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Interword spacing and reading performance among low-literacy Cambodian students

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This study investigated whether inserting interword spacing into Khmer text could enhance reading accuracy and fluency among native-speaker low-proficiency readers. In Experiment 1, 36 Grade 6 students in a low-literacy class read aloud paragraphs presented with and without added spaces. In Experiment 2, 115 students in Grades 9–11 silently read short passages in spaced and non-spaced formats to answer comprehension questions. Results indicated virtually no significant improvements in reading accuracy or fluency with spacing, apart from a significant reduction in missed syllables in Experiment 1. Survey responses revealed a preference for conventional non-spaced texts. Overall, adding interword spacing provided no pedagogical advantage for Khmer readers in this study, although it did not negatively affect performance either.

Keywords: interword spacing, Khmer, low-literacy

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The present study was motivated by an attempt to support Cambodian students with low literacy to read their school texts more easily. In Cambodia, as in other developing countries, children from poor backgrounds often start school late. This may be because their families cannot afford the resources needed for schooling or because families prioritize their children's help in earning money. In these cases, Cambodian students enter a fast-track program in which they complete two grade levels in one year. Research into delayed schooling in rural China found that for each year a student is delayed, cognitive development significantly decreases (Chen, 2017). The combination of impaired cognitive development and less time to study each grade's materials can make it difficult for students to read texts at their grade level. Late starters are also more likely to drop out of school (Chen, 2015; Wils, 2004), which may be partially due to difficulties in keeping up with their curriculum. In this context, a widely-applicable intervention to assist students with their reading would be highly beneficial. A body of research has shown some advantages to adding spaces between words in scripts that are not normally spaced, including for Chinese (Cui, 2023; Blythe et al., 2012) and Thai (Kasisopa et al., 2013; Winksel et al., 2009). These studies collectively found that low-frequency words were processed faster with interword spacing. Consequently, low-literacy readers of Khmer might also benefit from interword spacing. The research question for this study was as follows: Can interword spacing improve reading performance of Khmer texts for Cambodian students?

The Role of Spaces for Demarcating Word Boundaries

For spaced scripts like English, eye-tracking studies consistently find that readers land their eyes just left of center of a word, moving from one word center to the next rather than continuously along the characters (e.g., Mirault et al., 2019; Perea & Acha, 2009; Paterson & Jordan, 2010; Rayner et al., 1998; Slattery & Raynor, 2013). Without interword spacing, readers' eyes tend to land closer to the start of a word, backtrack more often, spend longer on each word fixation, and jump ahead in shorter saccades. This is true even for foreign-language readers whose first language does not use interword spacing, for example Thai (Winskel et al., 2009) or Japanese (Toshima et al., 2011). This effect is logical, considering the variety of word lengths in English. For example, "a" is one word, one syllable, and one letter, "strengths" is one word, one syllable, and nine letters, while "important" is one word, three syllables, and 10 letters.

Some non-spaced scripts use different strategies to demarcate word boundaries. Chinese uses logographic characters with one syllable and one morpheme per character, which reduces the ambiguity of where the center of the word would be. Japanese allows some characters to represent multiple syllables (e.g., 私, *watashi*) or two characters to represent one syllable (e.g., 今日, *kyou*), but generally follows the same pattern of one morpheme per logographic character. These characters are interspersed with grammatical words and words from foreign languages using other scripts, hiragana and katakana, which effectively demarcate word boundaries without needing spaces.

The same does not apply for alphabetic scripts written without interword spaces, such as Thai and Khmer. In Khmer, the subject of the present study, each syllable could include one, two, or three consonants, and the amount of space they take up on the page can vary significantly depending on the vowels around them. Some vowels sit above or below the consonant, while others extend horizontally to the left or right. For example, the word ខ្ញុំ (*I*) consists of one main consonant, one sub consonant, and a complex vowel above and below the main consonant, but takes up the space of a single character. In contrast, មើល (*look*) is also one syllable, two consonants, and one complex vowel, but requires three character spaces. Word length also varies significantly, comparing for example ស្រឡាញ់ (*love*, [sralanh], 2 syllables, 5 character spaces) and ស (*white*, [saa], 1 syllable, 1 character space). Moreover, the final form and starting form of letters are usually identical, as seen in the last letter of ពីរ (*two*) and the first letter of រលក (*wave*). Low-proficiency readers might stop at ពី (*from*), a common word in itself, and then try to read the next word starting with រ, requiring them to re-read the previous word. If unfamiliar words use non-transparent orthographies or silent letters, readers may struggle to identify the center of a word and its boundaries, which could conceivably result in reading difficulties.

Adding Interword Spaces to Non-Spaced Scripts

The effect of adding interword spacing to non-spaced alphabetic scripts has only been tested with Thai. Winskel et al. (2009) found that interword spaces helped Thai readers process lexical items, as indicated by the shorter total fixations on key words in the sentence, especially for words of lower frequency. However, the length of first-fixation was not affected by spaces, and eyes still landed roughly in the center of words. Similarly, Kasisopa et al. (2013) found that interword spaces helped guide Thai readers' eyes to the center of low-frequency words, but not for high-frequency words due to a ceiling effect for the more common words. This suggests that spaces could be particularly useful for processing new or less familiar words, which is especially relevant for school-aged readers with low literacy.

The findings from Thai are consistent with those from other non-spaced scripts. For example, Blythe et al. (2012) found that novel words inserted into meaningful sentences were processed more quickly by native readers of Chinese, both for children and adults, but only for total fixation durations, not for first fixations. This difference implies that the benefit of spacing was not in decoding word boundaries, but in processing. Additionally, Sainio et al. (2007) found that average fixation durations were shorter for spaced Hiragana texts, helping Japanese readers recognize words written in Hiragana that would typically be written with Kanji. Collectively, interword spacing seems to improve processing speed for native readers of non-spaced scripts.

