A STUDY ABOUT LAOTIAN AND CAMBODIAN STUDENTS' VIETNAMESE TONES PRONUNCIATION MISTAKE WITH THE APPLICATION OF PHONETICS SOFTWARE PRAAT

NGHIÊN CỨU LỖI PHÁT ÂM HỆ THỐNG THANH ĐIỆU TIẾNG VIỆT CỦA HỌC VIÊN LÀO, CAMPUCHIA TRÊN PHẦN MỀM NGỮ ÂM PRAAT

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1. Research data and research methodology:

We recorded 20 participants (called CTVs) including Laotian and Cambodian students who already finished first year course (intermediate level) in the Military Technical Academy. They were divied by their teachers into three main groups, which can be listed as "Good" (CTV1), "Medium" (CTV2) and "Poor" (CTV3).

"Audacity" software is used as a recording tool and is set up in the computer with the default value of 22, 050Hz, 16 bit and file format ".wave". CTVs' recording files are then seperated into 2,360 small files and divided into 20 folders.

Selected data are individual syllables, and they are put in sentences. "Ending sounds which are nasal sounds, semi-vowel or "zero" phonology will be faciliated to completely perform their features" (Doan Thien Thuat, 2016, p.77). Therefore, we choose open syllables, in which single vowels and "zero" ending sound are main syllables and are shown in six tones, such as *xi, ti, mi, xa, ta, ma, xu, tu, mu.*

After recording, we start analyzing the document with the help of Praat[1].

Steps of analysis:

- Step 1: Listen to specify pronunciation mistakes

    The researcher listens to the recorded files and identify mistakes

- Step 2: Use Praat to analyze and identify mistakes

Vietnamese tones pronunciation mistakes are divided into several categories: 1) Flat high tone ("thanh ngang" or "thanh không") pronunciation mistakes; 2) Flat low tone

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[1]   Praat is a computer software used to scientifically analyze and synthetic speech in phonetics. It is designed and continually developed by Paul Boersam and David Weenink – researchers of the Institute of Phonetic Sciences, University of Amsterdam, Netherland. Praat occupies a lot of useful functions, in which the most important function is speech analysis, spectral analysis, pitch analysis, formant analysis, intertsity analysis or jitter, shimmer, voice break analysis (http://www.fon.hum.uva.nl/praat/).

("thanh huyền"); 3)High rising tone ("thanh ngã"), 4) Falling rising tone ("thanh hỏi"); 5) Rising tone ("thanh sắc"); 6) Short low tone ("thanh nặng")

Speech phonology descriptions through Praat, which are both practical and correct, will demonstrate in details Laotian and Cambodian students' pronunciation mistakes. Hence, objective and precise conclusions will be proposed.

A sociology reseach method is applied during data collecting; synthesis method is used in data processing; observation, compare and contrast are used to describe, analyze and evaluate these mistakes.

2. Findings about Vietnamese tones pronunciation

2.1. High flat tone (thanh ngang – thanh không) pronunciation mistakes:

In Vietnamese, regarding criteria about pitch ranges and intonation, "thanh ngang" is defined as a "high" and "flat" tone which has high pitch range and and is shown by flat contour of tone, hardly fall or rise from the beginning of utterance until the end (Doan Thien Thuat, 2016, p.77).
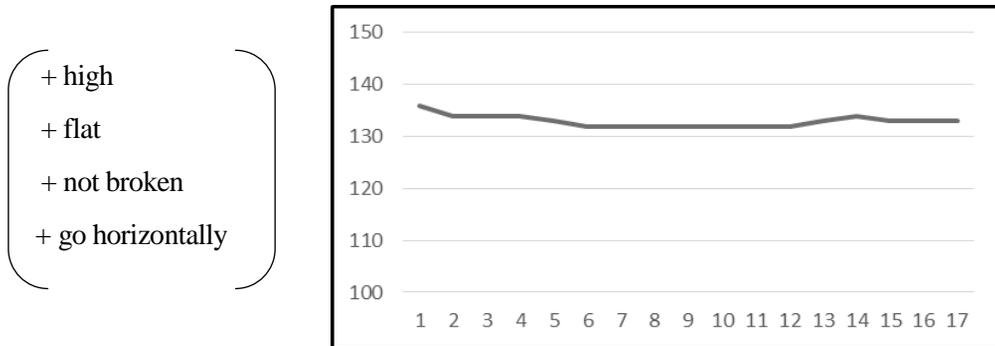

Chart 1. *High flat tone (Thanh khong – Thanh ngang) in Vietnamese*

In individual syllables, all participants in CTV groups pronounce appropriately in both pitch and duration, their tones' contour share similarities with native Vietnamese pronouncing. Participants also pronounce correctly the high flat tone's pitch (Table 1).

Table 1. *Laotian, Cambodian students' high flat tone (thanh ngang – thanh khong) pronunciation pitch*

	CTV1	CTV2	CTV3
Laotian	146 Hz	165 Hz	148 Hz
Cambodian	126 Hz	148 Hz	128 Hz

Note: CTV1 is "Good"

CTV2 is "Medium"

CTV3 is "Poor"

The process of making the tone is comparatively flat and is clearly shown in the Chart 2.

