A Late Opening Door: Exploring Associations Between Alpha-Syllabic Phonological Awareness and Foundational Hindi Reading Skills

The Community Library Project

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Author's Note

This paper is a product of the collective work of the TCLP curriculum team: Rajni, Saeb Mullick, Shivani Aggarwal, Kajol, Prachi Grover and Michael Creighton. Rajni, Kajol and Shivani Aggarwal contributed to data collection, data entry and tool design. Saeb Mullick contributed to study design and helped collect, organise and analyse data. He also helped develop the research tools and train the research team. Prachi Grover assisted in data collection contributed to study design and research tool development. Michael Creighton worked with Prachi Grover on the literature review and data analysis. He also contributed to study and tool design. This study was supported by a grant from WIPRO Cares. The authors report no conflict of interest. The research tools and datasets generated and analysed during the current study are available from the corresponding authors on reasonable request. Correspondence concerning this article should be addressed to Saeb Mullick at mullick.saeb@gmail.com or Michael Creighton at mocreighton@gmail.com.

Abstract

The pivotal role played by phonemic awareness in reading acquisition has been well documented in alphabetic languages, but research is sparse when it comes to Brahmi-derived alpha-syllabaries such as Devanagari. While several studies have found that phonemic awareness develops later in readers of alpha-syllabaries compared to readers of alphabetic languages, there is less agreement about the reasons for this or its importance. The Community Library Project (TCLP) posited 'two paths' to reading acquisition in an alpha-syllabary: a 'syllabic path' and an 'alpha-syllabic path' (TCLP, 2024). The 'syllabic path' would require syllabic awareness, 'whole akshara' knowledge, and extensive paired-associate learning. The 'alpha-syllabic path,' by contrast, would require insight into what Nag (2022) calls the 'Alpha-Syllabic Principle'—a combination of syllabic and phonemic awareness, along with an understanding of the phonemic markers within complex akshara. We argued this path would allow readers to orthographically map, rather than memorise, complex akshara. The current, cross sectional study asks if there exists a positive correlation between Alpha-Syllabic Phonological Awareness and foundational reading skills such as Word Reading Efficiency (WRE), Oral Reading Rate (ORR) and/or reading accuracy. The study involved 276 participants with education levels ranging from Grade 2 to the end of university. Phonological awareness was measured using the Alpha-Syllabic Awareness Probe-Hindi (ASAP-H), TCLP's adaptation of David Kilpatrick's Phonological Awareness Screening Test (2017). WRE was assessed using 'Word Reading Efficiency Probe-Hindi' (WREP-H), a timed word list based on both the Test of Word Reading Efficiency (TOWRE) and a similar assessment tool used by Bhide et al. (2014) for Marathi. ORR and accuracy were assessed using unseen passages from Eklavya Foundation's grade level textbooks. Findings indicate that while Hindi readers developed phonemic awareness more slowly than

would be expected in readers of English, there was nevertheless a strong correlation between phonemic awareness and both ORR and WRE. This was especially true among older readers, with the most skilled quartile of readers exhibiting high levels of phonemic awareness. Syllable-level awareness contributed to ORR and WRE among Grade 3 to 5 readers and to oral reading accuracy in readers in Grades 3 to 8. Our findings suggest that the WREP-H and the ASAP-H provide useful assessment data about Hindi WRE and phonological awareness, respectively. Our results offer further support for the idea that effective reading instruction in alpha-syllabaries like Hindi will involve instruction in phonological awareness, an analytical approach to alpha-syllabic phonics, language-rich read-alouds and opportunities to for students to read meaningful texts.

Introduction

The Community Library Project is a free, anti-caste library organisation which serves twelve thousand mostly working class and poor members in the New Delhi area. For years, we have seen that most of our members can read, but few can read their primary[1] language, Hindi, with fluency or confidence. In response to this, we have developed programs that have shown consistent, measurable gains in reading fluency, stamina and comprehension (TCLP, 2020, 2021). Since the pandemic, we have seen increasing numbers of members who cannot read connected text at all. Our work in government schools over the past two years has confirmed the widespread nature of this problem in the National Capital Region (NCR), and the fact that Pratham (2023) recently found that 57 percent of rural Grade 5 students were unable to read even a Grade 2 level text makes it clear that poor reading skills constitute a nation-wide problem of great urgency.

[1] A large proportion of the library members have migrated from different states and would thus have different home languages. Hindi, however, is a primary language in use for everyday conversation, at least in contexts outside of their homes, for example, at school, in the library, with friends, in the market etc.

In developing instructional interventions to address this problem in our local community, we reviewed extensive amounts of reading research both from Western countries, where alphabets are typically used, and from South Asia, where most reading is done in alpha-syllabaries such as Devanagari and other Bhrami-derived scripts. While we accept there has been a tendency among many scholars to focus primarily on reading in alphabetic scripts, and even, at times, to argue that alphabets are superior to other forms of writing–a problem David Share (2014) calls, 'alphabetism in reading science', we do not want to ignore the many insights that have come from thousands of well designed, thoughtful (and well-funded) Western research studies.

Our review of the existing reading science prompted us to ask several questions. In particular, we wondered whether the extensive research coming out of the West regarding orthographic mapping, phonemic awareness and sight word acquisition might have bearing on reading instruction in South Asian alpha-syllabaries. Though much of this research has been associated with the US based 'science of reading' (SOR) movement, we agree with Thomas (2022) and other critics that some advocates of SOR at times either oversimplify or misconstrue the actual reading research. Though we are interested in finding efficient ways to demystify the code of writing, we reject the idea that this can be best achieved by deemphasizing meaning making.Teachers can and must do both: we must both teach the code and nurture the curiosity and thinking skills needed to make meaning of text once the code is unlocked. We also are impressed by the growing body of research that demonstrates the importance of oral language skills in supporting decoding as well as comprehension. (Snowling & Hulme, 2021).

Literature Review

In a recent working paper (TCLP, 2024), we presented a survey of Western reading research regarding orthographic mapping and sight word acquisition as well as a review of related research from South Asia. In particular, that review examined studies that compare the process of reading acquisition in alphabetic scripts with the way readers learn to read in South Asian, Bramhi-derived alpha-syllabaries. The focus was on the role phonological awareness plays in reading acquisition, but we also looked at studies that explore other factors, including the visual complexity and nonlinearity of many Indic scripts (Daniels & Share, 2017; Nag et al., 2014). Here we highlight the key issues as we see them, and briefly outline a theoretical perspective that calls for an analytic approach to teaching reading in alpha-syllabaries.

Phonemic Awareness

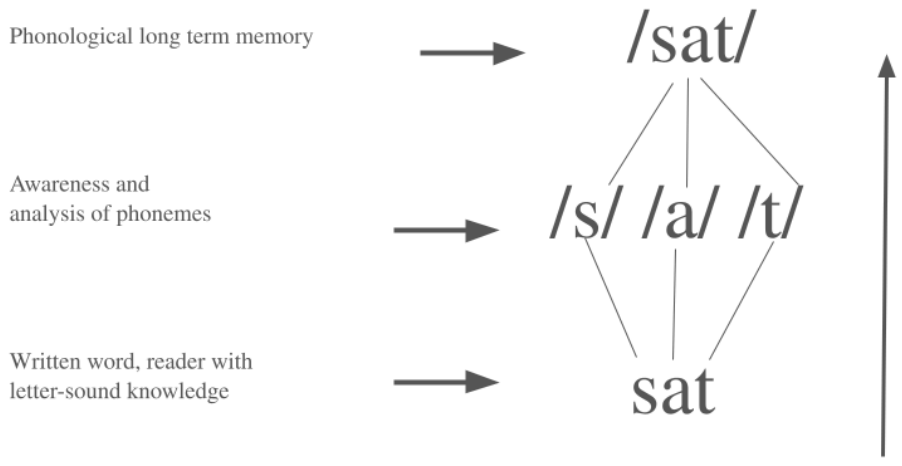
Phonological awareness refers to the awareness of any sounds that exist in spoken languages (e.g., 'onsets', rhymes, syllables, etc.) Phonemes are the smallest, most discreet sounds that exist in words (e.g., /s/ or /स्/). Phonemic awareness involves the explicit awareness of the phonemic structure of words. It can be demonstrated and measured by tasks that involve identification and manipulation of phonemes, and it is typically acquired in relation to literacy. Phonemic awareness is distinct from the implicit ability to distinguish sounds within languages, an ability that is typically present at birth (Share, 1995, 2008). Phonemic awareness does not typically emerge absent reading instruction or oral instruction that calls attention to phonemes in words.

In English, phonemic awareness has long been understood to be an important prerequisite to skilled reading. Thirty years ago, David Share (1995), called the evidence for this 'vast', and it has only expanded since (Share, 2021). Ability to blend and segment sounds is clearly important

in decoding and spelling, respectively; without these skills, it is impossible to 'sound out' or spell unfamiliar words. But Ehri (2005, 2014), Kilpatrick (2015, 2017), (Kilpatrick and O'Brian, 2019) and others have shown that in alphabetic languages phonemic awareness is also needed for orthographic mapping–the process by which readers subconsciously connect their knowledge of letter-sound combinations with their awareness of phonemes to make a mental map of words. By connecting graphemes (i.e., script) and phonemes (i.e., pieces of sound), readers anchor words in their long term memory, where they remain, available for instant recall. Though educators use the term 'sight words' to refer to a variety of things (e.g., common words, irregular words, or words that must be memorised), in this paper it simply refers to words that are instantly and automatically recognizable to a reader, as opposed to unfamiliar words or words that must be decoded.

Figure 1

Orthographic Mapping-Simplified



Kilpatrick's (2015, 2017) and Kilpatrick and O'Brian's (2019) review of reading research suggests that in order to efficiently 'map' new sight words for future automatic recall, readers in alphabetic languages must be able to both hear the phonemes in words and manipulate them with relative ease. They find that while phonic blending (i.e., /c/ /a/ /t/= cat) is necessary for decoding, skills like deletion (e.g., 'Say sheep … now say sheep, but don't say /p/') or substitution (e.g., 'Say lift … now say lift, but instead of /f/ say /s/'), learned to an automatic level, are better predictors of efficient orthographic mapping and long term sight word acquisition. But though there is broad agreement that effective reading in alphabetic scripts requires some degree of phonemic awareness, even Kilpatrick acknowledges that the exact nature and extent of awareness required is not a settled question (Shanahan, 2021).

South Asian akshara writing systems that grew out of the ancient Brahmi script are often called alpha-syllabaries or abugidas. They are similar to alphabets in some ways and syllabaries in others. These scripts are based on consonant characters that include an inherent vowel sound, typically /a/. Other vowel sounds are represented by adding specific marks, or diacritics, to these base characters. Additionally, these scripts often use composite characters, or ligatures, to represent consonant clusters. What orthographic mapping theory might tell us about reading in Indic scripts has not been resolved, but the existing research, though it conflicts in places, points in directions that have important instructional implications.

Key Insights from South Asia

As noted above, a recent TCLP working paper reviewed the limited literature on reading acquisition in alpha-syllabaries (TCLP, 2024). Here we highlight some of the important findings of that review.

