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IN
LINGUISTICS

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BANGKOK THAI TONES REVISITED

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There is a long tradition of studying Thai tones, beginning with the works of Cornelius Bradley (1909 and 1911) and Daniel Jones (1918, in Henderson 1976). The landmark work in Thai tonal description was done by Abramson in 1962. Both linguists and Thai language teachers alike consider the 1962 description to be the prescriptive standard and norm today. In 2006, Morén and Zsiga provided a description of Thai tones that many scholars in the field consider controversial, as it differs greatly from Abramson 1962. The current study offers a preliminary look at the state of Bangkok tones today as spoken by twenty-five female native speakers from three different age groups: Younger (18–24), Middle (30–40), and Older (50+). The current study shows preliminary evidence toward a change in progress for Bangkok Thai tone production, particularly in tone shapes across the three age groups examined. Younger speakers show a general trend toward a higher tonal onset for the Mid and Low tones, as well as a later pitch change for both the Falling and Rising tones.

1. BANGKOK THAI. Bangkok Thai, also known as Siamese in the linguistic literature, is a dialect of Thai spoken in the capitol of the Kingdom of Thailand. Linguists generally consider Bangkok Thai and Standard Thai, the Kingdom’s official language, to be one and the same. Much like Standard Thai, Bangkok Thai has high social prestige and is often used in mainstream Thai media such as talk shows, game shows, and television dramas. Anivan (1988) found that Bangkok speakers have the most innovative tones, while non-Bangkok speakers are more conservative, using tones that pattern with older Bangkok speakers. Tienmee (1992) observed that non-Bangkok Thai speakers seem to be aiming at Bangkok Thai when speaking Standard Thai. The difference between Bangkok Thai and Standard Thai is most likely one of register rather than dialect.

1.1 BANGKOK THAI TONES. There are five lexical tones in Bangkok Thai: High, Mid, Low, Falling, and Rising. High, Mid, and Low tones are traditionally considered to be level or relatively static, while Falling and Rising are considered to be contour tones. Table 1 illustrates the five lexical tones.

TABLE 1. Bangkok Thai Tones.

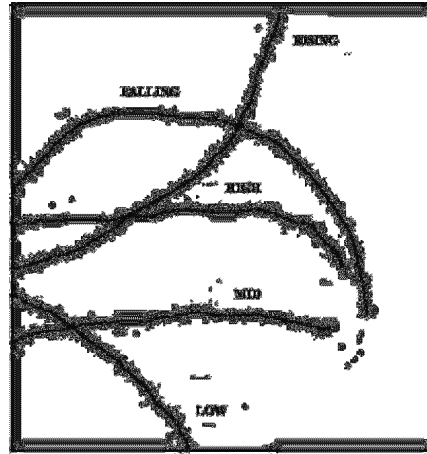
Thai	IPA	Tones	Gloss
กา	k ^h a:	Mid	n. ‘type of grass’ adj. ‘stuck, ajar’
ก้า	k ^h á:	High	n. ‘commerce’ v. ‘to sell’
ก่า	k ^h à:	Low	n. ‘galangal root’
ก้า	k ^h â:	Falling	n. ‘price, cost’
ขา	k ^h ǎ:	Rising	n. ‘leg’

Thai has a relatively restricted syllable structure with limited initial consonant clusters, no final consonant clusters, and a small number of allowable coda consonants. Additionally, Thai tones are distributed according to syllable types, distinguishing between open and closed syllables. Only Low, Falling, and High tones are allowed in closed syllables. Of all the tones, High tone has the lowest functional load in indigenous vocabulary, allowable only in two types of syllables.¹

¹ Syllables ending with nasals or semi vowels are open syllables, while those ending with voiceless stops are closed syllables. The High tone is allowed in (1) open syllables with an initial Low consonant and second tone marker and (2) closed syllables with an initial Low consonant and short vowel. See Appendix A for the Thai Tone Box.

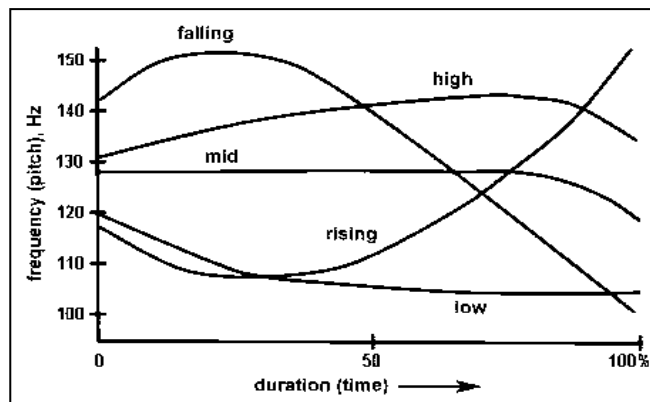
1.2 PREVIOUS DESCRIPTIONS OF THAI TONES. A historical cross-section of tonal descriptions shows that Standard Thai tones (and presumably also Bangkok Tones) are, indeed, phonetically changing. Studies from the early twentieth century by Bradley (1909 and 1911) and Jones (1918, in Henderson 1976) described Mid and Low as fairly static, though Mid had a slight fall toward the tonal offset.² Rising tone was not particularly contoured. High tone had a slight rise followed by a period of tonal plateau and ended with a sudden fall. Neither of the early studies indicated the age or gender of the speakers, though it is highly likely that Bradley recorded himself, as he was a native bilingual speaker of Standard Thai. Figure 1 below illustrates the tones of Siamese as recorded by Bradley (1911).

FIGURE 1. Tones recorded by Bradley (1911, adapted from Teeranon 2007).



A half-century after Bradley and Jones, Abramson (1962) observed, as shown in figure 2, markedly different tones when he recorded two male speakers in their 30s. High and Mid tones remain fairly static, with a slight fall during the last ten percent of the tonal duration. Low tone shows a gradual fall in F0 values in the first half of the tonal duration and remains static for the second half of the duration. Falling and Rising tones are highly contoured. Falling tone is characterized by a slight rise followed by a very short plateau and relatively sudden fall. Rising tone begins with a slight fall and is also followed by a slight contour with a relatively sudden rise.