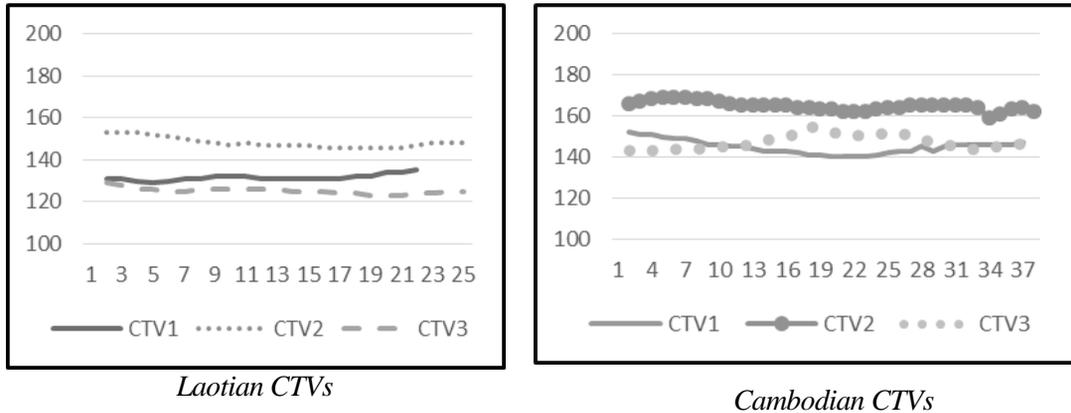*Laotian CTVs*   *Cambodian CTVs*

Chart 2. *The performance of high flat tone (thanh ngang – thanh khong) when each syllable is pronounced separately*

Nevertheless, when pronouncing whole sentences, participants perform differently (Chart 3)
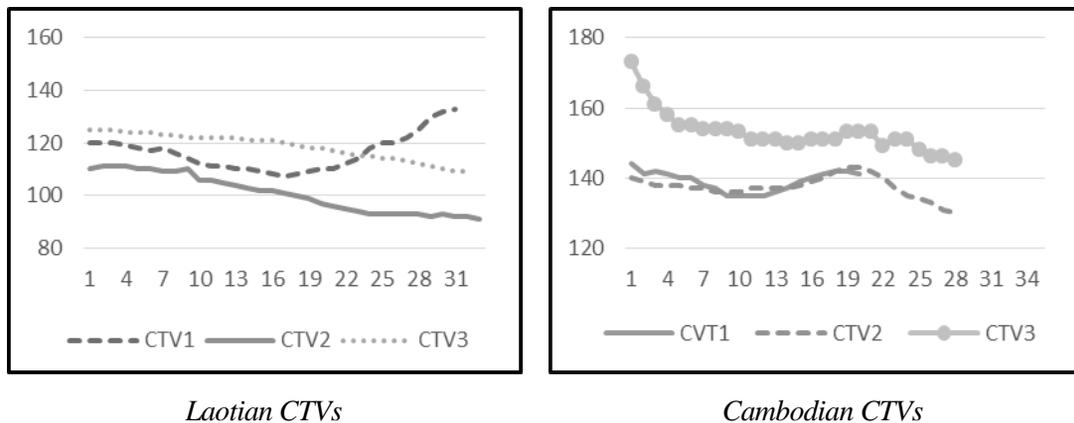

Laotian CTVs   *Cambodian CTVs*

Chart 3. *The high flat tone (thanh ngang – thanh khong) when are pronounced in sentences.*

In most of Cambodian participants' mistakes, the tone in individual syllables in sentences is uttered lower (CTV1: 131 Hz; CTV2: 141 Hz; CTV3: 149 Hz), the pitch though remained, go lower and lower in the end of pronouncing syllables, which makes the tone sounds similar to the flat low tone (thanh huyen) (69,6 %) or the short low tone (thanh nang) (28,2%) and the rising tone (thanh nga) (only 2,2%). For instance, *"Chị ấy có lông **mi** cong vút"* (She has curly eyelashes) is spoken as *"Chị ấy có lông **mị** cong vút"*, *"Đừng trả tôi tiền **xu** nhé"* (Please don't give back coin change to me) is pronounced as *"Đừng trả tôi tiền **xụ** nhé"*, *"Anh có sợ **ma** không?"* (Are you afraid of ghost) as *"Anh có sợ **mà** không?"*, *"Em làm việc ở công **ty** Sam Sung"* (I work at Samsung company) is performed as *"Em làm việc ở công **tì** Sam Sung"*, *"Từ nhà anh đến trường có **xa** không?* (Is it far from your house to your school?) is *"Từ nhà anh đến trường có **xà** không?"*

Similarly, Laotian participants also make this tone in sentences with lower average pitch than in individual syllables (CTV1: 120 Hz; CTV2: 101 Hz; CTV3: 115 Hz), pitch range is still kept in the beginning of utterance but tends to be lower in the middle and in the end like the flat low tone (thanh huyen) (81.1%) or rise up like rising tone (thanh sac) (18.9%). For example, "Anh có sợ **ma** không?" (Are you afraid of ghosts) is said into "Anh có sợ **mà** không?";"Chị ấy có lông **mi** cong vút" (She has curly eyelashes) is uttered into "Chị ấy có lông **mí** cong vút". It can be explained that Vietnamese language only has one high flat tone which is called "thanh ngang" or "thanh khong". However, Laotian's flat tone can be presented in three types which are "rising flat tone" (the first tone), "flat tone" (the second tone) and "low flat tone" (the fifth tone) (Pham Duc Duong, 1970, p.35). The mistake that often occurred when Laotian students making Vietnamese high flat tone (thanh ngang – thanh khong) is that the pitch in the beginning of the pronouncing process is as high as the second tone ("flat tone"), duration is kept expertly to make the tone as flat as the first tone ("rising flat tone"), yet it goes down like the second tone or go up like the first tone. It is obvious that Laotian participants are influenced by their mother tongue's tone system in the way they make Vietnamese's tone.

In this study, there are 46 Cambodian CTV cases, which accounts for 12.9% - a small proportion among six mistakes of tone pronunciation. While Laotians has 37 cases which possesses the smallest number 11.2%. It is indicated that the high flat tone (thanh ngang) is not a big challenge for Laotian and Cambodian students. Their mistake is mostly not to remain the tone's pitch and make it lower in the end of the process.

