Geminates in Guinaang Bontok:
Sonority Hierarchy and Phonetic Realization

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In Guinaang Bontok, consonants of all manners of articulation (stops, fricatives, nasals, liquids and glides) can appear as short and long (Reid 1963), which is not very common among the world’s languages. First, contrasts between short and long consonants are not as common as contrasts between short and long vowels (Ladefoged 2001). Second, not all consonants can appear as long even in the languages that have length contrasts in consonants. It was hypothesized that the cross-linguistically less common length contrasts, such as the length contrasts in glides, were phonetically less clear than the more common ones, such as contrasts between short and long stop and nasal consonants. In order to test this hypothesis, production data of different consonants in Guinaang Bontok were collected experimentally and an acoustic analysis of short and long consonants was conducted. The results suggest that the contrast between short and long glides is indeed phonetically less clear than the cross-linguistically more common contrast, such as the contrast in stop and nasal consonants.

1. Introduction

Bontok is one of the Central Cordilleran languages spoken in the municipality of Bontoc, Mountain Province in the northern Philippines (Reid 1976). This paper reports an acoustical analysis of single and geminate consonants in Guinaang Bontok. Guinaang Bontok is a dialect of Bontok that is spoken in Guinaang, a community of over 2,000 residents located in Mountain Province of northern Luzon.

Consonant phonemes of Guinaang Bontok are /p t k ? b d g m n ? l s w y/, and all of these consonants can appear as geminates phonologically (Reid 1963, 1973; E.

1 Versions of this paper were presented at a linguistic colloquium at California State University, Chico in February 2003, at the Tenth Annual Meeting of the Austronesian Formal Linguistic Association (AFLA X) in Honolulu, HI in March 2003, and at the Acoustical Society of America in Austin, TX in November 2003. A short summary of the presentation at AFLA X was published as Aoyama (2003). I sincerely thank Lawrence Reid, who helped me in constructing the word list in Guinaang Bontok, finding the participants, and instructing them. He was also a guide, a teacher and an interpreter during our trip to the Philippines. My thanks also go to the Catay family in the Guinaang village in the Philippines for their hospitality. I was inspired by Graham Thurgood’s 1993 paper, and discussions with Elzbieta Thurgood and Graham Thurgood have always been encouraging. I thank Sarai Granados and Lacey Decker for their assistance. Financial support was provided by the Arts and Sciences Advisory Council of the University of Hawai‘i at Mānoa. All errors are my own.
Of these consonants, /p t k m n l s w y/ appear as phonetically long consonants (e.g., [pː], [kː]). The voiced geminate stops are phonetically a sequence of two different consonants because the voiced stops (/b d g/) occur as [f], [ts] and [kʰ] in the syllable initial position in Guinaang Bontok (Reid 1963, 1973).

Phonetically long consonants may be analyzed as a cluster of identical consonants phonologically (Lehiste 1970; G. Thurgood 1993), as in the case in Guinaang Bontok (Reid 1963). Phonologically geminate consonants consist of the final consonant of the preceding syllable and the initial consonant of the following syllable (Hayes 1989; G. Thurgood 1993), regardless of their phonetic nature. The phonological analysis of phonetically long consonants varied in different languages reviewed in this paper. In order to avoid lengthy discussions on phonology of each individual language, the terms short/single and long/geminate will be used interchangeably. The discussions will be limited to phonological geminates (or clusters) that are phonetically long consonant in Guinaang Bontok and other languages.

The phonological contrast between short and long segments may be phonetically realized differently in various languages. For instance, it was found that the distinction between short and long nasals was clearer in Finnish than in Japanese (Aoyama 2001). Finnish allows more consonants to appear as long compared to Japanese (Sulkala and Karjalainen 1992; Vance 1987). In addition, it was found that long sounds occur more frequently in Finnish than in Japanese (Aoyama 2001). It appears that these frequency factors are related to how the contrast between short and long consonants are phonetically realized in each language.