First, there is convincing evidence and broad agreement that the nature of alpha-syllabaries influences the kind of phonemic awareness readers develop, especially with regard to the inherent, unexpressed schwa (Prakash et al., 1993; Bhide et al. 2014; TCLP, 2024).

There is also agreement that certain kinds of visual complexity and nonlinearity found in South Asian alphasyllabaries can be challenging for young readers, but more work would be needed to understand the extent and the instructional implications of those challenges (Nag et al., 2014; Vaid and Gupta, 2002; Vaid et al., 2017). Additionally, there is broad agreement that the orthographic breadth of the akshara is challenging for readers and that orthographic knowledge takes longer for readers to master than alphabetic knowledge (Nag 2007; Jayaraam, 2008; Nag and Snowling, 2012; Nag, 2014; Nag & Narayanan, 2019; Nag et al., 2014; Menon et al., 2017; Nesan et al., 2019; Wijaythilake et al., 2018; Wijaythilake & Parrila, 2019; Wijaythilake et al., 2019).

Regarding the role of phonological awareness in alpha-syllabary reading, there is general agreement in the studies reviewed that phonemic awareness tends to emerge more slowly in readers of alpha-syllabaries than would be expected in readers of alphabets (Nag 2007; Nag & Snowling, 2012; Wijaythilake et al.,2018; Menon et al., 2017), but there is no clear agreement on the relative importance of syllable level awareness as compared with phonemic awareness when it comes to reading acquisition (Nag, 2007; Jayaram, 2008; Nag and Snowling, 2012; Wijaythilake et al., 2018).

Finally, there appears to be growing acceptance of the idea that the nature of instruction likely plays a key role in the acquisition of both phonemic awareness and reading skills (Wijaythilake et al. 2019; Nag, 2022). This has led some to the idea that an analytic approach to early reading instruction, one which focuses on both phoneme-level and syllable-level markers,

might offer readers important advantages. Importantly, Nag (2022), now explicitly advocates for an 'analytic approach' to akshara teaching:

> *Keeping beginning instruction for the akshara writing system at the syllable level is also psycho-linguistically appropriate because the syllable is perceptually more discernible than the phoneme. But knowledge about markers is clearly beneficial for reading progress because it allows for an analytic approach to reading the extensive inventory of symbols in akshara languages. The implication then is to begin activities with phonemic/phonetic markers early after a first introduction to singleton akshara through a syllable-focused program. Explicit instruction about phonemic markers in parallel with the introduction of singleton akshara is useful for many reasons: It increases potential for transfer of insights from taught akshara to new akshara, and it affords insights about an influential aspect of the alpha-syllabic principle (p. 380).*

In our previous paper (TCLP, 2024), we presented a 'two paths postulate' as one way to explain the varied findings regarding the relative contribution to word reading skills made by phonemic awareness and syllabic awareness. We argued that unlike alphabets, with their clear grapheme-phoneme relationships, the dual nature of most South Asian scripts opens two paths to orthographic mapping. Young readers may take either a 'syllabic path' or an 'alpha-syllabic path' towards akshara knowledge and word reading. Which 'path' they take might depend on many factors. The fact that phoneme level markers are less prominent in alpha-syllabaries as compared with alphabets, coupled with instructional practices which often focus exclusively on the syllable, likely play an important role in deciding this question.

As long as students remained on the 'syllabic path', acquiring only syllable level phonological awareness, they would need to learn new complex akshara separately as individual

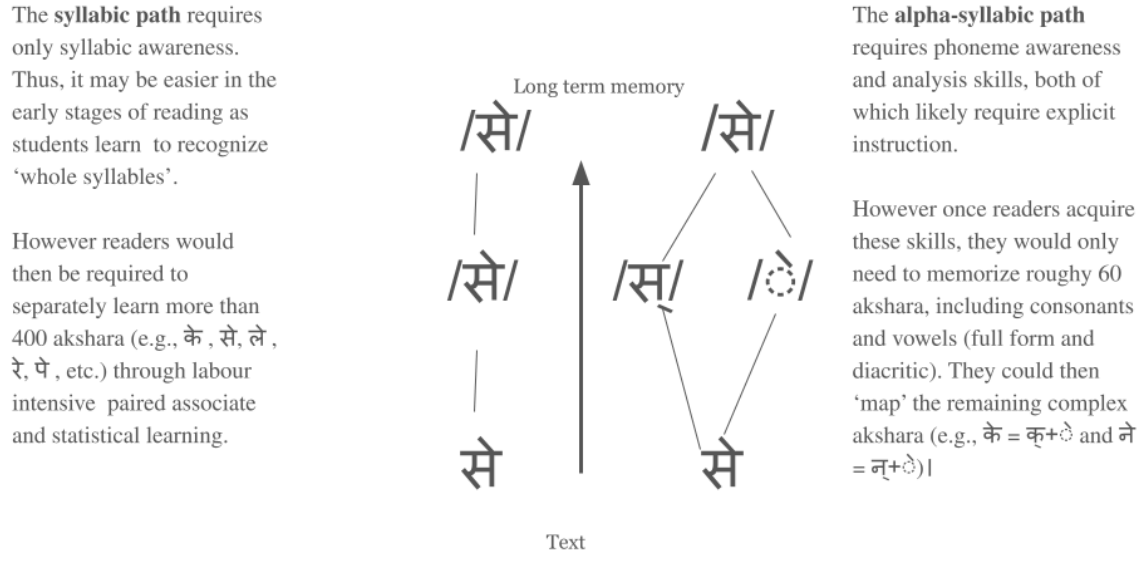
units; segmenting complex akshara into phonemic parts and blending (i.e., 'sounding out') those parts into syllables in order to decode new akshara would be impossible without a degree of phonemic awareness. The problem with this path is that it would require a tremendous amount of effortful, paired associate learning before readers were able to experience the joys of reading real, meaningful text. Students taught to 'think in syllables', without being explicitly directed towards the phonemic structure of the symbols they are reading, or the sounds and words those symbols represent, would have to rely on 'whole akshara' knowledge and phonological awareness at a syllable level to orthographically map new sight words, 'syllable by syllable'. This path to literacy might be relatively straightforward in a syllabary with a small number of symbols such as the one Sequoyah invented for Cherokee– that script with its 86 characters was so effective that the Cherokee nation obtained mass literacy within a few years of formally adopting it in 1825 (Georgia Historical Society, 2016). But learning a South Asian alpha-syllabary in this manner–syllable by syllable, symbol by symbol–would be an entirely different matter; it would require years to learn an orthography with more than 400 characters well enough to enable efficient orthographic mapping of new words.

It is likely that given enough exposure, students would begin to recognize the 'hidden patterns' in the code; statistical learning of this sort is not well understood, but learning words and word parts in this way would be less efficient than orthographic mapping (Kilpatrick, 2020). How long students might remain on this labour intensive 'syllabic path' path is not clear, but its existence might explain why several studies (e.g., Nag, 2007; Nag & Snowling, 2012; Nakamura et al., 2017; Menon et al., 2017) find that syllable level awareness plays such an important role in early reading acquisition. It might also explain the late emergence of phonemic awareness, akshara knowledge, and reading skills found in most of the studies cited above.

Fortunately, our reading of the research suggests there is another way: the ‘alpha-syllabic path’. As Nag (2022) points out, early explicit instruction in both syllable and phoneme level markers within akshara (e.g., matras) would likely support a deeper insight into what she calls the ‘alpha-syllabic’ principle. Based on our reading of orthographic mapping theory, young readers who received effective instruction in ‘alpha-syllabic’ phonics and alpha-syllabic phonological awareness should learn to read much more quickly than those who take the ‘syllabic path’– as long as they are also given the opportunity to ‘map’ new words while reading meaningful text. For these students, there would be no need to learn hundreds of complex akshara by rote or through pattern recognition. Instead of acquiring a vast amount ‘akshara knowledge’ they would learn a few dozen akshara and matras, and would ‘read’ or ‘sound out’ the rest, just as young readers of English with phonemic awareness ‘sound out’ words and word parts such as ‘at’, ‘am’, and ‘ill’.

Figure 2

Two Paths to Orthographic Mapping in Hindi



Research Objective

We previously hypothesised that phonemic awareness, as measured by a Hindi test modelled on David Kilpatrick's Phonological Awareness Screening Test (PAST) would be positively correlated with Oral Reading Rate (ORR) and accuracy (TCLP, 2024). That study looked at students from Grades 1 to 8 and found positive correlations between phonemic awareness on the one hand and both reading rate and accuracy on the other. We saw this at every grade level we looked at, but because we used different reading passages for readers from Grades 1 to 5, those sample sizes were too small to reach firm conclusions. Our sample of Grades 6 to 8 readers was somewhat larger than the others (n=51). There we found that all kinds of phonological awareness were significantly and positively correlated with reading rate. However, the section of our assessment that measured phonemic awareness was more strongly correlated than the section that measured syllabic awareness (r=.62 vs. r=.39). When we entered both kinds of phonological awareness into a backward stepwise regression, Syllable level measures were not significant and fell out of the regression. Compared with measures of syllabic awareness, measures of phonemic awareness were also more strongly associated with accuracy (r=.60 vs. r=.40).

The current study aims to revisit these research questions, using a more diverse and robust set of assessment tools. Though our 'two paths' postulate suggests that most or all skilled readers would demonstrate a wide range of alpha-syllabic awareness, including awareness of both syllables and phonemes, we were also interested in the possibility that some readers might acquire competence by relaying syllabic awareness alone. The answer to that question might have implications for instructional priorities.

This time, instead of just looking at the relationship between different kinds of phonological awareness on the one hand and ORR and accuracy on the other, we also examined the relationship between different kinds of phonological awareness and Word Reading Efficiency (WRE) as measured by a timed word list reading task. WRE is a measure of how quickly readers can read individual words (e.g., individually presented or from a list), whereas ORR is a measure of how quickly readers can read connected text (e.g., from a passage or paragraph). There is debate about the precise relationship between ORR and WRE, but there is wide agreement that the underlying skills required for both overlap a great deal (Eason et al., 2013).

To measure phonological awareness, we constructed the Alpha-Syllabic Awareness Probe-Hindi (ASAP-H), an improved version of the tool we previously used to measure phonological awareness. To measure ORR and accuracy, we used reading passages similar to the ones we used in our previous study. However, to obtain larger sample sizes, readers from Grades 1 and 2 were given a Grade 1 level text; readers from Grades 3, 4, and 5 were given a Grade 3 level text; and, readers at or above Grade 6 were given a Grade 6 level text. To measure WRE, we constructed the Word Reading Efficiency Probe, Hindi (WREP-H). This assessment was based on two existing research tools: the Test of Word Reading Efficiency (TOWRE) and an experimental probe developed by Bhide et. al. (2014) to measure the WRE of Marathi readers. Based on our review of the literature and our previous pilot study, we hypothesised that alpha-syllabic phonological awareness would positively correlate with measures of WRE, as well as with ORR and accuracy.

