The Assessment of Emergent and Early Literacy Skills in the Akshara languages

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Abstract

The assessment of language and literacy skills in the akshara languages pose distinct challenges that are related to the specificities of the orthography, contextual variability and population diversity, which in turn tend to be compounded by generally low levels of achievement. In this chapter, we discuss an assessment framework targeted at capturing children's language and literacy learning in the early years. Using assessments for Hindi and Kannada as cross-linguistic illustrative examples, we bring focus on psychometric rigor, test utility for research purposes versus practice, appropriateness of test adaptations, and challenges related to monitoring growth in language and literacy skills over time. A key consideration is the urgent need for sensitivity of assessments to contextual factors including demographic diversity (e.g. socioeconomic factors, home language(s), and access to literacy resources), classroom practices, and orthography.

Introduction

Assessments are used to address a wide range of important questions. Is the second grader reading at grade level? Is the literacy program effective? Is the child able to read with comprehension? To effectively address questions such as these we suggest that there are at least three key issues to consider. First, characteristics of the language of literacy instruction are important because they define the pace of literacy acquisition and the skill-set that is useful to assess. Unique characteristics may be related to the spoken and written forms of the language (e.g., its morphology, syntax, and orthography-specific features). Second, the socio-cultural, socio-economic, and socio-linguistic status of young learners is central because they each determine the opportunities for learning and may explain performance on an assessment. In addition, children's performance on a given task may be reflective of the extent of exposure to

the culture of testing and familiarity with assessment formats rather than simply the skills that underpin literacy. Finally, assessors must consider the psychometric appropriateness of individual tools by which skills and areas of knowledge are assessed especially given the varied purposes that motivate assessment. Since contextual realities are such that many young learners may be deprived of opportunities to encounter, learn, and consolidate their emergent and early literacy skills, it is clear that a key consideration in use of testing tools is the fairness and sensitivity of assessments to demographic diversity (e.g. socioeconomic level, home language(s)), socio-contextual factors (e.g., access to literacy resources) and classroom practices (e.g., the task demand of various types of reading comprehension questions). In this chapter, we discuss these three concerns to address the assessment of emergent and early literacy skills in the akshara languages.

The chapter is structured around an assessment framework that gives weight to skills and knowledge linked to not just literacy but also the foundations of literacy in broader language skills. This framework lends itself to a component by component analysis within the written language and spoken language domains and across literacy development (Nag, 2017a); the framework also fits well with our theoretical account of literacy acquisition as crucially dependent on language. The next sections introduce the akshara writing system and the foundational skills that contribute to literacy acquisition followed by the outlining of an assessment framework. The ensuing sections focus on issues related to psychometric rigor, test utility for research versus practice, appropriateness of test adaptations, and challenges related to monitoring growth in language and literacy skills over time. A key consideration is the sensitivity of assessments to demographic diversity. We conclude with suggested guidelines for test development for research and practice. Throughout, we use assessments for Hindi and

Kannada—belonging to the Indo-Aryan and Dravidian families respectively—as cross-linguistic illustrative examples.

The Orthography, Phonology and Morpho-syntax of Akshara Languages

Our writing is focused on the symbol block called *akshara*. The akshara orthographies are most commonly termed an alphasyllabary (Salomon, 2000), with other names being abugida (Daniels, 2000) and the akshara writing system (Nag, 2017b). Akshara are versatile units and run into several hundred; hence, these orthographies are also labeled 'extensive' (Nag, 2007). Individual phonemes in the akshara writing system can have either a primary or a secondary form as the written representation based on position in a word and other orthotactic rules. Akshara can be simple or complex depending on the amount of encoded phonological information. This is because the akshara unit can represent an open syllable, the body and coda of a closed syllable and a phoneme. In some akshara orthographies (but not all), the akshara unit also encodes information from across the syllable boundary. Transparency of the akshara orthography further contributes to what will be easier to read and spell. A distinct feature of these orthographies is that the phonemic units or markers can be visually decomposed for the majority of the akshara with some exceptions, e.g. the high frequency inherent vowel /a/ (also called the 'schwa') and the low frequency conjoint consonants like the /ksha/ and /jna/ in Hindi (similar clusters not found in Kannada). These exceptions introduce some opacity in an otherwise transparent system of phonology-to-orthography mapping. Additionally, akshara tend to behave differently when represented as a singleton akshara versus when embedded within a word. In the context of bi-syllabic and multi-syllabic words, the post-vocalic consonant visually maps on to the next akshara. This process known as re-syllabification accounts for a wide range of akshara for consonant clusters and can contribute to an additional layer of opacity because the

schwa suppression in the consonant akshara is left unmarked, or the representation is across the syllable boundary, or there are mismatched phonology-orthography mappings (e.g., the first two are common in Hindi and the second two in Kannada). As with all writing systems, the mastery of these ambiguities in sound-to-symbol linkages clearly takes longer than units that are transparent (reading: Nag, 2014a; Purushothama, 1990; Vaid & Gupta, 2002; spelling: Nag, Treiman & Snowling, 2010). At the printed level, the visual complexity of the akshara is attributable to the non-linear representation of markers within the symbol block. Typically, non-linearity results from the placement of vowel or consonant markers to the left, top, or bottom of a consonant. Visual complexity may also stem from the density of visual features in the akshara block, and whether these are disconnected from other segments in the symbol block (Kannada akshara: Nag, Snowling, Quinlan & Hulme, 2014a). Taken together, these multiple parameters of phonological and visual complexity of the akshara have implications for learning to read and spell well past primary school (for review see Nag, 2017b; Vagh, Nag & Banerji, 2017). Added to this, when there is limited availability of children's literature or the occurrence of such complexities is low in child-directed print, it too, presents an additional challenge to the literacy acquisition task.

Prior to learning about the written language, there are the foundation skills related to spoken language. At the level of single words, while all languages allow for word formation based on permitted combinations called morphotactics, languages differ in the range and variety of word formation processes allowed. One important process of word formation is to modify words by the addition of inflections where the new word carries new grammatical information (e.g., the plural marker –s added to words like mat, hat and bat and the past tense marker –ed to words like sway, stray and spray). The akshara-based languages vary in the complexity of

inflection use but are typically never as sparse as English. Among them, the Dravidian languages (Kannada, Malayalam, Tamil and Telugu) are strongly agglutinating in nature with a high density of inflections suffixed to a word (for reviews see Krishnamurti, 2003). In contrast, Hindi would be considered to be morphologically less dense. An example of grammatical information for the noun 'at night' in Kannada and Hindi is *raatrialli* (suffix *-alli*) and *raat ko* (postposition /*ko*/). Apart from inflectional morphology, languages also have the facility to generate new words through derivation. Here, the new word form can either belong to a different part-of-speech (e.g., magic, magician, magical in English; *pratham + ik = praathamik* in Hindi and *prathama + ika = praathamika* in Kannada, primary, here the suffix *–ik/-ika* forms adjectives from nouns) or remain in the word class but with a change of meaning (Hindi: *khet* and *khet+ ii*, farm and agriculture; *chamak* and *chamakdaar,* bright and sparkling). Examples of prefixes that change word meaning in Hindi and Kannada are *bahu-* (multi-) as in *bahu-bhaashii and bahu-bhaashika* (multi-lingual), and *mano-* (of the heart and mind) as in *mano-vigyaan* and *mano-vigyaana* (psych-ology, the science of heart and mind). Another example of word formation is compounding (e.g., moonlight, daydream and nevertheless) which is also common in most akshara-based languages. Finally, there are words formed through reduplication (Hindi: *chalte chalte,* Kannada: *hoogutta hoogutta,* while walking;) and echo-compounding (Hindi: *khaana-vaana,* Kannada: *thindi-gindi,* food and related matters); both these linguistic phenomena are found in several akshara-based languages and are considered as defining features of the South Asian linguistic landscape.