There is therefore reason to believe that interword spacing could be a useful strategy for helping low-proficiency native Khmer readers to read and comprehend texts. There is also precedent for manipulating normal texts to reduce reading difficulty. For example, Hebrew and Arabic scripts do not normally use vowels,

but vowel diacritics are added to texts intended for children or foreign-language readers. Similarly, Chinese children read with the romanized script pinyin before learning the logographic characters. Japanese children also initially read using the syllabary script Hiragana before learning the Kanji characters. Thai texts intended for children may also use interword spacing to help readers distinguish word boundaries. The present study tested whether interword spacing could be useful for Khmer readers.

Experiment 1

Since previous research has found facilitatory effects for interword spacing on non-spaced scripts, I tested whether adding interword spacing to Khmer resulted in better reading performance. The first experiment was conducted with 36 Grade 6 Cambodian students who attend public school for half the day and an NGO school for the other half. The NGO school aims to supplement their education in Khmer, English, mathematics, and ICT. As well as regular classes, a learning support program provides interventions to help low-achieving students to keep up with their studies. Students in this program are from very low socioeconomic backgrounds and often start education in late childhood. Experiment 1 was conducted in the context of this program, exploring methods to support the students' abilities to read independently. This study was conducted in accordance with the principles of the Declaration of Helsinki.

Text

The text was taken from a reading in their upcoming Khmer class. It describes a traditional dance from Pailin province, including its origins, purpose, and how it is performed. The text was divided into six paragraphs of roughly equal length, with an average of 67 target syllables per paragraph. In Version 1, the odd-numbered paragraphs had spaces inserted between word units, as identified by Khmer teaching staff, while in Version 2 the spaces were inserted in even-numbered paragraphs. Appendix A shows the full spaced text.

Procedure

The students were randomly assigned to one of the two versions of the text. They were asked to read the text aloud as quickly as possible while being audio recorded, as part of an assessment on their reading ability. The mean duration per paragraph was 40 seconds (SD = 9 seconds). Of the 36 students, four were excluded from analysis: two because their reading ability was too low, and two because their recordings were too noisy.

Assessment

Most previous studies comparing reading with and without interword spacing have used eye tracking (e.g., Blythe et al., 2012; Kasisopa et al., 2013; Winskel et al., 2009), assuming that longer saccades and shorter fixations are indicators of better reading performance. While this approach provides precise insights into the readers' eye movements, it would be difficult to assess reading accuracy and comprehension through eye-tracking. Kohsom and Gobet (1997) used a read-aloud protocol, which allowed them to code errors and record their participants' reading speed. This method is more relevant in the present context, but the raw reading speed may be too coarse a measure to distinguish differences in reading fluency. Experiment 1 therefore adopted more fine-grained temporal measures taken from a recent assessment study on reading fluency for first and second language readers (Suzuki & Kormos, 2023). First, audio files of each paragraph were trimmed to the start and end of phonation. The number of wrong and missed syllables were counted by three senior staff members at the school. A script in PRAAT (de Jong & Wempe, 2009) calculated the total duration, phonation time, number of uttered syllables, and number of silent pauses per paragraph. I then calculated six dependent measures for each paragraph and averaged the spaced and non-spaced conditions to provide the final dependent measures for analysis. The calculations were as follows:

- **Missed Syllables Ratio:** Missed syllables divided by target syllables.
- **Wrong Syllables Ratio:** Mispronounced syllables divided by target syllables.
- **Extra Syllables Ratio:** Uttered syllables (detected by the PRAAT script) minus target syllables, divided by target syllables. These include voiced hesitations, repetitions, self-corrections, and added words.
- **Silent Pause Frequency Ratio:** Number of silent pauses divided by target syllables.
- **Mean Silent Pause Duration (ms):** Total non-phonation time (silence) divided by number of silent pauses.
- **Mean Target Syllable Duration (ms):** Total phonation time (silent pauses excluded) divided by target syllables.

Results

Table 1 shows the descriptive statistics for all dependent measures. Since some dependent measures were not normally distributed, Wilcoxon Tests are reported for all measures for consistency. The only significant difference between conditions was for the ratio of missed syllables: the spaced condition (M = .001, SD = .02) had significantly fewer missed syllables than in the normal unspaced condition (M = .014, SD = .02), with a medium effect (r = .532, p = .005). Therefore, with interword spacing virtually no syllables were missed. The other results were all $r < .156$, $p > .385$, indicating no trend towards a difference between conditions for the other measures. Thus, interword spacing did not meaningfully improve reading accuracy or fluency in this experiment, but spaced text ensured that all syllables were read aloud.

A sensitivity analysis (paired design, a = .05, two-tailed) indicated that with 32 participants the study had 80% power to detect an effect of approximately dz = 0.51 (equivalent to $r \approx .25$).

Table 1. Descriptive statistics and Wilcoxon tests for all dependent measures. Ratios are per target syllable

	Missed Syllables Ratio	Wrong Syllables Ratio	Extra Syllables Ratio	Silent Pause Ratio	Silent Pause Duration	Target Syllable Duration
Mean (*SD*)						
Spaced	.001 (.02)	.056 (.05)	.367 (.19)	.189 (.12)	59 ms (24)	46 ms (09)
-	-	-	-	-	-	-
Unspaced	.014 (.02)	.052 (.05)	.387 (.22)	.188 (.12)	57 ms (24)	46 ms (10)
Wilcoxon Test	$W = 307$	$W = 217$	$W = 307$	$W = 304$	$W = 217$	$W = 228$
	$p = .005$	$p = .385$	$p = .432$	$p = .465$	$p = .390$	$p = .512$
	$r = .532$	$r = .155$	$r = .142$	$r = .132$	$r = .155$	$r = .119$

Thus, the design was adequately powered to detect medium-sized effects but not small effects.