Research Hypotheses:

1. There exists a positive correlation between Alpha-Syllabic Phonological Awareness and Word Reading Efficiency as shown through the ASAP-H and WREP-H.

2. There exists a positive correlation between Alpha-Syllabic Phonological Awareness and Oral Reading Rate and accuracy as shown through the ASAP-H and unseen Oral Reading Fluency (ORF) passages.

Methodology

Background and Demographics

TCLP runs three libraries in the Delhi NCR region. Total membership is around 12,000. Roughly half of those are under sixteen years of age; half are sixteen or older, with most of these being young adults. Some of these young adults have grown up in the library community, some have joined the library in search of a place to study for competitive examinations. Though TCLP does not have detailed data on the socio-economic background of our members, most, but not all, are working class or poor; which is to say they are broadly representative of Delhi NCR residents.

We were able to collect complete assessment data for 276 members, ages 6-30. The median age was 12 years; the mean was 12.11. Four members were in Grade 2; 103 were in Grades 3, 4, or 5; 113 were in Grades 6, 7, or 8; 43 were in Grades 9, 10, 11 or 12; 13 had completed Grade 12. Of the last group, 11 had studied in university for between one and three years. We did not collect data on the kind of schools or universities students were enrolled in; in past surveys we have found that about 80 percent of our school age members attend government schools or non-profit government aided schools.

We did not ask for gender, but of those who participated in this study TCLP membership data indicates that 46 percent were female, 54 percent were male. This is representative of the NCR where the National Commission on Population (2020) estimates that boys and men

constitute 53.5 percent of the population (National Commission on Population, Ministry of Health & Family Welfare, 2020).

To assess the reading strengths and needs of library members, TCLP holds an annual ‘universal screener' as part of a ‘Reading Mela’. In addition to games and read alouds, members are invited to participate in a ‘reading challenge’. Data was collected from three TCLP libraries located in the National Capital Region: South Ex-Kotla Mubarakpur, Delhi; Khirki Extension, Delhi; and Sikanderpur, Gurugram. Given the timing of our study, references to ‘Grade Level’ refer to beginning of the year grade level, unless otherwise noted.

At the time of joining TCLP, adult members, or parents or guardians of minor members, sign a membership application which grants permission for their children to issue books and participate in on-site library activities run by library staff or volunteers. Additionally, parents are required to visit the library once for an orientation; the few who cannot attend are contacted by phone or home visit. Additional permission is only required for off campus library field trips, or for special workshops run by outside organisations. We invited all members to participate in reading activities, by explaining that they would take only a few minutes and would help us improve library programs; participation, however, was completely voluntary.

Assessment Tools

This year, our ‘reading challenge’ included three assessment activities. All were administered by trained TCLP interns or staff with experience in administration of these or similar assessments. In one activity, students read a one minute unseen Hindi fluency passage, chosen from a textbook not available in Delhi schools[2]. Passages were scored for correct words

[2] We used texts from Eklavya Foundation’s open-source, graded textbook series for primary grades, ‘Khushi Khushi’. The texts were formatted for readability, uniformity and ease of assessment, and all images were removed from the texts. The original textbooks can be accessed here: https://www.eklavya.in/books/eklavya-books-pdf/451-primary-education-programme-pdf

per minute and accuracy. We followed commonly used administration guidelines for Oral Reading Fluency (ORF) measures: substitutions, omissions and words provided by the examiner were counted as errors; self-corrected words, insertions and repetitions were not. If students hesitated for more than three seconds, the examiner provided the correct word. There is a great deal of data to support the reliability and validity of procedures such as these[3]. We used one passage for Grades 1 and 2; one for Grades 3 to 5; and one for Grade 6 and above.

In the second activity, we administered an oral test of phonological awareness. The Alpha-Syllabic Awareness Probe-Hindi (ASAP-H) (see Appendix A) was an improved version of the PAST-H piloted in our last study and in our ongoing reading interventions. The PAST-H was adapted to Hindi from the Phonological Assessment Screening Test (PAST) by David Kilpatrick (2017). Each level of the PAST contains sublevels of related phonological awareness skills. PAST levels were derived from previously used research tools and are arranged in order of difficulty for English readers (Kilpatrick, 2017). Kilpatrick conducted several studies to establish the reliability and validity of the PAST; his results show the PAST, when administered with fidelity, strongly correlates to other measures of phonological awareness and tests of word reading skills (Kilpatrick & McInnis, 2012; Kilpatrick, 2017).

Content validity of the ASAP-H was further established through our adaptation and piloting process. TCLP curriculum team members collaboratively and carefully adapted the PAST into Hindi and tested our Hindi version on a variety of librarians, teachers, friends and library members (The Community Library Project, 2024). In the year following our initial study, we fine tuned the assessment based on classroom experience. We added two teaching items at the beginning of the test, as we found that members unfamiliar with this kind of activity often found

[3] See for example, University of Oregon, Center on Teaching and Learning (2018). Understanding the research behind DIBELS® 8th Edition (Technical Report 1801). Eugene, OR: Author. https://dibels.uoregon.edu/sites/default/files/DIBELS8thEdition_TechRpt1801_ResearchBrief.pdf

the first few items confusing. We also dropped the Onset-Rime level. Though onset-rime awareness is generally considered a prerequisite of other kinds of English phonemic awareness, the validation studies for the original PAST did not find this level to be a significant predictor of English reading skills (Kilpatrick & McInnis, 2012). This was also the case in our initial study; moreover, many readers appeared visibly confused by onset-rime tasks. Our results and experience, along with research by others (e.g., Bhide et al., 2014 and Prakash et al., 1993), suggested that awareness of the initial consonant may operate differently in an alpha-syllabary than it does in an alphabet. Based on these factors, we determined that questions measuring onset-rime awareness would likely not be useful in assessing the reading-related phonological awareness skills of Hindi readers.

In addition to two teaching items, the ASAP-H consists of three sections: Syllable Levels; Basic Phonemic Levels and Advanced Phoneme Levels. These levels include deletions and substitutions of syllables and phonemes (e.g., say, ‘pyaar’; now say pyaar, but don’t say ‘p’). In scoring the ASAP-H, we recorded one point for each correct, non-automatic, response and two points for each correct, automatic (i.e., in two seconds or less) response; we discuss how we scored these in our data analysis and results section, below.

We administered the ASAP-H as per the PAST guidelines instructions, with two small modifications. As noted above, we included two teaching items. To save time we discontinued testing if readers were unable to answer any items in one entire level correctly; each level consisted of five items, so this meant we discontinued after a minimum of five consecutive errors or non-responses..

To assess the internal consistency of the ASAP-H, we used data from the current study to compute Cronbach's Alpha, a statistical measure that evaluates the reliability of a scale by

determining how well the items correlate with each other. Cronbach's Alpha is an indication of how well the items in a test measure the same underlying construct. The overall Cronbach's Alpha for the ASAP-H was 0.98 (95% CI [0.97, 0.98]), indicating a very high level of internal consistency. Each of the three sections of the assessment (e.g., Syllable, Basic Phoneme, and Advanced Phoneme Levels) also demonstrated high levels of internal consistency, with Cronbach Alpha values ranging from 0.92 to 0.97. These results suggest that our adapted tool reliably measures phonological awareness in Hindi-speaking readers. Further support for the tool's validity comes from our earlier study of 51 middle school students, which found a strong and significant correlation ($r = .62$, $p < .001$) between the phonemic awareness levels of an earlier version of this tool and Hindi ORR (The Community Library Project, 2024).

The third tool we used was the Word Reading Efficiency Probe-Hindi (WREP-H) (see Appendix B). This 45 second word reading probe is an adaptation of the Marathi reading task used by Bhide et al. in their 2014 study of phonological awareness among bilingual Marathi/English readers. That task was an adaptation of the Test of Word Reading Efficiency (TOWRE). Like Bhide et al (2014), we ordered words from easiest to hardest based on orthographic features; because Hindi and Marathi use nearly identical scripts and have many words in common, in many cases the adaptation was straightforward. Understanding that common complex words are more likely to be orthographically mapped than uncommon complex words, we also attempted to order our word list from more commonly used words to less commonly used (i.e., more academic or literary) words. For this, we took help from a librarian who is bilingual in Marathi and Hindi.

To determine the internal consistency of the WREP-H, we conducted a Cronbach's Alpha test using the responses from participants in this study. In this calculation, we first removed the

39 cases from the analysis where members were not able to read any words from the practice test and did not attempt any words from the WREP-H test. Because this was a timed test, we could not assume that members would be unable to read any words beyond the time limit. Therefore, we only coded responses for words that were attempted and used pairwise deletion to handle missing responses.

We were only able to calculate Cronbach's Alpha for the first 26 words on the WREP-H, as extensive missing data beyond this point made it impossible for JASP to calculate reliable correlations using the pairwise deletion method. The value obtained was 0.83 (95% CI [0.80, 0.86]), indicating a reasonable level of internal consistency for the initial section of the test. This is a potential weakness in our methodology that may need to be addressed in future projects, possibly by employing methods to handle extensive missing data more effectively or by adjusting the test design to reduce the amount of missing data.

More details will be reported in the results section, but in this context, it is worth noting that our results showed a high correlation between ORR, as measured by our ORF passages, and WRE, as measured by the WREP-H. As noted, we had readers from Grades 3 to 5 read from one ORF text, while readers from Grade 6 and up read from another, more challenging text. In our Grade 3 to 5 sample (n=103), the correlation coefficient between ORR and the WREP-H was r=.93 (p<.001). In our sample of readers from Grade 6 and above (n=169), the correlation was r=.92 (p<.001). Because previous research has found high correlations between ORR and WRE (Eason et al., 2013), these results further support the validity of both our ORF passages and the WREP-H.

Given that we carefully adapted and revised assessment tools that have been established as reliable and valid, and that we followed consistent administration protocols, it is very likely that our tools are reliable and valid. The fact that our tools have demonstrated high levels of internal consistency, and high levels of correlation with other similar tests, further supports this idea.

Testing Environment and Other Factors

We arranged one room apart from other library activities, but the testing environment was not uniformly quiet. We brought members into the testing room three to five at a time and held assessments in different corners of the room, as we do when we collect progress monitoring data in our reading fluency program. We believe the data was not compromised by noise; in any case, any effect would have been random as we did not test any particular kind of member during particularly loud or quiet times.

There were many other variables at play in the group of readers we assessed, most of which we were not able to control for. First, most of our members go to schools of varying quality. Most, but not all of our members attend Hindi medium schools. Most, but not all members, are working class or poor. Most speak a version of Hindi as their first language, but many speak different regional variants of Hindi, and a few members come from West Bengal or Afghanistan and have stronger literacy skills in languages other than Hindi (e.g., Bengali, Dari or English).

