

## RESEARCH NOTE

**Another Look at the Tagalog Consonant Clusters****Kenichiro Kurusu***University of the Philippines, Diliman, Quezon City*

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**Abstract**

In Tagalog, consonant clusters are phonologically allowed and mainly found in loanwords from Spanish and English. However, their phonetic realization has not yet been studied while previous studies (Colantoni and Steele 2005; Kilpatrick et.al. 2006; Ramírez 2006) reported that a svarabhakti vowel has been observed between consonant clusters in Spanish and French. Thus, this research note claims that a svarabhakti vowel also occurs between consonant clusters in Tagalog based on an initial acoustic analysis conducted by Kurusu (2022a, 2022b). Although this is consistent with the findings of earlier works, not much has been said about its characteristics. Therefore, finally, this research note presents issues which should be studied in the future: (1) the phonetic environment where a svarabhakti vowel appears in Tagalog; (2) perception of a svarabhakti vowel by speakers, and; (3) universality of a svarabhakti vowel that appears between consonant clusters among languages in the world.

**Keywords:** *Tagalog, acoustic phonetics, consonant cluster, svarabhakti vowel, loanword*

**1. Introduction**

A consonant cluster is “[a] sequence of two or more non-syllabic consonants occurring within a syllable, either initially or finally” (Schachter & Otones, 1972, p.26).<sup>\*</sup> Tautosyllabic consonant clusters are more marked structures than closed syllables, and needless to say, open syllables. In other words, the CV syllable (henceforth C and V refers to consonants and vowels, respectively) is a basic syllable structure, often referred to as the core syllable since “there are no languages in which the CV type of syllable is not found” (Spencer, 1996, p.80). This type of syllable is universally common, and preferred as much as possible. Prince and Smolensky’s (2004) Optimality Theory (OT) express this as:

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<sup>\*</sup> I would like to thank all the participants who joined the acoustic experiment. Part of an earlier version of this paper was presented at the poster session of the Summer Course 2022 hosted by the Linguistic Society of Japan on September 1, 2022. I also would like to thank the audience for their discussion and suggestions. I am also grateful to Dr. Ariane Borlangan and two anonymous reviewers for their valuable comments and criticism.

(1)

1. – COD: Syllables do not have codas.
2. \*COMPLEX: No more than one C or V may associate to any syllable position node.

Many languages, however, allow syllables which are more complex than the core syllable. For instance, English usually permits two-membered onsets and codas which can be illustrated in Figure 1 as a kind of basic English syllable template. Note that English also permits three-membered onsets (sCC-) and more complex codas (-CCC or -CCCC).

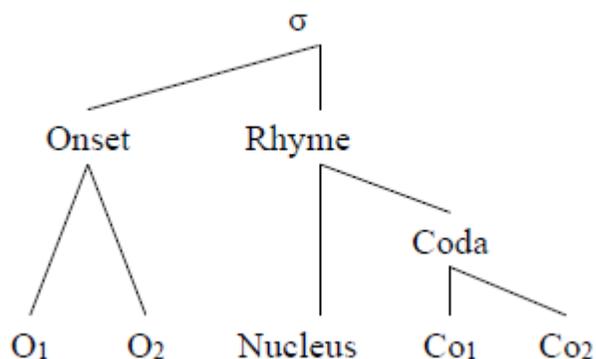


Figure 1. Syllable Structure of English (Spencer, 1996, p.91)

Tagalog, on the other hand, consonant clusters were originally prohibited in the native lexicon but have been eventually incorporated to the phonological system of the language as a consequence of the influx of loanwords from Spanish and English. They are still marked structures while single consonants may appear in the coda position in the native lexicon. Earlier works (Yap 1970; Schachter & Otones 1972; Soberano 1980; Santiago & Tiangco 1985; French 1988; Yamashita 1998; Garcia 1999; Himmelmann 2005; Laranjo 2017) have suggested that Tagalog has consonant clusters, and vowel epenthesis does not occur. However, no work thus far has attested that phonetic insertion of vowels (or a svarabhakti vowel) never occurs in Tagalog. In this research note, therefore, I will suggest that (1) a svarabhakti vowel also occurs between consonant clusters in Tagalog based on an initial acoustic analysis conducted by Kurusu (2022a, 2022b), and that (2) there are three potential issues which should be studied in the future.