FIGURE 2. Tones recorded by Abramson (1962).

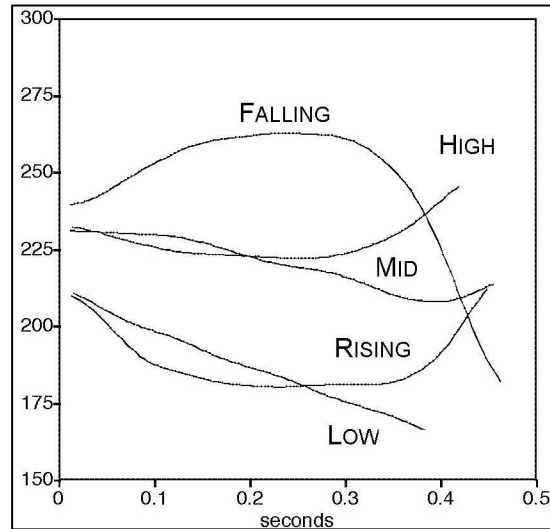


The most recent works show, yet again, different phonetic shapes for the five tones. Scholars (Morén and Zsiga 2006 and Teeranon 2007) found that High and Mid tones now have similar concave tone

² Though their recording methodology was surely different from current practices, their descriptions prove to be detailed and thorough. Their observations were so keen as to include some of the earliest notes on the relationship between tone distribution and syllable types.

shapes, that is, beginning with a slight fall in F0 values, followed by a plateau and ending with a slight rise. Teeranon (2007) argues that since High tone is becoming increasingly contoured, it should be categorized as such instead of as a ‘level’ or static tone. Falling tone remains remarkably similar to previous descriptions in that it has a slight rise followed by a small plateau and a sudden fall. Falling tone is phonetically higher than the High tone. Morén and Zsiga (2006) and Luksaneeyanawin (1998) show Low tone to be the most phonetically static, characterized by a gradual fall from tonal onset to tonal offset. Figure 3 illustrates the tones from Morén and Zsiga 2006.

FIGURE 3. Tones recorded by Morén and Zsiga (2006, as quoted in Zsiga 2007).



Some recent studies (i.e., Panroj 1990, Teeranon 2007, Kantong 2008) have tried to capture the tonal differences between younger and older speakers, while the majority of tonal studies did not, treating the tones as static across time and different speakers. Nearly a half-century after Abramson’s (1962) description, linguists and Thai language teachers alike still refer to his as the norm for Bangkok Thai speech (Hoonchamlong 2007). Sociolinguistic investigation of tones in the varieties of Thai is clearly still in its infancy, with no thorough description having been done on Bangkok Thai in nearly a half century.

Studies conducted after Abramsom (1962) involve young female adult speakers, usually in their early to mid 20s. Female Thai speakers have been more accessible than male speakers for linguistic studies, most likely because Thai linguists are overwhelmingly female with female students, or were themselves students working with foreign advisors abroad. Thai language teachers both domestically and internationally are also typically female. Additionally, scholarly work in Thai tones has focused primarily on citation-form pronunciation rather than connected speech, though there has been increased interest in connected speech pronunciation as well as tonal perception experiments (i.e., Tingsabadh and Krisnaphan 1996 and Roengpitya 2000, respectively). There is reason to revisit the citation-form pronunciation of Bangkok Thai tones, however. Noss (1975) argues convincingly that a thorough understanding of citation-form pronunciations is essential as the groundwork for any tonal study in Thai, whether phonetic or phonological. The current study continues with existing trends in Thai tonal phonetics. The author hopes to expand the scope of future investigations to include male speakers and connected speech pronunciations.

2. CURRENT STUDY.

2.1 SPEAKERS. Fifteen female native speakers of Bangkok Thai participated in this study. All speakers were born and raised in Bangkok with native Thai-speaking parents. Every speaker is a current resident of Bangkok and either has never lived outside of Bangkok for more than six consecutive months or has not done so in the past five years. All speakers reported using Standard/Bangkok Thai as the home language. Every speaker is currently attending university or is a university graduate. Speakers’ ages range from 18

to 61 years old. For this study the speakers were divided into three age groups, with five speakers per age group: 18–24 (Younger), 30–40 (Middle), and 50+ (Older).

2.2 RECORDING PROCEDURES. Participants were told that they were helping a foreigner learn Thai and needed to ask the learner to repeat what he or she just said. The goal was to elicit the most careful citation-forms at a moderate speech rate from the participants. Participants read the word list into an external microphone and were recorded directly into Praat. The recordings were made in a quiet office with minimal to no echo, as no sound-treated rooms were available for use at the time of this study. Participants read a twenty-four-word word list twice in the frame sentence, [p^hû:t¹ wâ: X ʔi:k¹ t^hi: dâ:j máj/mǎj k^há] ‘can you please say X again?’. The participants were asked to read the word list as naturally as possible at a moderate pace. The word list was typewritten in Thai and numbered from one to twenty-four.

2.3 LANGUAGE DATA. Words on the word list begin with a voiceless consonant and contain the long low front vowel [a:]. When possible, the words are open-syllables. The words are real lexical items in Thai. Initial consonants are organized into five different places of articulation: labial [p,p^h], alveolar [t,t^h], palatal [tɕ,tɕ^h], velar [k,k^h], and glottal [ʔ, h]. The distribution of the five tones—High, Mid, Low, Falling and Rising—is as even across the places of articulation as possible. There are five words each for Mid, Low, Falling and Rising tones. High tone has a total of four words.³ As tonal distribution is determined by the consonants and syllable types, three words recorded—3.[t^hà:t], 6.[tɕ^hâ:t], and 11.[hà:t]—are closed syllables in order to complete the tonal paradigm.⁴ There are a total of 720 tokens (2 x 15 speakers x 24 words) analyzed in this study. Table 2 shows the words and their phonetic distribution.

TABLE 2. Word list.