2.2. Flat low tone (Thanh huyen)

The tone is "low falling" and "flat", "low pitch; compared to the high flat tone (thanh ngang-thanh khong), it is lower by an exactly forth interval. The contour of tone is mostly flat and slightly goes down" (Doan Thien Thuat, 2016, p.77)
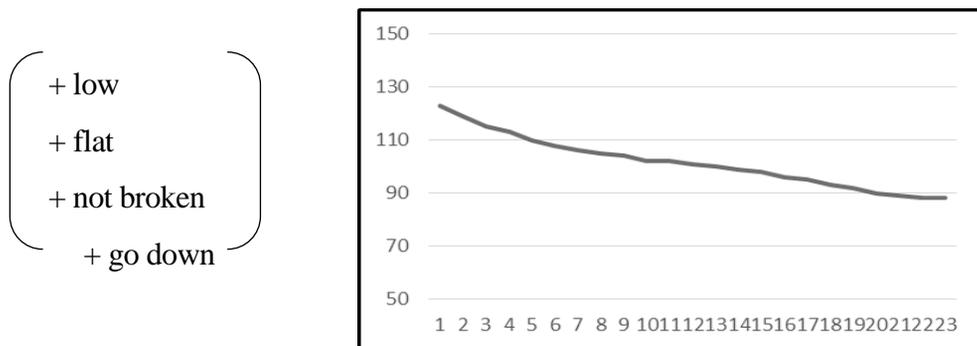

Chart 4. *Vietnamese's flat low tone (Thanh huyền)*

After processing 320 CTVs' recording files, we find out that students have the ability to make the tone similarly to Vietnamese in terms of pitch and duration. Nevertheless, similar mistakes between Laotian and Cambodian CTVs still emerge. The tone is likely to

be varied into high flat tone (thanh ngang - thanh khong) (accounts for 92% in Cambodian CTVs and 76.1% in Laotian CTVs), meaning that there is no falling down in the middle of the process but the pitch still remained as in the beginning; or sometimes goes higher in the end like the rising tone (thanh sac) (8% in Cambodian CTVs and 23.9% Laotian CTVs). The average pitch hence is higher, *tù 134 (Hz); mù: 128 (Hz); xà: 129 (Hz); tà: 135 (Hz)* can be taken as examples.

In chart 5, "xà" and "tà" is articulated like "xa" and "tá", "xì" and "tì" is said like "xi" and "tí". In chart 6, the sentence "Anh có xem phim nô **tì** không?" (Do you watch slavery movies?) is spoken into "Anh có xem phim nô **ti** không?"
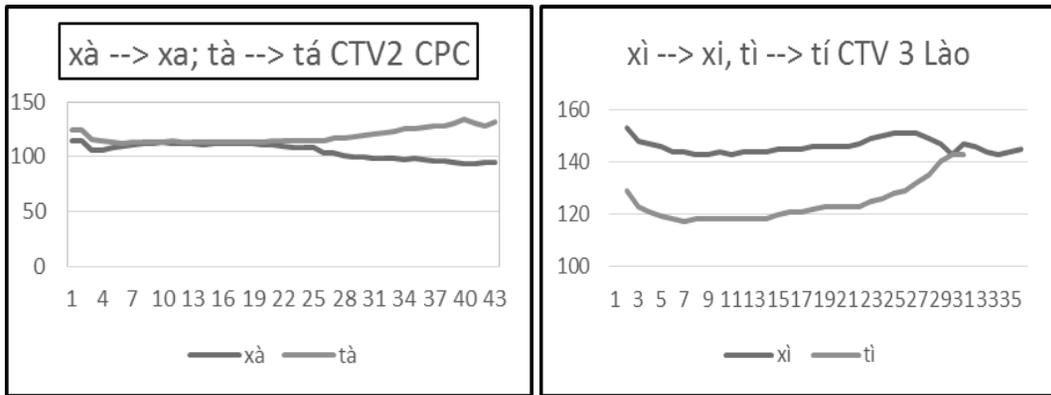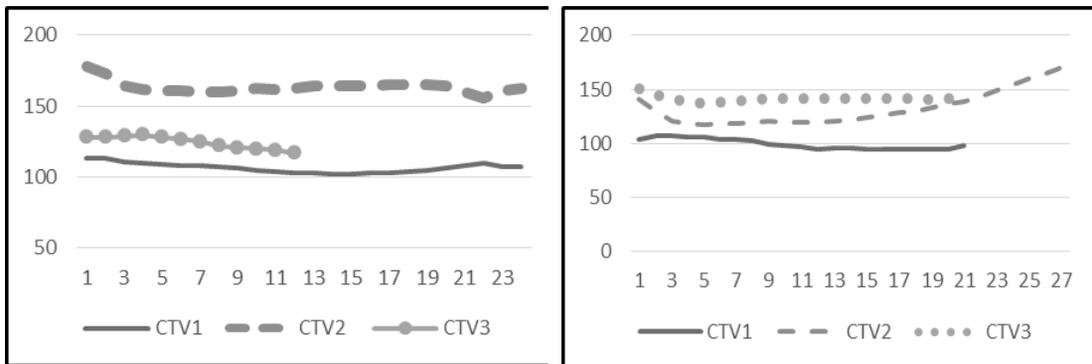

Chart 5. *Flat low tone (thanh huyen) pronunciation mistakes in individual syllables*

Cambodian CTVs   *Laotian CTVs*

Chart 6. *Flat low tone (thanh huyen) pronunciation mistakes in sentences*

An explanation for these mistakes is when reading out loud groups of words; students do not pronounce it low in the end of the utterance but still keep the pitch or make it significantly high like the rising tone (thanh sac). Accordingly, the performance of the tone is like high flat tone (thanh ngang – thanh khong) or rising tone (thanh sac).

