Journal of Child Language Acquisition and Development – JCLAD
Vol: 13 Issue: 1 1150-1159, 2025
ISSN: 2148-1997

Phonological awareness in biliterates of alphasyllabic and alphabetic orthography

Irfana Madathodiyil[1]
King Khalid University
Nihala Parveen[2]
All India Institute of Speech and Hearing
Neeraja K. V[3]
All India Institute of Speech and Hearing
Parvathy V[4]
All India Institute of Speech and Hearing

Received : 10.10.2023
Accepted : 21.02.2025
Published : 30.04.2025
DOI: https://doi.org/10.5281/zenodo.15312541

Abstract

Majority of the literature focused on the effect of L1 on the acquisition of L2 in most of the language aspects, but it is not possible to elude the influence of L2 on L1 processing especially young learners. As in the present study, learning Arabic along with Malayalam can be bewildering for children as Arabic has an alphabetic based orthography which is divergent from alpha syllabic Malayalam. Hence, this present study aimed to understand the phonological awareness in biliterates in comparison to monoliterates.

Forty participants were selected for the study. Among that, twenty participants were formally trained in both alpha syllabic (Malayalam) and alphabetic (Arabic) orthography were selected as a part of an academic curriculum with a minimum duration of three years. Another group of 20 children were trained only in Malayalam orthography (Alpha syllabic). Tasks included in the present study were phoneme isolation (initial and final), phoneme blending, phoneme deletion and phoneme segmentation.

Based on the descriptive and inferential statistics, it was evident that L2 orthography had no effect on L1 phonological awareness. Additionally, this study demonstrated that word composition complexity had no discernible impact on either the monoliterate (children who were trained only in alphasyllabic orthography) or biliterate (children who were trained in both alphasyllabic and alphabetic orthography) groups.

The present study shows that teaching entirely different languages from the native language cannot induce any adverse effect on the L1 orthography of the child. This information can be useful for the curriculum development for school-going children and be applicable to the assessment and treatment of bilingual children with reading difficulties.

Keywords: Biliterate, phonological awareness, alphasyllabic, alphabetic, orthogrpahy, Arabic, Malayalam

[1] Dr. Irfana Madathodiyil is currently working at King Khalid University. Her research area covers Speech production and Speech perception. Corresponding author's e-mail address is imadathodiyil@kku.edu.sa; ORCID: https://orcid.org/0000-0002-7261-13166

[2] [2]Nihala Parveen is currently working at All India Institute of Speech and Hearing. E-mail: nihalavattathoor2001@gmail.com; ORCID: https://orcid.org/0009-0005-8230-9152

[3] [3]Neeraja, K. V is currently working at All India Institute of Speech and Hearing. E-mail: neeraja.kv.02@gmail.com; ORCID: https://orcid.org/0009-0004-5599-8143

[4] Parvathy V is currently working at All India Institute of Speech and Hearing. E-mail: parvathyparuak@gmail.com; ORCID ID: https://orcid.org/0009-0008-3785-5535

1. Introduction

Phonological awareness (PA) is one of the key skills for the development of alphabetic orthography. This skill entails the perception of sub-lexical segments of speech at the level of phonemes, syllables, rimes, and onsets (Treiman, 1991). It can be represented by the capacity to mentally manipulate segments of speech such as tapping the syllables of a word, deleting onset of a word, or initial or final phoneme deletion of a word (McBride-Chang, 1995; Yopp, 1988). It also refers to one's "ability to recognize, discriminate, and manipulate the sounds in one's language, regardless of the size of the word unit that is the focus" (Antony & Francis, 2005). The development of PA abilities has been recognised as a crucial element of the development of literacy skills in both kindergarten and formal education. It is contingent on and mediated by the child's access to the phonology of his or her language (Wagner & Torgesen, 1987). In addition, it has often been studied within the context of children's literacy development. There is considerable evidence that phonemic awareness is closely related to successful learning to read and spell (Ball & Blachman, 1991). Initially, children develop a sensitivity to the larger phonological segments in speech and eventually adjust the sensitivity to discern smaller segments (Ziegler & Goswami, 2006). The capacity to create and recognize phonetic elements is innate in young children (Eimas et al.,, 1971).