Experiment 2

Listening to the audio files of Experiment 1, it was clear that the students were reading mechanically rather than for comprehension. For example, they did not pause at the end of sentences or vary their intonation. While the results of Experiment 1 showed very little benefit from interword spacing on reading aloud, it was still plausible that interword spacing could help with meaning-focused reading because in previous studies the advantages from interword spacing were in processing the words. A second experiment was therefore conceived to focus on a more educationally relevant task: silent reading for meaning. Additionally, the accuracy scores in Experiment 1 suggested that the text may have been too difficult for the participants. Interword spacing is assumed to be beneficial for low-frequency words, based on the studies with Thai readers (Kasisopa et al. (2013; Winskel et al., 2009). However, these studies involved educated populations of normal socioeconomic backgrounds. Low frequency words with low-literacy readers may be too difficult in comparison. If spacing facilitates reading, it is rational to assume that readers must already know the words they are reading. Experiment 2 therefore aimed to ensure that all words in the texts were known by using only high-frequency words and by recruiting older students from the same NGO school. These 115 students from Grades 9 to 11 had passed an entrance examination to attend the secondary school and, although their literacy levels may be lower than typically expected for their age due to their context, they could reasonably be expected to know all the words in these texts.

Texts

The texts were created for this experiment by the author. Each pair of texts was created in the same style. For example, in the first text, the question was to find the third item bought at the market while in the second text, the question was to find the third animal seen at the zoo. The structure of the two texts was identical, only changing lexical items. Another pair of texts asked the participants to understand how the main character felt about a situation. The answer was not written anywhere explicitly, but rather required a general reading of the entire text. Again, the two texts were structurally identical. Each pair of texts required a slightly different reading skill (e.g., skimming for specific information or comprehending the gist), and varied whether the answer was towards the beginning, the middle, the end, or required a more holistic reading. The texts were written to keep word counts ($M = 77$, $SD = 1$) and character counts ($M = 334$, $SD = 22$) as similar as possible. One text from each pair was assigned to be read with spaces and the other without spaces, allowing for comparable reading questions between the two conditions. The assignment of condition to text was counterbalanced between two versions. The 12 texts (6 pairs) are shown with their English translations in Appendix B.

Figure 1. Screens from Experiment 2. Top left: non-spaced text. Bottom left: Spaced text. Top right: Question before reading. Bottom Right: Answer selection after reading.

Tool

Experiment 2 was created on Gorilla Experiment Builder (www.gorilla.sc). The first screens showed example easy texts to familiarize the students with the procedure and then the trials alternated between a spaced and a non-spaced text, with text order randomized within condition and the starting condition also randomized. On the first screen, participants read the question. They then pressed a button to see the reading screen, where they read the text, and pressed another button when they were ready to answer. The next screen showed the question again with six response options, each chosen to be plausible without having read the text carefully. If participants selected the correct response, they moved onto the next question. If they selected an incorrect response or pressed the back button, they saw the reading screen again and continued with the current item. Figure 1 shows screens from the task. In the final screen, they were asked to choose whether they preferred reading with interword spacing, normally, or had no preference.

Procedure

The experiment was conducted on iPads during a regular class, built onto the end of an unrelated English-learning activity. Students read a brief description of the experiment and chose either to participate or to leave the class. On average the activity took 9 (*SD* = 4.1) minutes to complete.

Analysis and Results

Reading times were calculated as the combination of all time spent on reading screens for the same item. To clarify, this does not include time spent on the question or response screens. For example, if the participant chose an incorrect response and read the same text again, the reading time on both screens was summed. To remove outliers, trials beyond two *SD*s of the mean reading time (24 trials from 16 participants) were excluded within spacing conditions (1.7% of data). After data cleaning, the mean reading time per item was 21.985 (*SD* = 10.488) seconds for spaced texts and 22.896 (*SD* = 10.922) seconds for non-spaced texts. The data were not normally distributed and so a Wilcoxon test was conducted. There was no significant difference in reading times between the conditions ($W = 3702$, $p = .231$, $r = .11$). Regarding the final survey, 94 students preferred reading normally, 12 preferred reading with interword spacing, and 9 had no preference. Conclusively, therefore, interword spacing did not improve reading speed for meaning in this experiment and was not preferred by the students.

A sensitivity analysis (paired design, $a = .05$, two-tailed) indicated that with 115 participants the study had 80% power to detect an effect of approximately $dz = 0.26$ (equivalent to $r \approx .13$). Thus, the design was sufficiently powered to detect small effects.

Discussion

In two different experiments, Khmer reading accuracy and fluency was compared with and without interword spacing. In the first experiment, low-proficiency readers from Grade 6 read texts aloud in alternating spaced and non-spaced paragraphs, with practically no difference in accuracy and fluency measures. This is noteworthy as there was some room for improvement in accuracy, with 5% of syllables pronounced incorrectly, and more than a third of uttered syllables being non-target syllables. Moreover, approximately 20% of reading time, not including pauses between paragraphs, was silent, showing that they did need to pause to think about what they were reading. Under these conditions, an intervention to improve readability could have been effective, but interword spacing did not help. The only advantage was that in the normal non-spaced condition, 1.5% of syllables were missed, whereas in the spaced condition practically no syllables were missed.

