling). Additionally, interventions that focused on blending and segmenting had larger effects ($d = 0.67$ for reading outcomes and $d = 0.79$ for spelling) than those focused on other phonemic skills ($d = 0.27$ for reading outcomes and $d = 0.23$ for spelling).

Unsystematic Literature Reviews

Advanced phonemic awareness training has been promoted with claims that it results in superior reading outcomes to interventions without this emphasis. Kilpatrick (2020) stated “Studies that involved phonemic manipulation tasks, which allow for an assessment and training of phonemic proficiency, consistently demonstrate substantially higher standard score point gains in intervention studies” (p. 14). Kilpatrick and O’Brien (2019) noted “when the phonemic awareness training includes the more challenging phonemic manipulation activities, the results represent the strongest outcomes in the word reading intervention literature” (p. 202-203).

We examined the research that Kilpatrick and O’Brien (2019) cited in support of these claims. Eschewing effect sizes, which they stated, “cannot be consistently relied upon to determine intervention effectiveness” (p. 182), Kilpatrick and O’Brien used standard score point gains to classify *minimal*, *moderate*, or *highly-effective* interventions. They concluded that studies in the highly-effective category consistently represented interventions that implemented “more challenging phonemic manipulation activities along with systematic phonics instruction and reading practice” (p. 199). They cited 11 studies in this category.

None of the 11 studies cited by Kilpatrick and O’Brien (2019) as “highly-effective” permit inferences that inclusion of advanced phonemic activities were responsible for reading growth. Most studies were not even designed to investigate that possibility. Six of the studies (Alexander et al., 2001; Baht et al., 2003; McGuinness et al., 1996; Truch, 1994, 2003, 2004) involved only a single intervention group (i.e., no control or comparison group) – a methodologically weak, non-experimental design that provides little basis for causal inference. This subset was further complicated by two studies (Truch 2003, 2004), both unpublished, that included secondary analyses of intervention group data from different studies with different

measures. One study was not an intervention trial; Simos et al. (2002) compared changes in brain activation patterns of students with and without reading disabilities following interventions.

Only 4 of the 11 studies were experimental intervention trials (Torgesen et al., 1999, 2001, 2010; Wise et al., 1999). Torgesen et al. (1999) randomly assigned kindergarten students to either a phonological awareness and synthetic phonics (PASP) intervention, embedded phonics intervention, school-designed intervention, or no-treatment control. PASP involved the Audio Discrimination in Depth program (later, Lindamood Phoneme Sequencing), and allotted approximately 80% of instructional time on word-level skills and 20% on text. It included learning phoneme articulatory gestures; segmenting and representing phonemes in words using mouth-form pictures, blocks, and letters; phonemic decoding; decodable texts; high-frequency words; and fluency building in trade books. The embedded phonics program allotted 43% time to word-level skills and 57% to text-level activities, and included whole-word activities and games, identifying letter-sounds within words, writing words and sentences, reading sentences, identifying phonemes in words before writing them, integrating phonological and semantic information in text, and comprehension. Students in the PASP group outperformed the other groups at post-test in phonological awareness, decoding, and untimed word reading on a statistically significant basis. There were no differences between groups in reading comprehension.

Torgesen et al. (2001) observed no differences in reading outcomes (at post-test or 1- and 2-year follow-ups) between two code-focused intervention conditions, one that included greater emphasis in phoneme articulation and processing skills versus another that focused on text-based instruction and practice. Both groups benefited and there were no advantages observed for either treatment.

Torgesen et al. (2010) randomly assigned students to one of two computer-based intervention programs, or a BAU control condition. The two computer-based interventions explicitly taught phonological awareness, decoding, and text-reading, but one included a greater emphasis on word-level and phonological skills, and the other on text-level skills. Although students in the two intervention groups outperformed the control group, the intervention groups did not differ at post-test or one-year follow-up on any reading measures (word reading accuracy or fluency, phonemic decoding accuracy or fluency, spelling, and reading comprehension).

Wise et al. (1999) contrasted three phonics interventions, (a) sound articulation training (i.e., lip and mouth actions associated with sounds in words but no manipulation of them), (b) letter-sound manipulation training (manipulating sounds in printed words by swapping or changing letters, but no practice with articulation), and (c) sound articulation plus manipulation. The three phonics groups were compared to a BAU control condition. All phonics intervention groups outperformed the control group on reading and phonological awareness skills at post-test. Although the conditions that included sound manipulation training outperformed articulation-only on measures of phonemic awareness, the three phonics intervention conditions did not differ on measures of word reading, spelling, or reading comprehension.