At the sentential level the ordering of words is rule-governed. Both Hindi and Kannada are Subject-Object-Verb (SOV) languages, although there is a relatively free word order. Given the agglutinating nature of akshara languages, morpho-syntactic knowledge gains prominence in

language development. There is a small body of evidence to suggest that knowledge of inflectional morphology, derivational morphology, morpho-syntax and vocabulary are important not just for language comprehension but also reading comprehension (e.g. Nag & Snowling, 2011a; Vagh & Sharma, in press).

While the unique and distinct grapho-phonological and morpho-syntactic specificities of the akshara language define skills and knowledge that must be considered when planning an assessment, it is important to note that the attainments in each of these areas are firmly constrained by the context. Examples of contextual variability include bilingualism, multi-lingualism, diglossia, and dialect varieties of the school language. Depressed socioeconomic conditions, low access to books at home and at school and in general low resources and low family and community engagement in literacy activities signal potential disadvantage on a literacy-related assessment task. Turning to instruction in the classroom, children's learning histories may differ in several ways. Instruction may differ in the extent to which the textbook is privileged over a range of other language sources and the mechanics of reading and writing is privileged over comprehension and making inferences. There is growing evidence to show that these multiple factors individually and cumulatively contribute to low levels of achievement in the akshara languages (e.g., India: Bhattacharjea, Wadhwa & Banerji, 2011; Sharma, 1997; Singh, 2014; Vagh, 2009; Nepal: Pinto, 2010; Sri Lanka: Aturupane, Glewwe & Wisniewski, 2013; for multi-country review see Nag, Snowling & Asfaha, 2016).

Some ensuing implications of ecological and psycholinguistic constraints for the assessment of language and literacy skills are the high prevalence of zero scores and an inability to capture individual differences at the bottom of the attainments spectrum. Floor effects mask children's true abilities when for instance bi- or multi-linguistic knowledge bases are

unaccounted for or failure is linked to testing format rather than skill, proficiency, or knowledge. Moreover, while floor effects or low levels of attainment arising from classroom instructional practices provide information about the performance of a school or education system, they become inaccurate representations of individual abilities. Similar constraints also function at the high end of the attainments spectrum; assessments may turn out to be too easy and register ceiling effects because individual differences in children's mature skills and knowledge bases are not captured. In summary, patterns of attainments are driven by the learner's experiential ecology of home, community and school and this cannot be easily disentangled from the distinct learning demands posed by the specificities of a language or orthography.

What Early Skills Contribute to Literacy Acquisition in the Akshara Languages?

Oral language proficiency. Word knowledge and the grammatical rules of the spoken language help children effectively communicate and successfully comprehend the written word. The concurrent and predictive role of language proficiency to literacy development, well into middle school, is widely acknowledged for both first and second language learners (Kannada: Nag & Snowling, 2012; Gujarati: Patel, 2004; Hindi: Vagh & Sharma, in press). Aspects of oral language that have been shown to contribute to literacy development in the akshara languages include vocabulary knowledge, syntactic knowledge (the grammar rules that determine word order and sentential structure to communicate the message) and inflection knowledge (markers in words to index different grammatical information including case, tense, person, number, and gender). Given the multiple languages spoken in many communities, it becomes imperative to better understand the variability in children's skills in the home, community and school languages to better address their literacy and broader academic needs. But more importantly,

low proficiency in oral language implies a limited supply of linguistic cues to resolve the ambiguities in reading and writing that the child will inevitably encounter.

Phonological processing skills. Phonological processing refers to the ability to identify and manipulate sound units in a language. This is an important skill for decoding words in the akshara languages (for review see Nag, 2017b). Aligning with the nature of the akshara orthography, phonemic and syllabic awareness skills appear to be salient in the reading acquisition process well into middle school. While syllable processing has consistently emerged as a predictor of individual differences in reading attainments, the role of phonemic awareness remains somewhat unclear. Fluent readers tend to demonstrate increased proficiency in phonemic processing skills and these skills tend to correspond to the acquisition of complex akshara (Kannada: Nag & Snowling, 2012). But there is also research to suggest that despite increasing proficiency in phonemic level skills across the primary grades, the influence of phonological processing on decoding appears to be subsumed by syllabic level skills (Kannada and Telugu: Nakamura, Joshi & Ji, n.d.). It is unclear whether differences in these two studies can be attributable to different reading outcomes, i.e. rate and accuracy of reading words in connected text (Nag & Snowling, 2012) versus the accurate decoding of words in list form (Nakamura, Joshi & Ji, n.d.) or to differences in the specificity with which phonological awareness skills have been operationalized. While Nag & Snowling (2012) sampled a wider range of phonological manipulations (a beginning and final deletion task and a substitution task at the phonemic and syllabic levels), Nakumura et al. (n.d.) employed a single task, the deletion of the final syllable and phoneme. Moreover, the absence of unique contributions of phonemic level skills to reading accuracy in a multiple regression model as shown in Nakamura et al. (n.d.) does not indicate that the skill does not matter to reading acquisition. It is entirely possible that

its influence could be indirect or mediated. Although the mechanisms of influence of different levels of phonological processing are as yet unclear, it appears that analytical skills that allow readers to access the phonological units in words and akshara accrue benefits for accurate and efficient reading and spelling. For the purposes of assessment, insights into the child's mastery with phonological processing at each level can be expected to provide useful information.