In the paper, Cambodian CTV has 50 mistaken cases and Laotian CTV has 46 cases, which all presents for a low proportion (14%) in total six-tone pronunciation mistakes. A simplification can be given is that both high flat tone (thanh ngang) and flat low tone (thanh huyen) are considered as flat, no broken, horizontal or falling tones, thus paves a small amount of difficulties for students to practice. Nonetheless, resemblance of two tones in phonology makes them easily mistaken for each other, leading to inappropriate pitch and contour of tone. Laotian students are influenced by their language due to likeness between Vietnamese's high flat tone (thanh ngang), flat low tone (thanh huyen) and Laotian's three flat tones (the first, second and fifth tone).

2.3. High rising tone (thanh nga) pronunciation mistakes

High rising tone (thanh nga) has a complex contour of tone, suddenly twist when making the tone. On the other hand, it has pharyngeal phenomenon and might contain glottal stops. Contour of the tone can be categorized into three main steps: The first part starts similarly to flat low tone (thanh huyen), comparatively flat and gently go up. The second part is a going down remarkable short contour, sounds like being suddenly interrupted; at the same time, the strength of sound is lessened and glottal stop phenomenon might be emerged. The last part is a dramatic going-up contour of tone, finish considerably higher than the beginning." (Nguyen Van Lai, 1974, p.66)
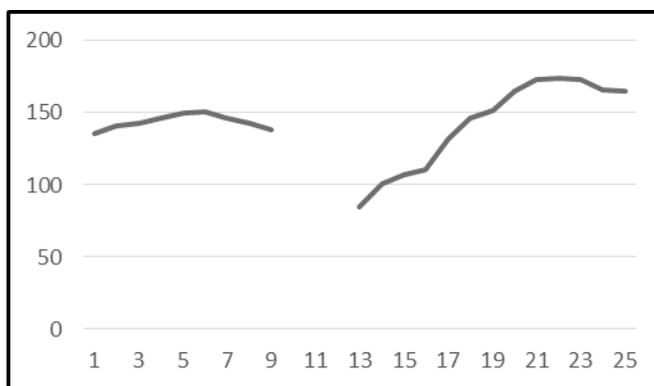

Chart 7. *High rising tone when pronouncing individual syllables*

The interrupted part in the middle (sounds totally omitted) displays the occurrence of glottal stop phenomenon during process.

The high falling and rising tone (thanh nga) performance with broken, glottal stop features in the middle is always seen as a extraordinarily challenging tone; for that reason, students sometimes make it correctly, sometimes give it some variants: like high rising tone (thanh sac) (69.4% for Laotian CTV and Cambodian CTV 89.1%) or similar to falling rising tone (thanh hoi) (4.8% for Laotian CTV and 10.9% for Cambodian CTV). Laotian CTVs also make it similar to flat low tone (thanh huyen) (6.4%) and high flat tone (thanh ngang – thanh khong) (19.4%). For instance. *"mã"* is said into *"má"* or *" mà"; "xũ"* is

varied into *"xú"*, *"Lấy cái **tã** thay cho em bé"* (Take the diapers for the baby) is spoken as *"Lấy cái **tả/ ta** thay cho em bé"*, *"Cả **xã** đang vào mùa thu hoạch lúa"* (The whole village is in rice harvest time) is pronounced into *"Cả **xá** đang vào mùa thu hoạch lúa"*. These mistakes are also presented in surveys and descriptions of a certain number of authors' studies which can be listed are Nguyen Van Lai (1974), Dinh Lu Giang (2011), and Nguyen Van Phuc (1999).
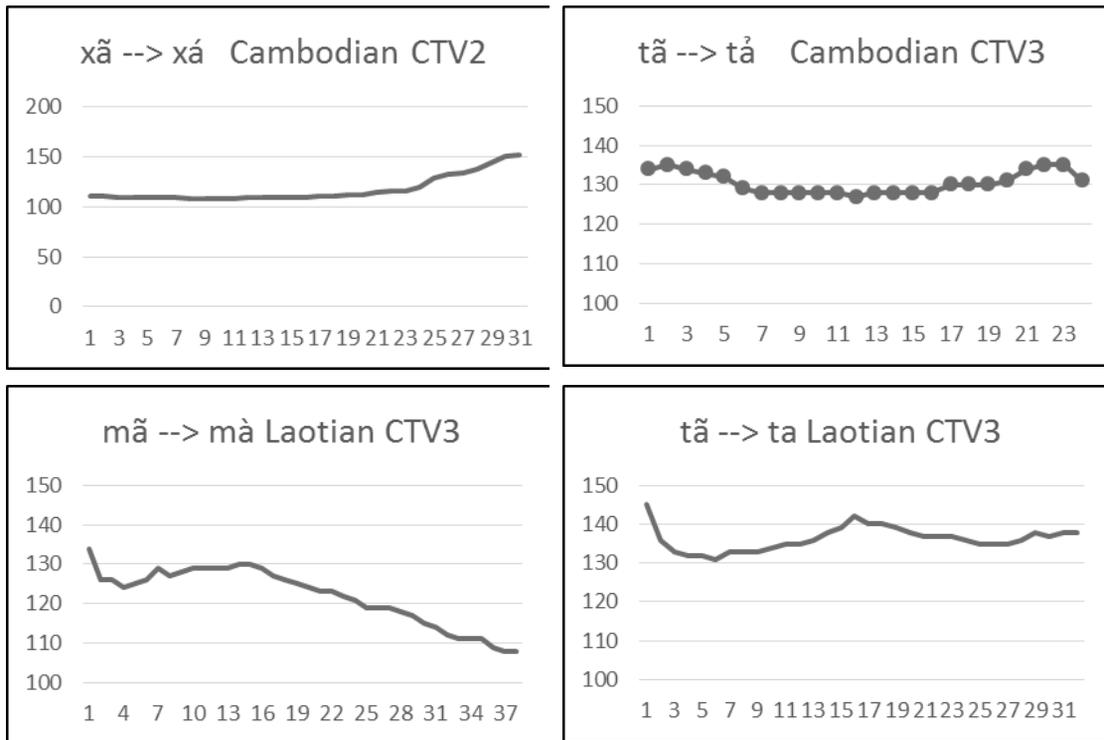