		Tones				
		High	Mid	Low	Falling	Rising
Place of Articulation	Bilabial	9. ป้า /pá:/	1. พา /p ^h a:/	16. ฟ้า /p ^h à:/	22. ป้า /pâ:/	14. ผ่า /p ^h ǎ:/
	Alveolar	21. ท้า /t ^h á:/	25. ต้า /ta:/	3. ถาด /t ^h à:t/	12. ท้า /t ^h â:/	19. ฐาน /t ^h ǎ:n/
	Alveo-Palatal	4. ช้า /tɕ ^h á:/	20. ช้า /tɕ ^h a:/	24. ฉ้า /tɕ ^h à:/	6. ช้าดี /tɕ ^h â:t/	23. ฉ้า /tɕ ^h ǎ:/
	Velar	13. ค้า /k ^h á:/	18. ค้า /k ^h a:/	8. ข้า /k ^h à:/	2. ค้า /k ^h â:/	10. ข้า /k ^h ǎ:/
	Glottal	n/a	7. อ้า /ʔa:/	11. หาด /hà:t/	17. อ้า /ʔâ:/	5. ห้า /hǎ:/

2.4 ANALYSIS. Recordings were conducted at a 44 kHz sampling rate. Each token was segmented at the vowel onset and offset. The vowel onset is defined in this study as the first high amplitude glottal pulse with an F0 value. In the case of unaspirated stops [p,t,k] and the glottal stop [ʔ], the vowel onset was defined as the fourth high amplitude glottal pulse to allow for the voicing onset. The vowel offset is defined as the second to last high amplitude glottal pulse with an F0 value. Segmented vowel intervals were each cross-checked visually with the spectrogram readings and also with the audio signals. The statistical

3 High tone is limited in terms of distribution and has a much lower functional load than the other four tones, as it can occur only in two syllable categories. There are no native Thai lexical items that contain a glottal initial consonant, the long vowel [a:], and the High tone.

4 There are lexical gaps in the Thai tonal paradigm for which the closed syllables [t^hà:t] and [tɕ^hâ:t] are used. No such open-syllable Thai words exist with initial [t^h] and [tɕ^h] with the vowel [a:] that contains the low and falling tones, respectively. The word [hà:t], however, was chosen in place of the open syllable [hà:], as the latter can be considered to be vulgar and some participants may have not been comfortable reading the word aloud.

analysis includes only one token per word in this study. With the exception of Female 14, the second token of each word was analyzed.⁵

Each vowel interval was measured for the F0 values with the aid of a Praat script. Measurements were taken at the vowel onset and at every 10% of the vowel duration thereafter, with a total of eleven points along the F0 trajectory, resulting in 3960 measurements (11 points x 24 words x 15 speakers). The mean F0 value (\bar{x}) was calculated for each vowel interval (per tone, per speaker, and per age group). The pitch range for each speaker was then individually determined and the pitch range for each speaker was normalized on a scale from 0 to 5. Zero represents the lowest F0 value of the speaker and 5 represents the highest. Measurements were statistically analysed and plotted with the aid of MS Excel.

3. RESULTS. All five tones are phonetically different from those observed by Abramson (1962), including those of the Older Speakers. The tonal patterns of all speakers pattern more closely with those of Morén and Zsiga (2006) than with those of Abramson, even for Older speakers. The results of this study point toward on-going phonetic changes of Thai tones in tonal shapes, onsets, and offsets. Of the five tones, the three age groups vary the most in their realization of the High tone. High and Mid tones changed from a convex pitch contour—a gradual rise in pitch after the onset, followed by a relatively static state that ends with a small dip—to a concave one. Younger speakers also have a higher tonal onset for the Low tone, being the same as the onsets for both the High and the Mid tones. This is in contrast to the patterns found in Older and Middle speakers where the High and Mid tones have an extremely similar onset pitch of 3. The Rising and Low tones in Older and Middle speakers do not share an onset range, unlike those observed by Abramson and Morén and Zsiga. Rising tone is the lowest tonal onset of all the five tones for all age groups. The discussion of the tones will be according to the numbers in the normalized pitch range, ranging from 0 to 5, as explained in the previous section.

3.1 OLDER SPEAKERS. Tones for the Older speakers in this study generally do not pattern with the Abramson “model” tones. The Older speakers would have been in their teens during Abramson’s study and, as to be expected, do not have the same tones as the speakers from his study who are a generation older. In fact, the Older speakers’ tones in this study pattern more closely with those observed by Morén and Zsiga.

The Falling tone in Older speakers begins slightly above 4 and remains relatively static for approximately 60% of the vowel duration, at which point the pitch falls to 2 during the last 40% of the vowel duration. The Falling tone is the only tone in this age group that patterns neither with any other tones in the paradigm nor with the Falling tone from previous studies. Older speakers’ average Falling tone in this study is characterized by a prolonged pitch plateau followed by a gradual fall in pitch in the last 30% of the duration. Falling tone observed by Abramson, however, shows an immediate rise during the first 25% of the duration followed by a gradual fall covering almost the entire pitch range until the tonal offset. Older speakers in this study do not have an immediate increase at the tonal onset and a much less dramatic decrease in pitch toward the tonal offset. Falling tone of Older speakers in this study shows much less of a decrease in pitch toward the tonal offset when compared with the Falling tone observed by Morén and Zsiga, though they do share the prolonged plateau.

High tone, as noted by Teeranon, is no longer phonetically high, but is realized mostly in the sixtieth percentile of the pitch range. High tone has a concave tone shape with a slight ‘hook’ in the last 10% of the duration. Additionally, High tone begins below 3 and shows a very small decrease in pitch during the first 40% of the duration, after which the pitch rises to slightly above 3 and then suddenly dips back down to 3 for the last 10% of the duration. The small “hook” at the end of the contour matches one observed by Abramson, though the hook found in the Older speakers here begins approximately 5%—10% later than the one in his study. High tone, in addition to not being particularly “high,” is very similar to the Rising tone, sharing nearly the same tonal contour.

5 A combination of the first and second utterances was analyzed for Female 14 due to some instances of intrusive ambient noise.