The phonological contrast between short and long segments may also be realized differently depending on the segment. For short and long vowels, it was approximately 1:2 in languages such as Japanese (Han 1962), Danish, Finnish and Estonian (Lehiste 1970:34). In Swedish, it was reported that, on average, long vowels were just 55% longer than the short vowels (McAllister, Flege, and Piske 1999). For short and long consonants, Esposito and Di Benedetto (1999) reported approximately 1:2 ratio between short and long voiceless stops (/p t k/) in Italian. The ratio was much larger in Finnish; the ratio between short and long /t/ was 2.7 (Richardson 1998: 150). Finally, according to E. Thurgood (2001), the durational ratio between the short and long affricates in Polish ([tʃ] vs. [tʃʰ]) ranged from 1:1.6 to 1:1.8, which was smaller than ratios in stop consonants in Italian and Finnish.

Sato (1998) studied short and long contrasts in vowels, nasals, fricatives and stops in Japanese. The ranges of durational ratios between short and long segments were 1:1.56 – 1:1.9 for vowels, 1:2.04 – 1:2.83 for nasals, 1:1.79 – 1:1.82 for fricatives, and 1:2.03 to 1:2.44 for stops. As demonstrated in the Sato (1998) study and in the review of other studies, it appears that there is a cross-linguistic tendency in the duration of short and long consonants. The durational ratio between short and long segments is comparatively small for vowels, fricatives and affricates, ranging from 1:1.55 to 1:2, whereas long nasals and stops are twice or three times as long as their short
counterparts. In other words, long vowels, fricatives and affricates do not need to be as twice as long as their short counterparts in order to be phonologically long. Long stops and nasals, on the other hand, seem to be at least twice as long as the phonologically short stops and nasals.

Cross-linguistically, it is not very common that nearly all consonant phonemes can appear as long consonants as in Guinaang Bontok. First, contrasts between short and long consonants are not as common as contrasts between short and long vowels (Ladefoged 2001). Second, not all consonants can appear as long even in the languages that have length contrasts. For instance, stops, fricatives, nasals and liquids can appear as both short and long in Finnish, but glides do not (Sulkala and Karjalainen 1992). In Japanese, phonetically long consonants are limited to nasals and voiceless obstruents (e.g., [p t k s]) with some exceptions (Vance 1987).

Furthermore, geminate consonants tend to occur in a highly restricted phonetic environment even in the languages that allow geminate consonants. The most favored environment is intervocalic, following a short stressed vowel, and preceding another short vowel (G. Thurgood 1993). In addition, G. Thurgood (1993) proposed preferences for the place of articulation for geminates to occur based on cross-linguistic examination of geminate consonants. His study shows that there is a strong preference for alveolar consonants to appear as geminates regardless of their manner of articulation.

A similar kind of preference seems to exist for the manner of articulation. Cross-linguistically, it appears that long or geminate consonants are allowed usually for less sonorous consonants (e.g., stops) than more sonorous ones. In Thurgood’s study (1993), there are only four languages in which glide geminates can occur whereas there are many languages in which stop and nasal geminates can occur. The sonority scale, an index of sonority among different sounds, is shown in (1) (from Spencer 1996). It appears that, cross-linguistically, there is a preference for consonants of low sonority to appear as long.

(1) Sonority hierarchy (from Spencer 1996: 90):
category                         example of sounds
vowels                           a, i, u
glides                           y, w
liquids                          r, l
nasals                           n, m
fricatives/affricates           s, v, z, tʃ
stops                            p, t, k

This study investigated whether the cross-linguistically less common length contrasts, such as length contrasts in glides, were phonetically less clear than the more common ones, such as contrasts between short and long stop consonants. Based on the cross-linguistic observations of geminate consonants, it was hypothesized that the difference between short and long sounds are the largest among sounds such as /p/, /t/.

Counterexamples for the cross-linguistic preferences proposed here were brought to my attention by some people. Blevins (2004) states that there are different ways for geminates to evolve and that no absolute universals can be expected in geminate inventory or distribution. The cross-linguistic preferences or tendencies mentioned here are not to be taken as absolute universals, and counterexamples to the preferences should not be problematic.
and /k/, and smaller in sounds such as /y/ and /w/. An experiment was conducted in Guinaang Bontok since it has length contrasts in sounds in every category on the sonority hierarchy.