Based on a single phoneme, very young children can identify words. However, they lack an innate talent that would enable them to purposefully modify phonological aspects along with this phonological aptitude (Durgunoglu & Öney, 1999). To comprehend and make use of the principles of the alphabetic system, researchers suggested that the development of both phonological awareness and letter knowledge is necessary (Byrne, 1998). However, according to a different perspective (Castles & Colheart, 2004), phonological awareness is a result of reading development rather than a prerequisite for reading.

Goswami (2010) lists variables that influence the emergence of PA prior to reading. The three factors namely, the syllabic construction of different languages, the vocabularies that make up those languages, and individual qualities such as perception all have an impact on how phonological awareness develops. Studies comparing the development of phonological awareness skills in opaque and transparent orthographic languages have found that children exposed to transparent orthography adopt phoneme-based reading strategies earlier than those exposed to opaque languages. In transparent languages like Spanish and Finnish, the majority of words can be pronounced out based on their spelling because of the great degree of uniformity in letter pronunciation. Many exceptions and abnormalities in pronunciation can be found in opaque languages like Portuguese and English, where words might have different pronunciations of the same letter combination.

An alphasyllabic writing system, or alphasyllabary, comes in between the alphabetic and syllabic types. In alpha syllabic writing systems, the basic grapheme represents a consonant, while an additional diacritic, or sometimes another transformation is applied, to denote the combination of

that particular consonant with a succeeding vowel (Castles & Colheart, 2004). Alphasyllabaries are a class of orthographies where sounds are indicated at the syllabic level and have special characteristics that denote sub syllabic/alphabetic information (Bright, 1996). Akshara knowledge is the best predictor of reading accuracy in alphasyllabaries. Alphabetical writing systems that use near-perfect phonemic writing have a unique letter for each individual phoneme, and a one-to-one resemblance between the sounds and the letters that indicate them.

According to studies in the Oriya language, syllable level awareness is more significant for word reading than phonemic awareness and does not play a significant role in learning to read Oriya (Mishra & Stainthorp, 2007; Padakannaya & Mohanty, 1995). Somashekara et al., (2014) found that PA skills are important for Malayalam speaking children at a young age, however the association between reading and PA is only valid for the first grade, not later grades.

Children can learn and develop syllable awareness skills more easily and earlier than phonemic awareness skills, which follow a similar course in Kannada (Tiwari et al., 2011). Furthermore, phonological knowledge was said to develop more gradually in Malayalam than in English.

A study by Alshaboul et al., (2014) investigated the relationship between English word reading and Arabic phonological awareness. One notable and unique result was the performance of English as L1 learners on the subtests of each of the three phonological awareness tests such as segmentation, matching and blending. An example given is, blending phoneme words as phonemes was the easiest followed by blending as syllables and onset-rimes. Moreover, the study revealed that children who learned well in Arabic phonological awareness were more prone to becoming better readers of English, an outcome that could change the teaching-learning development of English in the context of Arabic. Anthony and Francis (2005) suggest that children become more and more sensitive to smaller parts of words as they grow. This had no effect on native Arabic speakers, but proved clearer to English speakers.

Languages having entirely different phonological system may have varied metaphonological skills (Koda, 2005, 2008), and the quantity of information transfer between the phonological system also depends on their language similarity. Wang et al., 2006 had conducted a study in Korean–English biliterate and reported that orthographic information of Korea was not transferred to English, as there was vast disparity between the languages. Similarly, Chinese-English biliterate transferred phonological awareness skills, not orthographical information (Wang, Yang & Cheng, 2009).

This present study considered Malayalam-Arabic biliterate children as participants. Malayalam, a Dravidian language spoken in Kerala, India, uses a syllabic alpha letter system where each character denotes a syllable, not a sound. Arabic language is a semitic language native to Israel, Iran, Turkey, Middle Eastern countries, etc. An Arabic script is phonemic, that is, there is a high degree of regularity between the letters and characters of the language and their respective sounds. The Arabic language is written not only with the letters of the alphabet, but also with several characters not

viewed as part of the alphabet. In the discipline of teaching and studying Arabic as a second language, pronunciation has not received as much attention as other aspects such as morphology, syntax, sociolinguistics, and psycholinguistics. It has been stated in the fields of phonetics and phonology that Arabic pharyngealized sounds are distinctive and particular to Arabic, and they are seen to be the most challenging sounds for L2 learners of Arabic to acquire (Binasfour & Setter, 2018).