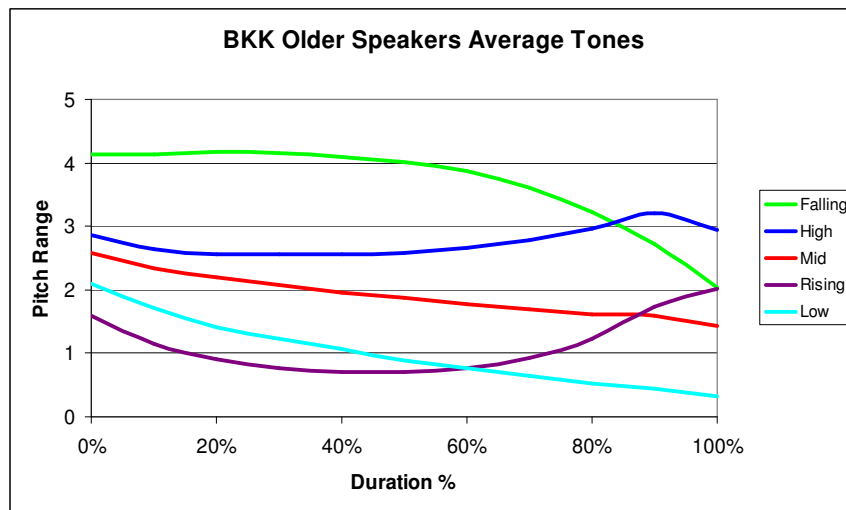
Rising tone is also concave, though it does not have the “hook” before the tonal offset. Rising tone for Older speakers begins between 1 and 2, then falls to its lowest point by 50% of the duration, followed by a gradual rise to 2 for the remaining 50% of the duration. The similarities between High and Rising tone are also evident in Morén and Zsiga 2006, though their two speakers do not have the “hook.” Recall, however, that the two speakers recorded by Morén and Zsiga are in their mid-20s and, thus, would not expectedly pattern with the Older Speakers in this study who are approximately one generation older. Rising tone does not share onset pitch range with the Low tone, unlike the pattern observed by Abramson and Morén and Zsiga.

The last two tones—Mid and Low—are nearly parallel though they are a different pitch range. Mid tone begins midway between 3 and 4 and gradually decreases in pitch to between 1 and 2. Low tone has a slightly steeper negative slope, beginning just above 2, then decreasing to just above 0. Of all the tones, Mid and Low have the most accurate nomenclature, as Low truly is the phonetically lowest tone, and Mid truly begins at the midpoint and stays well within the middle of the pitch range. Figure 4 shows the average tones for Older speakers.

3.2 MIDDLE SPEAKERS. Middle speakers in this study also do not pattern with the Abramson “model” tones. As expected, their tones are more closely aligned with the Morén and Zsiga study, as they are fairly close in age with the two speakers recorded. There are some characteristics, however, that set the tones of Middle speakers apart from those of Older speakers and Younger speakers.

Falling tone for Middle speakers is very similar to that of the Older speakers, though the decrease in pitch begins much later at approximately 75% of the tonal duration, whereas Older speakers’ Falling tone shows a decrease beginning slightly before the 60% mark. Additionally, the Falling tone has a lesser pitch decrease, from slightly above 4 to midway between 3 and 2 in the pitch range, while Older speakers show a decrease from 4 to 2 in the pitch range.

FIGURE 4. Average Tones for Older Speakers of Bangkok Thai.



High and Rising tones are similar in their concave contour, matching that found in the Older speakers as well as the pattern in Morén and Zsiga 2006. The High tone does, however, have a slight “hook” at the tonal offset, though the decrease in pitch is not as much as the one observed for the High tone of Older speakers. The High tone for Middle speakers is otherwise like that of Older speakers, with the tonal onset and the offset at approximately the 60th percentile of the pitch range and is, at its lowest point, midway between 3 and 2 by 40% of the tonal duration.

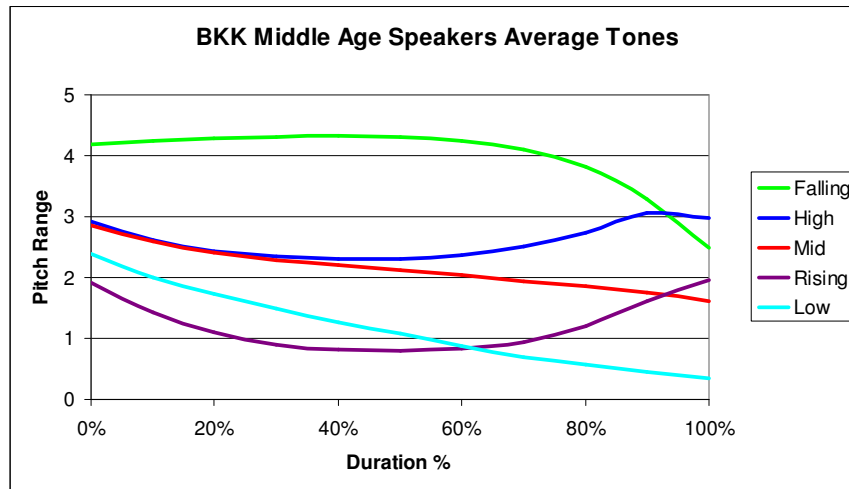
The Rising tone in Middle speakers has a concave shape with both the tonal onset and offset at 2 in the pitch range, slightly higher than that of Older speakers. The lowest point of the tone is at 50% of the tonal duration and rests slightly below 1 in the pitch range. Middle speakers’ Rising tone does not share a tonal onset range with the Low tone.

The Mid and Low tones for Middle speakers are similar though not nearly as parallel as for Older speakers. The Mid tone begins at 3 in the pitch range, and gradually decreases in pitch until the tonal offset at slightly below 2 in the pitch range. The Low tone begins midway between 3 and 2 in the pitch range, and has more of a decrease in pitch than for the Mid tone, with the tonal offset slightly above 0 in the pitch range. As is the case also for Older speakers, the Low tone for Middle speaker is phonetically the lowest tone, and the Mid tone is phonetically within the middle tone range in the paradigm. Figure 5 shows the average tones for Middle speakers.

3.3 YOUNGER SPEAKERS. Younger speakers' tones differ entirely from the Abramson "model," resembling more closely the tones observed by Morén and Zsiga, though there are some distinct differences. The speakers in Morén and Zsiga 2006 are nearly ten years older than most of the Younger speakers in this age group, which may contribute to the differences found when comparing the tones of these two groups.