2. Method

2.1. Materials

A list of 96 Guinaang Bontok words was prepared for this experiment. The list consisted of pairs or triplets of words that contrasted by the length of the word-medial consonant. The medial consonants that contrasted in length were voiceless stops ([p t k?], 27 words), nasals ([m n j], 25 words), a fricative ([s], 7 words), liquids ([l] and [r], 16 words) and glides ([w y], 21 words). Seventy-eight of the words were existing words in Guinaang Bontok. Eighteen made-up words were used in order to create pairs or triplets contrasting by the length of the medial consonants, because it was difficult to find several pairs or triplets of existing words in all places and manners of articulation. The made-up words were created on the basis of an existing form, and they were all phonotactically well-formed in Guinaang Bontok. The participants did not seem to have difficulty with the made-up words.

Frame sentences were also prepared. When the initial consonant of the target word was a stop or an affricate, (a) Apedna kinwániyen (the target word) “He just said (the target word)” was used. When the initial consonant of the target word was a liquid, a nasal or a fricative, (b) Nan kinwánína ket (the target word) “What he said was the target word” was used. For names and some of the made-up words, (c) Si (the target word) nan inayákhana “The target word is the one he called” was used.

2.2. Data collection and data analysis

The participants were four native speakers of Guinaang Bontok (2 males, 2 females). They were all residents of the Guinaang village in Mountain Province in the northern Philippines. Two male participants and one female participant were in their late 40s and early 50s. The other female participant was 15 years old. The data collection was done in a participant’s house in the village, using a cassette tape recorder with a microphone.

The materials were orthographically presented to the participants. The words and frame sentences were written on a notebook using the local orthography. The words were randomized so that the words in the pairs or triplets did not appear one after the other. The participants were asked to say each word in isolation first, and then to repeat the word in the frame sentence twice. Thus, three tokens (one in isolation and two in the frame sentence) were collected for each target word from each participant.

Of the 96 words, 35 words were selected and acoustically analyzed (see Appendix). An effort was made to select words that (1) consisted of two syllables, (2) had a stress on the first syllable when there is a stress in the word, and (3) were produced in the frame sentence (a). There were few exceptions for each criterion. Eighteen words included

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6 Note that they may not minimally contrast by the length of the medial consonant.
7 A glottal stop precedes all vowels word-initially in Guinnang Bontok (Reid 1963 and pers. comm.).
8 In the local orthography, r is used for the [r] allophone of /l/, and ch is used for the [ts] allophone of /t/.
single consonants and the other seventeen words included geminate consonants. The target single or geminate consonants always appeared intervocalically.

The recordings were digitized at 22.05 kHz, and the data was analyzed acoustically using the program Pitchworks. Wide-band spectrograms were produced for each target word and the durations of single and geminate consonants were measured in milliseconds. For stop consonants, voice-onset time (VOT) was included as a part of the consonant for both singleton and geminates. A total of 420 tokens (35 words x 3 repetitions x 4 participants) were analyzed.

3. Results

Table 1 summarizes the overall results. The duration values of the tokens produced in isolation and in the frame sentences were averaged because the values of the productions in isolation and in the frame sentences were highly correlated in all 4 subjects (r > .71, p < 0.01). The durations of the consonants in the last repetition were significantly shorter than the ones produced in isolation for 3 out of the 4 participants (paired t-test, t(34) = 2.2 to 3.1, p < 0.05). This is probably due to a faster speaking rate toward the end of three repetitions, rather than a difference between productions in isolation and in a frame sentence. The values from the second repetition (with a frame sentence) did not differ significantly from the ones in isolation.

<table>
<thead>
<tr>
<th></th>
<th>singleton mean (in ms.) (SD)</th>
<th>geminate mean (in ms.) (SD)</th>
<th>Ratio single: geminate</th>
</tr>
</thead>
<tbody>
<tr>
<td>glide</td>
<td>90 (16)</td>
<td>140 (25)</td>
<td>1.56</td>
</tr>
<tr>
<td>liquid</td>
<td>79 (13)</td>
<td>150 (28)</td>
<td>1.90</td>
</tr>
<tr>
<td>nasal</td>
<td>78 (16)</td>
<td>162 (28)</td>
<td>2.08</td>
</tr>
<tr>
<td>fricative</td>
<td>122 (14)</td>
<td>204 (33)</td>
<td>1.67</td>
</tr>
<tr>
<td>stop</td>
<td>94 (22)</td>
<td>176 (34)</td>
<td>1.87</td>
</tr>
</tbody>
</table>

Note: Average durations for fricatives are based on 24 tokens (2 words x 3 repetitions x 4 speakers) for singleton, and 12 tokens (1 word x 3 repetitions x 4 speakers) for geminates. For all others, each average duration is based on 48 tokens (4 words x 3 repetitions x 4 speakers).