The second experiment compared reading times for finding answers to questions that required comprehension through careful reading. This condition was thought to be more educationally relevant, probing the participants' ability to find information from a text. The higher number of participants and items could also have detected a smaller difference between conditions. Additionally, the texts were designed so that all words should have been known to the readers. However, there was no sign of any difference between the two spacing conditions. Given the numerous differences between the two experiments' methods and the similarities between measures from each condition, the results are quite unambiguous: in a real, pedagogical context, interword spacing did not help Cambodian school students read Khmer texts.

This first raises the question of why spaces did not help. The eye-tracking studies with Thai readers (Kasisopa et al., 2013; Winksel et al., 2009) found advantages in reading low-frequency words, specifically in shorter total fixations and in helping readers locate the centers of words. In Experiment 1, the text included low-frequency words and was relatively difficult for the participants, and so interword spacing could have helped. The mean target syllable duration was 46ms, while the total fixation time in Winksel et al. (2009) was much longer (>200ms), meaning that this measure should have been sensitive enough to detect a difference between conditions.

One explanation for this result could be that Khmer and Thai readers view spaces differently. Khmer sometimes uses spaces as punctuation, for example to separate list items, whereas Thai uses commas. The incongruency of seeing spaces used differently in Khmer may have hindered reading, offsetting any potential benefit from interword spacing. Additionally, Khmer children are taught to read entire syllables rather than to phonetically decode words. For example, they learn that កា is [kaː] and ក្ស is [keː], rather than learning to read the consonant ក and blend it with the vowel. In this respect, although the Khmer alphabet is decodable, Khmer readers may behave more like Chinese and Japanese readers, seeing whole syllables like logographs. Another difference lies in the socioeconomic background of the participants, who in the present study were late starters and may therefore be differently sensitive to interventions of a cognitive nature.

On the other hand, it is noteworthy that spacing did not hinder

reading. English readers find it far more difficult to read English when spaces are removed, but Khmer readers have seemingly no difficulty in reading with spaces, despite the fact that this is not how they normally read and that spaces are used as punctuation. Moreover, 10% of students expressed a preference for the spaced text and a further 8% had no preference.

Limitations

One potential limitation is that every participant in both experiments was exposed to both spaced and unspaced conditions, continually switching between the two. It is possible that longer exposure to spaced text could have allowed participants to adapt to the unusual format and a between-subjects design or more longitudinal design might have yielded different results. Future research could examine whether spacing Khmer text brings advantages to reading with longer and uninterrupted exposure. Another limitation is that comprehension was not tested in Experiment 1 and only tested by multiple choice in Experiment 2. It may be interesting to investigate the comprehension of longer passages without using multiple-choice responses. Finally, interword spacing may benefit the reading of low-frequency words that are known to the reader. A future study could specifically teach target words first and then conduct the intervention with those low-frequency words included in the texts.

Conclusion

In sum, interword spacing was not shown to be a practically advantageous intervention for the target population. Evidence from Thai adults in controlled experiments showed some processing benefits to adding interword spacing to texts. However, the benefits of interword spacing did not extend to educationally relevant measures among low-literacy Cambodian teenagers in a classroom context. The result highlights the importance of testing general conclusions from the literature with a variety of demographics, languages, and measures before implementing real-world interventions. Moreover, further research is still needed to find interventions to improve the target demographic's reading performance.

References

Blythe, H. I., Liang, F., Zang, C., Wang, J., Yan, G., Bai, X., & Liversedge, S. P. (2012). Inserting spaces into Chinese text helps readers to learn new words: An eye movement study. *Journal of Memory and Language*, *67*(2), 241–254. https://doi.org/10.1016/j.jml.2012.05.004

Chen, Q. (2015). Ready for school? Impacts of delayed primary school enrollment on children's educational outcomes in rural China. *International Journal of Educational Development*, *45*(C), 112–128.

Chen, Q. (2017). Impacts of late school entry on children's cognitive development in rural northwestern China—Does preprimary education matter? *Asia & the Pacific Policy Studies*, *4*(3), 586–601. https://doi.org/10.1002/app5.192

Cui, Y. (2023). Eye movements of second language learners when reading spaced and unspaced Chinese texts. *Frontiers in Psychology*, *14*. https://doi.org/10.3389/fpsyg.2023.783960

de Jong, N. H., & Wempe, T. (2009). Praat script to detect syllable nuclei and measure speech rate automatically. *Behavior Research Methods*, *41*(2), 385–390. https://doi.org/10.3758/BRM.41.2.385

Kasisopa, B., G. Reilly, R., Luksaneeyanawin, S., & Burnham, D. (2013). Eye movements while reading an unspaced writing system: The case of Thai. *Vision Research*, *86*, 71–80. https://doi.org/10.1016/j.visres.2013.04.007

Kohsom, C., & Gobet, F. (1997). Adding spaces to Thai and English: Effects on reading. *Proceedings of the 19th Annual Meeting of the Cognitive Science Society*, *19*.

Mirault, J., Snell, J., & Grainger, J. (2019). Reading without spaces: The role of precise letter order. *Attention, Perception, & Psychophysics*, *81*(3), 846–860. https://doi.org/10.3758/s13414-018-01648-6

Perea, M., & Acha, J. (2009). Space information is important for reading. *Vision Research*, *49*(15), 1994–2000. https://doi.org/10.1016/j.visres.2009.05.009

Rayner, K., Fischer, M. H., & Pollatsek, A. (1998). Unspaced text interferes with both word identification and eye movement control. *Vision Research*, *38*(8), 1129–1144. https://doi.org/10.1016/S0042-6989(97)00274-5

Sainio, M., Hyönä, J., Bingushi, K., & Bertram, R. (2007). The role of interword spacing in reading Japanese: An eye movement study. *Vision Research*, *47*(20), 2575–2584. https://doi.org/10.1016/j.visres.2007.05.017