This research note is organized as follows. Section 1 provides background for the study of Tagalog consonant clusters. Section 2 provides an overview of consonant clusters and phonotactics of Tagalog. Studies on possible phonetic realization of consonant clusters in some languages are found in Section 3. Section 4 presents the summary of a small-scale acoustic analysis on a svarabhakti vowel between consonant clusters I conducted. Finally, potential research questions for further analyses are discussed in Section 5.

## 2. Tagalog and its consonant clusters

### 2.1 Overview of the language

Tagalog is an Austronesian language spoken in the Philippines' National Capital Region (NCR,

also referred to as Metro Manila) and its surrounding areas. According to Eberhard et. al. (2021), Tagalog has 22 million native speakers in the country and more than 16.2 thousand L2 speakers in and outside the country.

Tagalog is also referred to as Filipino, the national language of the country, which is also stipulated as one of its official languages. Filipino has been renamed from Pilipino, which has been developed based on Tagalog with some imported lexicon from other languages. As such, it can be said that Tagalog functions as a de-facto lingua franca of the Philippines, and the terms Tagalog, Pilipino, and Filipino have been used to refer to the same language, broadly speaking. Since there is still controversy about what makes Filipino linguistically different from Tagalog except its socio-political status, the term Tagalog will be used in this research note. The same goes for the literature I adopted. Thus, although some of the previous literature may refer to Pilipino or Filipino, all of these will be treated as studies on Tagalog and their object of analysis will be uniformly referred to as Tagalog in this article.

Tagalog has been influenced by two major colonial languages: Spanish and English. Since 1565, the Spaniards had colonized the Philippines for more than 250 years. This centuries-long occupation brought about the overwhelming influx of Spanish lexicon into Tagalog. Wolff (1973, 2001) estimated that 10% of the dictionary entries in Tagalog are of Spanish origin. Note that Spanish loanwords also came from Latin America (especially Mexico), not only the Spanish mainland, and there is a possibility that words from the mainland have been indirectly introduced by people from such Spanish colonies. In 1898, the Americans took over the country. Although they occupied the country for a half century only, they succeeded to promulgate English as an important language across the archipelago. This was made possible by dispatching English teachers as well as putting up the educational system all over the country. Since Spanish was—and English has been—dominant and stipulated as official languages of the country, the influence of these languages is visible in Tagalog, particularly in its lexicon and phonology (Himmelmenn 2005), which will be discussed in section 2.2.

## 2.2 Phonemes in Tagalog

Tagalog has a relatively simple vowel system consisting of the following five: /i, e, a, o, u/. Tagalog was originally characterized as a three-vowel system (/i, a, u/), and the rest (/e, o/) has been added because of the significant influence of foreign languages: “The change from the three-vowel to the five-vowel system (with the addition of the phonemes /e/ and /o/) very likely has been brought about through the incorporation into Tagalog of many loan words from Spanish and English” (Schachter & Otones, 1972, p.8). For this reason, [e] and [o] may sometimes be regarded as allophones of /i/ and /u/ respectively.

Tagalog has 16 native consonants /p, t, k, ʔ, b, d, g, m, n, ŋ, s, h, l, r, j, w/, as presented in Table 1. Consonants in parentheses are of foreign origin.

## 2.3 Syllable structure of Tagalog

Previous studies (Yap 1970; Schachter & Otones 1972; Soberano 1980; Santiago & Tiangco 1985; French 1988; Yamashita 1998; Garcia 1999; Himmelmenn 2005; Laranjo 2017) have discussed the basic syllable structure of Tagalog. In general, they agreed that CV and CVC are the basic syllable structures of Tagalog. Yap (1970) included V and VC because her analysis was based on orthography, not phonology. The onset is obligatory as pointed out by Schachter and Otones (1972): “every Tagalog syllable contains an initial non-syllabic consonant or consonant cluster” (p. 26). Any one of the consonants including the glottal stop always occupies the onset position

(e.g., *aso* /ʔa.so/ ‘dog’, *tao* /ta.ʔo/ ‘person’) although it is not represented in the conventional orthography.