As expected, the average durations of geminate consonants were significantly longer than those of singletons in all consonant categories (for /s/, t(11) = 9.7, for other consonants t(47) = 14.0 to 17.9, p < 0.01, see Table 1 and Figure 1). The durational contrast between single and geminate consonants was the largest in nasals (mean 78 vs. 162 ms., ratio 1:2.08). The contrast in stops and liquids was the second largest (mean 94 vs. 176 ms. for stops, 79 vs. 150 ms. for liquids). It was smaller for fricatives (mean 122 vs. 204 ms., ratio 1:1.67) and the smallest for glides (mean 90 vs. 140 ms., ratio 1:1.56). The average duration of short glides was 90 ms., which was about 10 ms. longer than the average durations of short nasals and liquids (78 and 79 ms. respectively). The
average duration of geminate glides was also the shortest (140 ms.) compared to the average durations of other geminates (stops 176 ms., fricatives, 204 ms., nasals 162 ms., liquids 150 ms.).

Figure 1. Overall average duration of single and geminate consonants

Note: Average durations for fricatives are based on 24 tokens (2 words x 3 repetitions x 4 speakers) for singleton, and 12 tokens (1 word x 3 repetitions x 4 speakers) for geminates. For all others, each average duration is based on 48 tokens (4 words x 3 repetitions x 4 speakers).

Figure 2 shows the distribution of duration values for stops, nasals and glides. The values of short stops ranged from 53 to 138 ms., and those of nasals ranged from 51 to 116 ms. The shortest token of single glide consonants was 63 ms., which was 10 ms. longer than the shortest stop and nasal consonants (53 and 51 ms. respectively). The duration range for geminate glides was narrower and shorter in absolute duration, 100–205 ms., than the range for geminate stops and nasals (120–247 ms. and 113–234 ms. respectively).

Table 2 shows the range of duration values for single and geminate consonants grouped by the manners of articulation. It also shows the number of singleton tokens that were longer than the shortest geminate consonant in that category, and the number of geminate tokens that were shorter than the longest single consonant in that category. For instance, there were 5 tokens of single stop consonants that were longer than 120 ms., which was the shortest among the geminate stop tokens. Similarly, there were 3 tokens of geminate stops that were shorter than 138 ms., which was the duration of the longest single stop consonant.
Figure 2. Distribution of duration values for stops, nasals, and glides

Note: Each average duration is based on 48 tokens (4 words x 3 repetitions x 4 speakers).

<table>
<thead>
<tr>
<th></th>
<th>range-singleton (in ms.)</th>
<th>range-geminates (in ms.)</th>
<th>N of singleton in the geminate range</th>
<th>N of geminate in the singleton range</th>
</tr>
</thead>
<tbody>
<tr>
<td>glide</td>
<td>63–136</td>
<td>100–205</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>liquid</td>
<td>55–109</td>
<td>100–219</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>nasal</td>
<td>51–116</td>
<td>113–234</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>fricative</td>
<td>96–152</td>
<td>148–276</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>stop</td>
<td>53–138</td>
<td>120–247</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: Average durations for fricatives are based on 24 tokens (2 words x 3 repetitions x 4 speakers) for singleton, and 12 tokens (1 word x 3 repetitions x 4 speakers) for geminates. For all others, each average duration is based on 48 tokens (4 words x 3 repetitions x 4 speakers).

It can be seen from Table 2 that there was a large overlap in duration values between single and geminate glides. There were 11 tokens of single glides that were
longer than the shortest geminate glide (100 ms.), and there were 23 tokens of geminate glides that were shorter than 136 ms., the duration of the longest single glide. The numbers of singleton tokens that were longer than the shortest geminate single glide were less than 5 in all the other categories. Similarly, the numbers of geminate tokens that were shorter than the longest singleton token were less than 3 in all the other categories.

4. Summary and Discussion

The experimental data from Guinaang Bontok suggest that all geminate consonants were clearly differentiated from single consonants in duration. Nonetheless, the phonologically binary length contrast was phonetically realized differently for consonants of different manners of articulation. The contrast between single and geminate consonants was the largest in nasals, and the smallest in glides. In addition, the average duration of phonologically short and long consonants varied considerably; the average duration of phonologically short consonants ranged from 78 ms. (nasals) to 122 ms. (fricative), and the average duration of phonologically 'long' consonants ranged from 140 ms. (glides) to 204 ms. (fricatives).