Learning Arabic with Malayalam can be confusing for children because Arabic has a different alphabetic based writing system than the alpha syllabic Malayalam. In addition, the Arabic writing progress is right to left of the page while it is in the opposite direction in Malayalam. Hence, the present study aims to understand the phonological awareness of biliterate children in comparison to monoliterate with the following objectives: (1) to understand the PA of biliterate in comparison to monoliterate (2) to assess the differences in the PA based on the complexity of the stimuli and (3) to know the developmental variation of PA from children between the age of 5 and 8 years.

2. Methodology

1.1. Participants

There were forty children from the age range of 5-8 years, including an equal number of male and female subjects who participated in the present study. Twenty participants were formally trained in both alpha syllabic (Malayalam) and alphabetic (Arabic) orthography as a part of their school curriculum with a minimum duration of three years and were considered biliterate (Group I). The other group of children was trained only in Malayalam orthography (Alpha syllabic) and were considered mono-literate (Group II). None of them had any history of speech, language, hearing or neurological deficits. All of them were tested in the presence of any of the parents, and informed consent was taken before the test session.

1.2. Stimuli

Tasks included in the present study were phoneme isolation (PI), phoneme blending (PB), phoneme deletion initial (PD-I), phoneme deletion final (PD-F), and phoneme segmentation (PS). 10 tokens of each task were prepared with an equal number of complex and simple stimuli. Complexity was decided based on the manner of articulation of the phoneme consisting in the stimuli and embedded with a minimum of 1 complex phoneme in each complex stimuli. Selected stimuli included three to four syllabic words that are common and familiar to the children in their day-to-day lives. Simple stimuli included mainly glides, liquids, and nasals, and complex stimuli included fricatives and affricates. Practice stimuli were also made with three words for each task containing simple and complex words with different number of syllables.

1.3. Procedure

Parents' consents were taken prior to the test. The entire data collection procedure was completed in thirty minutes with a five-minute break in between. Participants were asked to complete the test individually in a quiet

room. Instructions were also provided prior to each task, along with appropriate illustrations. Words for practice were administered first before the actual testing. The mistakes made by the child during the practice time were corrected. After a two-minute gap, test stimuli were administered, and the sample was stored in audio format. There was no chance for correcting errors during the administration of test stimuli. Each correct answer was scored as 1 and zero for incorrect answers

3. Findings

3.1. PA of biliterates in comparison to mono literates

As shown in Table 1 there was no considerable difference between the two groups of participants. Group 1 was children trained only in Malayalam orthography (Alpha syllabic), and Group 2 was trained in both alpha syllabic (Malayalam) and alphabetic (Arabic) orthography. Indeed, the median of phoneme isolation was the same for both groups and phoneme segmentation was better in group two than in group one. Further non-parametric inferential statistics were administered, as there was no normality among the samples. Mann-Whitney U test showed no significant difference between the two groups for all the tasks including Phoneme isolation (/Z/=0.619; p= 0.536), Phoneme Deletion-Initial (/Z/= 0.498; p= 0.619), Phoneme Deletion-Final (/Z/= 0.110; p=0.912), phoneme segmentation (/Z/=1.805; p= 0.071) and phoneme blending (/Z/= 0.684; p= 0.494). It was evident that L2 orthography did not have an effect on the L1 phonological awareness. Contrary to the assumption, L2 orthographical learning can be considered as an advantage as the results showed a slightly greater score for group 2 than 1. Such results indicate that training in L2 augments the L1 learning.

Table 1
Descriptive statistics of different tasks of PA across groups

	Group 1				**Group 2**			
	Mea	**Median**	**S.D**	**IQR**	**Mea**	**Median**	**S.D**	**IQR**
PI	94.5	100	9.98	10.0	94.0	100	7.53	10.0
PD-I	82.5	95	22.9	30.0	78.0	90	28.0	40.0
PD-F	71.5	85	28.7	60.0	74.5	80	23.5	37.5
PS	80.0	90	22.2	27.5	90.5	100	12.7	20.0
PB	89.0	95	14.8	20.0	86.5	90	15.6	20.0

* S.D= Standard Deviation; IQR= Interquartile Range

3.2. PA based on complexity of the stimuli

Table 2 shows the descriptive statistics of PA tasks based on complexity across groups. As it is shown, there was not much variation across the complexity of stimuli, which was evident in both language groups. Wilcoxon signed Rank test showed no significant difference between simple and complex categories of stimuli for all the five tasks and it was seen in both L2 Arabic and Malayalam groups with p value greater than 0.05 (Table 3).