Table 1

*Tagalog consonant phonemes (Himmelmann, 2005, p.352)*

	Bilabial	Dental	Alveolar	Palatal	Velar	Labio-velar	Glottal
Plosive	p b	t d		(c) (j)	k g		ʔ
Nasal	m	n			ŋ		
Fricative	(f)		s				h
Lateral			l				
Tap or trill			r				
Glides	j				w		

More complex structures, i.e., consonant clusters, are also found in Tagalog. These are basically found in loanwords from Spanish and English since it is a consequence of continuous development and contact of the Filipino language with English and Spanish, which have different kinds of syllables (Laranjo, 2017). Based on Garcia (1999) and Yamashita (1998), CCV, CCVC, and CVCC are allowed in Tagalog. Soberano (1980) and French (1988) added more types such as CCVCC, CVCCC, and CCVCCC. However, the occurrence of three-member consonant clusters in coda is controversial for the following two reasons: (1) Soberano (1980) admitted that no word has been found in her collected data to exemplify such maximum syllable structure, and (2) syllable-final consonant clusters which have three constituents are permissible only in case that the first constituent is /j/ or /w/, which may be considered as combinations of diphthongs and two-member consonant clusters (e.g., *paint* /pejnt/ or /peint/ ‘paint’, *count* /kawnt/ or /kaunt/ ‘count’) based on the data presented by French (1988).<sup>15</sup> Hence, this paper assumes the syllable structure of Tagalog as illustrated in Figure 2 (Henceforth, in this article, consonants of clusters will be numbered in the order of closeness to the nucleus: at the upper right for the onset; at the lower right for the coda).

<sup>15</sup> It is also doubtful that these words provided by French (1988) could be regarded as Tagalog loanwords.

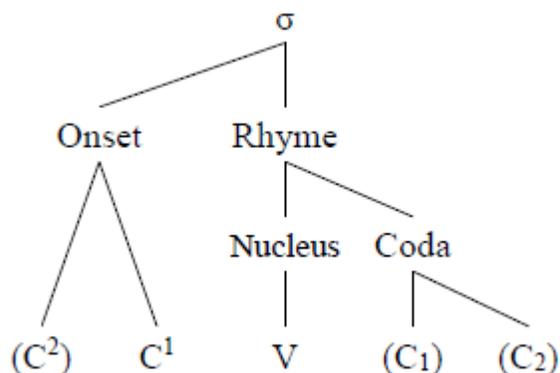


Figure 2. Syllable Structure of Tagalog

#### 2.4 Phonotactics of Tagalog consonant clusters

Although Tagalog has accepted complex syllable structures from foreign languages, consonant phonemes which may occur in consonant clusters are severely restricted. In this section, let us take a look at the phonotactics of Tagalog consonant clusters described by several previous studies.

**Consonant clusters in the onset.** In this section, consonant clusters in the onset position will be discussed. As we discussed in Section 2.3, Tagalog does not have consonant clusters that have more than two consonants (Schachter & Otones, 1972, p.26).

Yap (1970) summarized the possible prevocalic consonant clusters in the following formulas:

(2)

- a.  $C^2 = /t/$  if  $C^1 = /s/$
- b.  $C^2 = /p, b, k, g/$  if  $C^1 = /l/$
- c.  $C^2 = /p, b, t, d, k, g/$  if  $C^1 = /r/$
- d.  $C^2 =$  any consonants except  $/ʔ, w, j/$  if  $C^1 = /w/$  or  $/j/$

Ramos (1971) and Ramos et.al. (1971) suggested the same formula to illustrate the possible combinations of consonants in the onset:

(3)

- a. One of the following consonants  $/s, l, r, w, j/$  can be  $C^1$ .
- b. One of the following consonants  $/p, t, k, b, d, g, f, s, h, n, m/$  may be  $C^2$ .
- c.  $/t/$  can be  $C^2$  if  $/s/$  is  $C^1$ .

However, (2a) and (3c) are doubtful since the phonemic status of this foreign-originated sound is unstable. It appears in words such as *tsa* [ca] 'tea' and *kotse* [koce] 'car', which is similar to [tʃ] in English. In accordance with Himmelman's (2005) description (in Table 1), this research note deals with this sound as a single phoneme i.e., a voiceless palatal plosive, not a consonant cluster.