With a few differences, Falling tone for Younger speakers in this study patterns generally with Falling tone of the Older and Middle speakers. The tone begins nearly midway between 5 and 4 in the pitch range and remains relatively static until the remaining 30% of the duration, at which point the pitch decreases to 3 in the pitch range. When compared with the Falling tones of Older and Middle speakers, the Younger speakers in this study have a higher tonal onset and smaller and shorter pitch fall. This characteristic matches the anecdotal observations made by some Older speakers that Younger speakers' tones are 'flat' in pitch. The total pitch fall for the Falling tone is slightly over 10% of the total pitch range whereas the pitch fall is over 20% for Older speakers and nearly 20% for Middle speakers. The pitch fall duration is 30% of the total tone duration for Younger and Middle speakers, whereas it is 50% for Older speakers.

FIGURE 5. Average Tones for Middle Speakers of Bangkok Thai.



The High tone in Younger speakers has an onset slightly below 3 and the offset slightly above 3 in the pitch range, with the lowest point, 2 in the pitch range, at approximately 50% of the tonal duration. Younger speakers have the most concave contour for the High tone, spanning 20% of the entire pitch range, whereas Older speakers' High tone contour spans less than 10% of the pitch range and Middle speakers' High tone spans approximately 10% of the pitch range. Unlike the "hook" observed in Older and Middle speakers, the High tone in Younger speakers does not have a "hook" at the tonal offset. The tonal onset for Younger speakers is also the lowest of the three groups, sharing the pitch range with the Low tone.

Rising tone in Younger speakers proves to be the most interesting tone in terms of shape and other characteristics. Younger speakers have phonetically the lowest pitch range for the Rising tone, with the tonal onset slightly below 2 in the pitch range, the lowest point at slightly below 1 and 0 on the 60% duration mark, and the tonal offset slightly above 1. The pitch for the Rising tone is so low, in fact, that all five speakers in this age group have creaky voice quality in this tone. No other speakers in this study have

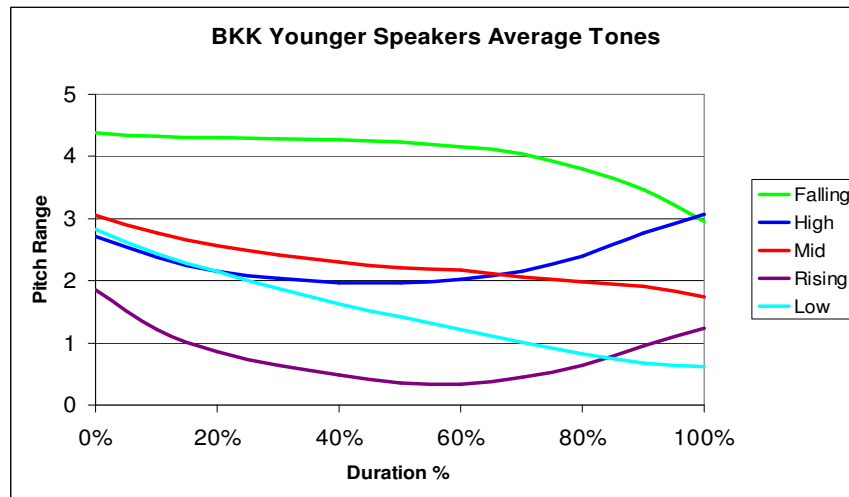
creaky voice at any point of the recording. The Rising tone offset is also the lowest, at slightly above 1, of any age group—one full pitch range lower than that for Older and Middle speakers, whose tonal offset for Rising tone is at 2 in the pitch range. Additionally, the rise in pitch for this particular tone and age group is 10% later than for Older and Middle speakers.

The Mid and Low tones for Younger speakers are not parallel. The Mid tone spans one full pitch range, from 3 to slightly below 2, while the Low tone spans two full pitch ranges, from slightly below 3 to almost midway between 1 and 0 in the pitch range. The onsets for the Mid and Low tones are the highest in this age group. As previously mentioned, the Low tone's onset is the same as that of the High tone. Figure 6 shows the average tones for the Younger speakers.

3.4 SUMMARY OF RESULTS. All three age groups in this study differ markedly from the Abramson tonal “model.” The oldest speaker in the present study, age 61, would have been just 14 years old during the time of Abramson's 1962 study. It is expected then, that even she would not have the same tones as the speakers recorded in Abramson 1962 who were in their 30s. In a similar vein, Older speakers' tones in this study also do not pattern with the speakers in Morén and Zsiga's 2006 study who were in their mid- to late-20s.

The Falling and High tones are the most different across age groups. Older speakers' Falling tone has a longer and more dramatic pitch fall spanning 50% of the duration and 40% of the pitch range. Middle speakers have a pitch fall of approximately 30% of the duration and pitch range. Younger speakers have a pitch fall that spans also 30% of the duration but only 20% of the pitch range.

FIGURE 6. Average Tones for Younger Speakers of Bangkok Thai.



The contour of the High tone is concave for all three age groups but in different degrees, with that of the Younger speakers being the most concave, spanning one full pitch range or 20% of the entire pitch range. Additionally, Older and Middle speakers have a “hook”—a small increase and decrease in pitch toward the offset—in the High tone, while Younger speakers do not. Middle speakers also have a “hook,” but a smaller one than Older speakers.

Rising tone is also concave for all three age groups. Younger speakers have the longest and largest decrease in pitch, 60% and over 30% of the total pitch range, respectively. Younger speakers also have the lowest tonal offset, at slightly above 1 in the pitch range, of any age groups. Older and Middle speakers have the tonal offset at 2 in the pitch range and the lowest point of the tone at approximately 50% of the total tone duration.

The Middle and Low tones are similar in shape across the three age groups. Unlike in other studies, neither the Middle nor the Low tone is contour in shape. The two tones are nearly parallel for the Older speakers, less so for Middle speakers, and are not at all parallel for Younger speakers. The Low tone's offsets are phonetically the lowest point in the average tone paradigm for both Older and Middle speakers, but not so for Younger speakers. The decrease in pitch for both the Mid and Low tones span ap-

proximately one full pitch range or 20% of the total pitch range for Older and Middle speakers. The Mid tone in Younger speakers shows a decrease of slightly over 20%, while the Low tone shows a decrease of 40% of the total pitch range. Figures 7 to 10 show the average of each tone across the three age groups, including the highest and lowest average values (y-error bars).

