

# Thai Tone Geography<sup>1</sup>

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## INTRODUCTION

Dialect geography, “the study of local differentiations in a speech area” (Bloomfield, 1933, p. 321), came into existence in Europe in the nineteenth century and has been carried out in many parts of the world. In Thailand, although studies of Thai dialects began to be conducted about 40 years ago, these studies only presented the system of each individual dialect or compared it with Bangkok Thai. Thus they are not proper studies of dialect geography. The first one that could be regarded as dialect geography in Thai was published only 22 years ago (L. Thongkum et al., 1978). However, since then many studies in dialect geography have been carried out in Thailand, providing new information on dialect variation in this country. More importantly, the studies of Thai dialects that deal specifically with tonal variation have shown how tone geography could be a distinct sub-branch of dialect geography with its own methods.

Tone geography is a new term. The most widely studied subtype of dialect geography is word geography, the study of lexical variation. It studies how speakers of the same language who live in different areas use different words with the same meaning. In word geography maps are usually produced to show how these words are distributed in the area of study—one map per semantic unit. When two different words or sets of words that represent the same semantic unit are used in adjoining areas, a line known as an isogloss is drawn to mark the boundary between the two areas. Sometimes when results shown in a set of maps are compiled, it is found that several isoglosses go through the same area. When this occurs dialect geographers conclude that an important dialect boundary lies in the area.

Although in almost every study of word geography consonantal and vocalic variations are also analysed and presented, the terms consonant geography and vowel geography have apparently never appeared in the literature on dialect geography. This may be because neither consonantal variation nor vocalic variation has been investigated in isolation. The present paper will show that tone geography could exist independently of word geography. Tonal variation among Thai dialects and subdialects can be systematically investigated. Several studies in Thai tone geography are already in existence. They will be reviewed to show how Thai tone geography has progressed up to now.

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<sup>1</sup>This paper is an outgrowth of two unpublished oral papers, “Acoustic-Based Tone Geography of Thailand: Dream or Reality” presented with Daranee Krisnapan at the Fifth International Conference on Thai Studies, 5–10 July 1993, at the School of Oriental and African Studies, University of London, United Kingdom, and “Tone Geography in Thailand: The Tone Box Method” presented at the Eighth International Conference on Methods in Dialectology, 3–7 August 1993, at the University of Victoria, British Columbia, Canada. The author wishes to thank Dr. Pranee Kullavanijaya and Professor Arthur S. Abramson for their helpful comments on the first draft of the paper.

## THAI DIALECTOLOGY AND TONE GEOGRAPHY

Linguistic studies of Thai dialects began in 1956 (Chantavibulya, 1956; Miller, 1956). Both descriptive studies of individual dialects and comparative studies of two or more dialects have been carried out since then (Tingsabadh, 1985). Although many of these studies deal with tone systems and tonal variation, only a few of them will fit the definition of tone geography given here. It is proposed that a study will be regarded as tone geography only when it shows how an area is subdivided on the basis of tonal variation on a single map or a set of maps. The descriptive studies that investigate the tone system of a single variety, therefore, do not belong to tone geography. Those studies that compare tone systems but do not show how tonal variation is distributed over an area are not regarded as studies of tone geography either.

Thai tone geography came into existence in the late 1970s. Diller (1976) in his study of Southern Thai diglossic speech variation included a map dividing Southern Thailand into six areas on the basis of tonal variation (see Figure 1). L.Thongkhum et al. (1978) investigated phonological variation in the varieties of Southern Thai spoken in Surat Thani province. Three types of tone systems were found in that study and the province could be divided into three distinct areas (see Figure 2). Thampradit (1981) showed that Southern Thai spoken in Phuket, Phangnga, Krabi and Trang may be divided into two areas on the basis of tonal variation (see Figure 3). Debavalya (1983) carried out the first study that deals exclusively with tone geography. In that study the boundary between two main Thai dialects: Central Thai and Southern Thai was located based on tonal variation (see Figure 4). A few tone geography studies have been carried out since then. Most limited their scope to one province, for examples, Loei (Taengko, 1987), Chaiyaphum (Sawangwan, 1991), and Udonthani (Sittiprapaporn, 1997). One study covers two provinces – Ang Thong and Phra Nakhon Si Ayutthaya (Malaichalern, 1988).

Tone geography in Thai dialectology owes its existence to a method developed in the discipline of comparative and historical Tai linguistics. It is known among the scholars working in Tai and Thai linguistics as the tone box method. It consists of two parts: the tone checklist and the tone box (Gedney, 1972). The structure of the method and its usage will be described in detail here for the benefit of those readers who are unfamiliar with Tai and Thai linguistics.

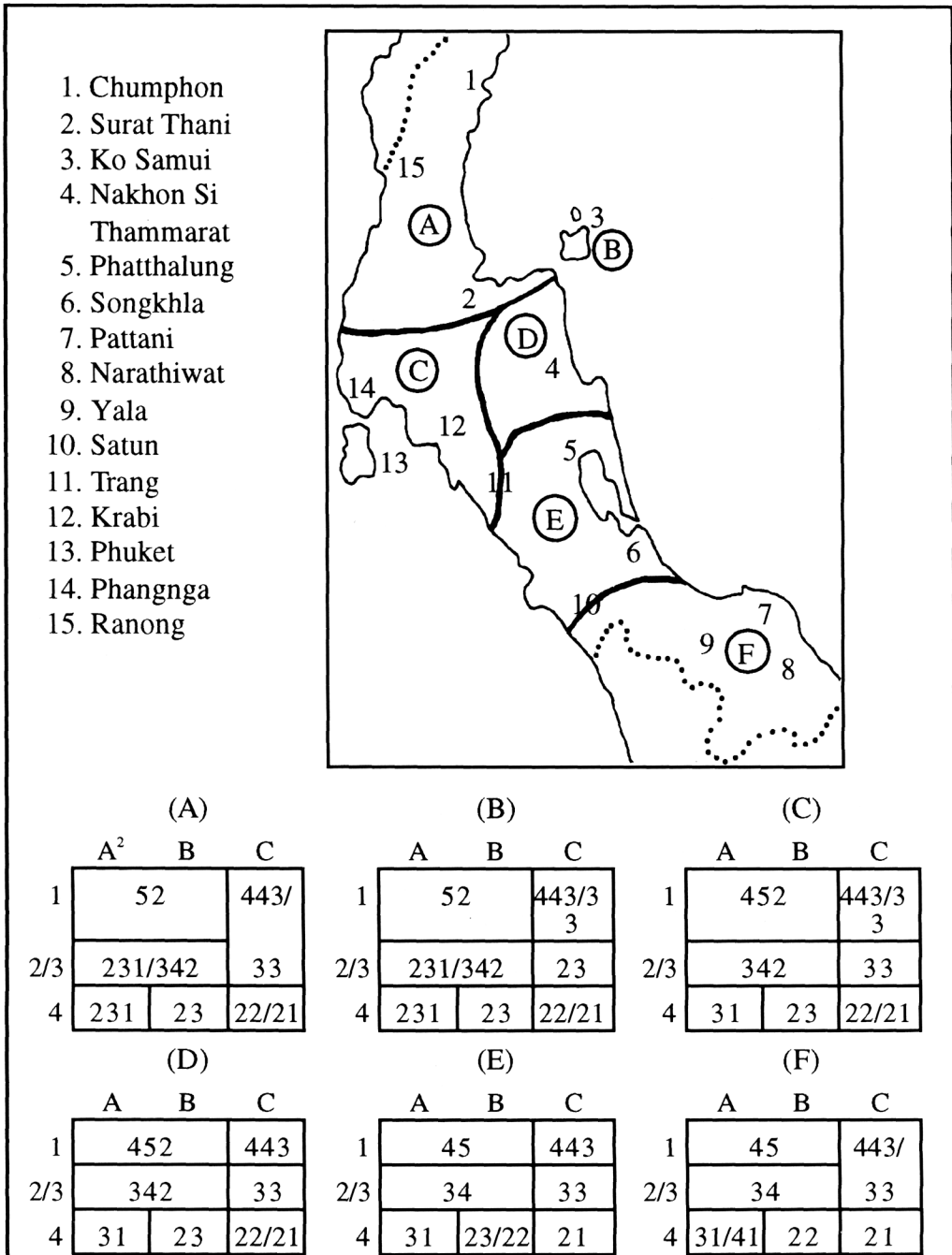


Figure 1. Map showing areal variation in tone of Southern Thai (adapted from Diller, 1976).

<sup>2</sup> The diagram in this and subsequent figures, together with all of the symbols, will be explained in detail in the section on the tone box method.