Since we were interested in how phonological awareness, however acquired, related to Hindi reading skills, and not the manner in which those skills were acquired, most of these confounding factors were unlikely to have a major impact on our investigation. That includes knowledge of English or other languages: few people in Delhi are truly monolingual or

monoliterate; English is taught as a subject in most schools, and English/Roman script is widely used in the market and on the internet. As with our previous study, there was one notable factor that may have affected our results. If members newly arrived to Delhi (e.g., from Afghanistan or West Bengal) had acquired phonemic awareness through instruction in another language (e.g., Bengali, Dari or English), but had not had time to acquire Hindi reading skills, they might skew the data toward showing a weaker relationship between fluency and accuracy in Hindi and phonemic awareness. We did not collect data about time spent in Delhi or schooling experience, so we were not able to control for this variable.

Also, some students in Delhi attend Anganwadi, kindergarten or pre-school, some do not. This is a variable we could not control. Given that we used 'Grade Level' as a rough marker for 'time in formal education', this might have influenced our data regarding contribution of Grade Level or schooling to reading skills. In the case of the few members who were no longer attending school or university, we assigned grade levels by adding one year to their highest level of completed schooling. This made it clear that they were not at the beginning of the last year they completed, but would have been at the beginning of any further formal study.

Data Analysis

We first cleaned our data, eliminating assessments that were incomplete or missing important information. We then conducted a variety of statistical analyses using the open source statistical software, JASP. We first looked at the relationship between automatic and non-automatic correct responses on the ASAP-H. Though Kilpatrick (2017) argues that automatic (i.e., two seconds or less) responses are the best indicators of phonemic awareness and proficiency, other research tools evaluate phonological awareness using correct responses only

and we wanted to explore different ways the ASAP-H might be used. We compared three ways of scoring the ASAP-H: scoring automatic responses only; scoring all correct responses equally, whether they were automatic or not; and counting two points for automatic responses and one point for correct, but non-automatic, responses.

After evaluating the correlations between scoring methods, we looked at how well correlated each scoring method was to the WREP-H results for four groups: the entire sample of readers; our sample of Grade 3 to 5 readers; our sample of Grade 6 to 8 readers; and our sample of readers in Grade 9 and above. Details will be reported in the results section. We determined all three scoring methods would likely be useful, but giving two points for automatic responses and one point for non-automatic, but correct responses was the strongest for theoretical and practical reasons. Going forward, we relied on this method to score the ASAP-H, though we converted two point automatic scores to 1 point scores and one point correct, not automatic, scores to half point scores, giving us a total of 40 points for the total ASAP-H score.

ASAP-H levels, like PAST levels, are comprised of related phonological skills; we converted the scores on each level into a 10 point scaled score. This will make it easier to adjust the length of future assessments without compromising the potential predictive value of the skills being measured.

To explore the different ways phonological awareness might operate at different stages of learning, we grouped our data into three grade level groupings:

Table 1

Grade Level Groupings

Grades 3-5	Grades 6-8	Grades 9 and up
n=103	n=113	n=56

Grouping in this way allowed us to compare groups of readers at different grade levels, while maintaining reasonably large sample sizes. In order to keep our grade level groupings consistent across the study, we did not combine the four Grade 2 readers with the group of readers from Grade 3 to 5 since they read a separate ORF text and thus could not be included in our analysis of ORR. We then analysed descriptive statistics to see how WRE and different kinds of phonological awareness changed across the grade level groupings represented in our samples.

Next, we analysed our entire sample to find the correlations between word reading efficiency as measured by the WREP-H and different kinds of phonological awareness, as measured by the ASAP-H. We also entered these variables into multiple linear regressions, along with Grade Level, to see which variables contributed most to WRE overall.

To explore different ways phonological awareness contributes to reading at different grade levels, we repeated the above procedures, finding correlations and performing multiple regressions, using the grade level groupings mentioned above, and used throughout this paper.

. Because Grade 3 to 5 readers all read the same ORF text, and readers from Grade 6 and up read another, more complex text, we were also able to use a similar procedure to explore the relationship between phonological awareness and ORR.

Next we analysed the kinds of phonological awareness demonstrated by the strongest quartile of readers as measured by the WREP-H, in order to see whether we could find evidence of competent readers relying on syllabic awareness only. We also briefly analysed the kinds of phonological awareness demonstrated by the bottom and mid quartiles of readers in our sample.

Finally, we explored the different ways phonological awareness contributes to oral reading accuracy across our grade level groupings. We did not analyse accuracy on the WREP-H, because unlike the ORF probe, where the task involved reading connected,

meaningful text, the WREP-H involved reading unrelated words, and skipping words is not penalised explicitly (i.e., through test instructions) or implicitly (i.e., by a desire or need to make sense of connected text).

Results

WREP-H Scoring Methods

We found all three methods of scoring the ASAP-H (i.e., 'correct only'; 'automatic only' and 'automatic-correct') were highly correlated with each other. The 'automatic-correct' scoring method correlated to both the 'automatic only' and the 'correct only' similarly at r = .99 (p<.001). The 'automatic only' and 'correct only' method of scoring were also highly correlated to each other at r = .95 (p<.001). When we looked at the correlations between the different methods of scoring the ASAP-H and WREP-H scores of the entire group and three grade level groupings, all were similar and very high.

Sample	WREP-H/ ASAP Correlation (Correct Only)	WREP-H/ ASAP Correlation (Automatic Only)	WREP-H/ ASAP Correlation (Automatic-Correct)
All Readers (n=276)	r=.81***	r=.81***	r=.82***
Grades 3-5 (n=103)	r=.80***	r=.78***	r=.80***
Grades 6-8 (n=113)	r=.71***	r=.72***	r=.73***
Grades 9 and up (n=56)	r=.58***	r=.60***	r=.60***

***p<.001

More details will be reported below, but it is worth noting that in all scoring methods, the overall WREP-H score correlated more strongly to WRE than any of its individual sections. Given that automatic response=full point/ correct, but not automatic=half point version of the

WREP-H showed slightly higher correlations to WRE and captured more potentially useful information, we decided to use that method of scoring in our classrooms and in this paper.

Word Reading Efficiency and Phonological Awareness Across Grade Levels

As expected, WRE scores were highest in the oldest readers. A great deal of variation was present within each grade level grouping. It is notable that WRE scores were quite low in our Grades 3-5 sample: the median reader was only able to read 22 words in 45 seconds, and the bottom quartile was not able to read any words at all.

Table 2

WREP-H (Correct Words) Scores: Overall, and by Grade Level Group

	All Readers	**Grades 3-5 (n=103)**	**Grades 6-8 (n=113)**	**Grades 9+ (n=56)**
Mean	36.7	21.6	39	61.4
Std. Deviation	24.2	18.3	19.9	19.4
Minimum	0	0	0	0
25th percentile	19	0	25	49.5
50th percentile	35	22	39	65
75th percentile	55	34	55	73
Maximum	96	71	96	95

In our sample, phonological awareness changed across grade level groupings. Since the ASAP-H includes 40 questions (10 at syllable level, 10 at Basic Phoneme Level; 20 at Advanced Phoneme Level), overall scores give us a broad sense of the different kinds of alpha-syllabic awareness demonstrated by readers at different grade levels. In our Grades 3-5 sample, median readers score 7.5, indicating that close to half of the sample is likely still working to master

syllabic awareness. At the 75th percentile, readers scored 19, suggesting they were aware of basic kinds of phonemes (e.g., substitution of the first sound in an initial consonant blend or deletion of a final consonant).

In our sample of Grade 6 to 8 readers, the median score of 20.5 indicates that roughly half of the sample had now mastered the skills measured by both our Syllable Level and our Basic Phoneme Level and was moving into a more complex kind of phonemic awareness. The 75th percentile score of 28.5 means the highest quartile of readers could hear and manipulate phonemes in more advanced ways (e.g., substitution of medial vowels; deletion of the second consonant in an initial or final consonant blend). Typical English readers can automatically answer 75-80 percent of similar items on the English PAST by the end of Grade 4; after that, significant growth is neither expected nor required for efficient orthographic mapping (Kilpatrick, 2017). To tell whether a student has mastered any particular skill would require one to review their individual assessment, but in terms of overall scores, a score of 28.5 on the ASAP-H is approaching the scores we might expect of most typical English readers at the end of Grade 4. In our sample of readers in Grade 9 and above, the median reader's score of 31.5 is, again is similar to the level of phonemic awareness we might expect of typical English readers, and even readers at the 25th percentile have mastered basic kinds of alpha-syllabic awareness and are moving on to more advanced ones.

Table 3

ASAP-H: Phonological Awareness Scores by Grade Grouping (40 pt. Scale)

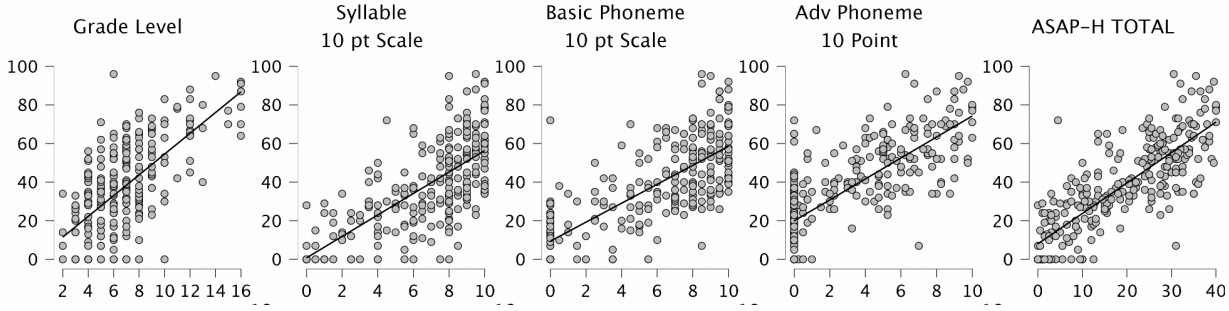
	All Readers (n=276)	Grades 3-5 (n=103)	Grades 6-8 (n=113)	Grades 9+ (n=56)
Mean	18.2	11.1	19.5	29.2
Std. Deviation	12.5	11.1	10.9	8.6
Minimum	0	0	0	4.5
25th percentile	6.5	1	10.5	25.5
50th percentile	18	7.5	20.5	31.5
75th percentile	29.5	19	28.5	35
Maximum	40	40	38.5	40

Figure 3

Correlations Between Word Reading Efficiency, Alpha-Syllabic Awareness and Grade Level

Word Reading Efficiency

(WREP-H)



In examining the overall correlation between phonological awareness and , the ASAP-H was strongly correlated to scores on the WREP-H (r= .82). This was also true of

ASAP-H/WREP-H correlations within each grade level grouping; though the correlation declined in the upper grades, it remained strong and significant (r=.60, *p<.001)*, even for readers in high school and above. When analysing the entire sample, all individual subsections of the ASAP-H were likewise strongly correlated with WRE.

In the Grade 3-5 level sample, Syllable Level scores were more highly correlated with WRE than other kinds of phonological awareness; in the upper two grade level samples, the correlation between word reading skills and syllable level awareness declined in relative and absolute terms. Basic Phoneme scores were more highly correlated with WRE in the younger two grade level groups; in our oldest readers, the importance of Basic Phoneme Level skills declined, especially relative to Grade Level and Advanced Phoneme Level skills. While Advanced Phoneme Level skills did not vary much between groups in terms of their correlation to WRE, compared with Syllable and Basic Phoneme Levels skills, their relative strength increased among older readers.