Table 2
Descriptive statistics of different tasks of PA based on complexity across language groups

	Group I				Group II			
	Mean	**Median**	**S.D**	**IQR**	**Mean**	**Median**	**S.D**	**IQR**
PI-Simple	92.00	100	18.80	15.00	92.00	100	13.61	20.00
PI-Complex	97.00	100	7.32	0.00	96.00	100	10.46	0.00
DI-Simple	85.00	100	23.28	20.00	80.00	80.00	25.95	35.00
DI-Complex	80.00	90.00	25.95	35.00	76.00	90.00	33.46	40.00
DF-Simple	80.00	100	25.13	40.00	76.00	80.00	23.92	40.00
DF-Complex	79.00	80.00	35.70	45.00	73.00	80.00	26.17	40.00
S-Simple	82.00	100	24.19	40.00	96.00	100	10.46	0.00
S-Complex	78.00	80.00	25.04	35.00	85.00	100	21.39	35.00
B-Simple	89.00	100	15.18	20.00	88.00	100	20.92	20.00
B-Complex	89.00	100	17.74	20.00	85.00	80.00	14.32	20.00

* S.D= Standard Deviation; IQR= Interquartile Range

Table 3
Test statistics /Z/ and statistical significance p values of effect of complexity of stimuli

		PI	**PD-I**	**PD-F**	**PS**	**PB**
Malayalam	**/Z/**	1.000	1.186	1.294	0.849	0.000
	p	0.317	0.236	0.193	0.396	1.000
Arabic	**/Z/**	0.921	0.649	0.775	1.930	0.775
	p	0.357	0.516	0.439	0.054	0.439

3.3. Developmental variation of PA between 5 to 8 years

As shown in Table 4, developmental variations were seen within each language group. Tasks such as phoneme isolation and phoneme blending were correctly elicited in the younger group, i.e., 5-6 years, where phoneme deletion both in initial and final positions and segmentation were noted to be less accurate for them. However, older age group showed more than 75% accuracy for all the tasks. This trend was seen in both Alphabetic and Alpha-syllabic language groups.

For phoneme isolation, mean scores were more in alphasyllabic language than in alphabetic language. In all other tasks, such as phoneme blending, phoneme deletion-initial and final and phoneme segmentation, mean scores were higher in alphabetic language than in alphasyllabic language. With respect to age group, both 5-6 years and 7-8 years children showed the same mean scores for phoneme isolation in alphasyllabic language. For alphabetic language, the mean score for phoneme isolation was higher in the age range of 7-8 years. For all the other tasks, mean scores were higher for the older age group (7-8 years) than the younger group (5-6 years).

However, based on inferential statistics, there was no significant difference between the two age groups, i.e. 5-6 years and 7-8 years, in both alpha

syllabic and alphabetic groups. Table 5 shows the /Z/ and p values of the Mann-Whitney U non-parametric test, which was used for the comparison between the two age groups across tasks in both orthographical groups

Table 4
Descriptive statistics of different tasks of PA based across age groups

Task	**Language**	**5-6 years**				**7-8 years**			
		Mean	**Median**	**SD**	**IQR**	**Mean**	**Median**	**SD**	**IQR**
PI	**Malayalam**	95	100	7.07	10.00	95	100	7.07	10.00
PD-I		76	80	27.96	37.50	78	85	23.94	42.50
PD-F		64	75	33.39	62.50	76	85	25.03	50.00
PS		78	90	26.99	25.00	87	90	14.18	22.50
PB		84	90	18.97	32.50	81	90	19.69	35.00
PI	**Arabic**	93	95	12.64	10.00	94	100	8.23	12.50
PD-I		78	95	15.23	22.50	89	100	32.93	42.50
PD-F		73	80	22.33	32.50	79	85	23.11	35.00
PS		82	85	17.51	32.50	94	100	10.74	12.50
PB		92	90	6.99	10.00	94	95	7.88	12.50

Table 5
Test statistics /Z/ and statistical significance p values of effect of complexity in stimuli

		PI	**PD-I**	**PD-F**	**PS**	**PB**
Malayalam	**/Z/**	0.359	1.096	0.925	0.077	0.934
	p	0.720	0.273	0.355	0.938	0.350
Arabic	**/Z/**	0.548	0.510	0.498	1.288	1.107
	p	0.584	0.610	0.618	0.198	0.268