Concepts about Print. Exposure to print helps children develop rudimentary understandings about the uses and functions of print and how the spoken and written word are connected (Teale & Sulzby, 1986). This exposure may be through experiences that are either direct (e.g., reading labels and flashcards, shared storybook reading) or indirect (e.g., watching others engage with print when reading the newspaper and filling out printed forms). Children with greater conceptual understandings about print tend to demonstrate better proficiency in listening and reading comprehension (Hindi: Vagh & Sharma, in press). Children's concepts about print provide a useful index of early and frequent exposure to print (Nepal: Pinto, 2010), which arguably is critical when we consider that the majority of children learning to read and write in the akshara languages may come from home and community environments characterized by low print or low literacy engagement with the purposes and functions of literacy. The language of print exposure is an area that is yet to receive systematic research attention, though surveys with low-income households suggest that availability of child-oriented print and parent engagement with children in print-related activities is extremely low (India: Bhattacharjea, Wadhwa & Banerji, 2011; Nag et al., 2014; Vagh, 2009; Nepal: Pinto, 2010). In parallel, surveys with middle income households suggest that print in some homes is multi-scriptal while in others it is focused on either the dominant language of the region or the minority language of the home (India: Kalia, 2009; Nag, Snowling & Mirkovic, 2018). One implication for assessment is the

need to contextualize test items as closely as possible to children's experiences. For instance, across several low-income communities in India, the access and availability to child-directed reading materials was exceptionally low. The wall calendar (Bhattacharjea, Wadhwa & Banerji, 2011; Nag et al., 2014) and religious texts (Vagh, 2009) were the most frequently reported print materials in the household. These commonly reported sources of print exposure provide potential contextualized materials for assessment of conceptual knowledge about print.

Orthographic knowledge. Orthographic knowledge, the ability to represent spoken language in written form is an important skill for literacy acquisition in all written languages. Learning to decode and spell begins with the learning of the basic sound-symbol units. For the akshara languages these are the vowels (V), consonants with the inherent vowel (Ca) and the consonants with ligatured vowels (CV). While these akshara tend to be easily learned, the acquisition of the complex akshara (CCV, CCCV) extends well into fourth grade (Nag, 2007). Emergent akshara recognition is a correlate of phonological skills (Hindi: Vagh & Sharma, in press; Kannada: Nag et al. 2014). In later grades, increasing akshara knowledge is associated with better visual word recognition, speed of processing as assessed on rapid automatised naming tasks, visual memory, vocabulary and spelling (Kannada: Nag & Snowling, 2011b, 2012; Nag, Treiman & Snowling, 2010; Purushottama, 2011; Siddhiah et al, 2016; Hindi: Gupta, 2004; Vagh & Sharma, in press). Visual complexity attributable to the visual features of the akshara and phonological complexity attributable to the number of sound units encoded in the akshara tend to contribute to the slower acquisition of akshara knowledge. Arguably then, children who have more exposure to print and greater exposure to the spoken language will come to the task of literacy learning with more cognitive reserves; they will show greater sensitivity to visual features in the symbol set and greater ease with manipulating the sounds in the language.

Emergent writing .Emergent writing refers to the early explorations around print in the form of markings, drawings, scribbles, symbol-like forms, invented spellings and conventional spellings. These word productions represent children's understanding that writing conveys meaning and that writing is a form of communication. Increased opportunities to engage in emergent writing activities help to refine children's understandings of how print encodes and conveys meaning. Opportunities to support emergent writing differ widely both at the level of instruction and apprenticeship as well as access to and type of writing tools; from this perspective the experiences for emergent writing are no different from the experiences for drawing in various contexts (for drawing, see Jolley, 2010). Thus, children's markings or scribbles evolve developmentally over time culminating in the acquisition of conventional spelling; there is also a growing body of evidence to show that emergent writing is far from random but reflective of patterns in the language and orthography and a form of statistical learning (Treiman & Kestler, 2013). Children's learning environments that value all forms of early explorations with print tend to be conducive to the early emergence of writing abilities and children who demonstrate early engagement in emergent forms of writing tend to demonstrate increased performance in listening and reading comprehension in the primary school years (Vagh & Sharma, in print).

In summary, a variety of emergent and early skills contribute to literacy acquisition. The array of skills relate to the linguistic system (lexicon, syntax and phonology), the mechanics of writing (transcription) and the orthographic system (symbols and mapping principles). However, these skills and knowledge are not discrete operators. On the contrary, successful reading and writing depend on the interplay between and interdependence amongst these skills and knowledge. Poor readers in one domain may show difficulties in several other domains, but also

strength in one domain can mitigate the losses associated with deficits in another domain. Hence, there is clearly a case for using assessments to develop *a profile of strengths and difficulties* in foundation skills and from this to make a judgment about children's learning.

An Assessment Framework

Assessments evaluate a learner's ability in some measurable way and provide a profile of relative strengths across component skills and knowledge bases. Assessments typically represent a small sampling of a domain of interest and help us to draw inferences about an individual or a group's level of ability or skill in the larger domain. For example, a picture naming task with a limited set of items is used as an estimate of a child's vocabulary repertoire while performance on a listening comprehension task serves to index broader language proficiency.

Well-designed assessments of language and literacy must have content (or test items) that account for language- and orthography-specific characteristics and thereby provide a representative sample of the underlying domain. In parallel, the format and content of assessments must be sensitive to local and contextual factors such as children's home and community language. In the context of diglossia, for example, ways to demonstrate sensitivity could be to avoid words and sentences that are particularly vulnerable to variation between the ordinary spoken variety and the more complex formal variety. But such selectivity may lead to a narrow and thus irrelevant test in which case the preferred way to show sensitivity would be through explicitly worked out scoring schemes and interpretation guidelines when diglossia effects are noted. Also important to note is whether classroom instructional practices have acquainted children with certain formats of assessments. For instance, absence of creative writing opportunities restricts the legitimacy of narrative writing assessments; similarly, when the sole focus is on verbatim responses from supplied texts, then it is difficult for children to

respond to inferential questions. In other words, unfamiliar test formats not only underestimate children's 'true' ability but also bring into question the validity of the assessments. Sensitivity in test construction and test use reduces the chances of unfair penalties on test performance. Hence, integral to our framework of assessment is the reporting of the test development process and the psychometric properties related to the operationalizing of a construct. Psychometric evaluations help us to understand whether an assessment provides a reliable profile of children's skills and knowledge and whether test inferences are defensible and valid. They also indicate adequacy for use with specific populations of interest. Classical test theory, generalizability theory, and item response theory are the dominant approaches to evaluating the psychometric properties of an assessment. The use of the latter two approaches, despite their many merits, is however extremely limited in assessments both in the akshara languages as well as internationally (Nag, 2017a). Our intent in this chapter is not to compare and contrast these approaches but rather to highlight the need for rigor in evaluating and in the reporting of an assessment's technical quality, including the validity associated with the interpretation of test scores and their use.

In keeping with the psychometric approach, reporting about individual tests should at the least include information about item level analysis (item difficulty and where appropriate differential item functioning), consistency in measurement (e.g., internal consistency or test-retest consistency from a classical test theory perspective), stringent assessments of interrater reliability (e.g., Cohen's Kappa estimates that accounts for chance versus mere estimates of correlations between raters) and validation evidence. Validity is an accumulation of evidence based on but not restricted to the relevance and representativeness of test content and concurrent and predictive information as support for specific test score interpretation (more below). A recent review of assessment tools for emergent and early literacy found transparent reporting of

these parameters to be poor in the few akshara languages in which tools are currently available namely Bengali, Gujarati, Hindi, Kannada, Malayalam, Odia, Tamil, Telugu, Thai, and Sinhala (Nag, 2017a).