Chart 8. *High falling rising tone (thanh nga) pronunciation mistakes*

Replacing broken tone by no broken or no glottal stop sound in the middle of pronunciation process "hence remains no distinctions and features for the tone". It also facilitates us to solve and choose simple pronunciation for Vietnamese children, "Syllables with high falling rising tone (thanh nga) tend to be produced like high rising tone (thanh sac): *mũi → múi; ngã → ngá*" (Doan Thien Thuat, 2016, p.78)

In this paper, the tone pronunciation mistakes hold 62 cases, 18.9% for Laotian CTV and 64 cases, 17.9% for Cambodian CTV in total mistakes. The proportion is higher than flat low (thanh huyen) and high flat tone (thanh ngang- thanh khong). The tone's phonological features which are high, broken, glottal stops and the non-existence of thanh nga in students' language shed the light on Laotians and Cambodians' pronunciation mistakes.

2.4. Falling rising tone (thanh hoi) pronunciation mistake

In Vietnamese tone system, falling rising tone (thanh hoi) "starts from the pitch of flat falling tone (thanh huyen)'s beginning of utterance. It also finishes at low pitch so it can be concluded that the tone belongs to low register group of tone. The contour of tone goes more lowly from the starting point, until the sixth interval (possibly seventh interval), it goes up proportionally to the previous going down contour, and finishes at the same pitch of beginning. This change of contour of tone is considered as "broken" feature of the tone (Doan Thien Thuat, 2016, p.79)
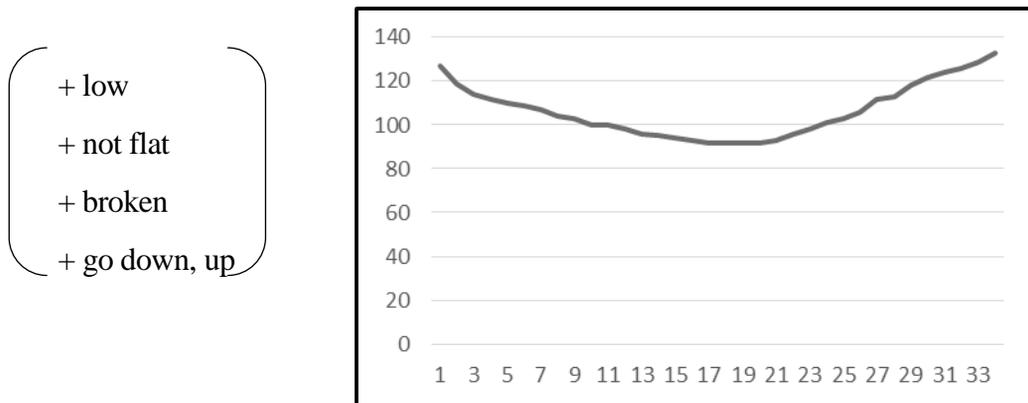

Chart 9. *Vietnamese's falling rising tone (thanh hỏi)*

Due to the tone's feature, it is also evaluated as a demanding tone to Laotian and Cambodian students when they have to put a significant effort to low their pitch in the middle and raise their pitch up until the end. On that account, a common mistake is that students pronounce it similar to the flat tone, only goes down like flat low tone with long duration (thanh huyen) (25% for Laotian CTV and 62% Cambodian CTV), short low tone (thanh nang) with short duration, (14.4% for Laotian CTV and 30.1% of Cambodian CTV), leading to improper pitch and tone process. Laotian CTV especially also make the tone into two variants which are high flat tone (thanh ngang- thanh khong) (20.2%) and the high falling rising tone (thanh nga) (15.4%)

For example, *"Đừng vứt **xỉ** than đi nhé"* (Don't throw the coal slag away) is spoken as *"Đừng vứt **xì** than đi nhé"*, *"Nhà này tôi mua một **tỉ**"* (I paid one billion for this house) is *"Nhà này tôi mua một **tị**"*; *"Cho củ **sả** vào cho thơm"* (Add some lemongrass for better aroma) is *"Cho củ **sá/ sã** vào cho thơm"*; *"Chị ấy là người **tỉ mỉ**"*(She is a very careful person) is *"Chị ấy là người **ti mi**"*; *"Tủ quần áo của chị ở đâu?"*(Where is your wardrobe?) is *"**Tù** quần áo của chị ở đâu?"*;*"Cô giáo cho học sinh làm văn miêu **tả**"*(The teacher asked students to do description exercises) is *"Cô giáo cho học sinh làm văn miêu **tạ**."*