In summary, despite advocates' claims advanced phonemic awareness training results in superior reading outcomes, available evidence provides no such support. With the exception of Coyne et al. (2021), no experiments have specifically tested such a hypothesis. Interventions that emphasized phonemic awareness included multiple components known to be effective, such as explicit phonics, word-level instruction, and extensive practice (e.g., Torgesen et al., 1999). Kilpatrick's reliance on standard score gains as indices of effects is also problematic; they are the product of much more than the intervention (e.g., core instruction, contextual variables, student

maturation), and are not appropriate for determining the effect of specific instructional components. Rather than indicating an advantage for advanced phonemic awareness training, research reflects the benefits of explicit phonics instruction and extensive practice reading and spelling words.

In Absence of Evidence, Is Advanced Phonemic Awareness Training Consistent with Theories of Word-Reading Development?

Approaches to reading instruction and intervention should be evaluated in terms of their theoretical plausibility (Ellis & Bond, 2016). There are practices that lack experimental evidence of effectiveness but are accepted because they are consistent with theories and evidence of reading development, and are unlikely to cause harm. For instance, studies have not demonstrated a robust effect for vocabulary instruction on students' generalized reading comprehension (Elleman et al., 2009), however, it is universally agreed that teaching new vocabulary is an important part of literacy instruction. Given that advanced phonemic awareness training lacks evidence of effectiveness, the next step is to examine its theoretical plausibility and alignment with perspectives on word-reading development.

Kilpatrick refers extensively to Ehri's (2005) phase theory, and Share's self-teaching hypothesis (1995), as theoretical bases for his phonemic proficiency hypothesis (see Kilpatrick, 2015, Kilpatrick & O'Brien, 2019). Kilpatrick argues that the ability to segment or blend phonemes is insufficient for reading proficiency, but that proficient phonemic segmentation skills, best reflected by tasks that involve phoneme deletion and replacement, provide an essential (and previously unrecognized) basis for orthographic mapping. The ability to complete advanced oral phonemic manipulation tasks is thought to be indicative of automaticity with

phonemic representations, which “presumably allows students to more easily remember the words they read” (Kilpatrick & O’Brien, 2019, p. 203).

Ehri’s Phase Theory

Ehri’s (2005, 2020) phase theory describes the predominant skills and knowledge sources children use in their transition from non-readers to reading words with automaticity. Central to the phase theory is the idea that letters are bonded to pronunciations in increasingly larger units, to the point that whole-word spellings are linked to pronunciations and accessed efficiently.

Ehri (2020) emphasized the importance of phonemic segmentation skills, which enables phonemes to be paired with letters. Letter-sound knowledge and phoneme blending help beginning readers move from a pre-alphabetic phase (i.e., identifying words based on holistic visual cues) to a partial alphabetic phase, in which students make use of letter-sound knowledge to decode (Ehri, 2005, 2020). In progressing from partial alphabetic to full alphabetic and consolidated phases, whereby students become increasingly proficient at decoding unknown words and recognizing familiar letter patterns by sight, Ehri emphasizes the reciprocal effect of orthographic knowledge on enhancing students’ perception of phonemes in spoken words (Ehri, 2020). Ehri’s theory and work do not suggest the need for proficiency with advanced phonemic manipulation tasks, or instruction in such skills, to facilitate orthographic mapping.

Share’s Self-Teaching Hypothesis

Share’s (1995) self-teaching hypothesis offered an explanation for how readers amass thousands of spelling-pronunciation linkages without requiring instruction in each one. He argued that “some basic phonemic awareness” (p. 160) and letter-sound knowledge are “co-requisites” (p. 161) for the origins of decoding and self-teaching process. In his view, phonological processing problems experienced by many poor readers are associated with

difficulties encoding phonological information, and retaining it in short-term memory to make accurate blending possible. Readers with difficulty encoding phonological information fail to build high-quality phonological representations of printed words after reading them—even if they produce a correct pronunciation.

Phonological representations are likely impaired in that only some phonological features of the word are represented in memory. For example, *beet* might be encoded with only some phonological features. The long *e* (/i/) sound might be strongly linked to *ee*—the reader would not confuse *beet* with *bat*. However, both /b/ and /t/ might have only partial representations. The next encounter with *beet* will require more effort to pronounce than for a reader with stronger phonological encoding. Blending is critical under Share's view, as difficulties with phonological short-term memory make it hard for the learner to retain correct phonological information. Even if /bit/ is immediately represented with all the correct phonological components, this information will degrade quickly—especially when new phonological information is presented.