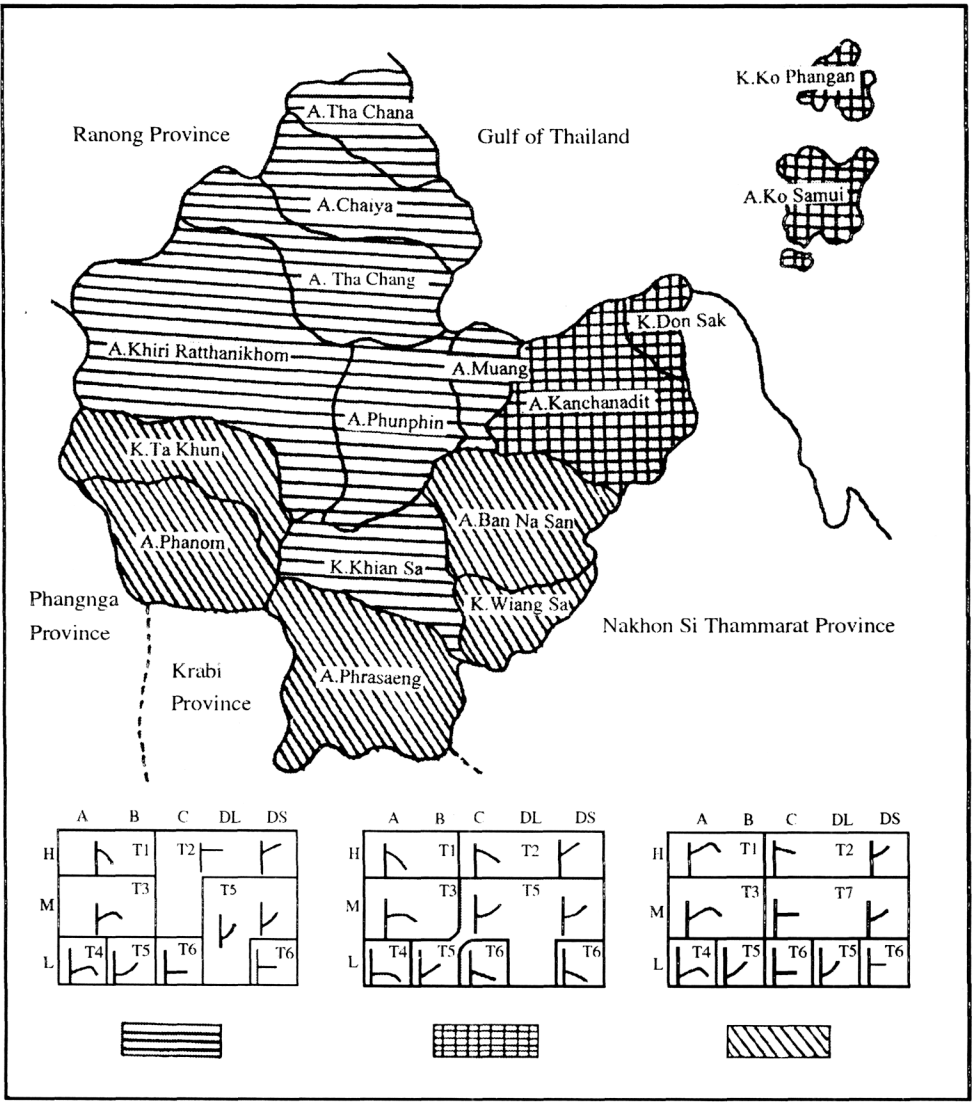


Figure 2. Map showing the distribution of the sub-dialects of Southern Thai spoken in Surat Thani province based on tonal variation (adapted from L.Thongkum et al., 1978).<sup>3</sup>

<sup>3</sup>In this and other diagrams, T refers to tone and the following numbers indicate the different tones in each system.



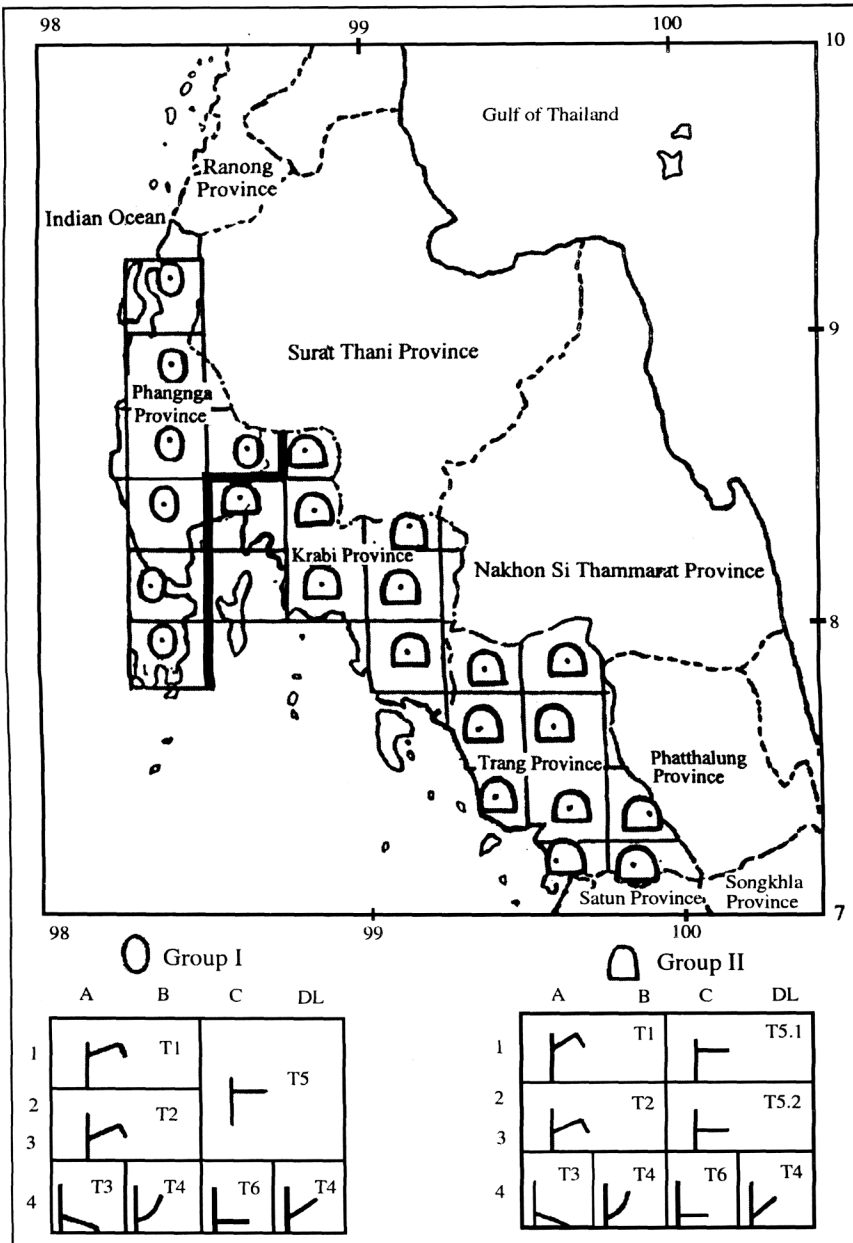


Figure 3. Map showing the distribution of the sub-dialects of Southern Thai spoken in Trang, Krabi, Phangnga, and Phuket provinces based on tonal variation (adapted from Thampradit, 1981).