A fundamental issue related to the validity of assessments is the intended purpose of assessment. Teachers, other practitioners, researchers and policy makers tend to use assessments for varied purposes. For instance, practitioners are likely to use assessments for summative, formative, or diagnostic reasons, whereas researchers may seek to understand the extent of variability in specific skills or knowledge and their concurrent or predictive role in relation to specific language or literacy outcomes. In contrast, policy makers may want to monitor and evaluate entire school systems. While there is overlap in the uses of tests for teaching, research and policy making, the larger point is that these intended purposes of assessments have implications for test design, administration, test evaluation, and subsequent reporting of scores. While some assessments may be suitable for more than a single purpose, it is often the case that assessments developed for a specific use are not appropriate for alternative uses. For instance, an assessment developed to evaluate group level performance may neither be specific nor sensitive enough for use as a diagnostic tool or to make pedagogical decisions about individual students. On the other hand, an assessment on which a substantial number of children fail or succeed, i.e. one which captures little variability may be of little value for research purposes but still provide useful information to educators and policy makers. Assessments that do not capture variability in performance prohibit the examination of factors associated with individual differences and/or pathways of influence of early skills on later development. However, assessments on which most children succeed or fail indicate the presence or absence of mastery and allow practitioners and policy makers to understand the status of learning for a group and in turn the effectiveness of a

program. In the ensuing sections, our discussion focuses on assessments from a research standpoint. Assessments at scale to evaluate extensive school systems, clinical assessments for diagnostic purposes, and assessments by teachers to guide and inform classroom practice are other important purposes of testing, but these are beyond the scope of the current chapter.

Taken together, our assessment framework for language and literacy acquisition has a strong psychometric perspective and accounts for the specificities of the orthography and the psycholinguistic characteristics of the language such that the sampled skill set is critical to concurrent associations with and predictive of future literacy outcomes. This framework, drawing from research in the akshara languages and mindful of contextual constraints, helps determine the domain-specific skills to be assessed and has the potential to enhance teaching-learning processes and in turn inform assessment design for further research. Current research in the akshara languages, as discussed, suggests that the skills and knowledge associated with reading comprehension and writing ability, the litmus tests of literacy acquisition, are language proficiency and grasp of its morphology and syntax, concepts about print and emergent writing, phonological processing skills at the syllable and phoneme level, the acquisition of simple and complex akshara, reading accuracy and fluency, spelling ability and narrative generation skills. In the next few sections we discuss some of the ways these skills and knowledge are assessed and highlight contextual as well psycho-linguistic challenges associated with their measurement. While a discussion of every assessment format is beyond the scope of this chapter, we focus on some of the most common formats including assessments from our work in Hindi (Vagh, 2009; Vagh & Sharma, in press) and Kannada (e.g., Nag, 2007; 2008; Nag, et al. 2014a, 2014b, 2018) to illustrate and highlight some promising assessments for research and practice.

Oral language. A wide spectrum of measures is available to assess oral language proficiency. This section will cover a selection of oral language tasks at the word level (picture-vocabulary, word definition) and at the sentence level (sentence repetition and listening comprehension). These assessments, while broadly indicative of children's linguistic knowledge, vary substantially in the specific area of oral language. As a consequence, the ensuing inferences from each task are either limited to or inclusive of children's lexical, morphological and syntactic knowledge.

Picture-Vocabulary Tasks. Vocabulary refers to the repertoire of words that the child understands (receptive vocabulary) and the words in a child's lexicon that she or he can actively use in oral or written communication (expressive vocabulary). Typically, receptive vocabularies tend to be larger than expressive vocabularies. The former may be assessed via picture identification tasks (identifying the picture that matches the target word from multiple choices) and the latter via picture naming tasks (providing a label for the target picture). Picture identification and picture naming tasks are the most commonly used assessments of oral language ability (for international trends see Nag, 2017a). This is perhaps because picture-vocabulary tasks are relatively easy to administer and score compared to other oral language measures. However, picture-vocabulary measures provide only a slice of oral language restricted primarily to those nouns and verbs that can be visually represented in a simple and clear illustration. In addition, a test of even thirty to fifty items provides only a small sampling of a very extensive domain bringing into question the representativeness of the assessment. Another considerable challenge is assessing children growing up in bilingual or multilingual contexts. Restricting assessments to just the language of instruction not only underestimates children's conceptual knowledge base but also undermines effective strategies to foster word knowledge

(Amritavalli, 2007; Snow, 2017). An ever present concern with picture-vocabulary tests is whether oral language assessments are biased against speakers of non-school languages or dialects.

Two separate longitudinal studies of emergent and early Hindi literacy skills in contexts of significant diglossia and dialect varieties illustrate innovations to avoid such a bias (Allahabad city in North India: Vagh & Sharma, in press; Mumbai city in West India: Vagh, 2009). In these studies credit was given for vernacular and non-standard variants of picture labels prevalent in children's home and community language environments. For instance, 30% of children provided a vernacular variant such as /chova/ for the target label /keel/ (nail) and 9% provided variants such as /fulva/ for the word /fool/ (flower). Such contextualizing of the scoring scheme to the language(s) of the region permits for a more accurate estimate of children's lexical knowledge although it then limits generalizability to contexts where other variants are prevalent. Despite this, we recommend that in line with the general principal of test fairness there should be explicit guidance notes for responses in non-standard language.

Other design related challenges for picture-vocabulary tasks are the selection of distractor items and the clarity of the pictures chosen to represent the target word and accompanying distractors. Phonologically similar sounding or semantically similar distractor items can help increase item difficulty but may in parallel cause confusion, leading to inconsistencies in measurement. Hence, pilot tests and item analyses sensitive to these issues are imperative. In the absence of word frequency lists or normative data, the selection of highly discriminating target words, particularly for longitudinal research in the akshara language is another considerable challenge. Rather than intuitively compiled graded lists, word frequency based on a corpus of children's literature can better inform the item selection process for vocabulary measures.

Similarly, rather than judging age of acquisition amongst monolingual speakers, developing norms representative of multilingual contexts can help provide meaningful age- and grade-appropriate benchmarks.

Word Definition Tasks. Tasks that require children to define select words are a measure of vocabulary depth in contrast to vocabulary breadth that is captured by picture-vocabulary tasks. Word definition tasks require children to be able to deduce the salient properties of the target word and present the information in a format that resonates with school-like tasks. Unlike the other assessments of oral language, definitional ability is regarded as a formal, decontextualized language skill as it lacks a shared temporal and physical context between narrator and listener (Kurland & Snow, 1997; Snow, 1990). The decontextualized nature of the task and the requirement for coherent production at the sentential level increases the cognitive and linguistic demand on this task compared to the picture-naming task. Coding schemes help evaluate children's responses and herein lies the challenge associated with this task because examiners have to rate oral responses in real-time or be accurate in recording running responses to be coded off-line at a later time. Thus, establishing inter-rater reliability in scoring children's responses is essential. Box 1 presents two coding schemes from three studies (Kannada and Hindi: Nag, 2008, 2014b; Hindi: Vagh & Sharma, in press).