FIGURE 7. Average Falling Tone for All Age Groups.

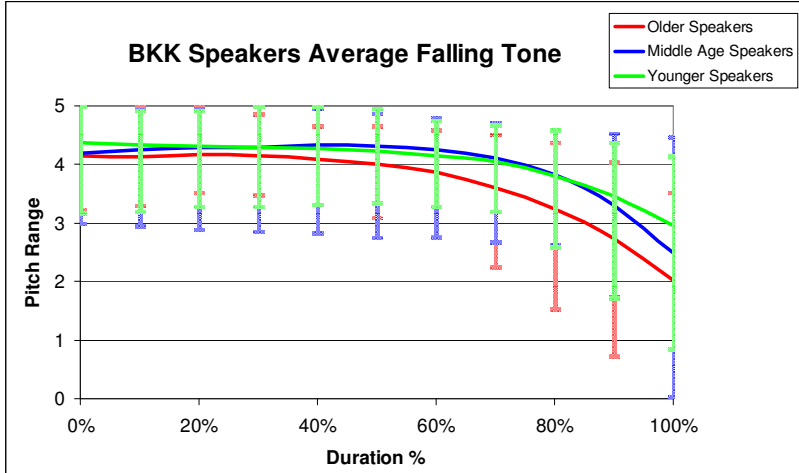


FIGURE 8. Average High Tone for All Age Groups.

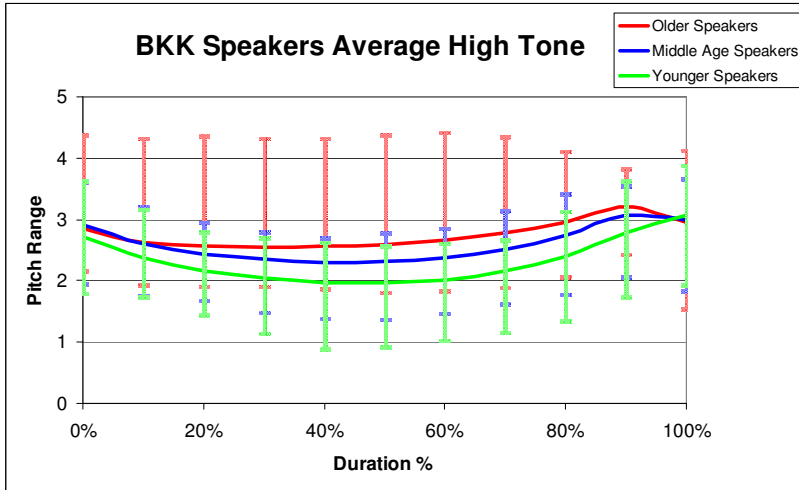


FIGURE 9. Average Mid Tone for All Age Groups.

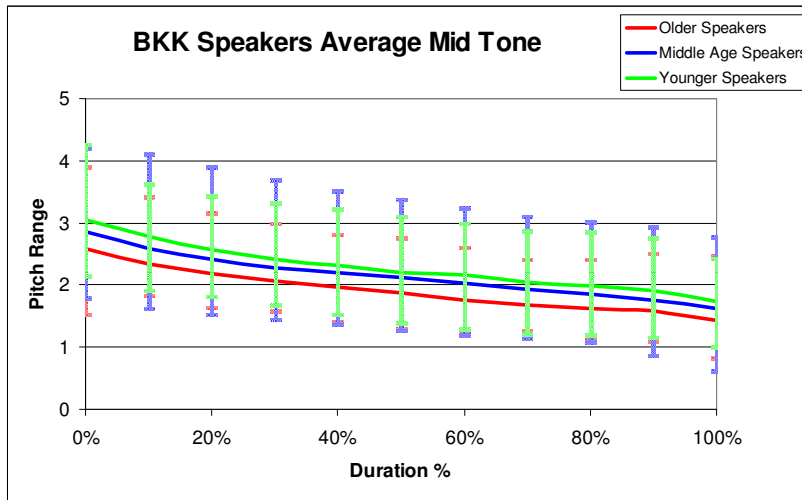


FIGURE 10. Average Rising Tone for All Age Groups.

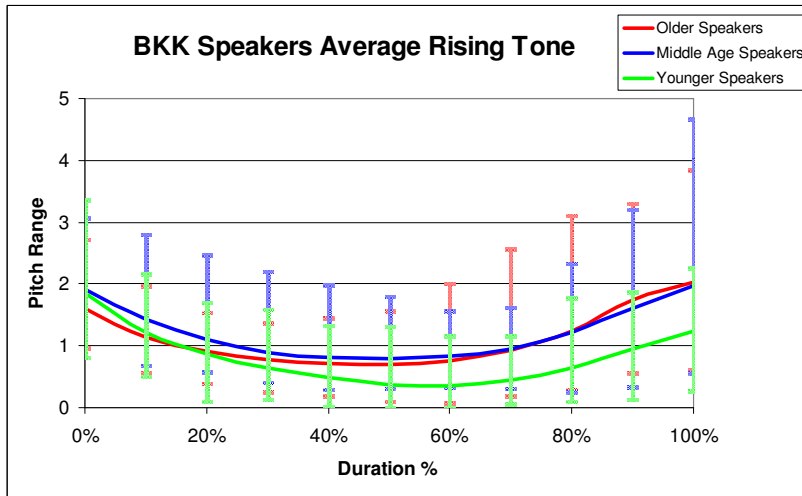
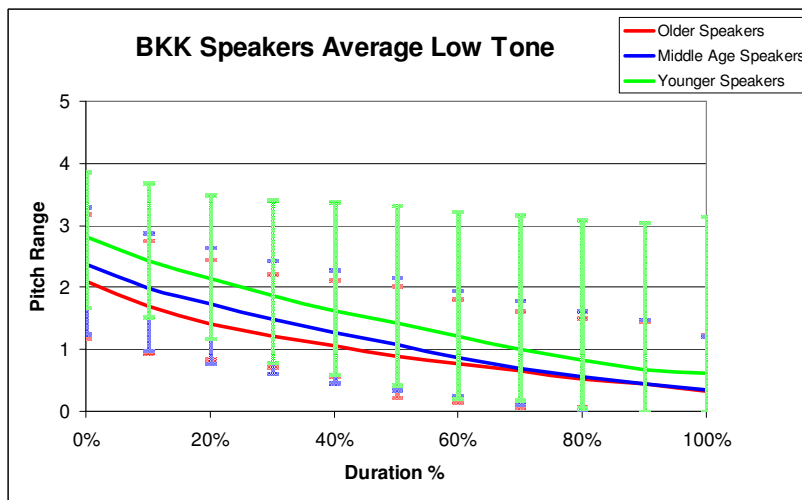


FIGURE 11. Average Low Tone for All Age Groups.