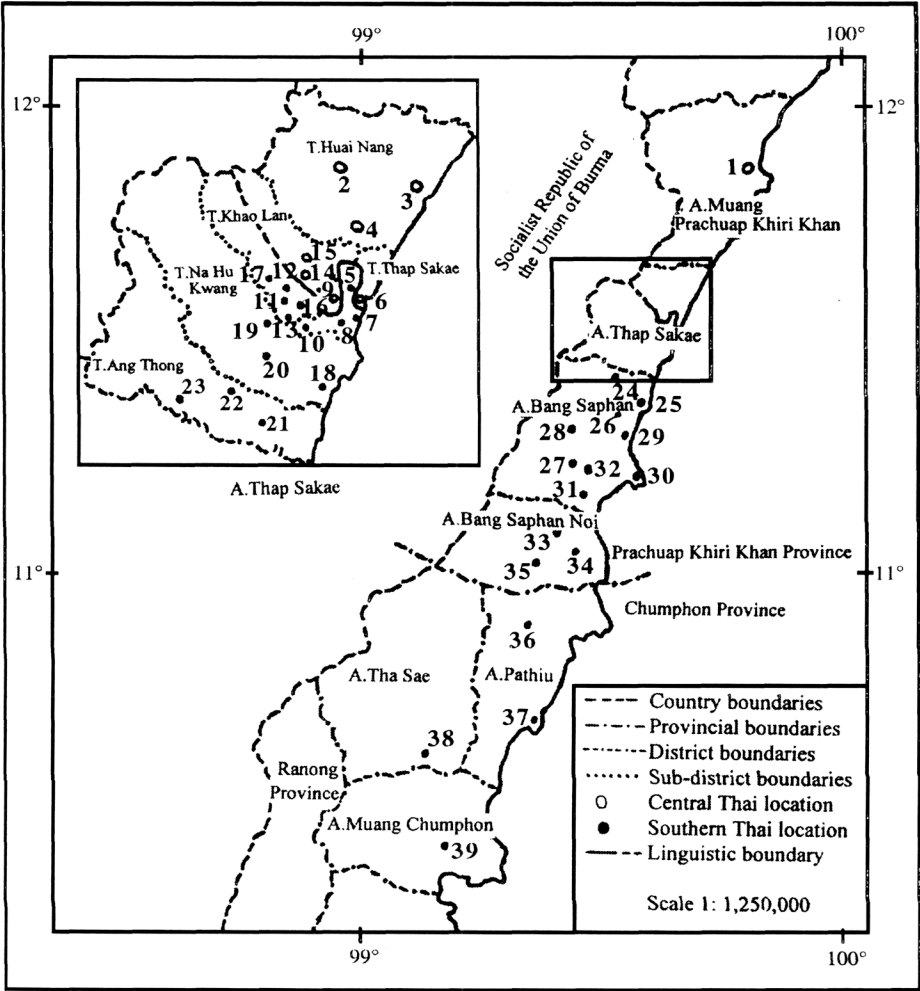


Figure 4. Map showing the borderlines between the Central Thai and the Southern Thai areas based on tonal variation (adapted from Debavalya, 1983).

THE TONE BOX METHOD<sup>4</sup>

Linguists working in the field of comparative and historical Tai linguistics compared the tone systems of the present-day Tai languages and dialects spoken in Thailand, Laos, Burma, Vietnam, and China and reconstructed four tones in the Proto-Tai language known as tones A, B, C, and D (see Diagram 1). The first three occur in syllables that end in long vowels, nasals, and semi-vowels—referred to here as “smooth syllables.” The last tone, tone D, occurs in syllables that end in stops—referred to here as “checked syllables.”

<sup>4</sup>I realise that the tone box method is already familiar to the linguists working in Thai and Tai linguistics. This section is included here for the benefit of those scholars who do not have any background knowledge in this area of study.

Diagram 1. The Reconstructed Tone System of Proto-Tai

Smooth Syllables			Checked Syllables
Tone A	Tone B	Tone C	Tone D

The tone systems of the present-day Tai languages and dialects differ from that of Proto-Tai due to subsequent tone splits and mergers. Evidence from numerous Tai languages and dialects shows that the primary tone split took place under the influence of two classes of Proto-Tai initial consonants: voiced and voiceless. In addition three sub-groups of the Proto-Tai voiceless initial consonants influenced further splits: friction sounds, unaspirated stops, and glottal sounds (Gedney, 1972 p. 434). Vowel length in checked syllables was also found to have played an important role in the subsequent stages of tonal development in this language family. The tone box was constructed on the basis of the above-mentioned findings (see Diagram 2). If all of the factors had full influence, the maximum number of tones in a variety could be twenty. However, the majority of Tai languages and dialects have between five and seven tones due to tone mergers and lack of tone splits. Thus, several slots in the tone box contain the same tone. This phenomenon will be shown below.

Diagram 2. The Tone Box (adapted from Gedney, 1972, p. 434).

		Proto-Tai Tones				
		A	B	C	D-long	D-short
Initial Consonants at time of splits	Class 1 Voiceless friction sounds					
	Class 2 Voiceless unaspirated stops					
	Class 3 Glottal sounds					
	Class 4 Voiced sounds					
		Smooth Syllables			Checked Syllables	

### The Tone Checklist

The tone box is used in conjunction with the tone checklist (Gedney, 1972, pp. 434–436), a list of 60 monosyllabic words with three words in each slot of the tone box. The words in the tone checklist are all Tai in origin. All of the words in each slot have the three Proto-Tai characteristics specified for that slot as shown in Diagram 2:

syllable structure, initial consonant, and tone. For example, the words in the A1 slot are หู /huuA1/ 'ear,' ขา /khaaA1/ 'leg,' and หัว /huaA1/ 'head'; in the D-long 4 slot are มีด /miitDL4/ 'knife,' ลูก /luukDL4/ 'sibling,' and เลือด /luwatDL4/ 'blood'; and in the D-short 2 slot are กบ /kopDS2/ 'frog,' ตับ /tapDS2/ 'liver,' and เจ็บ /tɕepDS2/ 'hurt.'

Researchers can modify the tone checklist by replacing or adding words wherever necessary. This is because the categories in the tone box are equivalent to the categories in the present-day Standard Thai writing system. Table 1 shows how in principle the three Proto-Tai tones correspond to the three tone markers in Standard Thai script, and the three Proto-Tai consonant categories to the three sets of consonant symbols in the script.<sup>6</sup> The smooth and the checked syllable structures also exist in Standard Thai.

Table 1. The Proto-Tai categories and the Thai writing system symbols and categories.

<b>Proto-Tai Tones on Smooth Syllables</b>	<b>Standard Thai Tone Markers</b>
Tone A	No tone marker as in ป่า /paaA2/ ‘to throw’
Tone B	The máai èek tone marker as in ป่า /paaB2/ ‘forest’
Tone C	The máai thoo tone marker as in ป้า /paaC2/ ‘aunt’
<b>Proto-Tai Initial Consonants</b>	<b>Standard Thai Consonant Sets</b>
Voiceless friction sounds	High consonants (11 characters: ข ฉ ถ ฐ ผ ฟ ศ ช ห)
Voiceless unaspirated stops and glottal stop	Mid consonants (9 characters: ก จ ด ต ถ ฏ บ ป อ)
Voiced sounds	Low consonants (24 characters: ค ท ม ง ซ ช ฌ ญ ท ฒ ณ ธ น พ ฟ ภ ย ร ล ว ห ฮ)

## Using the Tone Box Method

The tone box method allows us to analyse the tone system of any variety of Thai with ease. We begin by eliciting the words in the tone checklist from an informant. Thai researchers must take care not to say the words to prevent dialect interference. They either show pictures or ask questions to prompt an informant to say the required words. More than one informant is usually interviewed at each locality to obtain reliable results. The data are carefully recorded on tape.

<sup>5</sup>/A1/ indicates the tone of the syllable. We cannot use an ordinary tone marker like /hũu/ here because we do not know which tone occurs on this syllable in a variety. We just know that it is the tone that is specific to the A1 slot. In the same way DL4 and DS2 in the examples that follow refer to the tones of the D-long 4 and the D-short 2 slots.

<sup>6</sup>Subsequent tone merges in some languages and dialects resulted in the same pronunciation for two words written differently, for example คำ/khaaB4/ and ข้า/khaaC1/ in Standard Thai.

We usually analyse the tone of each word auditorily. Some researchers also analyse some tokens instrumentally to confirm their auditory judgement. All of the words in the same slot of the tone box normally carry the same tonetic variants. Sometimes the tonetic variant of a word differs from those of the other words in the same slot. When this happens, we only consider the tonetic variants of the majority of the words in the slot. Diagram 3 shows the tonetic variants in all of the slots in Standard Thai.

Diagram 3. The Tone Box showing the tonetic variants of Standard Thai.

	A	B	C	D-long	D-short
1	Low rising	Low gliding	High falling	Low gliding	Low level
2	Mid level	Low gliding	High falling	Low gliding	Low level
3	Mid level	Low gliding	High falling	Low gliding	Low level
4	Mid level	High falling	High rising	High falling	High level
	Smooth syllables			Checked syllables	

In the next step we compare the tonetic variant or variants of each slot with those of the other slots. Whenever different sets of variants occur in adjacent slots, we draw a line to separate them, for example, between A1 and A2, and A1 and B1 in Standard Thai shown in Diagram 4. The non-adjacent boxes that have the same variants are noted, for example, B4 and C3 in Standard Thai (see Diagram 4).

Diagram 4. The Tone Box showing the pattern of tone splits and mergers of Standard Thai together with the distribution of the five tones.

	A	B	C	D-long	D-short
1	Rising	Low	Falling	Low	Low
2	Mid	Low	Falling	Low	Low
3	Mid	Low	Falling	Low	Low
4	Mid	Falling	High	Falling	High
	Smooth syllables			Checked syllables	

It is usual to count the number of tones in the tone system under investigation by considering only the 12 slots of the smooth syllables. Thus, in Standard Thai there are five tones. The variants that occur in checked syllables are each analysed as an allotone of one of the tones in smooth syllables on the basis of phonetic similarity. In Standard

Thai, for example, the low level variant that occurs in short checked syllables is included as an allotone of the low falling tone. Finally, a short name is given to each tone, for example, “mid” for the mid level tone and “falling” for the high falling tone in Standard Thai.