The phonetic contrast between short and long consonants in Guinaang Bontok appears to be somewhat smaller compared to other languages. For stop consonants in Italian, Esposito and Di Benedetto (1999) reported duration of single /p t k/ to be approximately 100 ms., and geminate /pp tt kk/ to be approximately 200 ms.\(^9\) In Japanese, the average duration of single stop consonants was 70 ms. and the average duration of geminate stop consonants was 157 ms. in Sato’s study (1998). Han’s data on Japanese stop consonants showed similar values as in Sato (1998) (79 ms. vs. 198 ms., Han 1994).\(^10\) In Richardson (1998), Finnish adults’ production showed much larger values, 118 ms. vs. 319 ms. This was probably because the adult participants in Richardson (1998) were instructed to produce the target words in a manner in which they would ask children to imitate. In any case, the durational ratios between single and geminate stops ranged from 1:2 (Italian; Esposito and Di Benedetto 1999) to 1:2.7 (Finnish; Richardson 1998), and were larger than the ratio between short and long stops in Guinaang Bontok (1:1.87).

The durational ratio in nasals in Guinaang Bontok was also smaller than those in other languages. In Guinaang Bontok, the average duration of single nasals was 78 ms. and the average duration of geminate nasals was 162 ms (ratio 1:2.08). In Japanese, the average duration of short nasals was 50 ms. and the average duration of long nasals was 125 ms. in Sato (1998), and they were 68 ms. and 178 ms. respectively in Aoyama (2001). The Finnish contrast seems to be the largest for nasal consonants as well as for stop consonants; the average duration of short nasals was 62 ms. and the average duration of long nasals was 178 ms. (Aoyama 2001). In summary, the ratios between short and long nasal consonants were over 1:2.5 in both Finnish and Japanese (Sato 1998; Aoyama 2001). The durational ratio in Guinaang Bontok (1:2.08) was smaller than the similar contrasts in Finnish and Japanese, although the contrast in nasals was larger than those in other consonants in Guinaang Bontok.

\(^9\) The values can only be read from the figure (Figure 7, Esposito and Di Benedetto 1999).
\(^10\) Han (1994) and Sato (1998) reported the average duration of each test word, and I averaged the duration of each consonant. Voice onset time (VOT) was included as a part of consonant in both cases.
The contrast in fricatives seemed to be realized differently from length contrasts in other consonants. The contrast between single and geminate fricatives was rather small on average (122 ms. vs. 204 ms., ratio 1:1.67, see Table 1), but the range and overlap analysis suggested that the single and geminate fricatives were differentiated clearly. The boundary between short and long fricative geminates was approximately 150 ms.; all single fricative tokens were shorter than 150 ms. except for one, and all but one geminate fricative tokens were longer than 150 ms. Sato (1998) also reported a smaller durational ratio between short and long fricatives (103 ms. vs. 185 ms., ratio 1:1.80) compared to short and long stops and nasals. There was also no overlap in absolute durations of tokens (Sato 1998). Fricatives are intrinsically longer than stops, nasals and liquids (Lehiste 1970; Edwards 1997), thus the phonologically short fricatives are inevitably longer than the other short segments. The contrast seems to be well-maintained because the long fricatives are also longer (mean 204 ms.) than the other long segments, such as nasals (mean 162 ms.) and stops (mean 176 ms.). In the current study, fewer fricative tokens were analyzed compared to other consonants. More analysis needs to be conducted on fricatives tokens to confirm this finding.

It is known that place of articulation influences the intrinsic duration of consonants (Lehiste 1970). Han (1962) found that geminate /pp/ is generally 10% longer than geminate /kk/, and Espoisto and Di Benedetto (1999) showed differences among single and geminate /p t k/. The ratios and absolute durations in the current dataset may not be an accurate representation of consonants of different manners of articulation because some manners of articulation were represented by three consonants and others were examined by fewer consonants (see Appendix).