The other previous studies have provided the phonotactic constraints of onset consonant clusters in Tagalog:

(4) Schachter and Otones (1972)

- a. C<sup>1</sup> is always one of the followings: /j, w, r, l/
- b. One of six plosives (/p, t, k, b, d, g/), two nasals (/m, n/), three fricatives (/f, s, h/), or /l, r/ may be C<sup>2</sup> if C<sup>1</sup> is /j/ or /w/.
- c. One of the six plosives in (3b), or /f/ may be C<sup>2</sup> if C<sup>1</sup> is /r/
- d. One of the followings: /p, k, b, g, f/ may be C<sup>2</sup> if C<sup>1</sup> is /l/.

(5) Santiago and Tiangco (1985)

- a. /w, j, r, l, s/ may be C<sup>1</sup>.
- b. /p, t, k, b, d, g, m, n, l, r, s, h/ may be C<sup>2</sup> if C<sup>1</sup> is /w/ or /j/.
- c. /p, t, k, b, d, g/ may be C<sup>2</sup> if C<sup>1</sup> is /r/.
- d. /p, k, b, g/ may be C<sup>2</sup> if C<sup>1</sup> is /l/.

(6) French (1988)

- a. One of the stops (excluding the glottal stop), /f/, or /θ/ may be C<sup>2</sup> if the C<sup>1</sup> is /r/.
- b. Either non-coronal, non-glottal stop, or /f/ may be C<sup>2</sup> if C<sup>1</sup> is /l/.

(7) Garcia (1999)

- a. /l, r, w, j/ may be C<sup>1</sup>.
- b. /b, d, k, p, t, g, f, s, t, m, n/ may be C<sup>2</sup>.
- c. /lw, lj, rw, rj/ may be included.

(8) Laranjo (2017)

- a. One of the followings: stops /p, t, k, b, d, g/; nasals /m, n/; fricatives /f, s, h/ may be C<sup>2</sup>.
- b. C<sup>1</sup> is limited to liquids /l, r/ and glides /w, j/.

Laranjo (2017) also added another principle: Only liquids and glides may be the second consonant because these sounds are more sonorous than the other consonants (Laranjo, 2017). Table 2 below summarizes consonant clusters in the onset position in Tagalog based on what we have seen so far in this section.

Table 2

*Tagalog consonant clusters in the onset position (with example words)*

		C <sup>1</sup>									
		/r/			/l/		/w/		/j/		/m/
C <sup>2</sup>	/p/	/pr/	<i>preso</i>	/pl/	<i>plato</i>	/pw/	<i>pwede</i>	/pj/	<i>pyano</i>		
	/t/	/tr/	<i>tren</i>			/tw/	<i>twalya</i>	/tj/	<i>tya</i>		
	/k/	/kr/	<i>krus</i>	/kl/	<i>klase</i>	/kw/	<i>kwarta</i>	/kj/	<i>kyosko</i>		
	/b/	/br/	<i>braso</i>	/bl/		/bw/	<i>bwatya</i>	/bj/	<i>byahe</i>		
	/d/	/dr/	<i>dril</i>			/dw/	<i>dwende</i>	/dj/	<i>dyan</i>		
	/g/	/gr/	<i>grado</i>	/gl/	<i>glorya</i>	/gw/	<i>gwantes</i>	/gw/	<i>gwapo</i>		

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/m/					/mw/	<i>mwebles</i>	/mj/	<i>myamya</i>		
/n/					/nw/	<i>nwes</i>	/nj/	<i>nya</i>		
/f/	/fr/	<i>freshman</i>	/fl/	<i>flora</i>	/fw/	<i>Fuentes</i>	/fj/	<i>fuse</i>		
/θ/	/θr/	<i>three</i>								
/s/					/sw/	<i>swerte</i>	/sj/	<i>sya</i>	/sm/	<i>smorgasbord</i>
/h/					/hw/	<i>hwag</i>	/hj/	<i>hya</i>		
/l/					/lw/	<i>lwalhati</i>	/lj/	<i>lyabe</i>		
/r/					/rw/	<i>rwede</i>	/rj/	<i>ryan</i>		

**Consonant clusters in the coda.** In this section, consonant clusters in the coda position will be discussed. As well as in the onset, consonant clusters that have more than two consonants do not occur in the coda position as Yap (1970) stated that: “Postvocalic, prejunctural clusters occur in Tagalog and they are limited to two consonants only” (Yap, 1970, p.70).