4. CONCLUSION. There have been significant observable changes in the phonetic realizations of Thai tones in the past century, beginning with Bradley 1909 and 1911 in which there were three static tones—High, Mid, and Low—and two contour tones—Falling and Rising. The current generally accepted nomenclature is still a reflection of this observation made in the early twentieth century. Nearly a half century later, Abramson, in his landmark 1962 study, also found three generally static tones—High, Mid, and Low—as well as two contour tones—Falling and Rising. Morén and Zsiga (2006) observed, also half a century later, that there are only two relatively static tones, Mid and Low, while the High tone has become contoured with a concave shape. The Falling tone in their study, additionally, does not fall until well after 70% of the total tone duration, whereas Abramson observed the Falling to decrease in pitch by 40% of the total duration.

Teeranon (2007) found that participants in the under-twenty group perceive a concave contour overwhelmingly as the High tone, whereas the over-sixty group perceive a high level tone to be the High tone. Additionally, the over-sixty group confused the concave High and Rising tone more so than the under-twenty group. The over-sixty group, however, performed better than the under-twenty group when presented with a high level tone with a falling shape as the High tone. The hook observed in this study for the Older and Middle speakers' High tone may, in fact, still serve as a perceptual cue for these two groups of speakers, but not for Younger speakers. Teeranon concludes that “the F0 contours carry enough information for high tone identification ... [the] high tone is most certainly perceived as a contour tone in the under-twenty group than in the over-sixty group” (2007:12).

The current study shows preliminary evidence toward a change in progress for Bangkok Thai tone production, particularly in tone shapes across the three age groups examined. Younger speakers show a general trend toward a higher tonal onset for the Mid and Low tones as well as a later pitch change for both the Falling and Rising tones. As this study is meant as a pilot reinvestigation of Bangkok Tones, it is nowhere near being comprehensive. Additional data are needed in order to provide a more complete view of current Bangkok Thai tones. Future studies should take into consideration the effects of “classic” sociolinguistic factors such as age, gender, and socio-economic status. Place of residence within Bangkok may also have effects on the phonetic realization of tones since the various districts have different history of settlement patterns. Finally, a perception test on all five tones is needed to help determine and predict the changes in progress in Bangkok Thai tones. An accurate account of Bangkok Tones will be valuable to field linguists, theoretical linguists, and Thai foreign language teachers alike.

APPENDIX A. Thai Tone Box.

		Open Syllables			Closed Syllables	
		A	B	C	DL	DS
Consonant Class	High [k ^h , tɕ ^h , t ^h , p ^h , f, s, h]	Rising	Low	Falling	Low	Low
	Mid [k, tɕ, d, t, b, p, ʔ]					
	Low [k ^h , tɕ ^h , t ^h , p ^h , f, s, h] [ŋ, n, m, l, r, j, w]					

Consonant class reflects historical development of the initial consonants as found in modern Standard Thai, not as reconstructed for proto-Tai. Per Li's 1977 reconstruction, high consonants are reflexes of proto-voiceless stops/nasals and proto-fricatives. Mid consonants are reflexes of proto-voiceless unaspirated stops and preglottalized stops. Low consonants derive from proto-voiced stops and nasals. Tonal categories A, B, C, and D presented here are also reconstructed by Li (1977) for all proto-Tai languages. Tonal distributions differ for closed syllables, also referred to as "dead" syllables, according to vowel length and are, thus, shown in two different categories: DL (Dead Long) and DS (Dead Short). For more information on the Thai Tone Box, see Brown 1985 or Gedney 1989.

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APPENDIX B. Speaker Information.

Label	Speaker			Mother		Father	
	Age	Highest Level of Education	Other (L2) Language(s)	Birthplace	Other Language(s)	Birthplace	Other Language(s)
Female1	31	Doctorate	English Japanese	Bangkok	English	Bangkok	English
Female2	24	Bachelors	English	Chachuengsaw	N/A	Ayutthaya	N/A
Female3	31	Doctorate	English French Chinese Japanese	Bangkok	Chinese (L1) English	Bangkok	Chinese (L1) English
Female4	20	High School	English	Bangkok	N/A	Bangkok	Chinese (L1)
Female5	18	High School	English French Chinese	Bangkok	Chinese	Bangkok	Chinese
Female6	18	High School	English French	Sukhothai	Chinese (L1)	Pratumthani	N/A
Female7	61	Masters	English	Lampang	Northern Thai (L1)	Bangkok	English
Female8	32	Masters	N/A	Praeenburi	N/A	Chachuengsaw	N/A
Female9	21	Bachelors	English German Swedish Spanish	Pratumthani	Chinese	Bangkok	English Chinese
Female10	50	Doctorate	English French Chinese	Bangkok	N/A	Bangkok	N/A
Female11	52	Doctorate	English German	Kamphaengphet	English	Kamphaengphet	English
Female12	56	Doctorate	English Cantonese Japanese	Bangkok	English	Bangkok	English
Female13	61	Masters	English	Bangkok	N/A	Bangkok	N/A
Female14	37	Doctorate	English	Suratthani	English Japanese	Bangkok	English
Female15	35	Doctorate	English	Suratthani	English Japanese	Bangkok	English

APPENDIX C. Summary of Changes in Tone Shapes across Age Groups.