Slattery, T. J., & Rayner, K. (2013). Effects of intraword and interword spacing on eye movements during reading: Exploring the optimal use of space in a line of text. *Attention, Perception, & Psychophysics*, *75*(6), 1275–1292. https://doi.org/10.3758/s13414-013-0463-8

Suzuki, S., & Kormos, J. (2023). The multidimensionality of second language oral fluency: Interfacing cognitive fluency and utterance fluency. *Studies in Second Language Acquisition*, *45*(1), 38–64. https://doi.org/10.1017/S0272263121000899

Toshima, M., Ishikawa, T., & Mogi, K. (2011). Spaces enhance word segmentation and comprehension in tacit reading. In D. Liu, H. Zhang, M. Polycarpou, C. Alippi, & H. He (Eds), *Advances in Neural Networks – ISNN 2011* (pp. 76–82). Springer. https://doi.org/10.1007/978-3-642-21105-8_10

Wils, A. (2004). Late entrants leave school earlier: Evidence from Mozambique. *International Review of Education*, *50*(1), 17–37. https://doi.org/10.1023/B:REVI.0000018201.53675.4b

Winskel, H., Radach, R., & Luksaneeyanawin, S. (2009). Eye movements when reading spaced and unspaced Thai and English: A comparison of Thai–English bilinguals and English monolinguals. *Journal of Memory and Language*, *61*(3), 339–351. https://doi.org/10.1016/j.jml.2009.07.002

(Appendices follow)

Appendix A

1. របាំ ក្លោក ជា របាំ មួយ ប្រភេទ ដែល ប្រជាជន នៅ ខេត្ត ប៉ៃលិន និយម លេង ។ អ្នក សម្តែង របាំ នេះ មាន ពីរនាក់ ម្នាក់ ដើរ តួ ក្លោក ប្រកប ដោយ សម្លៀកបំពាក់ និង ពាក់ ស្លាប ដូច សត្វ ក្លោក ហើយ ម្នាក់ ទៀត ដើរ តួ ព្រាន ព្រៃ ដែល នៅ ដៃ មាន ស្នា និង បំពង់ ព្រួញ ព្យួរ ពី ក្រោយ ខ្នង ។
2. កាលណា ក្រុម របាំ ស្លៀក ពាក់ តែង តួ រួច គេ មក ជួប ជុំ គ្នា នៅ ត្រង់ កន្លែង ដែល បាន រៀប ចំ ទុក ។ ដើម្បី សម្តែង របាំ នេះ អ្នក លេង ត្រូវ ធ្វើ តាម ការ ណែនាំ ខាង ក្រោម ៖ ដំបូង អ្នក វាយ ស្គរ ចាប់ បន្លឺ មុន គេ រួច វង់ ភ្លេង ទាំង មូល ចាប់ ប្រគំ ឡើង ព្រម គ្នា ។
3. បន្ទាប់ មក អ្នក ដើរ តួ ក្លោក អង្គុយ លុត ជង្គង់ នៅ លើ តុ មួយ ខ្ពស់ ដៃ ទាំង ពីរ ប្រណម ទំនង ជា កំពុង ភាវនា ធម៌ ។ បន្ទាប់ មក ទៀត ក្លោក លោត ចុះ មក ដី កាង ដៃ ត្រដាង ស្លាប ហើយ បត់ រលាស់ មាន សណ្ឋាន ដូច ជា ក្លោក ហើរ ជើង ទាំង ពីរ លោត បន្តើរៗ ជា ចង្វាក់ រាំ ឆ្ងែល ជុំវិញ ទី កន្លែង ។
4. យូរៗ ម្តង ធ្វើ ជា លោត ផ្ដើលៗ ក ផ្លៀងផ្គង ឆ្វេង ស្តាំ ដៃ រលាស់ បង់បោយ រេ ចុះ រេ ឡើង តម្រែ តាម ចង្វាក់ ភ្លេង ។ បន្ទាប់ ពី នោះ ព្រាន ដើរ លោតៗ ជា ចង្វាក់ រាំ តាម ភ្លេង ភ្នែក គន់ រំពៃ ឆ្វេង ស្តាំ ហើយ ធ្វើ កាយ វិការ ជា ភ្ញាក់ ទុច ងឹក ព្រោះ ឃើញ ក្លោក នៅ ពី មុខ ។
5. បន្ទាប់ ពី នោះ មក ទៀត ព្រាន ទាញ ស្នា មក ដាក់ លើ ស្មា ផ្លៀង ក ម្ខាង ហើយ ហូត យក ព្រួញ មួយ មក ផ្គង សម្រួល លើ ចង្អុរ ស្នា បំបែរ ចុង តម្រង់ ទៅ រក ក្លោក ។ ព្រាន ធ្វើ ជា តម្លោះ កែ ឱ្យ ព្រួញ ធ្លាក់ ទៅ ដី តែ មិន ត្រូវ ក្លោក ទេ ។ ព្រាន ស្ទុះស្ទា ដោយ ក្តៅ ចិត្ត ព្រោះ បាញ់ មិន ត្រូវ ក្លោក រឹង ក្លោក នៅ តែ រោទ៍ ធ្វើ ព្រងើយ ។
6. ទីបញ្ចប់ ព្រាន ឃើញ ក្លោក ភ្លេច ខ្លួន ក៏ លប បាញ់ ក្លោក តែ ព្រួញ ជ្រុះ ទៅ ដី ដូច មុន ទៀត ។ ចំណែក ភ្លេង ត្រូវ ផ្លាស់ ប្តូរ បទ តាម ឆាក រឿង ដូចជា ពេល ក្លោក ចេញ ពង់ លើ តុ ភ្លេង លេង ចង្វាក់ យឺត បង្អួសៗ ។ ពេល តួ ព្រាន ព្រៃ ចេញ ភ្លេង រោទិ៍ យ៉ាង ញាប់ គួរ ឱ្យ រន្ធត់ ដល់ ពេល ព្រាន បាញ់ ខុស ភ្លេង លេង ចង្វាក់ ធម្មតា ។