Connectionist Perspectives

Although not invoked in arguments for advanced phonemic awareness training, the connectionist model of word-reading acquisition (Foorman, 1994; Harm & Seidenberg, 1999; Seidenberg & McClelland, 1989) is useful for considering its theoretical plausibility. The connectionist account posits that readers require strong phonological processing ability to read words, however, the parallel distributed nature of the model raises concerns about the necessity developing phonemic proficiency throughout the elementary grades. In the connectionist account, orthographic and phonological information about words develop in parallel, that is, learning about both facilitates improvement in the word-reading system. Reading (pronouncing) a single word increases the quality of (a) the reader's phonological and orthographic

representation of that word and (b) the reader's phonological and orthographic knowledge of all words. Because all words are connected in a single system, reading any word improves the orthographic and phonological quality for every word in the reader's lexicon. Children who receive sound-spelling focused reading instruction see improvements in the phonological system without focusing only on phonological features of the language (e.g., Harm et al., 2003). Readers improve their knowledge of the phonemic units in words in part because reading unfamiliar printed words requires the reader to break the word into sublexical orthographic units that map to phonemic units (Harm et al., 2005). These roles are reciprocal and mutually facilitative, thus removing the need for phoneme-focused instruction, especially once letter-sounds are learned.

Synthesis of Theoretical Perspectives

In summary, theories of word-reading acquisition acknowledge the importance of phoneme-level processing for reading acquisition, particularly the ability to segment and blend phonemes. However, these perspectives have not argued that proficiency with advanced phonemic manipulation skills, such as phoneme deletion and replacement, is necessary for the development of word-reading proficiency.

The argument for advanced phonemic awareness instruction is also not well-justified on a broader theoretical basis. The phonological system involves implicit knowledge of the articulatory features of sounds (e.g., /m/ is a bilabial nasal continuous sound) and the likely connections among them (e.g., consonant clusters with three sounds almost always begin with /s/; /s/ rarely precedes /v/ but can; /m/ frequently precedes /p/; /n/ never precedes /k/). The implicit ability to use that system for functional purposes, like reading, is not the same as having phonemic awareness skills, however. Phonemic awareness involves explicit knowledge and manipulation of spoken words' phonological features. Improving phonemic awareness skills will

certainly improve the strength of the phonological system. However, there is currently no evidentiary or theoretical basis to conclude that advanced phonemic awareness training will necessarily improve the reader's implicit knowledge of the phonological structure of the language better than (a) some other activity that requires phoneme-level processing or (b) word-reading or spelling activities.

Another problem with the purported benefits of advanced phonemic awareness training is that the English phonological structure is not composed of isolated phonemes that are consistently pronounced the same way. The /t/ sound differs in *step* (canonical phoneme), *top* (aspirated), *butter* (flap), *kitten* (glottal stop), *bat* (incomplete articulation), and *train* (phonologically similar to *ch*). The notion that advanced oral phonemic manipulation activities enhance mapping letters to sounds is complicated by the inconsistency of phoneme pronunciation of English.

Pre-readers may benefit from phonemic awareness instruction independent of print, because these activities are designed to foster the understanding that words have sublexical features – a fact that is neither intuitive nor necessary for using spoken language. However, based on evidence of the superior effects of phonemic awareness combined with print, the benefit of oral activities likely evaporates once letters become an option for instruction. Available evidence and perspective indicate this is true for all students, regardless of whether they are at-risk of reading difficulty (e.g., Bus & van Ijzendoorn, 1999; Fuchs et al., 2001). As children learn the alphabetic principle, printed letters become anchors for phonemes, and the basis for which phonemic awareness is relevant for reading and spelling.

Discussion

Research is clear that phonemic awareness plays a significant role in learning to read. Instruction in phonemic awareness benefits reading acquisition, especially when it is integrated with print. However, evidence and theory do not support the recent trend in advanced phonemic awareness training. The research to date can be summarized as follows.

There is no clear evidence that phoneme-level processing can be reliably differentiated into categories representing basic or advanced skills. The ability to complete so-called “advanced” phonemic manipulation tasks (e.g., phoneme deletion and replacement) does not appear to be any more strongly related to word reading than the ability to perform other phoneme-level tasks (e.g., phoneme segmentation and blending). Further, performance on advanced phonemic awareness measures does not appear to discriminate good from poor readers better than performance on other phoneme-level tasks.