Correlations Between ASAP-H, Grade Level and WREP-H Scores

Variable	**All Readers (n=276)**	**Grades 3-5 (n=103)**	**Grades 6-8 (n=113)**	**Grades 9+ (n=56)**
Grade Level	r= .66***	r= .39***	r= .07	r= .57***
Syllable Awareness Levels	r= .74***	r= .80***	r= .61***	r= .39**
Basic Phoneme Levels	r= .76***	r= .78***	r= .67***	r= .50***
Advanced Phoneme Levels	r= .75***	r= .63***	r=.66***	r= .62 ***
ASAP-H Score	r= 82***	r=.80***	r= .73***	r= .60***

**p< .05, **p< .01, ***p< .001*

To better understand the importance of the trends noted above, we conducted a series of multiple linear regressions. When Grade Level and the overall ASAP-H scores for the entire

sample were entered into a linear regression to see how they contributed to Word Reading Efficiency (WRE), the model yielded an adjusted r-squared of 0.73, suggesting that 73 percent of the variance in word reading efficiency could be explained by these two variables alone. The model and both variables were significant ($p < .001$). When individual level scores were entered into the regression in place of the overall ASAP score, the model remained significant ($p < .001$), and all levels of the ASAP contributed significantly to WRE. A one-year increase in Grade Level predicted an increase of 2.5 words read on the WREP-H. A 10 percent increase in Syllable level scores predicted an increase of 1.5 words, while a 10 percent increase in Basic Phoneme level scores and Advanced Phoneme scores predicted increases of 1.7 and 1.8 words on the WREP-H, respectively.

When regression analysis was conducted on the Grade 3-5 sample using Grade Level and the overall ASAP-H scores, the adjusted r-squared was 0.66, and the model was significant ($p < .001$). The ASAP-H score had a greater impact on WRE compared to Grade Level, although both were statistically significant. When individual levels of the ASAP-H were entered into the regression in place of the total score, the model remained significant ($p < .001$) with an adjusted r-squared of 0.69. Syllable levels contributed the most, followed by Basic Phoneme levels and Grade Level. Advanced Phoneme level skills did not significantly contribute to this model.

When similar regressions were conducted on the Grade 6-8 sample, Grade Level did not contribute significantly to the model and was subsequently removed. The ASAP-H score alone yielded an adjusted r-squared of 0.52, and the model was significant ($p < .001$). When individual ASAP-H levels were entered into the regression, the model remained significant ($p < .001$) with an adjusted r-squared of 0.52. However, neither Syllable levels nor Grade Level contributed significantly to the model and were removed. Both Basic Phoneme and Advanced Phoneme

levels contributed similarly: a 10 percent increase in Basic Phoneme scores predicted a gain of 2.5 words on the WREP-H, as did a 10 percent increase in Advanced Phoneme scores.

When we conducted a similar analysis on the grade 9+ sample, the model yielded an adjusted r-squared of 0.48, with both the ASAP-H score and Grade Level contributing similarly and significantly ($p < .001$). When individual ASAP-H levels were entered into the regression, the model remained significant ($p < .001$) with an adjusted r-squared of 0.48. However, neither Syllable Levels nor Basic Phoneme Levels contributed significantly to the model and were subsequently removed. Both Grade Level and Advanced Phoneme Levels contributed similarly: a 10 percent increase in Advanced Phoneme scores predicted a gain of 3.1 words on the WREP-H, and one additional year of formal education predicted a gain of 3.0 words on the WREP-H.

Contributions of Alpha-Syllabic Awareness to Oral Reading Rate

Because we used one ORF text when assessing readers in Grades 3 to 5 and another, more complex text when assessing readers in Grades 6 and above, we could not combine all data in one analysis; instead, we organised the data into grade levels groupings when looking at the relationship between phonological awareness and ORR. Descriptive statistics for oral reading rates are presented for each grade level, in the table below.

Table 4

ORF: Oral Reading Rate (CWPM) by and Grade Grouping

	Grades 3-5* (n=103)	**Grades 6-8** (n=113)**	**Grades 9+** (n=56)**
Mean	44.37	67.34	119.79
Std. Deviation	42.94	38.69	45.75
Minimum	0	0	0
25th percentile	0	40	89
50th percentile	39	69	115
75th percentile	72	93	150
Maximum	171	166	205

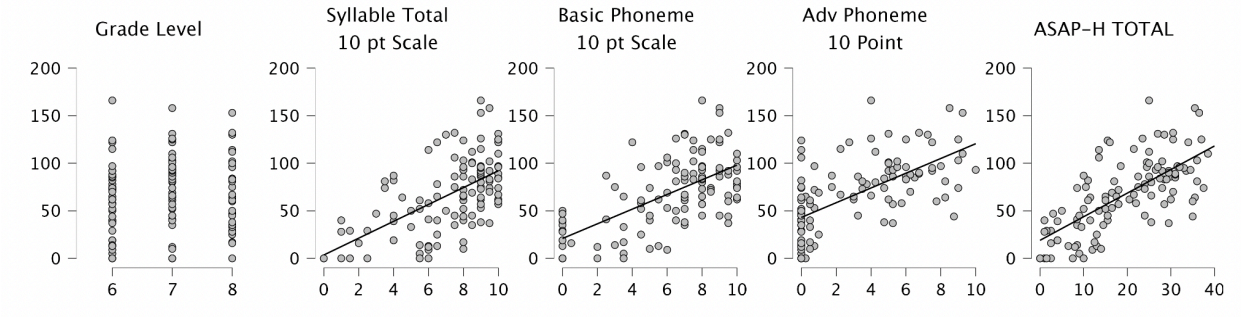
**Readers in Grades 3-5 read from a Grade 3 level ORF text.*

***Readers from Grades 6 and above read from a Grade 6 level ORF text.*

Correlation coefficients between the ASAP-H and ORR, ranged from r= .80 in our Grade 3-5 readers to r= .60 in our Grade 9 and up readers. Compared with WRE scores, similar patterns emerged when we analysed the relative correlations between ORR and each subsection of the ASAP-H. Syllable Level scores were most strongly correlated with ORR scores in the early grades; Basic Phoneme Level correlation coefficients were relatively strong among the younger two groups of readers, but less so among Grade 9 and above readers; Advanced Phoneme Level correlations remained similar in absolute terms, but increased in relative importance in the two oldest groups of readers.

Figure 4

Oral Reading Rate/ASAP-H and Grade Level Correlations: Grades 6-8



Correlations Between ASAP-H, Grade Level and ORR (CWPM) Scores

Grades Level Grouping:	Grades 3-5 (n=103)	Grades 6-8 (n=113)	Grades 9+ (n=56)
Grade Level	r= .37***	r= .11	r= .57***
Syllable Awareness Levels	r= .78***	r= .59***	r= .39**
Basic Phoneme Levels	r= .78***	r= .64***	r= .50***
Advanced Phoneme Levels	r= .65***	r=.63***	r= .62 ***
ASAP-H Score	r=.80***	r= .70***	r= 60***

**p< .05, **p< .01, ***p< .001*

Regression analyses at each grade level grouping showed patterns very similar to those observed for WRE. At the Grade 3-5 level, a model that included the ASAP-H score and Grade Level was significant ($p < 0.001$) and yielded an adjusted r-squared value of 0.66. According to this model, a 10-point (i.e., 25 percent) increase in ASAP-H scores predicted a gain of 29.3 correct words per minute, while a one-year increase in Grade Level predicted an increase of 8.5 correct words per minute. When we entered all three levels of phonological awareness into the regression, Syllable Level and Basic Phoneme Level skills were both significant and similar

predictors of reading fluency; however, Advanced Phoneme Level skills were not significant and were thus removed from the model.

Similar to our results for WRE, when regressions were conducted on the Grade 6-8 sample using Grade Level and the ASAP-H total score as variables, Grade Level did not contribute significantly to the model and was removed. The ASAP-H score alone yielded an adjusted r-squared of 0.48 and was significant ($p < .001$). Among these readers, a 10-point (i.e., 25 percent) gain in ASAP-H scores predicted an increase in reading fluency of 24.8 words per minute. When individual ASAP-H levels were entered into the regression model, the model remained significant ($p < .001$) with an adjusted r-squared of 0.48. For these readers, neither Syllable Level nor Grade Level contributed significantly to the model. A 10 percent gain in Basic Phoneme Level scores predicted an increase of 4.8 correct words per minute (CWPM), while a 10 percent gain in Advanced Phoneme Level scores predicted an increase of 4.5 CWPM.

When we conducted similar analysis on the Grades 9+ sample, a model including ASAP-H score and grade level was significant and yielded an adjusted r-squared value of 0.45; a 10 point (i.e., 25 percent) increase in ASAP-H scores predicted a gain of 20.4 CWPM; one year increase in grade level predicted an increase of 8.4 CWPM. At this level when we looked at individual levels of the ASAP-H, only Grade Level and Advanced Phoneme Level skills were significant predictors of reading rate; a 10 percent gain in Advanced Phoneme level skills predicted an increase of 6.6 CWPM.

Phonological Awareness Among the Top Quartile of Readers As Measured by the WREP-H

We next looked at the top quartile of readers, as measured by the WREP-H, to see if there was evidence that efficient and fluency word reading skills might be obtained by means of syllabic awareness only. This group of 65 readers scored at least 56 on the WREP-H (i.e., 75

correct words per minute on this 45 second test). They would have had to read a wide variety of complex words, including multi-syllabic words with consonant clusters and vowel sequences. Readers at the low end of this group would have read words like, स्पष्ट, प्रवास, परिचय, दिनांक, and स्वभाव. The median readers in this group would have encountered words such as खुशनसीब, अस्पष्ट, and नास्तिक.

As noted above, to pinpoint an individual student's strengths and needs, a level-by-level analysis of their performance on the ASAP-H would be required. However, some broad patterns can be inferred from total scores. Since a perfect (i.e., automatic and correct) score on on the ASAP-H Syllable levels would yield a score of 10, and a perfect score on both Syllable and Basic Phoneme Levels would yield a score of 20, any score above 10 indicates a reader has some level of phonemic awareness, and any score above 20 suggests they have mastered most or all Syllable and Basic Phoneme level skills and have obtained some Advanced Phoneme level skills.

Top Quartile of Readers Measured by the WREP-H (n=65)

Group of Reader	**ASAP-H Score**
Minimum	4.5
Maximum	40
Mean	30.3
5th percentile	15.6
10th percentile	23.9
50th percentile (median)	31.5

The mean and median scores (30.3 and 31.5) indicate that top half of readers in this quartile were able to automatically and correctly respond to around 75 percent of the tasks presented—levels similar to those obtained by typical readers on comparable phonological tasks

as measured by Kilpatrick's Phonological Awareness Screening Test (PAST) (Kilpatrick, 2017). Only one reader in our sample of top readers failed to demonstrate any phonemic awareness skills. The 5th percentile score in our sample was 15.6, suggesting that 95 percent of these readers had mastered most or all Syllable Level skills and more than half of the skills measured by the Basic Phoneme levels section of the ASAP-H. The 10th percentile score of 23.9 suggests that 90 percent of the top readers in our sample had mastered all or most Syllable and Basic Phoneme Level Skills and some Advanced Phoneme Level Skills.