Appendix B

Text with Interword Spaces	*Translation*
សុភ័ក្ត្រ ទៅ ផ្សារ ព្រឹក មិញ។ គាត់ ឃ្លាន ដូច្នេះ គាត់ រក គុយទាវ។ គាត់ រក មិន ឃើញ គុយទាវ ដើម្បី ញាំ ទេ តែ គាត់ បាន ឃើញ មួក ដ៏ ស្រស់ស្អាត និង អាវ យឺត ចម្រុះ ពណ៌ ដូច្នេះ គាត់ បាន ទិញ វា។ បន្ទាប់ មក គាត់ បាន សួរ រក ហាង គុយទាវ ទៀត ប៉ុន្តែ នៅ តែ រក មិន ឃើញ។ គាត់ ក៏ បាន ទិញ ផ្លែ ប៉ោម មួយ ជំនួស វិញ។ ចុងក្រោយ គាត់ បាន ទិញ ចេក ចៀន និង កូកាកូឡា មួយ កំប៉ុង នៅ ពេល ធ្វើ ដំណើរ ទៅ ផ្ទះ វិញ។	Sopheak went to the market this morning. He was hungry so he was looking for noodles. He could not find any noodles to eat, but he saw a nice hat and a colorful T-shirt, so he bought it. He then asked for another noodle shop but still could not find it. He also bought an apple instead. Finally, he bought a banana and a can of Coca-Cola on the way home.
ម៉ានុន បាន ទៅ សួនសត្វ កាលពី ម្សិលមិញ។ គាត់ រំពឹង ថា គាត់ នឹង រំភើប ចិត្ត ពេល ឃើញ ដំរី។ ទោះជាយ៉ាងណា ក៏ ដោយ មុន ពេល ស្វែង រក សត្វ ដំរី ឃើញ គាត់ បាន ឃើញ ស្វា ធាត់ មួយ ក្បាល និង បក្សី ពណ៌ ផ្កា ឈូក ដ៏ ស្រស់ ស្អាត។ បន្ទាប់ មក គាត់ បាន សួរ អំពី ដំរី ប៉ុន្តែ រក មិន ឃើញ។ គាត់ បាន ទៅ មើល ខ្លា ជំនួស វិញ។ ចុងក្រោយ គាត់ បាន ឃើញ សត្វ ពីងពាង និង ពស់ ដំ គួរឲ្យ ខ្លាច ប៉ុន្តែ គាត់ រក មិន ឃើញ ដំរី នោះ ទេ។	Manon went to the zoo yesterday. He hopes he will be excited to see the elephant. However, before searching for the elephant, he saw a fat monkey and a beautiful pink bird. He then asked about the elephant but could not find it. He went to see the tiger instead. He finally saw the scary spider and snake, but he did not find the elephant.
សុភា រស់ នៅ ជាមួយ ឪពុក នៅ ក្នុង ភូមិ មួយ។ ផ្ទះ របស់ នាង តូច ប៉ុន្តែ នាង ចំណាយ ពេល ច្រើន ជាមួយ មិត្ត ល្អ បំផុត របស់ នាង លីណា ដែល រស់ នៅ ក្បែរ នាង។ រដ្ឋា និង ប្អូនស្រី ឈ្មោះ រ័ត្ន រស់ នៅ ទល់ មុខ ផ្ទះ របស់ នាង។ ពួកគេ រស់ នៅ ជាមួយ យាយ របស់ ពួកគេ ហើយ ឆ្កែ របស់ ពួកគេ តែងតែ ព្រុស លឺៗ បង្ករ សម្លេង រំខាន។ ឆ្លងកាត់ ស្ពាន មាន គ្រួសារ បងប្រុស នាង។ គាត់ រស់ នៅ ជាមួយ ប្រពន្ធ និង កូន ពីរនាក់ ឈ្មោះ ឆាយ និង វ៉ាន់ថន។	Sophea lives with her father in a village. Her house is small, but she spends a lot of time with her best friend Lina, who lives next door to her. Ratha and her sister Roth live in front of her house. They live with their grandmother and their dogs are always barking loudly, making a lot of noise. Across the bridge was her brother's family. He lives with his wife and two children, Chhay and Vanthorn.