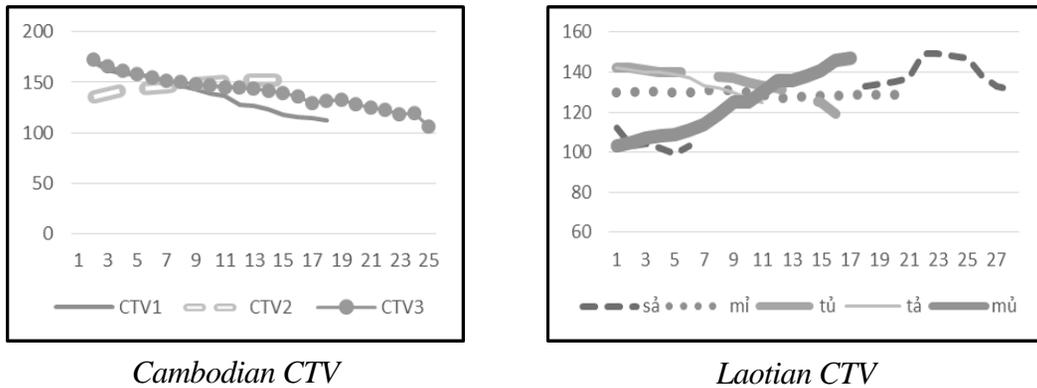*Cambodian CTV*   *Laotian CTV*

Chart 10. *Falling rising tone (Thanh hoi) when is pronounced in sentences*

In the paper, there are 79 cases of Cambodian CTV making mistakes, which accounts for 22.1%, 76 cases of Laotian CTV (23/1%) which is the highest proportion in six-tone pronunciation mistakes; consequently, this tone pronunciation mistakes are ordinary. It can be interpreted by the tone's phonological features which is "not flat, broken, gradually rises and falls", making struggles for students.

Mostly, Laotian students also make the tone with variants of the five other tones. A hypothesis is given that in Laotian language, there is no completely similar tone to falling rising tone (thanh hoi) in Vietnamese, but "the third tone – rising and falling tone and the forth tone – falling and rising tone" (Pham Duc Duong, 1970, p.36) are also broken tones but only go in a direction. It can confuse Laotians when trying to utter the tone and making it into five other tones is an unavoidable mistake.

2.5. Rising tone (thanh sac) pronunciation mistakes

Rising tone (thanh sac) is described as "high, not flat, not broken". "It starts at the same pitch with the high flat tone (thanh ngang). This part takes half of the rhyme, after that the contour rises and finishes higher than the high flat tone (thanh ngang) with a major second interval." Regarding syllables which has stop, unvoiced ending sounds and short-vowel main sounds, "the pitch remarkably rises, the contour of tone goes up sharply and finishes in a small range" (Doan Thien Thuat, 2016, p.80)
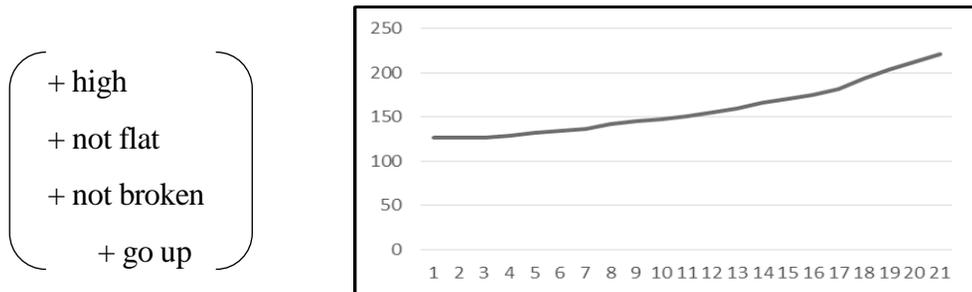

Chart 11. *Vietnamese's rising tone (thanh sac)*

To Cambodian CTV, the tone is also complicated to make, and tends to be pronounced into the high flat tone (thanh ngang – thanh khong) (31.2%), meaning that the beginning is lengthened and no rising in the end or falling like short low tone (thanh nang) (68.8%). *Chờ tôi một **tí** nhé" (just a moment) is "Chờ tôi một **ti** nhé"; "Tôi không thích đánh **má** hồng" (I don't like blush) is "Tôi không thích đánh **ma/ mạ** hồng" can be taken as typical illustrations for these mistakes.*

However, among Laotian CTV, the mistakes are more intricate when they build four variants of four tones: rising tone (thanh sac) is pronounced into short low tone (thanh nang) (41%), into high flat tone (34%), into falling rising tone (thanh hoi) (17%) and flat low tone (thanh huyen) (8%).
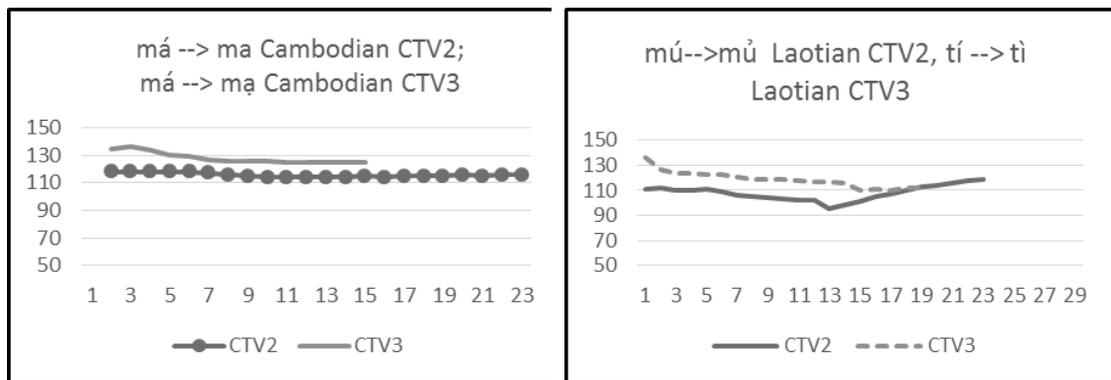
Chart 12. *Rising tone (thanh sac) pronunciation mistakess*