		Older Speakers	Middle Speakers	Younger Speakers
Falling	<i>Onset</i>	just above 4	just above 4	almost midway between 4 and 5
	<i>Offset</i>	2	midway between 2 and 3	just below 3
	<i>Shape</i>	<ul style="list-style-type: none"> convex small gradual increase from onset to highest point at 25%, slightly above 4 	<ul style="list-style-type: none"> convex small gradual increase from onset to highest point at 50%, slightly above 4 	<ul style="list-style-type: none"> convex pitch plateau until highest point at 50%, slightly above 4
High	<i>Onset</i>	just below 3	just below 3	almost midway between 2 and 3
	<i>Offset</i>	3	3	3
	<i>Shape</i>	<ul style="list-style-type: none"> concave sudden decrease until the lowest point at 15%, midway between 2 and 3 small 'hook' during last 10% 	<ul style="list-style-type: none"> concave gradual decrease until the lowest point at 45%, midway point between 2 and 3 small 'hook' during last 10% 	<ul style="list-style-type: none"> concave gradual decrease until the lowest point at 50%, right at 2
Mid	<i>Onset</i>	midway between 2 and 3	just below 3	just above 3
	<i>Offset</i>	midway between 1 and 2	just above midway between 1 and 2	above midway between 1 and 2
	<i>Shape</i>	static	static	static
Low	<i>Onset</i>	2	below midway point between 2 and 3	just below 3
	<i>Offset</i>	just below midway point between 0 and 1	below midway point between 0 and 1	midway between 0 and 1
	<i>Shape</i>	static	static	static
Rising	<i>Onset</i>	midway between 1 and 2	just below 2	just below 3
	<i>Offset</i>	2	2	slightly above 1
	<i>Shape</i>	<ul style="list-style-type: none"> concave graduate decline until the lowest point at the 45%, just above midway between 0 and 1 	<ul style="list-style-type: none"> concave gradual decrease until lowest point at 50%, just above midway between 0 and 1 	<ul style="list-style-type: none"> concave gradual decrease between lowest point at 55%, midway between 0 and 1

REFERENCES

- Abramson, Arthur S. 1962. The vowels and tones of Standard Thai: Acoustical measurements and experiments. *International Journal of American Linguistics* 28(2):1–146.
- Anivan, Sarinee. 1988. Evolution of Bangkok tones. In *International Symposium on Language and Linguistics*, ed. by Cholticha Bamroonraks, 8–21. Bangkok: Thammasart University.
- Bradley, Cornelius B. 1909. Graphic analysis of the Siamese ‘tones’. *Transaction and Proceedings of the American Philological Association* 40:xcv–xcvii.
- Bradley, Cornelius B. 1911. Graphic analysis of the tone-accents of the Siamese language (with one plate). *Journal of the American Oriental Society* 31(3):282–89.
- Brown, J. Marvin. 1975. The Great Tone Split: Did it work in two opposite ways? In *Studies in Tai Linguistics in Honor of William J. Gedney*, ed. by John G. Harris and James R. Chamberlain, 33–48. Bangkok: CIEL, Office of State Universities.
- Brown, J. Marvin. 1985. *From ancient Thai to modern dialects and other writings on historical Thai linguistics*. Bangkok: White Lotus Co.
- Gedney, William J. 1989. *Selected papers on comparative Tai studies*. Ann Arbor, MI: University of Michigan Press.
- Henderson, Eugenie J. A. 1976. Thai phonetics sixty years ago: Gleanings from the unpublished notes of Daniel Jones. In *Tai linguistics in honor of Fang-Kuei Li*, ed. by Thomas W. Gething, John G. Harris, and Pranee Kullavanijaya, 162–70. Bangkok: Chulalongkorn University.
- Hoonchamlong, Yuphaphann. 2007. *Thai language and culture for beginners, Volume 1*. Honolulu, HI: University of Hawai‘i Press.
- Kantong, Ekapon. 2008. Tonal variation in Chiang Mai Thai by age group. Chulalongkorn University MA thesis.
- Li, Fang-Kuei. 1977. *A handbook of comparative Tai*. Honolulu, HI: University of Hawai‘i Press.
- Luksaneeyanawin, Sudaporn. 1998. Intonation in Thai. In *Intonation systems: A system of twenty languages*, ed. by Daniel Hirst and Albert Di Cristo, 376–94. Cambridge: Cambridge University Press.
- Morén, Bruce, and Elizabeth Zsiga. 2006. The lexical and post-lexical phonology of Thai tones. *Natural Language and Linguistic Theory* 24:113–78.
- Noss, Richard B. 1975. How useful are citation forms in synchronic Thai phonology? In *Studies in Tai linguistics in honor of William J. Gedney*, ed. by James G. Harris and John R. Chamberlain, 274–84. Bangkok: CIE, Office of State Universities.
- Panroj, Piyachut. 1990. Acoustic characteristics of tones in Bangkok Thai: Variation by age groups. Chulalongkorn University MA thesis.
- Roengpitya, Rungpat. 2000. Can a perceptual experiment reflect tonogenesis in Tai? *Proceedings: The International Conference on Tai Studies*, Thailand, July 29–31 1998, ed. by Somsongee Burusphat, 361–70. Nakhon Prathom, Thailand: ILCRD, Mahidol University.
- Teeranon, Phanintra. 2007. The change of Standard Thai high tone: An acoustic study and a perceptual experiment. *SKASE Journal of Theoretical Linguistics [online]* 4(3). Accessed online at http://www.skase.sk/Volumes/JTL10/pdf_doc/1.pdf on 10 June 2008.
- Tienmee, Wanna. 1992. Classification by tone shapes and by patterns of tonal splits and coalescences. *Mon-Khmer Studies* 21:229–36.
- Tingsabadh, M.R. Kalaya, and Daranee Krisnaphan. 1996. Tones in Standard Thai connected speech. Paper presented at the Fourth International Symposium on Language and Linguistics: Pan-Asiatic Linguistics. Bangkok, Thailand. January 8–10, 1996.
- Zsiga, Elizabeth. 2007. Modeling diachronic change in the Thai tonal space. Paper presented at PLC31, University of Pennsylvania, Philadelphia.

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