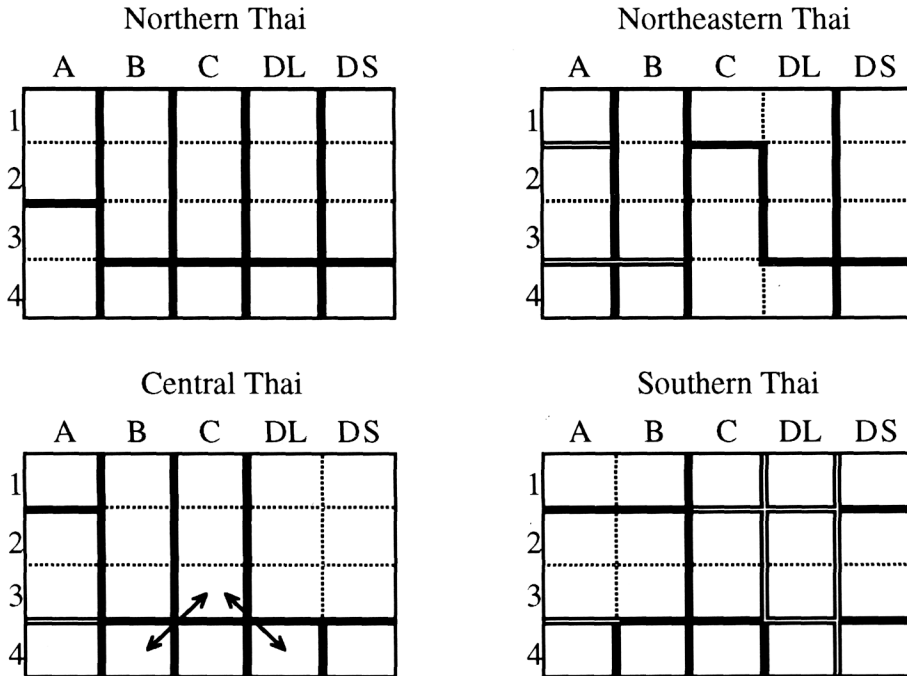
Standard Thai therefore has five tones: rising, mid, low, falling, and high. The rising and mid tones only occur in smooth syllables. The falling and high tones occur in the smooth syllables as well as, respectively, in the long and the short checked syllables. The low tone occurs in all three types of syllables: smooth, long checked, and short checked.

### **The Tone Box Method and Thai Tone Geography**

The tone box method is a very convenient tool for analysing the tone system of any variety of Thai. A person with phonetic training can find out within a short time the number of distinctive tones and their allotones in any Thai variety. It also tells how each tone is distributed, i. e., whether it occurs in smooth syllables, in long checked syllables, in short checked syllables, or in a combination of these types of syllables. We can also tell which words carry each tone in each variety through our knowledge of the equivalence between the Standard Thai writing system and the Proto-Tai tone and consonant systems described above. That function of the tone box method applies to the descriptive study of a variety. We could of course obtain the same result through the traditional method of commutation tests. From that point of view the tone box method only helps facilitate our analysis. However, when we turn to the study of tone geography, the tone box method has a distinct and very important role to play.

In dialect geography, linguists usually analyse and present consonantal and vocalic variation based on their occurrence in a word or a set of words. Weinreich (1954) found the method unsatisfactory and suggested that dialectologists should study consonantal and vocalic variation in the context of the overall phonological system of a language. He proposed a schematic display known as the “diasystem” for the purpose. In Thai dialectology the tone box method provides an alternative “diasystem” dealing specifically with tones. It shows all of the tones in each system and how each tone is distributed both among different syllable structures and among groups of lexical items. The tone box diagram is therefore a very useful tool in Thai dialectology. It has played a very important role in the advancement of the study of tonal variation in Thai.

After using the tone box method to analyse the tone systems of numerous regional varieties of Thai, dialectologists found that the four main Thai dialects—Northern Thai, Northeastern Thai, Central Thai, and Southern Thai—have distinct patterns of tone splits and mergers. Diagram 5 shows the most typical pattern of tone splits and mergers for the four dialects. In the diagram the bold lines show where tone splits and mergers always occur in each dialect, and the double lines where tone splits and mergers only occur in some of its subdialects.

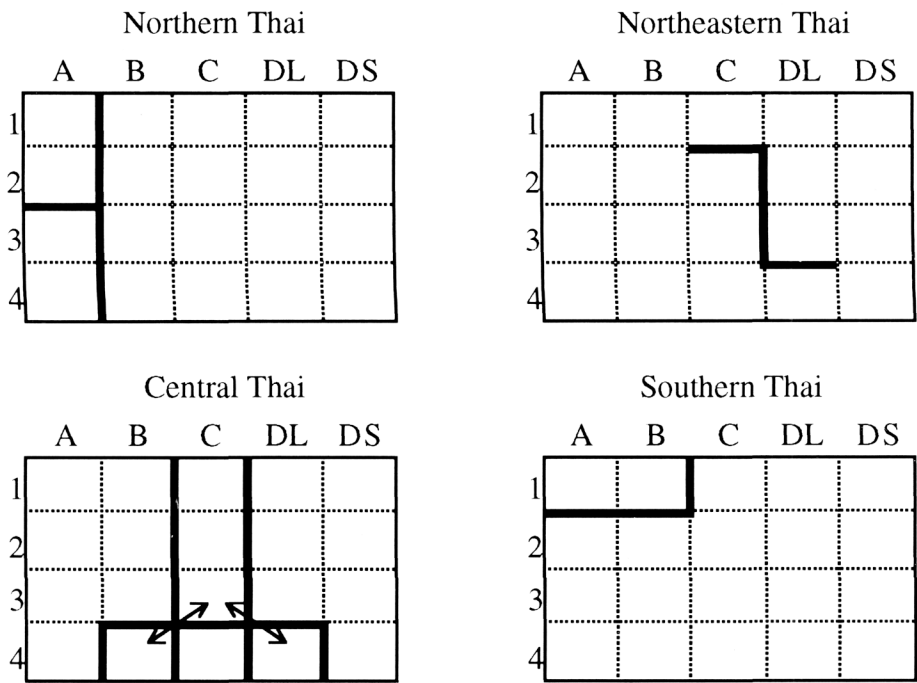
Diagram 5. Typical patterns of tone splits and mergers in the four main Thai dialects.<sup>7</sup>

Comparing the patterns of tone splits and mergers of the four dialects, one can pinpoint the features that separate one dialect from another. Diagram 6 shows those distinctive characteristics. Northern Thai is the only dialect that has one tone in A1 and A2 and another in A3 and A4. Northeastern Thai is the only dialect with one tone in C1, DL1, DL2, and DL3, and another tone in C2, C3, C4, and DL 4. Central Thai is the only dialect that has one tone in B4, C1, C2, C3, and DL4. Southern Thai is the only dialect that has one tone in A1 and B1.<sup>8</sup>

<sup>7</sup>DL and DS are equivalent to D-long and D-short respectively.

<sup>8</sup>It will be shown later in this paper that the distinctive characteristics of Southern Thai need further refinement.

Diagram 6. The distinctive characteristics separating the four main Thai dialects.



The distinctive characteristics of the four Thai dialects help Thai dialectologists identify which dialect a variety belongs to. More importantly, they can be used to investigate Thai tone geography covering the whole of Thailand, leading to the production of a linguistic atlas. The project has not yet been accomplished as it requires very many resources. Up to now, as already mentioned, tone geography has only been carried out in small areas. Almost all of these studies used the tone box method, for example, L.Thongkum et al. (1978), Pimpa (1986), Taengko (1987), Sawangwan (1991), and Sittiprapaporn (1997). Those tone geography studies that did not use the tone box method in its original form all used the method as the basis for designing an alternative investigating procedure (Malaichalern, 1988; Nualjansaeng, 1992). In the following section progress in Thai tone geography will be reviewed and suggestions will be made on its possible future directions. Special attention will be given to the issue of methodology.

**PROGRESS IN THAI TONE GEOGRAPHY**

Thai tone geography consists of three levels: that of the main dialects, that of the sub-dialects, and that of the accents. There are four main dialects; each has its own distinctive pattern of tone splits and mergers (see Diagram 6). Subdialects of each dialect all share the same distinctive pattern of that dialect and differ in the splits and mergers at other places in the tone box. Accents are members of the same subdialect and differ mainly in the phonetic characteristics of their tones. Studies exist at all three levels, but much more work is required before the full picture of Thai tone geography is obtained.