However, a majority of both Laotian and Cambodian CTV pronounce syllables which has unvoiced ending sounds, (such as "*mít, tát, xát, mút, sút*") into short low tone (thanh nang) (such as "*mịt, tạt, xạt, mụt, sụt*")
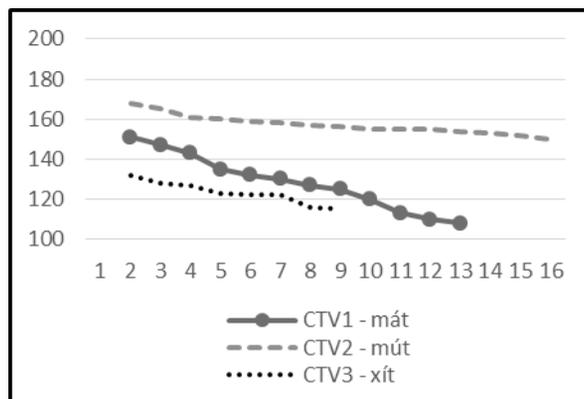
Chart 13. *Rising tone (thanh sac) pronunciation mistakes in unvoiced ending sound syllables*

Among Cambodian CTV's six-tone pronunciation mistakes, this tone's mistakes take the highest proportion (24.6%). It indicates that remaining pitch during the process of making tone is significantly challenging, especially to Cambodian students.

2.6. Short low tone (thanh nang) pronunciation mistakes

Some characteristics of the tone which can be listed are "a low pitch range. It approximately starts with the flat low tone (thanh huyen)'s pitch (…), the contour of tone begins flatly, lasts for most of syllables' part, and subsequently goes down with a big slope, until a tenth interval. In case that the ending sounds are nasal sounds, the going down part takes place at the ending sounds. If the main sound is short vowels, the flat part is narrowed" (Doan Thien Thuat, 2016, p.81). This tone possesses the shortest duration among Vietnamese six tones.
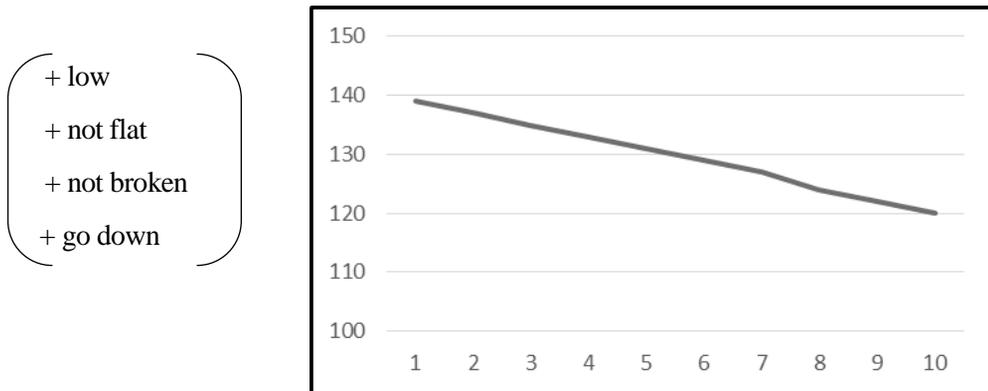
+ low

+ not flat

+ not broken

+ go down

Chart 14. *Vietnamese's short low tone (thanh nang)*

Laotian and Cambodian learners are frequently incorrect since the going down part is not pronounced quickly and straight, but is lengthened and go flat like the high flat tone (thanh ngang – thanh khong) (chart 15). These mistakes is present in 12 circumstances from Cambodian CTV accounting for 40% among total inaccuracies; and 10 cases of making mistakes among Laotian CTV which hold 25%. There are 7 cases that Laotian students pronounce short low tone into flat low tone (15.9%).
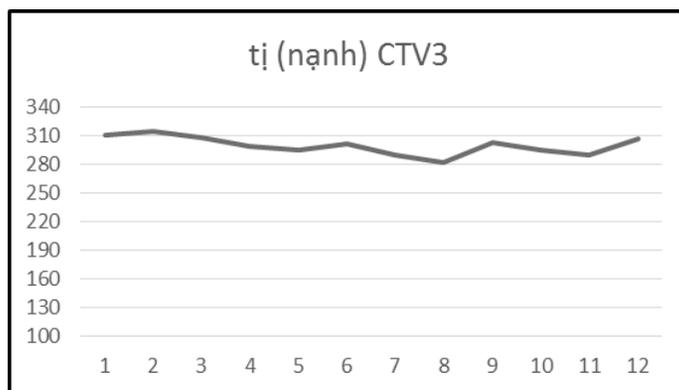
Chart 15. *Short low tone (thanh nang) pronunciation*

Regarding syllables which obtain unvoiced ending sounds, participants often pronounce them into high rising tone (60% among Cambodian CTV and 59.1% among

Cambodian CTV). For example, *tạt, tụt, tịt* is spoken into *tát, tút, tít*. Only two tones which are short low tone (thanh nang) and rising tone (thanh sac) can be presented in these syllables. Accordingly; when students do not correctly define the tone's duration and pitch, the high rising tone (thanh sac) will be changed into short low tone (thanh nang) (chart 13) or thanh nang will be varied into thanh sac (chart 16).
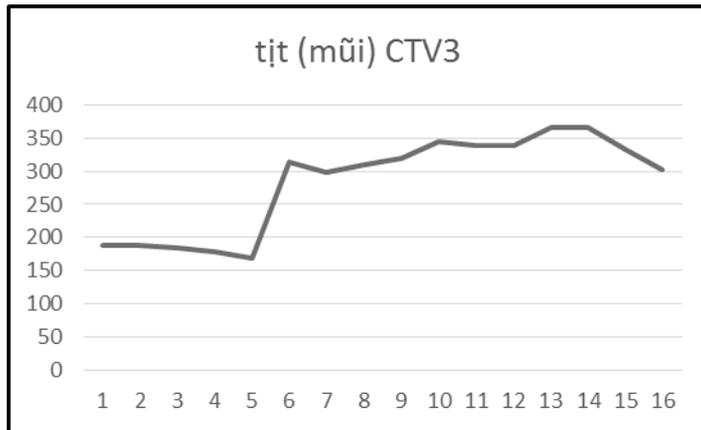

Chart 16. *Short low tone (thanh nang) pronunciation mistakes in unvoiced ending sound syllables*

In the study, the tone pronunciation mistakes appear in 30 cases among Cambodian CTV, accounting for the lowest proportion (8.4%). There are 40 cases of making mistakes among Laotian CTV (12.2%). Primarily, this tone mistakes do not emerge in either Laotian or Cambodian CTV1. It demonstrates that the "low, not broken, not flat, falling down" is the most undemanding tone to CTV participants.