សុខា រៀន នៅ សាលា ធំ មួយ ជាមួយ បង ប្រុស ឈ្មោះ សុខ។ ពួក គេ ស្ថិត ក្នុង ថ្នាក់ តែមួយ ហើយ ពួក គេ តែងតែ អង្គុយ នៅ កៅអី ជាមួយ គ្នា។ សុខា អង្គុយ ក្បែរ សុធិន ក្រោយ លីហួរ និង ទល់មុខ បង ប្អូន ជីដូន មួយ ឈ្មោះ សុផា។ គ្រូ គាត់ មិន ចូលចិត្ត អោយ គាត់ អង្គុយ ក្បែរ បង សុខ ទេ ដោយសារ តែ ពួក គេ និយាយ គ្នា ហើយ លេង ច្រើន។ ដូច្នេះ សុខ ត្រូវ អង្គុយ ខាង ក្រោយ ថ្នាក់។ សុខ អង្គុយ ក្បែរ មិត្ត សម្លាញ់ របស់ គាត់ គឺ បញ្ញា និង ហ៊ាង។	Sokha attended a large school with his brother Sok. They are in the same class and they always sit in the same chair. Sokha sits next to Sotin behind Ly Hour and in front of his cousin Sothea. His teacher did not like him to sit next to Sok because they talked and played a lot. So Sok has to sit behind the class. Sok sits next to his friends Panha and Heang.
កាល វិភាគ របស់ បញ្ញា គឺ រវល់ ណាស់។ នៅ ថ្ងៃ ចំន្ទ និង ថ្ងៃ សុក្រ គាត់ សិក្សា គណិត វិទ្យា ហើយ ថ្ងៃ អង្គារ គាត់ សិក្សា ភាសា ខ្មែរ។ នៅ ថ្ងៃ ពុធ គាត់ សិក្សា ប្រវត្តិ សាស្ត្រ ហើយ នៅ ថ្ងៃ ព្រហស្បតិ៍ គាត់ សិក្សា គីមី វិទ្យា។ គាត់ ធ្វើ កិច្ចការ ផ្ទះ ជា រៀង រាល់ ល្ងាច ជា មួយ មិត្ត គាត់ សុខ ប៉ុន្តែ គេ មិន ធ្វើ វា នៅ ថ្ងៃ សុក្រ ទេ ព្រោះ នោះ ជា ពេល ដែល គេ លេង បាល់។ ព្រឹក ឡើង គេ រៀន ភាសា អង់គ្លេស និង រូបវិទ្យា។	Panha's schedule is very busy. On Mondays and Fridays he studied mathematics and on Tuesdays he studied Khmer. On Wednesday he studied history and on Thursday he studied chemistry. He does his homework every evening with his friend Sok, but he does not do it on Fridays because that is when they play football. In the morning, they learn English and physics.
កញ្ញា ធ្វើ កិច្ចការ ជា ច្រើន។ នៅ ថ្ងៃ សៅរ៍ និង ថ្ងៃ អាទិត្យ នាង លេង បាល់ ទះ ហើយ នៅ ថ្ងៃ អង្គារ នាង លេង បាល់ ទាត់។ នៅ ថ្ងៃ ពុធ នាង ជូន យាយ នៅ ភោជនីយដ្ឋាន ហើយ នៅ ថ្ងៃ ព្រហស្បតិ៍ នាង រៀន របាំ ប្រពៃណី។ នាង ចូល ចិត្ត និយាយ លេង ជា មួយ មិត្ត ភ័ក្តិ របស់ នាង ធីតា បន្ទាប់ ពី រៀន ហើយ ប៉ុន្តែ មិន មែន ក្នុង ថ្ងៃ អាទិត្យ ទេ ព្រោះ ធីតា និង ទៅ លេង ភូមិ គ្រួសារ របស់ នាង។ កញ្ញា សម្អាត ផ្ទះ នៅ ថ្ងៃ ចំន្ទ។	She does a lot of work. On Saturdays and Sundays she plays volleyball and on Tuesdays she plays football. On Wednesdays, she takes her grandmother to a restaurant, and on Thursdays, she learns traditional dances. She likes to hang out with Thida's friends after school, but not on Sundays because Thida is going to visit her family village. She cleans the house on Monday.
ម្សិលមិញ បុរី ប្រឡង គណិតវិទ្យា។ គាត់ បាន ខំរៀន យ៉ាង លំបាក ពេញ មួយ សប្តាហ៍ ហើយ គាត់ ពិតជា មាន ទំនុកចិត្ត នៅ ពេល ចាប់ផ្តើម ប្រឡង។ គាត់ បាន បញ្ចប់ លឿន ជាង សិស្ស ដទៃ ទៀត ប៉ុន្តែ ថ្ងៃនេះ គាត់ បាន ដឹង ថា គាត់ បរាជ័យ។ អ្នក ខ្លះ នឹង មាន អារម្មណ៍ ខកចិត្ត ចំពោះ លទ្ធផល នេះ។ អ្នក ខ្លះ អាច មាន អារម្មណ៍ ភ័យខ្លាច ក្នុង ការ ប្រាប់ ឪពុក ម្តាយ ឬ បន្ទោស គ្រូ ប៉ុន្តែ បុរី គិត ថា វា ពិតជា ល្អ ណាស់ ដែល គាត់ អាច រៀន ពី កំហុស របស់ គាត់។	Yesterday, Borey took the math exam. He worked hard all week and he was very confident at the beginning of the exam. He finished faster than the other students, but today he realized he had failed. Some people will be disappointed with the result. Some may be afraid to tell their parents or blame the teacher, but Borey thinks it is good that he can learn from his mistakes.
ម្សិលមិញ ប្អូនស្រី របស់ ម៉ានុន បាន លួច លុយ គាត់។ ថ្ងៃនេះ គាត់ មិនមាន លុយ ទិញ អាហារ ទេ។ គាត់ មិនបាន ស្រែក ដាក់ នាង ទេ ព្រោះ ជាធម្មតា នាង ជួយ គាត់ ហើយ នាង ប្រាប់ គាត់ថា នាង ស្រឡាញ់ គាត់។ វា ចម្លែក ណាស់ ព្រោះ នាង មាន ការងារ ធ្វើ។ គាត់ មិន ដឹង ថា នាង មាន បញ្ហា ឬ ក៏ នាង គិត ថា វាជា ការ លេង សើច ដើម្បី សប្បាយ។ គាត់ នឹង សួរ នាង នៅ យប់នេះ។ មិត្ត របស់ គាត់ បាន ចែករំលែក អាហារ ថ្ងៃត្រង់ អោយគាត់ ដូច្នេះ គាត់ មិនឃ្លាន ទេ។	Yesterday, Manon's sister stole his money. Today he has no money to buy food. He did not yell at her because she usually helped him and she told him she loved him. It's weird because she has a job. He did not know if she had a problem or if she thought it was just a joke. He will ask her tonight. His friend shared lunch with him so he was not hungry.
សំណាង ចង់ រៀន ភាសាអង់គ្លេស។ ក្តី ស្រមៃ របស់ គាត់ គឺ ចង់ រស់នៅ ក្នុង ប្រទេស កាណាដា ដូច្នេះ វា ពិតជា សំខាន់ សម្រាប់ គាត់។ គាត់ មិនមាន គ្រូ ដើម្បី រៀន ជាមួយ ទេ ប៉ុន្តែ នោះ មិន មែន ជា បញ្ហា ឡើយ ព្រោះ គាត់ មាន សៀវភៅ ច្រើន ហើយ គាត់ អាច រៀន តាម កាលមើល វីដេអូ នៅ លើ ទូរស័ព្ទ របស់ គាត់។ ទោះជាយ៉ាងណា គាត់ មិនមាន គ្នា ដើម្បី អនុវត្ត ជាមួយ ទេ ព្រោះ គាត់មិន ស្គាល់ ជនបរទេស ណា មួយ ឡើយ ហើយ មិត្តភ័ក្តិ គាត់ ក៏ មិនខ្វល់ នឹង ភាសាអង់គ្លេស ដែរ។ ពួកគេ ចូលចិត្ត លេងតែ បាល់ទាត់។	Samnang wants to learn English. His dream is to live in Canada, so it really matters to him. He does not have a teacher to study with, but that is not a problem because he has a lot of books and he can study by watching videos on his phone. However, he did not have anyone to practice with because he did not know any foreigners and his friends did not care about English. They like to play only football.