When entered into a linear regression model, overall phonological awareness skills as measured by the ASAP-H did not significantly predict differences between the top quartile of readers. Grade Level was the strongest, most significant predictor ($p < .001$). Only Advanced Phoneme skills contributed significantly ($p < .05$) to WRE.

Phonological Awareness in Average and Lowest Quartile Readers

We briefly analysed the average (i.e., second and third quartile) and lowest quartile of readers in our sample as measured by the WREP-H. A few observations are noted here. First, the level of phonological awareness was very low in the lowest quartile of word readers (n=70). This aligns with the high correlation between WREP-H and ASAP-H scores overall; poor readers, as measured by the WREP-H, tended to have the weakest phonological awareness. The lowest quartile of readers read between 0 and 19 words correctly, with a mean WREP-H score of 5.4. The median reader in this quartile did not read any words. Among these readers, Syllable Level skills significantly predicted inter-group differences, while neither Grade Level nor other types of phonological awareness predicted reading efficiency.

As expected, the middle two quartiles of readers (n=141) exhibited more varied phonological and word reading skills. Readers in this group read between 20 and 55 words on the WREP-H. For these readers, Advanced Phoneme Level skills, followed by Basic Phoneme Level skills and Grade Level, were significant predictors of inter-group differences. Syllable Level awareness was not a significant predictor of WRE among these readers.

Contributions of Alpha-Syllabic Awareness to Oral Reading Accuracy

Reading accuracy increased across grade levels, even as the text used with the older two grade level groups was more complex than the one used with readers in Grades 3-5.

Table 5

ORF: Oral Reading Accuracy (percent) by and Grade Grouping

	Grades 3-5* (n=103)	**Grades 6-8** (n=113)**	**Grades 9+** (n=56)**
Median	86%	92%	98%
Mean	60%	82%	94%
Std. Deviation	42	25	14
Minimum	0	0	0
Maximum	100%	100%	100%

*Readers in Grades 3-5 read from a Grade 3 level ORF text.
**Readers from Grades 6 and above read from a Grade 6 level ORF text.

The correlations between oral reading accuracy and different kinds of phonological awareness differed in notable ways from what we found in our analysis of WRE and ORR.

Table 6

Correlations Between ASAP-H, Grade Level and Oral Reading Accuracy

Variables	**Grades 3-5 (n=103)**	**Grades 6-8 (n=113)**	**Grades 9+ (n=56)**
Grade Level	r= .33***	r= .01	r= .20
Syllable Awareness Levels	r= .76***	r= .67***	r= .30*
Basic Phoneme Levels	r= .66***	r= .64***	r= .52***
Advanced Phoneme Levels	r= .41***	r=.50***	r= .52***
ASAP-H Score	r=.65***	r= .64***	r= .60***

**p< .05, **p< .01, ***p< .001*

In our sample of readers, syllable level awareness played a more important role in reading accuracy when compared with ORR, especially in the early years. Though the ASAP-H score remained a significant overall predictor of reading accuracy, in the Grades 3-5 sample, syllabic awareness was more highly correlated and predictive of reading accuracy; no other variable was a significant predictor when all levels were entered into regression. Syllable Level scores were also the best predictor of reading accuracy in our Grade 6-8 sample; a 10 percent increase in Syllable level scores predicted a four percent gain in accuracy (*p<.001).* A ten percent increase in Basic Phoneme Level skills predicted a two percent increase in accuracy (*p<0.01).* In the Grade 9 and older readers, Basic Phoneme Level skills were the only significant predictor of reading accuracy, with a ten percent increase in scores in this level predicting a four percent increase in accuracy.

Discussion

The ASAP-H's overall internal consistency, and the consistency found within each level, suggest it is a reliable measure of phonological awareness in Hindi readers and that it may be possible to develop a reliable short form of this assessment for the purpose of screening and progress monitoring. The fact that scoring the ASAP-H in three different ways (i.e., counting only automatic responses; scoring only correct responses; or counting a weighted mix of the two) yielded similar results suggests that different methods of scoring assess the same underlying set of skills: proficiency with alpha-syllabic phonological awareness skills. While any version of the test would likely prove useful, we chose to analyse the results of this study by scoring a full point for correct and automatic (e.g., two seconds or less) responses and a half point for correct but not automatic responses. This method of scoring showed marginally higher correlations with WREP-H scores, and more importantly, it will provide teachers and researchers with more granular information than the other two scoring methods. However, given that automaticity is not typically expected of readers of English until the end of second grade (Kilpatrick, 2017), it may be preferable to focus on 'correct only' scores in the early primary grades.

Because the ASAP-H measures many of the same skills as the PAST, from which it was derived, we can see that phonemic awareness emerges later compared to typical readers of English in the US. The median reader in our Grades 3-5 sample demonstrated little, if any, phonemic awareness; their ASAP-H scores of 7.5 suggest they are thinking primarily in syllables. It is only in our Grade 9 and up sample that the median reader demonstrates levels of phonemic awareness comparable to those Kilpatrick (2017) finds typical of English readers by the end of Grade 4. These results are broadly in line with the many studies cited above that found phonemic awareness developing late in readers of alpha-syllabic scripts as compared with

readers of alphabets (Nag, 2007; Nag and Snowling, 2012; Wijaythilake et al., 2018; Menon et al., 2017).

It is important that we try to identify the reason for this delay. Based on our review of the literature and our experience, it seems likely that at least two kinds of factors are at play. First, compared to alphabetic scripts where there is, in theory, a 1:1 relationship between most phonemes and graphemes, in alpha-syllabaries, phoneme markers are less visually prominent. This is not a problem in itself; alpha-syllabaries are efficient and effective writing systems. However, without adequate instruction, the syllabic organisation of the script may make it more difficult for beginning readers to independently deduce the phonemic structure within complex akshara and words. If our understanding of orthographic mapping in alpha-syllabaries is correct, it is likely that until readers gain analytic insight into the phonemic structure of spoken and written akshara and words, they will be forced to learn hundreds of complex akshara by rote, not by decoding and orthographic mapping. They will similarly lack the skills for efficient orthographic mapping of all the new words they are struggling to read. This leads us to the second set of factors: instructional practices. If, as our results suggest, orthographic mapping and skilled reading in Hindi depends on alpha-syllabic phonological awareness, then figuring out how to teach these skills will become a high priority.

The overall correlation between the alpha-syllabic awareness as measured by the ASAP-H and WRE as measured by the WREP-H, is extremely high: r=0.82 (p<.001). That correlation and the fact that all sublevels of the ASAP-H correlate strongly and significantly to WRE, suggests this is an assessment that will be useful in many contexts, at many ages.

The fact that the different kinds of phonological awareness measured by the ASAP-H contribute differently to WRE depending on the grade level of the readers is likewise

important.The skills measured by the Syllabic and Basic Phoneme Levels were most predictive of WRE in Grades 3-5; Basic Phoneme and Advanced Phoneme Level skills were the best predictors in the Grades 6-8 sample; and for readers in Grade 9 and above, the skills measured by Advanced Phoneme Levels were most important. However, the fact that there are so few effective readers in our sample of Grade 3-5 readers suggests it would be foolish to wait until Grade 6 to teach phonemic awareness skills. The sooner readers can acquire these skills, the better.

ORR is closely related to WRE, so perhaps it should not be surprising that the patterns we found in the relationship between ORR and phonological awareness so closely mirrored the relationships we found between WRE and phonological awareness. Still, the parallels are striking, overall and in each grade level grouping.

It is likewise striking that the correlation between phonological awareness and WRE in this sample was stronger than the correlation between Grade Level and WRE; this was true overall and in each of our grade level groupings. Phonological awareness was also more strongly correlated with ORR than Grade Level in two of our three grade level groupings (Grades 3-5 and Grades 6-8); for readers in 9th grade and above, most of whom had acquired high levels of alpha-syllabic awareness, Grade Level (i.e., years in school) became a more powerful factor and a better predictor of reading rate than the overall ASAP-H score. But even in this sample, Advanced Phoneme level scores remained a better predictor of ORR than Grade Level.

It is both sobering but it is also hopeful that automaticity in word reading appears to be better predicted by phonological awareness than by years of formal education: it would be far cheaper and easier to teach phonological awareness skills than it would be to drastically increase instructional time by lengthening the school day or year.

Among the highest quartile (n=65) of word readers of our sample, all but one demonstrated some levels of phonemic awareness and 90 percent had scores that suggested they had mastered some skills measured by the Advanced Phoneme Level of the ASAP-H and most or all skills measured by both the Syllabic and Basic Phoneme levels of that assessment. This suggests that the number of skilled readers who rely on syllabic awareness alone is extremely small, if any of these readers exist at all. The 'syllable path' does not appear to lead to skilled, fluent reading.

These top readers also suggest the need for a caveat in our thinking about the need for phonological awareness instruction. Among the best readers, phonological awareness is not a predictor of improved reading, but Grade Level (i.e., time in school) is. How can this be? Our results suggest that the majority of the best readers in our sample already have adequate phonological awareness. Having pried open that door, they are equipped to efficiently acquire new sight words. Further instruction in phonological awareness will not be useful to these readers; what they need is good instruction along with access to real, meaningful text to read and think about. Like readers all over the world, they will become more fluent readers simply by reading.

Syllable level awareness played a more prominent role when it came to reading accuracy. In fact, in the Grade 3-5 sample, Syllable level scores were a better predictor of reading accuracy than the overall ASAP-H score; those skills were the only level of the ASAP-H that predicted reading accuracy. In Grades 6-8, syllable level awareness was joined by the skills measured by the Basic Phoneme Level; it was only in our oldest sample of readers that syllable level skills no longer predicted oral reading accuracy.

More research is needed to explain this, but two explanations present themselves. First, similar levels of accuracy can mean vastly different things in different contexts. One reader might read 10 words a minute with 100 percent accuracy; another might read 30 words a minute with 92 percent accuracy; still another might read 150 words a minute with 98 percent accuracy. It is also true that for beginning readers, large jumps in accuracy are common (e.g., from 50 percent to 80 percent), but among more skilled readers, much smaller gains (e.g., from 92 percent to 97 percent) may be the difference between 'frustration level' and 'independent level', as measured by many reading assessments.

More fundamentally, oral reading accuracy, WRE and ORR depend on an overlapping, but not identical, set of skills. WRE is the most direct measures of the size of a reader's automatic, sight word vocabulary; it depends on sight word recognition and efficient decoding. ORR depends on a reader's sight word vocabulary and decoding efficiency, but also on other things, including oral language and self-monitoring skills. Oral reading accuracy also depends on oral language and self-monitoring skills; it requires accurate, but not necessarily efficient, decoding skills; a large sight word vocabulary is helpful, but not required for accurate reading.