Current evidence does not indicate that advanced phonemic proficiency is necessary for skilled word reading. This statement is not to be confused with the evidence that some degree of skills in segmenting and blending phonemes is important for students to access the alphabetic code. However, there is no evidentiary or widely-accepted theoretical work that suggests children must be able to accomplish advanced phonemic manipulation tasks as prerequisites for learning to read certain types of words. Research suggests that proficiency with phoneme-level tasks is, in part, a result of learning to read and spell. Phonemic awareness is certainly involved in reading development, however the relation is far from perfect. Deficits in phonemic awareness are a common factor in reading difficulty, but they are one of many. There is no evidence that a lack of proficiency with advanced phonemic manipulation is a cause of their reading difficulties, or “missing piece” needed for remediation.

At present, there is no evidence that targeting phonemic awareness separate from print differentially benefits reading skills over integrating phonemic awareness activities with letters. Available evidence indicates that student reading and spelling outcomes are stronger when phonemic awareness instruction uses letters and words. To date, there is no basis for concluding that interventions for struggling readers should include advanced phonemic awareness training. There is no available evidence that activities aimed at developing proficiency with advanced phonemic manipulation skills are a beneficial component of explicit phonics instruction.

Implications for Practice

Programs and professional development training focused on advanced phonemic awareness, and notions about the importance of phonemic proficiency for instruction and assessment, are popular in US schools. The Heggerty organization reportedly serves over 7,250 school districts across the country (Heggerty.org, 2021), and their programs are endorsed by several state departments of education and technical assistance agencies. Kilpatrick's text, instructional program, and assessment are in wide use, and his recommendations have been endorsed by a number of state education agencies and influential professional support organizations. Messaging around advanced phonemic awareness training appears to be used by states for how they evaluate programs and curricula. For example, Arkansas has created a list of approved programs and curricula based on their definition of the science of reading, and in evaluating specific programs, reviewers have made comments such as "Advanced phonological skills (addition, substitution, deletion) are not evident in the scope and sequence; these skills will need to be added as they are critical to development of phonological awareness" (Arkansas Division of Elementary and Secondary Education, 2020a). Some even recommended that programs be altered to remove print, for example, "letters are used with sounds, which will need

to be adjusted to meet the Science of Reading; [phonological awareness] should not have print attached” (Arkansas Division of Elementary and Secondary Education, 2020b).

Although advanced phonemic awareness training programs and related recommendations are not evidence-based, they have been promoted as if they are. Advocates include numerous citations of well-known scholars and publications, creating an impression of empirical support, when closer inspection reveals that the conclusions of these publications do not align with the recommendations of the advocates, provide no evidence of support, or recommend a different approach.

There have been instances in education wherein practitioners have overinterpreted or overextended recommendations from trainers or program developers that have subsequently impacted practice. However, we do not believe that the trend toward advanced phonemic awareness instruction is entirely the result of educators’ misinterpretations, nor should educators be blamed for implementing such practices. Both Heggerty and Kilpatrick strongly recommend phonics instruction (Heggerty, 2020; Kilpatrick, 2015; 2019), however, both explicitly portray a dichotomy between phonemic awareness and phonics. Although they are certainly different things, advocating a dichotomy may communicate a potentially problematic notion that phonemic awareness can only be improved through oral activities, and may lead teachers to sacrifice phonics and other print-based instruction for oral phonemic awareness training.

Phonemic awareness is predictive of skilled reading, but correlational studies should not be interpreted as evidence supporting advanced phonemic awareness training. There are many constructs that correlate with reading development, but that does not mean they should all be targets of instruction. For example, rapid automatized naming (RAN) – the ability to quickly name stimuli such as colors, letters, numbers, or objects – is predictive of learning to read across

written languages (Araújo et al., 2015). However, evidence that RAN training improves reading skills is tenuous at best (Kirby et al., 2010), and few would recommend that reading instruction include teaching students to name colors, objects, or even letters more quickly.

Advocates of advanced phonemic awareness training have helped alert educators to an important part of reading instruction that has historically been ignored by teacher training programs and classroom practice. The Heggerty programs use explicit instruction, and anecdotal reports indicate they are highly engaging for students. Kilpatrick's work overall has helped draw educators' attention to reading research and prominent theories of reading development. We reiterate that phonemic awareness is an important part of beginning reading instruction, especially when integrated with print. We do not imply that phonemic awareness instruction should cease, nor that state-wide efforts aimed at promoting practices consistent with the science of reading are misguided. The present debate about the nature of phonemic awareness is an indication that, although there is considerable work to be done, the field has made significant progress in understanding effective reading instruction. A primary implication for practice is that a lack of evidence supporting advanced phonemic awareness training should give educators pause before devoting time or resources to it with students beyond initial reading instruction, teaching it independent of print, or considering it as a primary objective of reading instruction. Caution is especially warranted if educators are implementing advanced phonemic awareness training instead of, or as a prerequisite for, phonics instruction and reading practice.