Yap (1970) listed possible combinations: /ks, ts, ld, rd, rs, ns/ while Ramos (1971) and Ramos et.al. (1971) listed /rs, ks, rt, ks/ only. Again, it remains questionable that the sequence of /t/ and /s/ can be regarded as a consonant cluster, which possibly turn out to be a single consonant from other languages.

Schachter and Otones (1972) said that one of the following: /j, w, r, l/ may be the first segment, and gave the following possible combinations:

(9)

- a. /jp, jt, jk, jb, jd, jds (jdʒ?), jm, jn, js, jl/ if C<sup>1</sup> is /j/.
- b. /wt, wn, ws/ if C<sup>1</sup> is /w/.
- c. /rt, rk, r(d)s, rd, rn, rs/ if C<sup>1</sup> is /r/
- d. /l(t)s, lb, l(d), lf, ls/ if C<sup>1</sup> is /l/

Santiago and Tiangco (1985) listed similar combinations as in (9)

(10)

- a. /jp, jt, jk, jb, jd, jm, jn, jl, js/ if C<sup>1</sup> is /j/.
- b. /wt, wn, wl/ if C<sup>1</sup> is /w/.
- c. /rt, rk, rd, rn, rs/ if C<sup>1</sup> is /r/.
- d. /lb, ls/ if C<sup>1</sup> is /l/.
- e. /sk, nt, ks/ may occur other than (10a) ~ (10d).

French (1988) appeared to include clusters beyond morpheme boundary such as a functional morpheme /s/ in English:

(11)

- a. Any nonglottal consonant can precede /s/.
- b. /l, r, w, j/ can precede any obstruent except glottals and voiced velars, and the dental fricatives.
- c. A nasal can be followed by /s/ or assimilates to the point of articulation of the voiceless stops and /d/.

Garcia (1999) stated that /b, d, f, k, l, m, n, p, s, t/ may be C<sup>2</sup> while /k, d, l, n, r, w, j/ may be C<sup>1</sup> providing sample words for the possible combinations. This explanation can be summarized as follows:

- (12)
- a. /jb, jd, jk, jl, jm, jp, js, jy/ if C<sup>1</sup> is /j/.
  - b. /wn, ws, wt/ if C<sup>1</sup> is /w/.
  - c. /rd, rk, rn, rs, rt/ if C<sup>1</sup> is /r/.
  - d. /lb, lf, ls/ if C<sup>1</sup> is /l/.
  - e. /ks, ds/ are also possible.

Finally, Laranjo (2017) suggested one principle:

- (13)
- a. Plosives except /g/ may be C<sup>1</sup> because these are the weakest<sup>16</sup> consonants among all.
  - b. /s/ may also be C<sup>2</sup> due to its special characteristic.
  - c. Nasals such as /n, ŋ/ may be C<sup>1</sup> while /m, ŋ/ may be C<sup>2</sup> though nasals cannot combine with each other.

Table 3 will be presented here to summarize consonant clusters in the coda position in Tagalog based on what we have seen so far in this section.

Table 3

*Tagalog consonant clusters in the coda position (with example words)*

		C <sub>2</sub>													
		/p/		/b/		/t/		/d/		/k/		/f/		/v/	
C <sub>1</sub>	/p/														
	/d/														
	/k/					/kt/	<i>kompakt</i>								
	/f/														
	/v/														
	/m/	/mp/	<i>limp</i>												
	/n/					/nt/	<i>dent</i>	/nd/	<i>end</i>	/nk/	<i>wink</i>				
	/ŋ/									/ŋk/	<i>pink</i>				
	/l/	/lp/	<i>palp</i>	/lb/	<i>balb</i>	/lt/	<i>felt</i>	/ld/	<i>cold</i>	/lk/	<i>milk</i>	/lf/	<i>golf</i>	/lv/	<i>delve</i>
	/r/	/rp/	<i>harp</i>	/rb/	<i>curb</i>	/rt/	<i>kart</i>	/rd/	<i>rekord</i>	/rk/	<i>work</i>	/rf/	<i>turf</i>	/rv/	<i>curve</i>
	/w/	/wp/	<i>cope</i>	/wb/	<i>stove</i>	/wt/	<i>awt</i>	/wd/	<i>crowd</i>	/wk/	<i>oak</i>	/wf/	<i>oaf</i>	/wv/	<i>grove</i>
/y/	/jp/	<i>tayp</i>	/jb/	<i>drayb</i>	/jt/	<i>layt</i>	/jd/	<i>reyd</i>	/jk/	<i>bayk</i>	/jf/	<i>life</i>	/jv/	<i>dive</i>	
/s/									/sk/	<i>desk</i>					