There are two approaches to item selection for the word definition task. In the first approach, words are typically high frequency because the goal is defined as an assessment of definitional ability, which can be hampered if the target word is not well-known or understood by the child. Examples of high frequency words are mouse (/chuha/), cat (/billi/) and drum (/dholak/) for Hindi learners in Grade 1-2 (from Vagh & Sharma, in press). A second approach to item selection is to cover a wide range of early and late acquired words. Examples of late

acquired words are *garajna* and *gudugitu* (to roar, thunder); *parinaam* and *parinaama* (result) in Hindi and Kannada respectively, for use in primary and middle school (Nag, 2008; Nag, 2014b). The versatility of the graded task across age bands and proficiency levels makes such tests particularly attractive in longitudinal research programs.

Most concerns outlined in the section above on picture-vocabulary tasks remain relevant with word definition tasks. To mitigate the influence of dialects/diglossia, a pictorial representation of the target word can be used (Vagh & Sharma, in press), and the coding scheme should not penalize for productions that reflect diglossia or dialect effects (Nag, 2008, 2014b; Vagh & Sharma, in press). Another variation to the assessment format worth consideration is to offer children the option to respond in their home languages in addition to the instructional language in order to arrive at a more comprehensive profile of language proficiency. However, to the best of our knowledge, such an innovation in the design of word definition tasks is as yet untested with akshara languages.

Sentence repetition tasks are an innovative way to assess language processing mechanisms where children repeat verbatim a sentence spoken aloud by the examiner; a relatively simple and straightforward task. Primarily used in clinical settings and contexts of second language learning, the task presents a promising approach for assessing oral language because of its wide sampling of the language domain. Importantly, "the entire language system is recruited during sentence repetition while being sensitive to language-specific characteristics" (p. 19, Nag, et al., 2018). Areas that may be captured through the task include children's knowledge of content-function words, preferred word order (e.g. the subject-verb-object order or the subject-object-verb order) and inflections in the language.

Most sentence repetition tasks cover a range of sentence structures and use a word by word coding scheme. A refinement to this word-level scheme to suit the morphologically rich and agglutinating akshara languages is to score for word-internal details. This includes assessment of accuracy in children's production of the word stem and all inflections that modify the meaning of the word to capture the intended event semantics such as who-did-what-to-whom. Assessment of inflections brings focus on morpho-syntax including children's assessment of case markers, person-number-gender markers (also called PNG markers), tense markers and markers for passive structures. A further area of interest is whether children's production retain the coherence of the 'message' in the just heard sentence or whether there is a collapse in meaning. A summary of such a scheme is given in Box 2, for a first application of this scheme see Nag et al., 2018.

As evident from the above description, while sentence repetition tasks are simple to administer and make low demands on testing time, their complexity is in the design of appropriate sentences and in the coding and analysis of errors. Sentence level factors that affect performance relate to word frequency, syntactical complexity (e.g. active and passive sentences), frequency of sentence type and plausibility of the events encoded in the sentence. In the field of bilingual and multilingual research as well as in second language teaching open questions remain about the challenges for non-native speakers and dialect speakers on the processing of grammatical and phonological systems. Arguably, tasks such as sentence repetition that allow a broad sampling of the underlying complexities of the language system may provide valuable new information.

Listening comprehension Tasks. Listening comprehension is the ability to extract meaning from spoken language in the form of a discourse, an oral narrative or an aural

presentation of an informational text. Listening comprehension tasks are particularly suitable for use with beginning and struggling readers and represent a dynamic approach to assessing oral language ability that is beyond the level of single word meanings and sentences. Multiple psycholinguistic skills underpin the ability to make meaning from spoken language. These include but are not limited to lexical knowledge, morphology, syntax, and ability to hold and process information in working memory.

Key issues for development and administration of listening comprehension assessments are choice of text–topic and its grade-appropriateness, and inter-rater reliability among examiners to account for the reading of the text and scoring of children's responses. A text that requires specialized knowledge (word and world knowledge) is likely to impose greater cognitive demands for meaning extraction than a text that is on a common or familiar topic. Deeply embedded in choice of topics for listening comprehension tasks is the possibility of undue bias against learners with limited opportunities for exposure to certain types of world knowledge. Similarly vocabulary, grammatical structure, length of text and number of events in the text that a child has to keep track of in order to comprehend the narrative are other parameters to consider. In addition, a substantial challenge specific to all akshara languages is the absence of information about word frequency or commonly upheld parameters for leveling texts.

The format of questions eliciting comprehension of just-heard material can be deployed in a multiple-choice format using written, verbal or pictorial options. Pictorial formats help reduce the cognitive load particularly for young learners and reduce rating errors in scoring oral responses in real-time. However, the challenges related to diglossia and bi- and multilingual contexts (as discussed above) persist. In addition, it is important to consider issues of accent and

pronunciation when examiners are not from the same language backgrounds as the assessed children. In summary, when developing and interpreting listening comprehension tasks it is vital to be sensitive to text properties such as topic and grade appropriateness and training of examiners in reading texts and scoring responses.

Phonological Processing Tasks. Phonological processing refers to the ability to isolate and manipulate the sounds of a language. The units of sound may be phonemes or syllables or the parsing of syllables into body and coda (or, if for languages like English, then into onset-rime). These skills are assessed in a variety of ways. For instance, and roughly in order of task demand and explicit display of phonological processing skill, the tasks cover blending of units, parsing or segmentation of units, identifying or generating rhyming words, identifying words that begin and end with the target sound, and substitution or deletion of the first, final or middle unit. Nonword repetition and decoding of nonwords are also often considered as broadly tapping the same underlying phonological domain as the processing tasks described above. Each of these task manipulations lend themselves to much experimental innovation in terms of item complexity and have allowed for teasing out challenges to learning to read in the akshara orthographies (e.g. Nag & Snowling, 2012).

Typically in research studies, one or a small selection of the above manipulations are used to index children's phonological awareness skills. This is understandable given that testing time is limited. However, there is a need for more research with comprehensive phonological processing batteries to critically examine whether the specificities of phonological skills assessed by individual manipulations are similar and whether the tasks are interchangeable. Another open question is whether the pathways of influence on reading development converge or differ when the skills have been elicited via different manipulations. It may turn out that multiple

manipulations across multiple levels of phonology are the best option for indexing a meaningful profile of children's phonological abilities. Such research will also be helpful in resolving inconsistencies across research studies and for better defining the role of phonological awareness skills in learning to read in the akshara languages.

Within a psychometric perspective, the reporting of inter-rater reliability and test reliability is important, especially where raters have to make on-line judgments about children's performance on a response by response basis. Our experience has been that training for phoneme level tasks requires more time and practice, and even though the akshara is not always a syllable representation, assessors may misunderstand syllable level tasks as demanding akshara-by-akshara manipulation. Inferences about phonological awareness have to be considered in light of the required manipulations (e.g., deletion versus substitution, syllable level task versus body-coda level task) and type of akshara (e.g. does the task demand manipulating sounds that map onto a segmental unit within the akshara or the whole akshara). Finally, as with all forms of oral language assessment, item selection has to be sensitive to the issue of diglossia, dialects, and second language learners because any of these can influence the enunciation of certain phonemes, placing some children at greater risk for poor performance (e.g., the use of 's' for 'sh' or 'r' for 'dh' in the regional dialects of Bihar in North India, and the dropping of the glottal /h/ in the regional dialects of Karnataka in South India).