### Tone Geography of the Main Thai Dialects

At the most general level, Thai tone geography aims at identifying the areas where the four Thai dialects – Northern Thai, Northeastern Thai, Central Thai, and Southern Thai—are spoken as well as locating the borderline between the adjacent dialects. There are three of these borderlines: Northern Thai and Central Thai, Northeastern Thai and Central Thai, and Southern Thai and Central Thai. The tone box method is the main tool for any study of tone geography at this level, due to the existence of the distinctive patterns of tone splits and mergers (see Diagram 6).

Up to now only one of the borderlines, that between Central Thai and Southern Thai, has been fully investigated (Debavalya, 1983). Debavalya used the distinctive patterns of Central Thai and Southern Thai as shown in Diagram 6 to locate the borderline between Central Thai and Southern Thai. This is seen in Figure 4. The details of her work show that all of the varieties south of the borderline investigated in her study have the pattern of tone splits and mergers shown in Diagram 7.

Diagram 7. The pattern of tone splits and mergers in the varieties spoken south of the borderline (Debavalya, 1983).

	A	B	C	DL	DS
1					
2					
3					
4					

Debavalya classified all of the varieties as Southern Thai because they have the Southern Thai merger between A1 and B1. However, the pattern of tone splits and mergers in column A and B in the varieties that Debavalya called Southern Thai differs from the typical pattern of the Southern Thai varieties as shown in Diagrams 5 and 6. In particular it does not have the merger between A2 and B2, and between A3 and B3. Moreover it does not have the split between B1 and B2. The pattern in Diagram 7 is clearly a mixture between Central Thai and Southern Thai, and the variety is most likely a hybrid of the two dialects. This phenomenon is common in the so-called *transitional zone* or *transition area*<sup>9</sup>. Debavalya therefore only found the borderline between Central Thai and the Central Thai/Southern Thai hybrid. Further work has to be carried out south of the area studied by Debavalya to locate the borderline between the hybrid variety and Southern Thai.

Despite the problem in Debavalya's study, we have more information on the Central Thai and the Southern Thai borderline than that of the other two borderlines.

<sup>9</sup>Another well known hybrid variety in Thai is Khorat Thai, which is spoken in Nakhon Ratchasima province, the gateway between the central region and the northeastern region. Khorat Thai has linguistic features that are similar to both Central Thai and Northeastern Thai.

Much more work has to be carried out before we have a full picture of tone geography at the level of the main dialects. In addition, recent studies in word geography in Thai have shown that social variables can play important roles in dialect distribution. A very important study was carried out by Maryprasith (1992) in which she used lexical variation in three age-groups (10–20 years old, 35–45 years old, and over 60 years old) to locate the borderline between Central Thai and Southern Thai. She found that in the case of the youngest group, i.e., 10–20 years old, the borderline is located much further south than those of the other two groups. It is most likely that the tonal borderlines among the main Thai dialects also fluctuate under the influence of these variables. In the future, therefore, studies of the tonal borderlines among the main dialects have to consider other social variables like age-group and level of education as well.

### **Tone Geography of the Thai Subdialects**

In our definition all of the subdialects of a dialect share the distinctive pattern of tone splits and mergers of that dialect (see Diagram 6). The subdialects may differ in many ways: number of tones, number of allotones, phonetic characteristics, distribution of tones in types of syllables, and occurrence of tones in words or sets of words. In Northeastern Thai, for example, its subdialects spoken in Roi-et, Ubon, Loei, and Lom Sak (see Diagram 8) all have the distinctive pattern of Northeastern Thai mentioned above: one tone occurring in C1, DL1, DL2, and DL3, and another tone occurring in C2, C3, C4, and DK4. The Roi-et system has seven tones. The Ubon system has six tones. The other two systems have five tones. The tone in A1 in Roi-et, Ubon, and Lom Sak is low-rising, but in Loei it is mid-falling. Tone 4 in Ubon occurs in all of the words that contain both tone 4 and tone 5 in Roi-et.

Thai tone geography at the level of subdialects has made some progress, but we still need much more research. Although we have information on the tone systems of many varieties of Thai from the work by Brown (1965)<sup>10</sup> and recent studies of Northeastern Thai subdialects by Pimpa (1986), Taengko (1987), Sawangwan (1991), and Sittiprapaporn (1997), we still do not have enough information on tonal variation within each dialect to conclude how many subdialects exist in each dialect. We do not know either whether tone geography will confirm the finding in word geography that Northern Thai consists of two main subdialects, Eastern Northern Thai and Western Northern Thai (Phantachat, 1983), and the finding in word geography and linguistic geography (i.e., vocalic and consonantal variation) that Southern Thai also consists of two main subdialects, Eastern Southern Thai and Western Southern Thai (L.Thongkum et al., 1978; Thampradit, 1981; Ache, 1985; Lertkultanon, 1991; Mahaphuntong, 1996).

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<sup>10</sup>This study is not a tone geography one, but it gives an accurate presentation of the tone systems of a large number Thai varieties.

Diagram 8. The patterns of tone splits and mergers of the Northeastern Thai sub-dialects of Roi-et, Ubon, Loei, and Lom Sak (adapted from Brown, 1965).

Northeastern Thai spoken in Roi-et

	A	B	C	DL	DS
1	T1		T6		
2	T2	T4			T1
3					
4	T3	T5	T7		T5

Northeastern Thai spoken in Ubon

	A	B	C	DL	DS
1	T1		T5		
2	T2	T4			T1
3					
4	T3		T6		T4

Northeastern Thai spoken in Loei

	A	B	C	DL	DS
1	T1		T4		
2		T3			T1
3	T2				
4			T5		T3

Northeastern Thai spoken in Lom Sak

	A	B	C	DL	DS
1			T4		
2	T1	T3			T1
3					
4	T2		T5		T3

Tone geography at the subdialect level has often been carried out as small projects covering one province each. These studies will eventually provide the required information, but it will take a very long time and their results may not be fully comparable. It would be ideal if a single study could be done covering the whole area of a dialect or the whole country using the same word list and the same elicitation as well as analysis techniques. Such a study would give us the most satisfactory picture of tone geography at the subdialect level.

### Tone Geography of the Thai Accents

Accents are defined here as members of the same subdialect having the same number of tones as well as the same pattern of tone splits and mergers, and differing in the phonetic realisations of some or all of the tones. Previous studies of tonal differentiation among Thai accents may be classified into two types according to the method used: those that only use the tone box method and those that use another method in conjunction with the tone box method. The former usually investigates tone systems of both subdialects and accents in a province (e.g., Pimpa, 1986; Taengko, 1987; Sawangwan, 1991; Sittiprapaporn, 1997). They tend to concentrate on tonal differentiation among sub-dialects and do not have anything much to say about accents. The other group of studies (Malaichlern, 1988; Nualjansaeng, 1992), on the other hand, aims at studying how accents differ from one another and how they are distributed over an area..

Malaichalern (1988) studied the tone geography of Central Thai spoken in the provinces of Ang Thong and Phra Nakorn Si Ayutthaya, located about one hundred kilometres north of Bangkok. As a speaker of Ang Thong Thai, Malaichalern knew that speakers of the two provinces speak differently and wanted to prove that the discrepancies could be explained by variation in tonal realisations. She experimented with a new method of study and succeeded well. She pinpointed the distinctive characteristic of each tone using her own judgement as a native speaker. For example, in the case of the tone in such words as ไข่ /khaiB1/ 'egg' and ป่า /paaB2/ 'forest' (which is referred to in that study as tone 2), Malaichalern decided that what differentiates the accents is whether the majority of the tonetic variants is [43],<sup>11</sup> [32], or [21]. When a map was produced to show the distribution of these groups, it was found that the criterion set by Malaichalern worked very well indeed. The tone (identified here as tone 2) is realised as [43] in the area close to Suphanburi province and furthest from Bangkok, as [32] in the area closer to Bangkok than the first area, and as [21] in the area closest to Bangkok<sup>12</sup> (see Figure 5). Malaichalern went on to select the distinctive characteristic of each tone, group the varieties according to the characteristics, and display them on a map. After that she compiled the maps of all of the tones into a single map (see Figure 6) and produced a display of the areas where different accents are used.

Malaichalern's method is very interesting but there is one major problem: how to identify the distinctive characteristic of each tone. Malaichalern managed to do so because she came from the area under study. Nualjansaeng (1992) tried using the same method but did not succeed to the same extent because she was not a native speaker and did not have confidence in identifying the distinctive characteristics. Further work has to be carried out to solve this problem.