In this context, it is interesting to note that in phonetically opaque alphabetic languages, such as English, dyslexia typically results in difficulty with both fluency and accuracy, but in phonetically transparent languages, like Spanish or Italian, it is fluency more than accuracy that is affected (Kilpatrick, 2017). Kilpatrick argues that this can be explained by the way different kinds of reading skills require different levels of phonological proficiency. Through good instruction, many dyslexic readers acquire the phonics skills and the basic phonemic awareness skills (e.g., segmenting and blending) necessary to decode unfamiliar words, even while they lack the phonemic proficiency to become efficient at orthographic mapping. In phonetically

transparent languages, they are able to ‘sound out’ the many ‘unmapped’ words they encounter in their reading, so their fluency more than their accuracy is affected.

Given that Hindi and most other Indic scripts are phonetically transparent, and that there is evidence that phonological awareness develops slowly in many readers of these scripts for reasons discussed above, it is reasonable to assume that many readers acquire the phonics skills and phonological awareness necessary to decode words long before they acquire the skills needed to efficiently orthographically map them. This could explain the relative importance of Syllable and Basic Phoneme level awareness in the early grades. As readers in higher grades begin to encounter more complex words containing more vowel diacritics, consonant blends and dipthongs, they slowly deduce the phonemic structure of complex matras. Early interventions that included instruction in the full range of alpha-syllabic awareness skills, along with an analytic approach to alpha-syllabic phonics, could demystify the code and enable efficient orthographic mapping much faster.

Taken as a whole, these results strongly support the idea that reading in Hindi depends on a wide range of alpha-syllabic awareness skills. However, in a majority of cases, sight word acquisition through efficient orthographic mapping appears to require levels of phonemic awareness broadly similar to those found in English readers: mastery of most or all of the skills measured by the ASAP-H’s Syllable and Basic Phoneme levels and at least some of the skills measured by the Advanced Phoneme level.

Syllabic awareness is a prerequisite for phonemic awareness and is important in its own right in early grades, as students are learning how to decode relatively simple words. It may also play a more important role in word reading accuracy; this is an idea that requires more research, but it makes intuitive sense that strong syllabic awareness would be helpful when decoding

unfamiliar words in syllabically organized scripts. However, the results presented here suggest that on its own, syllabic awareness does not appear to result in truly automatic, fluent reading at any age.

This study is cross-sectional, so it cannot prove causation. But given that phonological awareness skills appear to have such a strong impact on reading automaticity and fluency, and given that decades of research in the West proves that these phonemic skills can be easily taught, these results suggest that small changes in instructional practices may lead to large gains.

Of course, many factors influence educational outcomes: large class sizes, poverty, an emphasis on rote memorization, and other ineffective teaching practices all likely play a role in limiting reading achievement. These issues matter greatly and must be addressed by any comprehensive movement for education reform. However, our review of previous research and this study suggests there are three relatively straightforward strategies that can improve reading outcomes. First, we can teach students alpha-syllabic phonological awareness, ensuring they have a strong understanding of the sounds within words. Second, we can use an analytic approach when teaching alpha-syllabic phonics, employing methods that reveal the phonemic structure within akshara and words. Third, we can provide students with access to language rich classrooms, read-alouds and meaningful texts, allowing them to develop oral language skills and to use their growing understanding of language, script and phonological structures to efficiently acquire a larger vocabulary and a larger lexicon of automatically recognized sight words. By focusing on these strategies, we can equip readers with the skills they need to become lifelong, effective readers.

These are relatively small changes; they will not solve everything, but they could have an outsized impact. Further research is needed to test these results and the instructional practices we are suggesting in experimental and classroom settings.

Conclusion

In broad agreement with the 'alphas-syllabic principle' proposed by Nag and Snowling (2012) and Nag (2022) and the theories of orthographic mapping and self-teaching advanced by Erhi (2005, 2014), Share (1995, 2008), and Kilpatrick (2015, 2017), our results suggest that the range phonemic awareness skills measured by the ASAP-H, are key contributors to WRE and ORR. Syllabic awareness alone does not appear to result in efficient word reading skills, but it likely plays an important early role as students learn to accurately decode words.

These findings support an ‘alpha-syllabic’ approach to reading instruction that includes three key teaching practices: explicit instruction in phonological awareness; an analytic approach to teaching alpha-syllabic phonics; access to language-rich read alouds and ample time for students to read real, meaningful text. Longitudinal research is needed to develop and test these ‘alpha-syllabic’ practices, but it is likely that relatively small changes in instruction can lead to significant gains in reading skills.

References

Bhide, A., Gadgil, S., Zelinsky, C. M., & Perfetti, C. (2014). Does reading in an alpha-syllabary affect phonemic awareness? Inherent schwa effects in Marathi English bilinguals. Writing Systems Research, 6(1), 73-93. https://doi.org/10.1080/17586801.2013.855619

Daniels, P. T., & Share, D. L. (2017). Writing system variation and its consequences for reading and dyslexia. Scientific Studies of Reading, 22(1), 101–116. https://doi.org/10.1080/10888438.2017.1379082

Ehri, L. C. (2005). Learning to read words: Theory, findings, and issues. Scientific Studies of Reading, 9(2), 167–188.

Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. Scientific Studies of Reading, 18(1), 5-21. https://doi.org/10.1080/10888438.2013.819356

Eason, S. H., Sabatini, J., Goldberg, L., Bruce, K., & Cutting, L. E. (2013). Examining the relationship between word reading efficiency and oral reading rate in predicting comprehension among different types of readers. *Scientific Studies of Reading: The Official Journal of the Society for the Scientific Study of Reading, 17*(3), 199–223. https://doi.org/10.1080/10888438.2011.652722

Georgia Historical Society. (2016, November 15). Sequoyah and the Cherokee syllabary. Georgia Historical Society. Retrieved August 29, 2023, from https://georgiahistory.com/education-outreach/online-exhibits/featured-historical-figures/sequoyah/talking-leaves/

Jayaram, K. (2008, January). Early literacy project - Explorations and reflections part 2. Contemporary Education Dialogue, 5(2), 175–212. https://doi.org/10.1177/0973184913411166

Kilpatrick, D. (2012). Phonological segmentation assessment is not enough: A comparison of three phonological awareness tests with first and second graders. *Canadian Journal of School Psychology, 27*, 150-165. https://doi.org/10.1177/0829573512438635

Kilpatrick, D. A. (2015). Essentials of assessing, preventing, and overcoming reading difficulties. Wiley & Sons.

Kilpatrick, D. A. (2017). Equipped for reading success: A comprehensive, step-by-step program for developing phonemic awareness and fluent word recognition. Casey and Krisch Publishers.

Kilpatrick, D. A. (2020, February 6). *Phonemic proficiency* [Conference presentation]. Wisconsin State Reading Conference. https://wsra.memberclicks.net/assets/Convention/handouts_2020/Kilpatrick%20Phonemic%20Proficiency.pdf

Kilpatrick, D. A., & McInnis, P. J. (2012). *The Phonological Awareness Screening Test (PAST): An initial report*. Unpublished report, State University of New York, College at Cortland & East Syracuse-Minoa Central School District; Keuka College & Nazareth College; Hammondsport Central School District. Retrieved from https://education.ohio.gov/getattachment/Topics/Learning-in-Ohio/Literacy/Striving-Readers-Comprehensive-Literacy-Grant/Literacy-Academy/4-PAST-Reliability-and-Validity-Data.pdf.aspx?lang=en-US

Kilpatrick, D. A., Joshi, R. M., & Wagner, R. K. (2019). Reading development and difficulties: Bridging the gap between research and practice. Springer.

Kilpatrick, D. A., & O'Brian, S. (2019). Effective prevention and intervention for word-level reading difficulties. In D. A. Kilpatrick, R. M. Joshi, & R. K. Wagner (Eds.), Reading development and difficulties: Bridging the gap between research and practice (pp. 179-210). Springer.

Menon, S., Krishnamurthy, R., Sajitha, S., Apte, N., Basargekar, A., Subramaniam, S., Nalkamani, M., & Modugala, M. (2017). Literacy research in Indian languages (LiRiL): Report of a three-year longitudinal study on early reading and writing in Marathi and Kannada. Azim Premji University and Tata Trusts.

Nag, S. (2007). Early reading in Kannada: The pace of acquisition of orthographic knowledge and phonemic awareness. Journal of Research in Reading, 30, 7-22. https://doi.org/10.1111/j.1467-9817.2006.00329.x.

Nag, S. (2014). Alphabetism and the science of reading: From the perspective of the akshara languages. Frontiers in Psychology, 5. https://doi.org/10.3389/fpsyg.2014.0086

Nag, S. (2022). Reading the Akshara writing system. In M. Snowling, C. Hulme, & K. Nation (Eds.), The science of reading: A handbook (2nd ed., pp. 372–390). Wiley-Blackwell.

Nag, S., & Narayanan, B. (2019). Orthographic Knowledge, Reading and Spelling Development in Tamil: The First Three Years. In R. M. Joshi & C. McBride (Eds.), Handbook of Literacy in Akshara Orthography (pp. 55-84). Literacy Studies (Vol. 17). https://doi.org/10.1007/978-3-030-05977-4_4

Nag, S., & Perfetti, C. A. (2014). Reading and writing: Insights from the alphasyllabaries of South and Southeast Asia. Writing Systems Research, 6(1), 1-9. https://doi.org/10.1080/17586801.2014.883787

Nag, S., & Snowling, M. J. (2012). Reading in an alphasyllabary: Implications for a language-universal theory of learning to read. Scientific Studies of Reading, 16, 404–423. https://doi.org/10.1080/10888438.2011.576352.

Nag, S., Snowling, M., Quinlan, P., & Hulme, C. (2014). Child and symbol factors in learning to read a visually complex writing system. Scientific Studies of Reading, 18(5), 309–324. https://doi.org/10.1080/10888438.2014.892489

National Commission on Population, Ministry of Health & Family Welfare. (2020, July). *Population Projections for India and States 2011-2036*. Census of India 2011. Retrieved from https://main.mohfw.gov.in/sites/default/files/Population%20Projection%20Report%202011-2036%20-%20upload_compressed_0.pdf

Nesan, M., Sadeghi, A., & Everatt, J. (2019). Literacy Acquisition in the Malayalam Orthography: Cognitive/Linguistic Influences within a Multilingual Context. In R. M. Joshi & C. McBride (Eds.), Handbook of Literacy in Akshara Orthography (pp. 85-102). Literacy Studies (Vol. 17). https://doi.org/10.1007/978-3-030-05977-4_5

Prakash, P., Rekha, D., Nigam, R., & Karanth, P. (1993). Phonological awareness, orthography, and literacy. In R. J. Scholes (Ed.), Literacy and language analysis (pp. 55–70). Lawrence Erlbaum Associates, Inc.

Pratham. (2023). Annual Status of Education Report (Rural) 2022. ASER Centre.