Print-based Skills

Emergent Literacy Tasks. Concepts about print (CAP) refer to children's understanding of print conventions, its functions and uses. These include understandings of print directionality, of book orientation, that print conveys meaning, and that akshara strung together form words (e.g., see Table 1). One of the most widely used formats for assessment of emerging print

concepts is an adaptation of Marie Clay's work (1979) wherein the assessor whilst reading a book observes the child's book handling skills and asks questions such as "where should I begin reading?" Other assessment formats of emergent print concepts include asking children to identify environmental print (e.g., pointing to the start point of a word on a calendar or a prominent name board), straightening akshara flashcards to face the right way up, copy visually simple to more complex features in akshara and distinguishing (not naming) akshara from amongst other symbols. Assessments of print concepts tend to differ in the number and nature of items, which makes comparisons across research studies less straightforward. As with all domains covered in this chapter, decisions on number of items and particular sub-skills are likely to be driven by issues of testing time, especially when the task is administered along with a battery of other assessments.

Our current work with the Concept about Print task suggests that children tend to reach ceiling on many of the test items (e.g., front of the book, where to start reading) by the end of the first year of instruction when the school is average to well-functioning; yet the few items that continue to capture variation (e.g., mapping words with finger) show predictive validity and relate to children's later reading and listening comprehension attainments (Vagh & Sharma, in press). Concepts about print and other emergent literacy tasks are also remarkably responsive to time-bound shared book reading interventions especially in print starved classrooms (Nag et al., 2014b). Both of these preliminary trends suggest that there is a need for greater attention to the development of concepts about print and emergent literacy tasks in settings where akshara languages are in use. Finally, emergent literacy tasks have a unique motivational role in assessment situations in the early grades. We find that children are put at ease when

participating in a book reading task or a copying task; these tasks do not seem to produce the same anxiety as other school-like tasks, and this helps set a positive tone for the testing session.

Akshara Knowledge and Decoding Tasks. For understanding individual differences across the primary school years, the research is clear that assessments of symbol knowledge need to encompass the extensive variety of akshara ranging from simple to complex (see Nag, 2017b). Assessments that focus on the primary forms of vowels (V) and consonants with the inherent vowel (Ca), which form the primary set (the '*varnamala*' in Hindi or '*varnamale*' in Kannada) and consonant-vowel pairs (CV) (the *barakhadi* or *aksharamala* matrix) are important but limiting when children move beyond the basics. Typically, these akshara—V, Ca, CV and CCV—tend to be assessed as independent singleton symbols, but knowledge of akshara can also be assessed in the context of words either in list form or in connected text or nonwords. Assessments of akshara as isolated units versus assessments of akshara in the context of words tap different yet overlapping skills. The singleton approach and the reading of nonwords primarily targets akshara-phonology mappings while the reading of words is likely to also implicate lexical-semantic information including the use of contextual cues to decode unfamiliar words. All approaches – singleton akshara, nonwords, words in list form and words in connected text—are useful to assess as these allow researchers and practitioners to better identify sources of individual differences as well as children's areas of struggle. There is rich cross-linguistic evidence for the associations between symbol knowledge and literacy acquisition, particularly for beginning readers as well as for the ability to string akshara together to decode words in list form and connected text.

A significant challenge in developing assessments of symbol knowledge and decoding is the absence of frequency data for the different types of akshara and for words based on a corpus

of children's literature. Informal age of acquisition corpora and frequency analysis on small child-directed print corpora has been rare in the akshara literature, but where used, they have allowed for improved experimental manipulation (e.g., Nag, 2014a). An additional challenge is the absence of parameters for leveling reading materials that account for the linguistic properties of reading materials. See Box 3 for suggested guidelines. The absence of evidence-based benchmarks to evaluate text level or its readability hinders comparability and generalizations across research studies as researchers may have employed different parameters to develop reading passages, thus creating passage level confounds. A common way around this problem has been to align text to state-mandated curricula. However, a limitation of this approach, particularly for research, is the absence of information about the appropriateness of the pace of instruction mandated in state curricula.

Turning next to the assessment of decoding, two common indices employed in assessment are accuracy and fluency. While accuracy is the correct decoding of words (or nonwords), fluency relates to the ability to accurately decode at an appropriate pace. Fluency is taken as indicative of a level of automaticity with sounding and blending of the akshara in words and is seen as allowing cognitive resources to be devoted to meaning making rather than to decoding (e.g. Wijayathilake & Parrila, 2014).

An important issue in the area of assessment of the component skills of reading relates to the utility of reading fluency as an index of reading comprehension for the akshara languages. Are fluency and accuracy measures adequate indicators of reading comprehension? If yes, then what constitute appropriate fluency rates, i.e. grade-appropriate norms? Evidence, albeit limited, suggests that accuracy explains reading comprehension above and beyond fluency, and the joint contribution of accuracy and fluency (number of words read correctly in a minute) explains 58%

of the variation in reading comprehension, which although substantial still leaves a little less than half of the variation unexplained (Hindi: Vagh & Biancarosa, 2011). This suggests that for the akshara languages, while fluency and accuracy are important, by themselves they are not sufficient indices of good comprehension. An additional open question is the efficacy of words as a metric of fluency for strongly agglutinative languages such as Kannada, Malayalam, Tamil, and Telugu, where length of words are likely to be longer than for less agglutinative languages such as Hindi, while morpheme counts are similar.

Reading Comprehension Tasks. Reading comprehension is the ability to make meaning from the reading of a text. Reading for understanding is the result of a complex interplay between varied language-based and print-related skills including comprehension strategies such as looking back in the text or skimming ahead to enhance understanding. Reading comprehension, therefore, is a multi-dimensional construct. Reading for meaning takes on many forms and purposes, some of which are authentic practices carried out in the context of everyday life (e.g., following a recipe, reading a prescription), while others are more academic or school-based (e.g., reading to prepare a research paper, a book report, or to respond to questions based on the text). The skills demonstrated in the latter context is what assessments of reading comprehension often aspire to capture.

Comprehension assessments usually are in the form of responses to questions based on a passage that is either read aloud or silently by the child. Questions can elicit factual information, inferences or a synthesis of the read text. The assessment format can be multiple-choice in verbal or pictorial format, can elicit an oral or written answer, or can require children to provide a

retelling. Alternatively, comprehension assessments can require children to provide the missing word in a sentence or the missing words (every n^{th} word) in a passage referred to as Cloze tasks.