Implications for Research

Phoneme proficiency remains a hypothesis, not yet a basis for instructional recommendations. Considering this issue, it is important to recall the *argument from ignorance fallacy* – an absence of evidence is not evidence of absence. In other words, a lack of evidence

that advanced phonemic awareness training is beneficial is not the same as evidence it is not. However, in making the claim that advanced phonemic awareness training will improve reading skills, advocates of the perspective hold the burden of proof to demonstrate this benefit empirically.

Before instructional recommendations are justified, experimental studies are needed that demonstrate the added value of advanced phonemic awareness training over practices that integrate basic phonemic awareness skills with print and that do not demand phonemic “proficiency”. Studies in which advanced phonemic awareness training is added to phonics instruction and compared only to BAU classroom instruction are not sufficient for inferring causality. Rather, studies are needed in which advanced phonemic awareness activities are experimentally manipulated across conditions, thus facilitating causal inferences regarding their benefit. These studies must examine outcomes in students’ *reading* skills, not just improvements in phonemic awareness. Studies must demonstrate a benefit of advanced oral phonemic manipulation activities over using that same time for instruction and supported practice in reading and spelling words.

It is possible that advanced phonemic awareness training may benefit word-reading for reasons other than the hypothesis that phonemic proficiency enhances orthographic mapping. For example, advanced phonemic awareness training may strengthen phonological memory (i.e., phonological short-term or working memory), observed to be positively correlated with reading and spelling development (e.g., Cunningham et al., 2021) and implicated in Share’s (1995) self-teaching hypothesis. Stronger phonological memory may allow students, when attacking an unknown word, to retain partially decoded sound segments in working memory for longer periods of time, which may enable more accurate recoding (i.e., blending). As another

possibility, the use of daily, oral phonemic awareness exercises with a variety of words may expand entries in students' oral vocabulary, thus providing a stronger basis for set-for-variability (i.e., the ability to adjust approximate or partial pronunciations to match a correct pronunciation in oral vocabulary), which is associated with word-reading especially for words that are phonetically irregular (Elbro et al., 2012; Kearns et al., 2016; Tunmer & Chapman, 2012).

These are testable hypotheses. We envision randomized controlled trials in which one condition includes explicit phonics instruction + advanced phonemic awareness training, contrasted with explicit phonics instruction alone, and a control condition. Additional studies could compare phonics + advanced phonemic awareness training versus phonics + additional practice reading and spelling words. Mediation analyses could test three hypotheses; that specific phonemic awareness training improves word reading and spelling via enhanced (a) phonemic awareness, (b) phonological memory, or (c) set for variability. We invite advocates of advanced phonemic awareness training to collaborate on such studies.

Conclusion

Is a stronger focus on advanced phonemic awareness potentially harmful? In and of itself, probably not. But as we noted at the outset of this paper, our concern is about what is *not* happening when advanced phonemic awareness training is taking place. Instructional time for teaching reading is limited. Regardless of one's side in the debates about the pedagogy of reading instruction, one of the most agreed-upon notions is that children need repeated and extensive opportunities to read words to develop reading proficiency. Unfortunately, opportunities that many children have to engage with print are woefully low, especially for students that need it the most (e.g., Kent et al., 2012). Isolating phonemic awareness training from print threatens this even further.

We call on the advocates of advanced phonemic awareness training to more accurately and responsibly describe the research behind their claims, acknowledge where evidence is absent or insufficient, and take greater care in considering the messages they convey to educators. Translating empirical findings into classroom-based practices is the ultimate goal and responsibility of reading researchers. Communicating what we *do not know* from research is just as important as translating what we do. Moreover, developing theories of word reading development is an essential piece of reading research and an important step for scientific research. However, theories that have not been empirically validated through robust and reliable research methods should not be presented to practitioners as evidence-based practices. To do so is irresponsible and confusing to the field. Finally, we encourage educators and policy-makers to critically evaluate the recommendations made by program developers, vendors, and education trainers, and demand clarification of the evidence behind their recommendations.

At present, recommendations to spend instructional time on advanced phonemic awareness training outside of print, or that students should develop “phonemic proficiency” to become proficient readers, are not evidence-based.

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