4. Discussion and conclusion

The present study had three objectives, and the first objective was to analyze the effect of learning alphabetic language orthography, i.e. Arabic, along with alpha syllabic language, i.e., Malayalam. Results / The results show no significant difference between children learning both languages simultaneously in comparison with children who learned only their native language orthography. In fact, the mean values of a few tasks were better for simultaneous learners than the other group. This can be because of the transfer effect of L2 to L1, and it is reflected in reading skills reported in previous studies (Altmisdor, 2016). Moreover, it is an agreement with the language Interdependence Hypothesis (Cummin, 1979, 1991) where the learning of any language skill in first and second languages are dependent on each other. Participants of the present study are simultaneous learners of two languages with entirely different orthographies, and that cognitive load enhances their cognitive-linguistic capacity more than a child who learns single native language orthography. In addition, Koda's (2008) transfer facilitation can be applied to explain the improved performance of children who are known to write two languages than one language. However, there can be a question of consistent enhanced performance across tasks that were not seen in children who are learning two orthographies. This can be explained as the linguistic distance effect as Arabic and Malayalam are

entirely two entities of the orthographical system. Similar results have been seen in Korean–English biliteracy acquisition (Wang, Park, & Lee, 2006).

Other objectives were to see the effect of the complexity of stimulus and developmental variation on the accuracy of phonological awareness. The present study showed no complexity effect on phonological awareness tasks in both language groups. Some of the previous studies showed contrasting findings where they had considered syllable shape (Cunningham, Witton, Talcott, Burgess & Shapiro, 2015) and word structure (Anthony & Francis, 2019) as factors to manipulate the complexity of stimuli. Instead, the present study considered articulatory characteristics to categories of simple and complex stimuli sets, and it was shown to have a positive effect on phonological awareness in a previous study (Treiman, 1984). It can be reasoned as an insignificant developmental variation where the participants acquired most of the phonological awareness tasks with more than 75% accuracy, and it consisted of simple and complex tasks.

The complexity effect would have been seen in younger participants aged less than 5 years, and it can be considered as a limitation of the study. Nevertheless, native Malayalam-speaking children learn Arabic formally by 5 years, and chances of obtaining participants below that age are minimal. Similarly, phonological awareness in other biliterates can also be investigated in the future for the process to be better understood. As a whole, the present study highlighted the non-disturbed phonological awareness skills in biliterate children where the orthographical systems were far apart, i.e., alpha syllabic (Malayalam) and alphabetic (Arabic). It supports the policy of teaching any combinations of languages in primary classes of school as it is not negatively impacted.

References

Alshaboul, Y., Asassfeh, S., Alshboul, S., & Alodwan, T. (2014). The Contribution of L1 Phonemic Awareness into L2 Reading: The Case of Arab EFL Readers. *International Education Studies*, *7*(3), 99-110. http://dx.doi.org/10.5539/ies.v7n3p99

Altmisdort, G. (2016). The Effects of L2 Reading Skills on L1 Reading Skills through Transfer. *English Language Teaching*, *9*(9), 28-35. http://dx.doi.org/10.5539/elt.v9n9p28

Anthony, J. L., & Francis, D. J. (2005). Development of phonological awareness. *Current directions in psychological Science*, *14*(5), 255-259. http://dx.doi.org/10.1111/j.0963-7214.2005.00376.x

Anthony, J. L., Lonigan, C. J., Driscoll, K., Phillips, B. M., & Burgess, S. R. (2003). Phonological sensitivity: A quasi-parallel progression of word structure units and cognitive operations. *Reading Research Quarterly*, *38*(4), 470-487. http://dx.doi.org/10.1598/RRQ.38.4.3

Ball, E. W., & Blachman, B. A. (1991). Does phoneme awareness training in kindergarten make a difference in early word recognition and developmental spelling?. *Reading research quarterly*, 49-66. https://psycnet.apa.org/doi/10.1598/RRQ.26.1.3

Binasfour, H., & Setter, J. (2018). The Influence of Vowel Context on the Perception and Production of Emphatic Sounds Among L2 learners of Arabic. *Language Studies Working Papers*, *9*, 14-25.