The selection of the reading material and the framing of questions is central to the development of reading comprehension assessments. As discussed for listening comprehension, the topic of the text, vocabulary demands (familiar versus rare words), syntactic complexity, and length of the text all have a bearing on the assessment of comprehension ability. See Box 3 for some recommendations on the reporting of text characteristics. Despite the simplicity of the assessment approach and strong alignment with classroom practices, evidence from other language contexts suggests that not all comprehension measures can be used interchangeably. Work with some popular assessments of English reading comprehension, for example, indicates that measures vary in the extent to which they capture decoding skills as against comprehension skills (Keenan, Betjemann & Olson, 2008; Nation & Snowling, 1997). We are not aware of similar direct comparisons between different formats of comprehension assessment in the akshara writing system. Linked to the issue of differences between measures of the same construct are the types of questions (e.g. factual, inferential) on a reading assessment and the format of capturing children's responses. The scoring of short answers in written format arguably includes an additional dimension of writing ability to the assessment of reading comprehension. Taken together, we wish to emphasize that assessments that go by the name of reading comprehension test are not all equivalent, and it is prudent to carefully analyze task demands. A final point is related to test administration and reliability: Adequate training of raters and the reporting of inter-rater reliability is essential irrespective of oral or written format of capturing children's responses to the comprehension questions.

Component Skills for Writing. Assessment of writing abilities for the youngest learners evaluate emergent writing skills such as scribbles, drawings or invented spelling in response to a prompt as well as their ability to transcribe akshara, typically V, C, and CV units. Prompts that elicit children's emergent writings, for instance may be a read-aloud of a short story that the child is asked to draw and write about (Vagh & Sharma, in press). Scoring schemes account for drawings, scribbles (non-symbols), independent akshara and strings of akshara. On the other hand, assessments of akshara formation capture children's sound-symbol mappings and transcription ability. The stringing of words together to spell words captures children's ability to accurately transcribe the sounds of the spoken language, which involves knowledge of the symbol set, i.e., sound-symbol mappings, rules of akshara formation, including the mechanics of forming individual akshara. Spelling, for the akshara languages, tends to be more challenging than reading, given the presence of a wide variety of complex akshara and mismatches in phonology-orthography mappings due to re-syllabification (e.g., Nag, 2014a, for examples in Tamil and Bengali see Nag & Narayanan and Sircar & Nag chapters respectively in this volume). Some akshara segments are also more prone to errors given the minor differences in visuo-spatial orientation (e.g., the ligatured short and long vowel sounds /i/ and /ii/ in Hindi) and orthographic-phonological sequences (e.g., the mis-sequence in CCV arrangements in Kannada with the V ligatured to the first rather than the final consonant in a cluster).

Dictation, a test format common in most classrooms and familiar to most children, enables the assessment of young learners' spelling attainments. By including words on a dictation list that capture diverse aspects of akshara-phonology mapping (e.g., Nag, 2014a; Nag et al, 2010), researchers and teachers can gain insights about the pace of their acquisition as well as individual children's strengths and gaps in knowledge. A further method of item selection is

items selected for their morphological complexity, such as manipulating the complexity of affixes in words and morphophonological changes due to sandhi rules, although we are not aware of systematic assessment of this aspect of spelling knowledge in any of the akshara based languages. However, a considerable challenge is the effects of diglossia on spelling development. For instance, speakers of regional dialects in Bihar tend to articulate and spell the Hindi word 'shaadi' (marriage) as 'saadi' as they tend not to distinguish between the phonemes 'sh' and 's'. An open question is how best to account for these factors so that items on an assessment are not unduly biased against speakers of certain regional dialects.

Writing skills can also be assessed in the context of sentences and narratives. Just as with reading words in connected texts, sentence construction and writing longer narratives, too, draw upon multiple psycho-linguistic processes beyond those implicated/involved in/elicited by word-level dictation. For young learners, pictorial prompts are useful to elicit a sentence, a description, or a narrative (e.g., picture prompt of a tiger with a cold clutching a handkerchief and warmly wrapped in a woolen scarf in Nag, 2013a). The assumption here is that visual cues help provide a context for an otherwise decontextualized task and help emergent and beginning writers to generate ideas and as a consequence generate longer writing samples. Often, the prompt is just a target word, a written or oral prompt, or the retelling of a familiar story or a set of words (such as connectors, inflections, transitional words or phrases) that children are asked to use in the construction of their narratives.

In addition to spelling, scoring rubrics for sentence construction and narrative writing assessments evaluate syntactical knowledge, narrative organization, event sequencing, the extent to which settings and characters are developed, use of punctuations and length of narratives,

along with at times a composite global indicator for writing ability. While these assessments are crucial to understand a desirable goal of literacy instruction, i.e. the ability to communicate in writing for varied purposes, two considerations are of critical importance. The first relates to handwriting and ambiguities in akshara formation. Poor handwriting can make it difficult for raters to decipher the written text, even if they are just singleton akshara. This makes the task of evaluating other attributes challenging. In addition, consistent application of the scoring rubric and agreements on the judgments of quality made by raters are considerable challenges. Hence, adequate training of raters and the reporting on inter-rater reliability for these measures is a minimum requirement.

The second issue relates to the limitations imposed by classroom instruction as writing ability is closely linked to opportunities offered within classrooms. Typically, in many akshara language classrooms, opportunities for creative writing and responding to open-ended writing prompts are typically uncommon. Children may perform poorly on measures that demand these skills simply due to lack of exposure. Hence, when assessing narrative writing abilities of children, two careful considerations have to be made. First, if there is little opportunity to practice narrative writing skills beyond the mechanics of writing and if there is little familiarity with the format of assessment, then researchers have to consider how best to leverage or introduce appropriate supports. Examples of support could be in the form of modeling and practicing specific task demands and providing adequate number of trial sessions. Second, threats to the validity of the desired inference have to be well thought out. For instance, if the interest is to understand pace of acquisition of certain skills (e.g., use of low frequency or late acquired inflections) then lack of opportunity or usage undermines the inference of interest. But on the other hand, questions about quality of instruction can be validly addressed by ensuring

that there is rich language input and an explicit inclusion of later acquired material in a selective and thoughtful manner (see chapter on pedagogy by Mathur & Nag; this volume).

Discussion

Measurement undergirds all evidence-based research. Robust measures that are designed to evaluate specific theoretical accounts advance our understanding of the literacy acquisition process. However, with the prevalence of a wide variety of researcher-developed tasks in the akshara languages, clarity with the test development process (e.g., selection of words, details about text features) becomes an imperative. Such transparency allows for greater comparability across research studies, promotes the generalizability of research evidence, and mitigates confounds attributable to text and other differences in linguistic material. In addition, seemingly similar measures of the same construct can be tapping into very different skills, which also makes it difficult to resolve inconsistencies across research studies in learning to read in the akshara languages, e.g. the role of phonemic awareness (Nag & Snowling, 2012; Nakamura, Joshi & Ji, n.d.); visuo-spatial arrangements (Nag, et al., 2014a; Vaid & Gupta, 2002; Winskel & Iemwanthong, 2010); and word complexity (e.g. Hussain et al. 2015; Kandhadai & Sproat, 2010). Hence, research that specifically addresses comparability across diverse assessment approaches is essential. In the absence of such work, the use of multiple approaches such as different test formats as for oral language measures and varied sets of manipulations as for phonological awareness tasks is preferable in arriving at a more comprehensive and accurate profile of the construct.