In summary, the acoustic analysis of single and geminate consonants in Bontok suggested that the phonological length contrast is more clearly realized in stops, nasals, and liquids than in glides. It seems that the phonetic properties of contrasts between single and geminate contrasts in Guinaang Bontok match with the cross-linguistic tendencies; the results suggest that the length contrasts are phonetically larger in more commonly found length contrasts (stops and nasals) than less commonly found contrasts (glides) in a language which has length contrasts in consonants of all manners of articulation.
Appendix: The list of words and frame sentences

The word list

<table>
<thead>
<tr>
<th>Target word</th>
<th>Gloss</th>
<th>Frame sentence used</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stop</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ípit</td>
<td>squeeze</td>
<td>a</td>
</tr>
<tr>
<td>ippit</td>
<td>a nonsense word</td>
<td>a</td>
</tr>
<tr>
<td>kópot</td>
<td>a nonsense word</td>
<td>a</td>
</tr>
<tr>
<td>koppot</td>
<td>a kind of mushroom</td>
<td>a</td>
</tr>
<tr>
<td>kákak</td>
<td>a kind of bird</td>
<td>a</td>
</tr>
<tr>
<td>kakak</td>
<td>a clacking sound</td>
<td>a</td>
</tr>
<tr>
<td>ókip</td>
<td>pack</td>
<td>a</td>
</tr>
<tr>
<td>okkip</td>
<td>a nonsense word</td>
<td>a</td>
</tr>
<tr>
<td><strong>Fricative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lísíng</td>
<td>a nonsense word</td>
<td>b</td>
</tr>
<tr>
<td>lísing</td>
<td>a nonsense word</td>
<td>c</td>
</tr>
<tr>
<td>lissing</td>
<td>a kind of beetle</td>
<td>b</td>
</tr>
<tr>
<td><strong>Nasal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>amá</td>
<td>father</td>
<td>a</td>
</tr>
<tr>
<td>amma</td>
<td>do something gently</td>
<td>a</td>
</tr>
<tr>
<td>anák</td>
<td>child</td>
<td>a</td>
</tr>
<tr>
<td>an-annak</td>
<td>children</td>
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<tr>
<td>iná</td>
<td>mother</td>
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<td>inna</td>
<td>a nonsense word</td>
<td>a</td>
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<tr>
<td>tónga</td>
<td>a nonsense word</td>
<td>a</td>
</tr>
<tr>
<td>tongnga</td>
<td>an ear of corn</td>
<td>a</td>
</tr>
<tr>
<td><strong>Liquid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ílang</td>
<td>a portion of fresh meat</td>
<td>a</td>
</tr>
<tr>
<td>illang</td>
<td>name of a place</td>
<td>a</td>
</tr>
<tr>
<td>Word</td>
<td>Meaning</td>
<td>Syllable</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------</td>
<td>----------</td>
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<tr>
<td>aling</td>
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<td>alling</td>
<td>earring</td>
<td>a</td>
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<tr>
<td>árang</td>
<td>rice granary</td>
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</tr>
<tr>
<td>arrang</td>
<td>bagasse</td>
<td>a</td>
</tr>
<tr>
<td>arók</td>
<td>urge</td>
<td>a</td>
</tr>
<tr>
<td>arrok</td>
<td>a simple-minded person</td>
<td>a</td>
</tr>
</tbody>
</table>

**Glide**

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
<th>Syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td>kháwa</td>
<td>center</td>
<td>a</td>
</tr>
<tr>
<td>khawwa</td>
<td>middle finger</td>
<td>a</td>
</tr>
<tr>
<td>cháya</td>
<td>sky</td>
<td>a</td>
</tr>
<tr>
<td>chayya</td>
<td>a name</td>
<td>a</td>
</tr>
<tr>
<td>cháyon</td>
<td>swing</td>
<td>a</td>
</tr>
<tr>
<td>chayyong</td>
<td>a kind of rice</td>
<td>a</td>
</tr>
<tr>
<td>káyang</td>
<td>play with water</td>
<td>a</td>
</tr>
<tr>
<td>kayyang</td>
<td>a kind of wine jar</td>
<td>a</td>
</tr>
</tbody>
</table>

**Frame sentences**

(a) *Apedna kinwániyen* (the target word).

“He just said ____.”

(b) *Nan kinwánina ket* (the target word)

“What he said was ____’.

(c) *Sí* (the target word) *nan inayákhana*.

“____ is the one he called.”
References