Castles, A., & Coltheart, M. (2004). Is there a causal link from phonological awareness to success in learning to read?. *Cognition*, *91*(1), 77-111. http://dx.doi.org/10.1016/S0010-0277(03)00164-1

Cunningham, A. J., Witton, C., Talcott, J. B., Burgess, A. P., & Shapiro, L. R. (2015). Deconstructing phonological tasks: The contribution of stimulus and response type to the prediction of early decoding skills. *Cognition*, *143*, 178-186. https://doi.org/10.1016/j.cognition.2015.06.013

Durgunoğlu, A. Y., & Öney, B. (1999). A cross-linguistic comparison of phonological awareness and word recognition. *Reading and Writing*, *11*, 281-299. https://psycnet.apa.org/doi/10.1023/A:1008093232622

Eimas, P. D., Siqueland, E. R., Jusczyk, P., & Vigorito, J. (1971). Speech perception in infants. *Science*, *171*(3968), 303-306. https://doi.org/10.1126/science.171.3968.303

Goswami U (2010) A psycholinguistic grain size view of reading acquisition across languages, in Brunswick S, McDougall and Mornay-Davies (eds.), *Reading and dyslexia in different orthographies*, pp. 23–43, Psychology Press, New York. http://dx.doi.org/10.4324/9780203858462

Koda, K. (2005). Learning to read across writing systems: Transfer, metalinguistic awareness, and second language reading development. *Second language writing systems*, 311-334. https://doi.org/10.4324/9780203935668

Koda, K., & Zehler, A. M. (2008). Impacts of prior literacy experience on learning to read in a second language. *Learning to read across languages: Cross-linguistic relationships in first-and second-language literacy development*, 68-96. http://dx.doi.org/10.1007/s11145-010-9280-9

McBride-Chang, C. (1995). Phonological processing, speech perception, and reading disability: An integrative review. *Educational Psychologist*, *30*(3), 109-121. https://psycnet.apa.org/doi/10.1207/s15326985ep3003_2

Mishra, R., & Stainthorp, R. (2007). The relationship between phonological awareness and word reading accuracy in Oriya and English: A study of Oriya-speaking fifth-graders. *Journal of Research in Reading*, *30*(1), 23-37. https://doi.org/10.1111/j.1467-9817.2006.00326.x

Padakannaya, P. (2000). Is phonemic awareness an artefact of alphabetic literacy. *ARMADILLO*, *11*, 13-14.

Mohanlal, S., Sharada, B. A., Fatihi, A. R., Gusain, L., Bayer, J. M., Ravichandran, S. M., ... & Thirumalai, S. (2014). Relationship between phonological awareness and reading abilities in Malayalam speaking typically developing children.

Teemant, A., & Pinnegar, S. (2007). Understanding language acquisition instructional guide. *Brigham Young University-Public School Partnership. Retrieved August*, *27*, 2023.

Tiwari, S., Krishnan, G., Rajashekar, B., & Chengappa, S. K. (2011). Reading acquisition in Malayalam-English biliterates. In *Language Literacy and Cognitive Development (LLCd) Symposium, 16 th–17th December*.

Treiman, R. (1984). On the status of final consonant clusters in English syllables. *Journal of verbal learning and verbal behavior*, *23*(3), 343-356. https://psycnet.apa.org/doi/10.1016/S0022-5371(84)90237-8

Treiman, R. (1991). Phonological awareness and its roles in learning to read and spell. In *Phonological awareness in reading: The evolution of current perspectives* (pp. 159-189). New York, NY: Springer New York. http://dx.doi.org/10.1007/978-1-4612-3010-6_6

Wagner, R. K., & Torgesen, J. K. (1987). The nature of phonological processing and its causal role in the acquisition of reading skills. *Psychological bulletin*, *101*(2), 192. https://psycnet.apa.org/doi/10.1037/0033-2909.101.2.192

Wang, M., Park, Y., & Lee, K. R. (2006). Korean-English biliteracy acquisition: cross-language phonological and orthographic transfer. *Journal of educational psychology*, *98*(1), 148. https://psycnet.apa.org/doi/10.1037/0022-0663.98.1.148

Wang, M., Yang, C., & Cheng, C. (2009). The contributions of phonology, orthography, and morphology in Chinese–English biliteracy acquisition. *Applied Psycholinguistics*, *30*(2), 291-314. https://doi.org/10.1017/S0142716409090122

Yopp, H. K. (1988). The validity and reliability of phonemic awareness tests. *Reading research quarterly*, 159-177. https://doi.org/10.2307/747800

Ziegler, J. C., & Goswami, U. (2006). Becoming literate in different languages: similar problems, different solutions. *Developmental science*, *9*(5), 429-436. https://doi.org/10.1111/j.1467-7687.2006.00509.x