### FUTURE DEVELOPMENT IN THAI TONE GEOGRAPHY

To produce a complete linguistic atlas of Thai tone geography we need information on the tone systems of many more varieties. Progress in Thai tone geography has two important obstacles, lack of interest among researchers and incompatibility of research results. As far as the first obstacle is concerned, although research in Thai dialectology has been very active during the past three decades, most researchers have preferred working in the area of word geography rather than in tone geography. There are two reasons. First, word geography can be carried out by postal questionnaire, while tone geography requires field work, which is time consuming and expensive. Secondly, many researchers who are interested in tone geography do not feel confident enough with their ability to analyse tone auditorily, so they decided not to work in this field. As far as the second obstacle is concerned, techniques used in data elicitation have much influence on tonal realisations. Results obtained from different elicitation techniques are therefore not really comparable. Data analysis in most studies has also been carried out auditorily and reliability of results is a problem.

<sup>11</sup>The numbers in brackets refer to pitch height: 1 is low, 2 is lower mid, 3 is mid, 4 is upper mid, and 5 is high.

<sup>12</sup>Tone 2 in Suphanburi Thai is often realised as [43] and in Bangkok Thai as [21].

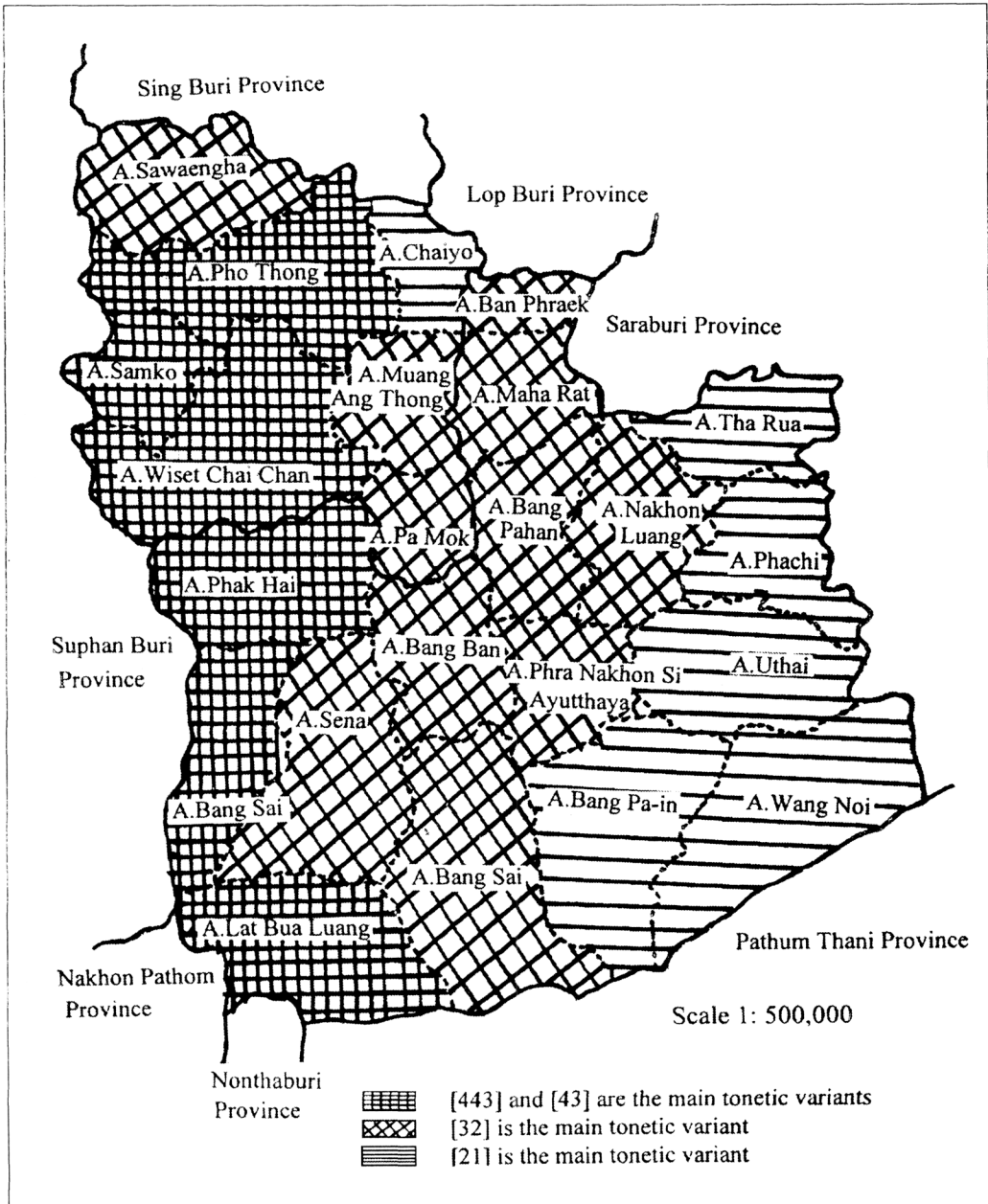


Figure 5. Map showing the distribution of the subdialects of Central Thai spoken in Ang Thong and Phra Nakhon Si Ayutthaya provinces based on phonetic realisations of tone 2 in smooth syllables (adapted from Malaichalern, 1988).

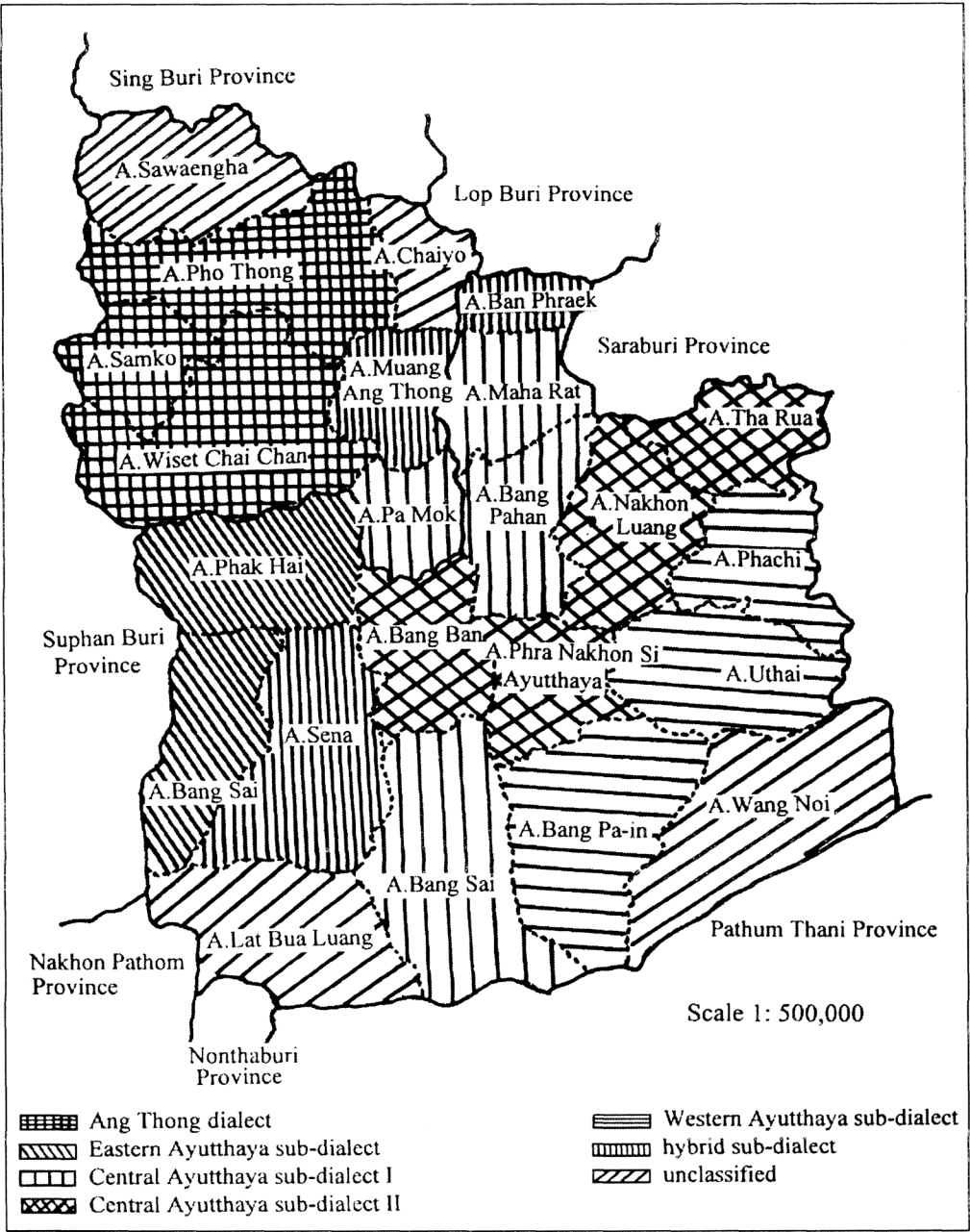


Figure 6. Map showing the distribution of the subdialects of Central Thai spoken in Ang Thong and Phra Nakhon Si Ayutthaya provinces, based on variation of all of the tones in the system (adapted from Malaichalern, 1988).