3. Conclusion:

In short, Laotian and Cambodian students with no disadvantages of places of articulation are able to pronounce Vietnamese tones. However, lack of knowledge about pitch, process of tone pronunciation as well as the influence of their mother tongues' features (five tones in Laotian and no tones in Khmer language), along with confusion among tones when saying sentences or paragraph, give rise to imprecise each tone pronunciation. To be more specific:

Table 2. *Numbers and proportion of six-tone pronunciation mistakes of Laotian and Cambodian CTV*

Tones	Laotian CTV		Cambodian CTV	
	Number of mistakes	Proportion (%)	Number of mistakes	Proportion (%)
High flat tone (Thanh khong)	37	11.3	46	12.9
Flat low tone (huyen)	46	14.0	50	14.0
High rising tone (nga)	62	18.9	64	17.9

Falling risng tone (hoi)	76	23.2	79	22.1
Rising tone (sac)	67	20.4	88	24.7
Short low tone (nang)	40	12.2	30	8.4
Total	328	100	357	100

As it can be seen from the Table 2 that:

- The number of Laotian CTV making mistakes in uttering tones is smaller than Cambodian CTV. A hypothesis for this is that Laotian is also a tonal language with five tones, while there is no tone in Khmer language.

- While falling rising tones (thanh hoi) (23.2%) are the most common mistakes for Laotian CTV, high rising tone (thanh sac) (24.7%) mistakes appear the most frequently; meanwhile, the most undemanding tone for Laotian is high flat tone (thanh khong) (11.3%) and short low tone (thanh nang) (8.4%) for Cambodian CTV.

- Nevertheless, both CTVs make more mistakes when articulating tones with "high" phonological feature (Laotian: 50.6%; Cambodian: 55.5%) and make less mistakes with tone with "low" phonological features (Laotian: 49.4%, Cambodian: 44.5%); "flat" tones mistakes (Laotian: 25.3%, Cambodian: 26.9%) emerge less than "not flat" tone mistakes (Lao: 74.9%, Cambodian: 73.1%)

Table 3. *Mistake rates among kinds of syllables from CTVs*

	Laotian CTV (%)	Cambodian CTV (%)
Individual syllables	22.6	27.9
Syllables in sentences	77.4	72.1
CTV1	10.7	11.8
CTV2	25.6	23.8
CTV3	63.7	64.4

From the table, it can be concluded that tone mistakes are unremarkably found in individual syllables and CTV1, while mistakes are observed more in syllables in sentences and CTV2 and CTV3.

Table 4. *Proportion of tones pronunciation mistakes (%)*

Tones	CTV	Confused tones					
		1	2	3	4	5	6
1. khong	Laotian		81.1			18.9	
	Cambodian		69.6	2.2			28.2
2. huyen	Laotian	76.1				23.9	

Tones	CTV	Confused tones					
		1	2	3	4	5	6
	Cambodian	92.0				8.0	
3. nga	Laotian	19.4	6.4		4.8	69.4	
	Cambodian				10.9	89.1	
4. hoi	Laotian	20.2	25.0	15.4		25.0	14.4
	Cambodian		62.3			7.6	30.1
5. sac	Laotian	34.0	8.0		17.0		41.0
	Cambodian	31.2					68.8
6. nang	Laotian	25.0	15.9			59.1	
	Cambodian	40.0				60.0	

From this table above, when Cambodian CTV face difficult tones, they often make it into less challenging tones which are "not broken", flat, go up or go down such us high flat tone (thanh khong), rising tone (thanh sac) flat low tone (thanh huyen) and short low tone (thanh nang). As a result, mistakes are concentrated in these tones; while Laotian CTVs handle in different ways which leads to tone variations. It can be given interpretation that Khmer language has no tones and tend to utter uncomplicated tones, and the five tones of Laotians are extraordinary inhibiting to learning Vietnamese tones process, making them confuse between two languages.

Pronunciation mistakes in general and tones pronunciation mistakes in particular is an inevitable part of the language acquisition. It is a direct consequence of each learner's incomplete phonetic understandings in different levels.

In order to figure out the solutions for these issues, teachers need to provide fundamental knowledge about characteristics of each tone's pitch, contour of tone; on the other hand, students should always keep in mind that tones and meaning has a tight correspondence, changing the tone means changing the meaning. Hence, learners need to remember the word's meaning in the specific context to listen, write and pronounce appropriately. Mistakes description and analysis help teachers evaluate students and levels and determine their disadvantages so that suitable solutions (set up curriculum, mistake correction tool) can be brought out; at the same time, students' awareness of putting more effort to practice and enriching their understandings about pronunciation will also be raised to achieve better result and be more sociable with the native Vietnamese.

In addition, learners' activeness also plays an important role in timely detecting and solving mistakes. For those reasons mentioned above, both teachers and students are required to intensively practice to bring these knowledge and skills become a systematical habit in pronouncing Vietnamese. Mistakes correction process hence needs to connect knowledge to skills and are continuously carried out.

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