វត្តី ហាត់បាល់បោះ ជារៀងរាល់ ថ្ងៃ ជាមួយ មិត្តភក្តិ របស់ នាង។ នាង មិនមាន សម្លៀក បំពាក់ ត្រឹមត្រូវ ឬ ទីលាន បាល់ បោះ នោះ ទេ ប៉ុន្តែ នោះ មិនមែន ជា បញ្ហា នោះ ទេ ព្រោះ នាង អាចលេង ក្នុង សម្លៀកបំពាក់ ធម្មតា ហើយ នាង បាន បង្កើត សំណាញ់ បាល់បោះ នៅ ផ្ទះ របស់ នាង។ ទោះជាយ៉ាងណា ក៏ដោយ នាង មិនស្គាល់ នរណា ម្នាក់ ដែល អាច បង្រៀន នាង ពី របៀប កែលម្អ ចំណុច ខ្វះខាត នាង បាន ឡើយ ហើយ មិត្តភក្តិ	Vatey practices basketball every day with her friends. She does not have the right clothes or the basketball court, but that does not matter because she can play in casual clothes and she has created a basketball net at her home. However, she does not know anyone who can teach her how to improve her shortcomings and her friends can not help because they are not good at basketball.
កាហ្វេ គឺ ជា ភេសជ្ជៈ ពេញនិយម ខ្លាំង មួយ។ មនុស្ស ខ្លះ ផឹក កាហ្វេ ៤ ទៅ ៥ ពែង រៀងរាល់ ថ្ងៃ។ លើក ដំបូង ដែល អ្នក ផឹក វា ផ្តល់ ថាមពល ច្រើន។ មនុស្ស ខ្លះ មាន អារម្មណ៍ ល្អ បន្ទាប់ ពី ផឹក ខណៈ ដែល មនុស្ស មួយ ចំនួន ឈឺ ក្បាល។ វាល់ ពេល ដែល អ្នក ផឹក កាន់តែ ច្រើន កម្លាំង កាហ្វេ និង ថយ ចុះ។ ចុងក្រោយ អ្នក ត្រូវ ផឹក កាហ្វេ ដើម្បី មាន អារម្មណ៍ ភ្ញាក់ និង ស្រលះ។ ដូច្នេះ ហើយ មនុស្ស ផឹក វា រៀងរាល់ ថ្ងៃ។ វា មិន ប៉ះពាល់ សុខភាព ទេ បើ មិន ផឹក ច្រើន។	Coffee is a very popular beverage. Some people drink 4 to 5 cups of coffee every day. The first time you drink it gives you a lot of energy. Some people feel good after drinking while some people have a headache. The more you drink, the more coffee you have and the less energy you have. Finally, you need to drink coffee to feel awake and refreshed. And so people drink it every day. It does not affect health if not drunk a lot.
កីឡា គឺ ជា ការ កម្សាន្ត ពេញនិយម មួយ។ មនុស្ស ខ្លះ លេង កីឡា ប្រភេទ ផ្សេងៗ ជាច្រើន រៀងរាល់ ថ្ងៃ។ សាលារៀន លើក ទឹក ចិត្ត ឲ្យ កុមារ លេង កីឡា ដើម្បី សុខភាព និង រៀន អំពី ការ ងារ ជា ក្រុម ប៉ុន្តែ វា មិន មែន ជា ហេតុ ផល ដែល មនុស្ស ជ្រើសរើស ចំណាយ ពេល ក្រៅ ផ្ទះ និង លេង កំសាន្ត ពេល ពួកគេ ចង់ សប្បាយ ទេ។ មនុស្ស ចង់ ជួប មិត្តភក្តិ និង ចំណាយ ពេល ជាមួយ គ្នា។ ការ លេង កំ អាច ធ្វើ ឲ្យ មនុស្ស មាន អារម្មណ៍ សប្បាយ ចិត្ត ផង ដែរ។	Sport is a popular pastime. Some people play many different sports every day. Schools encourage children to play sports for health and learn about teamwork, but that is not why people choose to spend time outdoors and have fun when they want to have fun. People want to meet friends and spend time together. Playing can also make people feel happy.

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