A constraint of literacy acquisition research in the akshara languages is the lack of norms for skills and knowledge such as vocabulary knowledge or oral reading fluency. The

implementation of norming studies that can provide data representative of a wide segment of the population is unquestionably fraught with many challenges given the diversity in children's home language and socio-economic backgrounds. However, norm-referenced assessments help us understand the distribution of skills within a population. Undoubtedly, within a context of low quality schooling, norms are likely to be depressed and will not be an accurate representation of young learners' 'true' potential. Even so, norms help provide realistic benchmarks for the current status of skills and knowledge in the population of interest and further the ability to compare and generalize across the evidence base.

To conclude we present below a summary of the issues and recommendations discussed in this chapter.

a. Diglossia is ubiquitous in the Indian context. Assessments of language and literacy need to be sensitive to variations attributable to regional dialects.

b. Assessments of print concepts and book handling skills show promise for children from print impoverished home and community environments.

c. Symbol knowledge assessments need to account for the diverse and extensive range of akshara beyond the basics of vowels, consonants with the inherent vowel, and consonant with vowel ligatures.

d. A review and analysis of a corpus of children's literature in the akshara languages is needed to understand frequency of occurrence of different akshara types and of words in print.

e. For measures based on reading passages such as listening comprehension and reading comprehension, comprehensive reporting of text features related to semantics and syntax will allow for better comparability across research studies.

f. Use of multiple formats in the assessment of skills will contribute to a more robust skill profile.

g. Current reporting about test development and test properties is poor. Integral to a robust framework of assessment is the reporting of the test development process and the psychometric properties related to the operationalizing of a construct.

In the current chapter, our attempt has been to present an assessment framework for language and literacy acquisition in the akshara languages that is grounded in the psycholinguistic properties of the language and contextual realities of children's linguistic and socio-economic backgrounds including considerations of schooling opportunities. A limitation is that we haven't discussed issues related to cross-linguistic comparisons, which given its breadth, is beyond the scope of this chapter. Demonstration of psychometric robustness is an imperative. With the evolving landscape in akshara research, test formats and approaches will undoubtedly gain in specificity. Considerations of test appropriateness in relation to the inference must though remain paramount.

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Box 1

Scoring Schemes for the Word Definition Task

Word Definition Task (Nag 2008, 2014b)

The child had to explain the meaning of words representing actions, qualities, states, time, place, and result.

- Score 3: Accurate definitions, synonyms, and translated equivalents
- Score 2: Sentential use of the word and descriptions
- Score 1: Repeating of the word with an inflection or using idiomatic phrases

Noun Definition Task (Vagh & Sharma, in press)

The child was asked the label of the pictured noun and was then asked to tell the examiner as much as they knew about it.

- Score 2: Target picture is described with four or more attributes relevant to the target noun including synonyms. E.g. A rat is an animal. A rat lives in a burrow. A rat has two ears. A rat runs fast
- Score 1: Target picture is described with one to three relevant attributes including synonyms or if the child relates a personal experience connected to the target word

Box 2

Scoring Scheme for the Sentence Repetition Task (Nag et al., 2018)

The child had to repeat verbatim a sentence spoken aloud by the examiner, which was scored at three levels:

Sentence level coding. Measured word-order accuracy and the length of the produced utterance. Word order was scored as correct when the exact order of the sentence elements was preserved and length was unchanged. When the repetition was a phrase or a shorter syntactically complete sentence that preserved event semantics, it was coded as a shortened utterance.

Word- and affix-level coding. Content words (nouns, verbs) with specific grammatical suffixes were scored for accuracy on the root, inflection, and the boundary (see online-only supplementary material for examples). Dialect variations for roots of words (e.g., dropping of the glottal fricative /h/ in word initial position; thus *aakidaLu* for *haakidaLu*) were accepted and all other substitutions were coded as a semantic change. Because inflections on the semantic substitutions and the boundary could be accurate for the new root–inflection pairing, semantic substitutions were included in the analyses of accuracy on boundaries and inflections.

Box 3

Relevant Text Features for the Akshara Languages: Suggested Guidelines

- Word frequency: Establishing grade appropriate word frequency and akshara frequency lists based on a corpus of children's literature, including the writing of children from different grades attending different types of schools.
- Curricular demands: Analyzing state-prescribed textbooks to understand the text characteristics of the prescribed curriculum and mandated pace of instruction (see rubric proposed by Vagh & Nag, 2017).
- Suggested metrics for reporting text characteristics that account for syntactic and semantic difficulty of the written materials for the akshara languages:
    - Average number of akshara per sentence to provide the syntactic complexity of a text. The akshara is a more relevant metric than words as it accounts for the morphologically rich and agglutinating akshara languages.
    - Average number of complex akshara per sentence.
    - Proportion of high frequency words.
    - Proportion of complex akshara.
    - Proportion of instances of re-syllabification.
    - Type-token ratios for akshara and words, which help account for repetitions. This is based on the premise that repetitions in a text (such as in early readers) make a text easier to read.
    - Overall length of text captured by number of akshara, words and sentences.

Further research is needed to address how best to synthesize text characteristics to index the grade-appropriate level of a text. We propose:

- Backward mapping of the metrics to state-mandated curricular as well as to children's reading performance at different grades to better understand alignment of text to grade.
- Analysis of children's reading errors can provide additional insights to the appropriateness of the metrics and the mapping process.
- Qualitative considerations of the topic or content's suitability for the desired population
- Consideration of issues such as font size, spacing, page layout, which are as yet understudied for the akshara languages.

	Nag, 2013b	Vagh, 2009	Vagh & Sharma, in press
Concept	Prompts	Prompts	Prompts
Parts of a book and book handling skills	Front of the book, back of the book, book title, open the book to where the story begins, open the book to the page just read	Front of the book, back of the book, book title, open the book to where the story begins	Front of the book
Print conveys meaning	Show the picture, show the words, meaning of word 'xxx'	Show the picture, show the words, where to start reading	Where to start reading
Print directionality	Show how the finger should move, return sweep to left	Which way to read, return sweep to left, line order, left page before right	Which way to read, return sweep to left line, left page before right
Word correspondence	Finger pointing	Finger pointing	Finger pointing
Difference between akshara and word	Show one word, count number of words on the page, show any one akshara, show first akshara of a word, show last akshara of a word, count number of akshara in the book title	First akshara of a word, last akshara of a word, number of akshara in a word, number of matra, number of words	
Punctuation marks	Meaning of question mark, period and comma	Meaning of question mark, period, comma and quotation marks	

Table 1: Concepts About Print tasks (Nag, 2013b; Vagh, 2009; Vagh & Sharma, in press). Each prompt is assigned a score of 1 for a correct response.