Shanahan, T. (2020, April 18). How can I teach RAN to improve my students' reading? Shanahan on Literacy. Retrieved August 10, 2023, from https://www.shanahanonliteracy.com/blog/how-can-i-teach-ran-to-improve-my-students-reading

Shanahan, T. (2021, November 13). RIP to advanced phonemic awareness. Shanahan on Literacy. Retrieved August 24, 2023, from https://www.shanahanonliteracy.com/blog/rip-to-advanced-phonemic-awareness

Share, D. L. (1995). Phonological recoding and self-teaching: Sine qua non of reading acquisition. Cognition, 55(2), 151–218.

Share, D. L. (2008). Orthographic learning, phonological recoding, and self-teaching. Advances in Child Development and Behavior, 36, 31-82. https://doi.org/10.1016/S0065-2407(08)00002-5.

Share, D. L. (2014). Alphabetism in reading science. Frontiers in Psychology, 5, 752. https://doi.org/10.3389/fpsyg.2014.00752.

Share, D. L. (2021). Common misconceptions about the phonological deficit theory of dyslexia. Brain Sciences, 11(11), 1510. https://doi.org/10.3390/brainsci11111510

Snowling, M. J., & Hulme, C. (2021). Annual research review: Reading disorders revisited–the critical importance of oral language. *Journal of Child Psychology and Psychiatry, 62*(5), 635-653. https://doi.org/10.1111/jcpp.13324

Thomas, P.L. (2022). The Science of Reading Movement: The never-ending debate, and the need for a different approach to reading instruction. National Education Policy Center. Retrieved August 12, 2023, http://nepc.colorado.edu/publication/science-of-reading

The Community Library Project. (2020). Hindi Reading Fluency: A library-based intervention to increase oral reading fluency in readers: 2019-20. TCLP Prints. Retrieved August 8, 2023, from https://www.thecommunitylibraryproject.org/hindi-reading-fluency/.

The Community Library Project. (2021). The Community Library Project Remote Hindi Reading Fluency Program 2020-21. Retrieved August 8, 2023, from https://www.thecommunitylibraryproject.org/hindi-reading-fluency/

The Community Library Project. (2024). Two Paths Postulate: A TCLP Working Paper on The Impact of Phonological Awareness on Hindi Reading. Retrieved July 31, 2024, from https://www.thecommunitylibraryproject.org/the-reading-project/

Vaid J, Gupta A. (2002). Exploring word recognition in a semi-alphabetic script: the case of Devanagari. Brain and Language, 81(1-3), 679-90. https://doi.org/10.1006/brln.2001.2556.

Vaid, J., Rao, C., & Chen, H.-C. (2017). The processing cost for reading misaligned words is script-specific: Evidence from Hindi and Kannada/Hindi readers. Journal of Cultural Cognitive Science, 1. https://doi.org/10.1007/s41809-017-0005-3

Wijaythilake, M. A. D. K., & Parrila, R. (2019). Reading and Writing Sinhala. In R. M. Joshi & C. McBride (Eds.), Handbook of Literacy in Akshara Orthography (pp. 195-216). Literacy Studies (Vol. 17). https://doi.org/10.1007/978-3-030-05977-4_11

Wijaythilake, M. A. D. K., Parrila, R., Inoue, T., & Nag, S. (2018). Instruction matters to the development of phoneme awareness and its relationship to akshara knowledge and word reading: Evidence from Sinhala. Scientific Studies of Reading, 22(5), 420–433. https://doi.org/10.1080/10888438.2018.1466890

Wijayathilake, M. A. D. K., Parrila, R., Inoue, T., & Nag, S. (2019). Cognitive predictors of word reading in Sinhala. Reading and Writing, 32(7), 1881–1907. https://doi.org/10.1007/s11145-018-9927-5

Appendix A

Alpha-Syllable Awareness Probe-Hindi (ASAP-H)

Name: _____ Date: _____ Grade _____
Age _____ School: _____ Member Number:_____ Evaluator: _____
Teaching Items: Mode teaching items with two post-its, blocks or other similar objects. बोलो बदबू ।अगर हम बदबू बोलते हैं, बद बोलने के बिना, हम बू कहेंगे। आप की बारी:" बोलो डाकघर। अब बोलो डाकघर पर डाक मत बोलो। क्या बचा है? "____ समीक्षा: अगर हम डाकघर बोलते हैं, डाक बोलने के बिना, हम घर कहेंगे। ओके?

I. SYLLABLE LEVELS

Basic Syllable Levels

Level D Deletion : "बोलो भूकंप। अब बोलो भूकंप पर भू मत बोलो।" समीक्षा: अगर हम भूकंप बोलते हैं, भू बोलने के बिना, हम कंप कहेंगे। ओके? एक और कोशिश करें।

D1 1.(भू)कंप ____ 2. (आप) का ___ 3. हम (दर्द) ____
D2 4.(सोम)वार ____ 5. (फेंक) ना___ 6. जान (वर) ____

LEVELS E2-3 "बोलो मनमौजी अब बोलो मनमौजी पर मन मत बोलो।" समीक्षा: अगर हम मनमौजी बोलते हैं, मन बोलने के बिना, हम मौजी कहेंगे । ओके?

7. मनमौजी 8.समझाया 9.अनुसार 10. इंतज़ार

(मन)मौजी ____ (सम) → झाया____ (अ)→नुसार ____ (इं) → तज़ार__

Level D
Correct / Automatic

C:____/6 A: ____/6

Level E
Correct / Automatic

C:____/4 A: ____/4

Basic Syllable Total:

____/10 A: ____/10

PHONEME LEVELS: *Basic Phoneme Levels*

LEVEL H

H1 (Deletion): "बोलो प्यार। अब बोलो प्यार पर प् मत बोलो।" समीक्षा: अगर हम प्यार बोलते हैं, प् बोलने के बिना, हम यार कहेंगे प्यार -यार। ओके?

11.प्यार -(प्)→ यार ____ 12. श्लोक -(श्) → लोक ____

H2 (Substitution) "बोलो भ्रम। अब बोलो भ्रम पर भ की जगह, क् बोलो ।" समीक्षा: अगर हम भ्रम बोलते हैं, पर भ की बजाय, हम क् कहते हैं, तो हम क्रम कहेंगे। भ्रम-क्रम।

13. भ्रम भ् → क्= क्रम ____ 14. श्रम श् → ड = ड्रम ____ 15. प्लेट प्→ स्= स्लेट____

Level H1/2
Correct / Automatic

C:__/5 A: ____/5

Level I1/2
Correct / Automatic

C:__/5 A: ____/5

Basic Phoneme Total:

____/10 A: ____/10

LEVEL I "बोलो सेब अब बोलो सेब**,** पर ब् मत बोलो।**"** समीक्षा: अगर हम ख़ास बोलते हैं, स् बोलने के बिना, हम खा कहेंगे खास -खा ओके? एक और कोशिश करें

16. सेब
-(ब्)= से ___

17. कोस
-(स्) = को___

18. भूत
-(त्) = भू__

19. बंद
-(द्)= बन ____

20. कर्म
-(म्)= कर _____

Advanced Phoneme Levels

LEVEL J (Substitution) "बोलो बाल । अब बोलो बाल पर आ की जगह**,** ओ कहो।**"** समीक्षा: अगर हम बाल बोलते हैं, पर आ की बजाय, हम ओ कहते हैं, तो हम बोल कहेंगे। बाल-बोल, ओके? एक और कोशिश करें

21. बाल
आ→ ओ = बोल____

22. मेल
ए→आ = माल ___

23. कौन
औ →इ = किन___

24. दम
अ → आम = दाम ___

25. काम
आम→ अ = कम ___

LEVEL K1 (Deletion): "बोलो प्यार। अब बोलो प्यार पर य् मत बोलो।**"** समीक्षा: अगर हम प्यार बोलते हैं, य् बोलने के बिना, हम पार कहेंगे प्यार -पार ओके?

26. प्यार
-(य्)→ पार___

27. क्रिया
-(र्)→ किया___

28. श्लोक
-(ल्)→ शोक____

29. क्रम
-(र्) → कम___

30. प्यास
-(य्)→ पास____

LEVEL L (Substitution) **"**बोलो काट । अब बोलो काट पर ट की जगह**,** म् बोलो।**"** समीक्षा: अगर हम काट बोलते हैं, पर न की बजाय, हम म् कहते हैं, तो हम काम कहेंगे। काट -काम। ओके? एक और कोशिश करें।

31. काट
ट्→म् = काम ___

32. मन
न्→त् = मत ___

33. बीत
त् →स् → बीस___

33. कब
ब् →म् = कम ____

35. नाम
म्→क् = नाक ____

LEVEL M

M1 (Deletion) "बोलो बाँट। अब बोलो बाँट पर न् मत बोलो।**"** समीक्षा: अगर हम बाँट बोलते हैं, न् बोलने के बिना, हम बाट कहेंगे बाँट - बाट। ओके? एक और कोशिश करें

36. बंद
-(न्)→ बद ____

37. कंप
-(म्)→ कप ____

38. मस्त
-(स्) → मत ___

39. नर्स

40. तर्क

Level J
Correct / Automatic

C:__/5 A: ____/5

Level K1
Correct / Automatic

C:__/5 A: _____/5

Level L
Correct / Automatic

C:__/5 A: _____/5

Level M1
Correct / Automatic

C:__/5 A: _____/5

Advanced Phoneme Total:

C:_____/20 A: _____/20

-(र्)→ नस ____ -(र्)→ तक ____

Appendix B

Word Reading Efficiency Probe-Hindi (WREP-H)

Practice

आठ

दम

भाई

तेल

मटका

बरसात

कड़वा

यात्रा

Name: _____ **ID:**_____ **Age:** _____ **Class:** _____

माँ	टांग	भूखा	प्राकृतिक
एक	वस्तु	रुमाल	हुड़दंग
कर	शीर्ष	लड़खड़ाना	वज्रासन
बस	कहानी	परिवार	भरतनाट्यम
भय	सुई	हमदर्द	परिश्रम
दे	सूर्य	भयानक	मंत्रिमंडल
तो	नाच	घबराहट	वनस्पति
हो	तंबू	कृपया	मूर्तिकृत
की	स्पष्ट	कार्रवाई	षट्कोण
घी	कुर्सी	संबोधित	व्यवसाय
सेब	खोलो	कर्मचारी	हस्तनिर्माण
बाल	फ़िक्र	चिट्ठी	सर्वोच्चतम
तू	उछल	पत्रकार	रचनात्मक
नाच	दूध	संतोष	हस्ताक्षर
खा	बदल	खुशनसीब	पुरस्कार
हाथ	मूर्ती	संकल्प	अत्यधिक
काल	बंदर	अस्पष्ट	चंद्रबिंदु
तंग	पसंद	नास्तिक	ज्ञानसागर
नोक	परिचय	मूर्तिकार	गणराज्य
बास	प्रवास	व्यवस्था	धूम्रपान
लाल	दिनांक	मुसाफ़िर	स्पष्टीकरण
राज	भिखारी	आकर्षण	मार्गदर्शन
धूप	कुत्ता	महत्वपूर्ण	उत्कृष्टता
पैसे	सुंदर	मूल्यवान	वर्जित
नाक	चंदा	संप्रदाय	पितृसत्ता
प्रेम	स्वभाव	जबरदस्ती	पूंजीवाद