In this section I will propose a method of study that aims at overcoming the two obstacles, so that there can be significant progress in Thai tone geography, especially at the levels of main dialects and subdialects. The method has been developed over the past decade (Tingsabadh, 1990; Tingsabadh, Krisnapan, & Banditkul, 1991;

Tingsabadh & Krisnapan, 1992; Krisnapan, 1995; Tingsabadh & Deeprasert, 1997). It uses simple data collection techniques, and data analysis is carried out instrumentally.

Data collection in this method consists of two parts. In the first part researchers use the tone checklist proposed by Gedney (1972) to find the pattern of tone splits and mergers of the variety under investigation. At this stage we need not analyse the pitch pattern of each tone in exact detail. We only have to divide the tone box accurately. Once we have the pattern of tone splits and mergers, we move on to the next part. In the second part of data collection tone sets are prepared based on the pattern of tone splits and mergers of each variety. One word is selected for each tone, and all of the words must be minimally distinguished by tone. For example, the tone sets for Standard Thai are shown in Table 2. Diagram 10 shows how the words fit into the pattern of tone splits and mergers of this variety:

Table 2: Tone sets for Standard Thai.

	<u>Words</u>	<u>Standard Thai Script</u>	<u>Gloss</u>	<u>Standard Thai Pronunciation</u>
Set 1	/khaaA4/	คา	'to be stuck'	/khaa/
	/khaaB1/	ข้า	'galangal'	/khàa/
	/khaaC1/	ข้า	'I'	/khâa/
	/khaaC4/	ค้า	'to engage in trade'	/kháa/
	/khaaA1/	ขา	'leg'	/khǎa/
Set 2:	/khaatDL1/	ขาด	'to be torn'	/khàat/
	/khaatDL4/	คาด	'to tie'	/khâat/
Set 3:	/khatDS1/	ขัด	'to polish'	/khât/
	/khatDS4/	คัด	'to steer (a boat)'	/khát/

There are 11 empty slots in Diagram 10 because we already have a word carrying the tones for those slots. For example, we do not need the words in the B4, C2, and C3 slots because they carry the same tone as the word in the C1 slot. Separate tone sets are normally constructed for the tones in DL and DS. This is done in order to check their phonetic realisations before including them as allotones of the appropriate tones in the columns A, B, or C.

Diagram 10. The tone box containing words for the tone sets in Standard Thai.

	A	B	C	D-long	D-short
1	/khǎa/	/khàa/	/khâa/	/khàat/	/khàt/
2					
3					
4	/khaa/		/kháa/	/khâat/	/khát/
Smooth syllables			Checked syllables		

Once the tone sets are ready, we use them as the basis to construct our wordlists. We use five tokens of each word in the tone sets in the wordlists. For convenience in data collection it is recommended that there should be two wordlists, one of the words with smooth syllables and the other with checked syllables. The tokens of each word occur in the wordlist at random. No two tokens of a word should occur consecutively in the wordlist to prevent confusion in data analysis (see Table 3).

Table 3 Tone Set Wordlists for Standard Thai.

List 1: Smooth Syllables

1.	/khaa/	6.	/khàa/	11.	/khâa/	16.	/khǎa/	21.	/khǎa/
2.	/khâa/	7.	/kháa/	12.	/khàa/	17.	/khàa/	22.	/kháa/
3.	/khàa/	8.	/khâa/	13.	/khǎa/	18.	/khaa/	23.	/khaa/
4.	/khǎa/	9.	/khaa/	14.	/khaa/	19.	/kháa/	24.	/khàa/
5.	/kháa/	10.	/khǎa/	15.	/kháa/	20.	/khâa/	25.	/khâa/

List 2: Checked Syllables

1.	/khát/	5.	/khâat/	9.	/khàt/	13.	/khàat/	17.	/khâat/
2.	/khàat/	6.	/khàt/	10.	/khát/	14.	/khát/	18.	/khàat/
3.	/khâat/	7.	/khàat/	11.	/khâat/	15.	/khâat/	19.	/khàt/
4.	/khàt/	8.	/khát/	12.	/khàat/	16.	/khàt/	20.	/khát/

Researchers are advised to prepare different versions of the tone set wordlists prior to each field trip. We normally know which patterns of tone splits and mergers may be expected in the area of investigation. No time will thus be wasted in the preparation of the wordlists on location. We just select the appropriate lists for the variety being



investigated after having found the pattern of tone splits and mergers. To elicit the data the researcher first trains the informant to recognise a sign representing each word in the tone set. In the case of Standard Thai, for examples, pointing at oneself designates ข่า /khâa/ 'I', and pointing at one's leg designates ข่า /khǎa/ 'leg.' Pictures may also be used as cues. Once the informant can respond correctly to all of the cues, the interviewer turns on the tape recorder and gives the cue for each word on the list from the first to the last. It is recommended that the interviewer call the number of each word for easy identification in data analysis. To facilitate analysis the interviewer is advised not to rush through the wordlist. There should be a pause between calling out the number and giving the signal for the word, and also after the pronunciation of each word. This elicitation technique has been found to be efficient and to save a lot of time.

Data analysis is very convenient at present, since much good speech analysis software is available. It is recommended that the fundamental frequency of each item on the wordlists be analysed from the beginning and at every 10 percentage points of duration thereafter, making it 11 points of measurement per item. In this way the durations of all of the items are normalised (Abramson, 1962). A spreadsheet programme is then used to compile results. The measurement results of the five tokens of each word are recorded in one table. The average fundamental frequency value at each point of measurement of the five tokens is calculated. After that the average fundamental frequency values of all of the tones are transferred to the same table—one table for the smooth syllables, one for the long checked syllables, and one for the short checked syllables. Line graphs are produced showing the average curves of all of the tones in each context (see Figures 7).

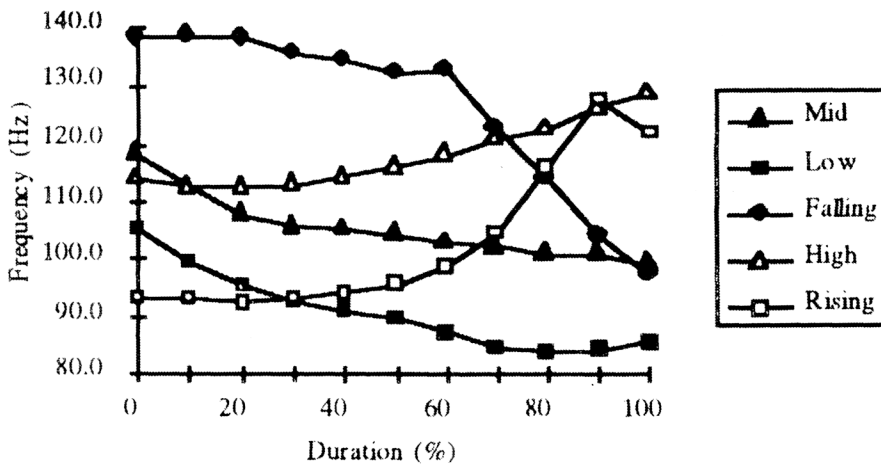


Figure 7. The five tones of Standard Thai (Tingsabadh & Deeprasert, 1997)

Using the method described above, one can obtain a graphic display of all of the tones in a variety without much difficulty. If the tone systems of most of the varieties of Thai spoken in every part of the country are investigated by this method, the results can

be used to construct a linguistic atlas for Thai tone geography. The patterns of tone splits and mergers together with the graphs will play important roles in the production of the atlas. These are many possible ways to present the maps. This will have to be explored further. A database of the tone systems of all varieties of Thai can also be constructed with an audio-visual display of the tone system graph for each variety. The database can be linked to a map to show where each variety is spoken. The information could also be interpreted and presented in a study of Thai tone geography. However, the results obtained may not be good enough for the study of tone geography of accents. This type of study requires another method, an analysis of connected speech. Accents differ very little from one another and it is suspected that the tonal characteristics that differentiate them appear only when speakers converse freely. Much more work has to be done to find the most appropriate method to study such variation. Some recent studies have begun experimenting with a new method in studying tones in connected speech (Krisnapan, 1995; Tingsabadh & Krisnapan, 1997; Kamdee, in preparation; Worawong, in preparation; Teeranon, in preparation). In the near future we will know whether tonal variation among accents can be analysed from connected speech. If the results of these studies are positive, Thai tone geography at the level of accents will have a bright future.