<sup>16</sup> In terms of sonority value of segments, plosives are the least sonorous among other consonants, which leads Laranjo (2017) to describe it as “weakest”.

Table 3 (continued)

		C <sub>2</sub>											
		/s/		/tʃ/		/dʒ/		/m/		/n/		/l/	
C <sub>1</sub>	/p/	/ps/	<i>lips</i>										
	/d/	/ds/	<i>brids</i>										
	/k/	/ks/	<i>teks</i>										
	/f/	/fs/	<i>puffs</i>										
	/v/	/vs/	<i>knives</i>										
	/m/	/ms/	<i>hymns</i>										
	/n/	/ns/	<i>alawans</i>	/ntʃ/	<i>branch</i>								
	/ŋ/												
	/l/	/ls/	<i>dimpols</i>					/lm/	<i>film</i>	/ln/	<i>kiln</i>		
	/r/	/rs/	<i>nars</i>			/rdʒ/	<i>billiards</i>	/rm/	<i>dorm</i>	/rn/	<i>barn</i>		
	/w/	/ws/	<i>blaws</i>					/wm/	<i>ohm</i>	/wn/	<i>brawn</i>	/wl/	<i>pawl</i>
	/y/	/js/	<i>beys</i>			/jdʒ/	<i>average</i>	/jm/	<i>geym</i>	/jn/	<i>carbine</i>	/jl/	<i>seyl</i>
/s/													

### 3. Phonetic realization of consonant clusters

Though we have seen consonant clusters are phonologically allowed in Tagalog, phonetic realization of them is another problem. In fact, some scholars pointed out that a svarabhakti vowel, “a vowel-like fragment that exists to transition from one consonant to another” (Schmeiser, 2020, p. 16), may be observed between consonant clusters in Tagalog as well as other language varieties relevant to the study of Tagalog consonant clusters, and they are discussed in this section.

#### 3.1 Tagalog

Even some studies on Tagalog suggested that phonetic realization of consonant clusters may be different.

One of the significant implications about this issue has been pointed out by Yap (1970) as Tagalog speakers, especially older people, may not produce initial and final clusters because such clusters were not originally present in the sound system of Tagalog. She gave examples of insertion of an epenthetic vowel between the initial clusters: e.g., [tarak] for *trak* ‘truck’, [kalasi] for *klase* ‘class’, [tarabaho] for *trabaho* ‘work’ etc.

Another implication from the previous studies is elision of C<sup>2</sup> of the consonant clusters in the coda. Schachter and Otones (1972) and Laranjo (2017) pointed out that some loanwords which contain syllable-final consonant clusters have alternative pronunciation such as: [des] or [desk] for *desk* ‘desk’; [ʔabsen] or [ʔabsent] for *absent* ‘absent’; [ʔabstrak] for *abstract* ‘abstract’; [konek] for *konekt* ‘connect’; [konsep] for *konsept* ‘concept’; [ʔadap] for *adapt* ‘adopt’.

#### 3.2 Philippine English

Philippine English (PhE) is one of the emerging national varieties of World Englishes (Borlongan 2023). The Philippines has the largest number of English speakers in Asia, and it is reported that 93% of the population can speak in English. Although the variety has been modeled after General American (GA), the pronunciation of English by the Filipino speakers differs depending on various factors.

Tayao (2008) generalized the characteristics of the pronunciation of PhE and observed three processes that consonant clusters in PhE undergo: (1) dropping of the last constituent of consonant clusters, e.g., *past* /past/ becomes [pas]; (2) inserting vowels such as [maun.teyn] for mountain /maun.tn/; (3) putting prosthetic vowels before the initial syllable in the cluster. Tokyo University of Foreign Studies Language Modules (n.d.) particularly describes the dropping of the final consonant in word-final consonant clusters e.g., /t/ in *project*, *approached*, or *asked*. Shahrudin et.al. (2023) also refers to this phenomenon as consonant cluster simplification in case those in the final position end with plosives (although this has been observed in many Englishes and even in GA and British English).