## CONCLUSION

Tone geography is a part of dialect geography. The tone geography of Thai can be investigated at the level of dialects, subdialects, and accents. The tone box method is a very important tool, but some adaptation is necessary when it is used in the study of tone geography. A great deal more research has to be carried out to gain full knowledge of the tone geography of Thai. So far progress in this important field of study has not been satisfactory due to lack of interest and incomparable results. A method for investigating the tone systems of Thai varieties proposed here could yield more comparable studies in the future, leading to the production of a linguistic atlas of Thai tone geography. Connected speech is seen as a very important source of data on tonal variation among accents.

## REFERENCES

- Abramson, A. S. (1962). *The vowels and tones of Standard Thai: Acoustical measurements and experiments*. Indiana University Research Center in Anthropology, Folklore, and Linguistics, 20.
- Ache, D. (1985). ภูมิศาสตร์คำศัพท์ภาษาไทยถิ่นใต้จังหวัดสุราษฎร์ธานีและนครศรีธรรมราช [Word geography of Southern Thai spoken in Surat Thani and Nakhon Si Thammarat]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Bloomfield, L. (1933). *Language*. London: George Allen & Unwin Ltd.
- Brown, J. M. (1965). *From ancient Thai to modern dialects*. Bangkok: Social Science Association Press of Thailand.
- Chantavibulya, V. (1956). ความแตกต่างระหว่างภาษากรุงเทพฯและภาษาสงขลา [Variation between the Bangkok dialect and the Songkhla dialect]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.

- Diller, A. V. N. (1976). *Toward a model of Southern Thai diglossic speech variation*. Unpublished doctoral dissertation. Cornell University, Ithaca.
- Debavalya, K. (1983). แนวแบ่งเขตภาษาไทยถิ่นกลางกับภาษาไทยถิ่นใต้โดยใช้วรรณยุกต์เป็นเกณฑ์ [A linguistic borderline between Central Thai and Southern Thai: A tonal study]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Gedney, W. J. (1972). A checklist for determining tones in Tai dialects. In M. Estellie Smith (Ed.), *Studies in linguistics in honor of George L. Trager* (pp. 423–437). The Hague: Mouton.
- Kamdee, S. (in preparation). การศึกษาวรรณยุกต์เพื่อการจำแนกสำเนียงของภาษาไทยถิ่นบ้านลาดจังหวัดเพชรบุรี [A tonal study to differentiate Banlad accents of Phetchaburi Province] M.A. thesis. Chulalongkorn University, Bangkok.
- Krisnapan, D. (1995). แนวการศึกษาวรรณยุกต์จากคำพูดต่อเนื่อง: กรณีศึกษาภาษาไทยถิ่นเพชรบุรี [A connected speech approach to tonal study: A case study of Phetchaburi Thai]. Unpublished doctoral dissertation. Chulalongkorn University, Bangkok.
- L.Thongkum, T. (Ed.). (1978) เสียงและระบบเสียงในภาษาไทยถิ่นใต้จังหวัดสุราษฎร์ธานี 16 อำเภอ [Sounds and sound systems of Southern Thai spoken in the 16 amphoes of Suratthani province]. Bangkok: Indigenous Languages of Thailand Research Project, Chulalongkorn University.
- Lertkultanon, S. (1991). ภูมิศาสตร์คำศัพท์ภาษาไทยถิ่นใต้จังหวัดพังงาและกระบี่ [Word geography of Southern Thai spoken in Phangnga and Krabi]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Mahaphuntong, C. (1996). การกำหนดแนวแบ่งเขตภาษาไทยถิ่นใต้ตะวันออกกับภาษาไทยถิ่นใต้ตะวันตกโดยใช้พยางค์ที่มีสระเสียงยาวกับพยัญชนะท้าย /k/ หรือ /ʔ/. [Locating a dialect boundary between Eastern Southern Thai and Western Southern Thai using syllables with long vowels and final /k/ or /ʔ/]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Maryprasith, P. (1992). การแปรของเขตปรับเปลี่ยนภาษาระหว่างภาษาไทยถิ่นกลางและภาษาไทยถิ่นใต้ตามอายุของผู้พูด: การศึกษาคำศัพท์ [Aged-based variation of the linguistic transition area between Central Thai and Southern Thai: A lexical study]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Malaichalern, Y. (1988). วรรณยุกต์ในภาษาไทยถิ่นจังหวัดอ่างทองและพระนครศรีอยุธยา [Tones in the Thai dialects of Changwat Ang Thong and Phra Nakhon Si Ayutthaya]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Miller, R.A. (1956). Phonology of the Thai dialect of Nakhon Sithammarat. *Orbis*, 5, 250–258.
- Nualjansaeng, J. (1992). วรรณยุกต์ในภาษาไทยถิ่นอำเภอมืองนครปฐม [Tones of the Thai dialect of Amphoe Muang Nakhon Pathom]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Panupong, V. (1983). รายงานผลการวิจัยเรื่องภูมิศาสตร์คำศัพท์ในจังหวัดนครราชสีมา: โครงการทดลอง [Word geography in Nakhon Ratchasima: A pilot project]. 2 volumes. Bangkok: Faculty of Arts, Chulalongkorn University.
- Phantachat, W. (1983). ภาษาถิ่นย่อยของคำเมือง: การศึกษาคำศัพท์ [Regional varieties of Kham Muang: A lexical study]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.

- Pimpa, W. (1986). *A tonal comparison of Northeastern Thai dialects in Khon Kaen Province*. Unpublished M.A. thesis. Mahidol University, Bangkok.
- Sawangwan, S. (1991). ภูมิศาสตร์ภาษาไทยถิ่นในจังหวัดชัยภูมิโดยใช้ระบบวรรณยุกต์ [A Thai dialect geography in Chaiyaphum province: A tonal study]. Unpublished M.A. thesis. Mahidol University, Bangkok.
- Sittiprapaporn, W. (1997). *A Thai dialect geography of Udonthani province: A tonal study*. Unpublished M.A. thesis. Mahidol University, Bangkok.
- Taengko, J. (1987). *A tonal comparison of Tai dialects in Loei province*. Unpublished M.A. thesis. Mahidol University, Bangkok.
- Teeranon, P. (in preparation). หน่วยจังหวะกับการแปรของวรรณยุกต์ในคำพูดต่อเนื่องภาษาไทย [Rhythmic unit and tonal variation in Thai connected speech]. M.A. thesis. Chulalongkorn University, Bangkok.
- Thampradit, J. (1981). การใช้ลักษณะทางสัทศาสตร์ของสระสูงในการแบ่งเขตภาษาถิ่นในจังหวัดตรัง กระบี่ พังงาและภูเก็ต [The use of the phonetic characteristics of high vowels for a dialect survey of Trang, Krabi, Phangnga, and Phuket]. Unpublished M.A. thesis. Chulalongkorn University, Bangkok.
- Tingsabadh K. (1985). *Thai dialectology up to the year 1984*. *Science of Language Papers*, 5, pp. 74–102. Department of Linguistics, Faculty of Arts, Chulalongkorn University.
- Tingsabadh, K. (1990). วรรณยุกต์ในภาษาไทยถิ่นสุพรรณบุรี: การศึกษาเปรียบเทียบวรรณยุกต์ในคำกับวรรณยุกต์ในถ้อยคำต่อเนื่อง [Tones in Suphanburi Thai: A comparative study between tones in citation forms and tones in connected speech]. Unpublished research report. Department of Linguistics, Faculty of Arts, Chulalongkorn University, Bangkok.
- Tingsabadh, K., & Deeprasert D. (1997). Tones in Thai Connected Speech. In A. S. Abramson, (Ed.), *Southeast Asian linguistic studies in honour of Vichin Panupong* (pp. 297–307). Bangkok: Chulalongkorn University Press.
- Tingsabadh, K., Krisnapan, D., & Banditkul, U. (1991). ภาษาเมืองเพชร [Phetchaburi Thai]. In *Phetchaburi: Development in society and culture* (pp. 103–125). Bangkok: Institute of Thai Studies. Chulalongkorn University.
- Tingsabadh, K., & Krisnapan, D. (1992). Tonal overlapping: An instrumental study of Suphanburi Thai. In S. Luksaneeyanawin (Ed.), *Proceedings of the Third International Symposium on Language and Linguistics: Pan-Asiatic Linguistics*, Vol. II, pp. 804–817. Bangkok: Chulalongkorn University.
- Weinreich, U. (1954). Is a structural dialectology possible? *Word*, 10, 388–400.
- Worawong, N. (in preparation). วรรณยุกต์ภาษาไทยถิ่นกาญจนบุรี [Tone in Kanchanaburi Thai] M.A. thesis. Chulalongkorn University, Bangkok.