### 3.3 Spanish and French

Some scholars conducted acoustic analyses and reported that a svarabhakti vowel was observed between onset consonant clusters in some varieties of Spanish and French (Colantoni & Steele 2005; Kilpatrick et.al. 2006; Ramírez 2006). Though their analyses were limited to onset consonant clusters, the following tendency has been reported. Firstly, a svarabhakti vowel was more frequently observed when C<sup>1</sup> was a rhotic rather than a lateral. Secondly, a svarabhakti vowel was more frequently observed when C<sup>2</sup> was a voiceless plosive.

They also pointed out that the epenthesis attested in their studies were not driven by phonology, but phonetics based on the following findings: (1) the quality of the epenthetic vowels “shows clearly reduced vowel space” (Kilpatrick et.al., 2006, ), and they “appear in the central area of the Spanish vocalic triangle and approximate the schwa /ə/, although they tend slightly towards the nucleic vowel of the syllable” (Ramírez, 2006, p.54) and (2) a svarabhakti vowel does not participate in phonological phenomena (e.g., syllabification and stress placement) as stated in Colantoni & Steele (2005, p.90).

## 4. An acoustic experiment on Tagalog consonant clusters

Kurusu (2022a, 2022b) conducted an acoustic analysis and revealed the phonetic realization of consonant clusters in Tagalog. In his study, the following research questions are investigated: whether (I) a svarabhakti vowel is observable between consonant clusters and (II) a consonant member of clusters can be omitted. In this section, a summary of his study is to be provided.

### 4.1 Methodology

Among possible combinations of consonant clusters in Tagalog discussed in Section 2.4, only limited samples are used in his analysis: (a) plosives + liquids in the onset /pr/, /tr/, /kr/, /br/, /dr/, /gr/, /pl/, /kl/, /bl/, /gl/, and (b) /lb/, /kt/, /nt/, /lt/, /ld/, /ŋk/, /sk/, /ks/, /ns/, /ls/ in the coda. Other combinations are ruled out for the following reasons: (i) combinations with foreign phonemes such as /f/, /v/ and /θ/ are excluded since speakers might perceive words with such phonemes as English, which might consequently affect the results of the analysis; (ii) combinations formed with glides (/j/ or /w/) are controversial as consonant clusters. In the onset, they can be regarded as a consequence of dropping of vowels (/i/ or /u/) in the CVCV sequence, and in the coda, it seems that the glides also form diphthongs e.g., [sejl] ‘sail’, [brawn] ‘broun’; (iii) combinations in the coda formed with /r/ e.g., /nars/ *nars* ‘nars’, /kard/ *kard* ‘card’ are excluded because /r/ after vowels in such sequences may be regarded as rhotic vowels as in English by participants of the experiment.

Five native Tagalog speakers are involved in this analysis. All of the participants are graduate or undergraduate students who have been studying in Japan at the time of the experiment.

They all speak English as L2 and one of them understands other Philippine languages at a native-speaker level. Information on the participants is summarized in Table 4.

Table 4

*A list of native Tagalog speakers*

ID	Gender	Age	Note
T1F	female	29	
T2F	female	23	
T3F	female	21	
T4M	male	33	
T5M	male	29	Ilocano is also a mother-tongue

The recording was conducted with a Zoom H1n recorder in a quiet place. Participants were asked to pronounce sample words three times each with pauses. All the tokens are analyzed by Praat (Boersma & Weenink 2021, ver. 6.2.03), a computer software for acoustic analysis.

#### 4.2 Results

In the onset, a svarabhakti vowel was observed between consonant clusters as shown in Figure 3. Compared to Figure 4, it is obvious that the speaker T4M produces it in Figure 3. 82% of all the tokens from consonant clusters formed by plosives + /r/ are intruded by vocalic elements regardless of its position within words while only 6% of the tokens from consonant clusters formed by plosives + /l/ show intrusive sounds.

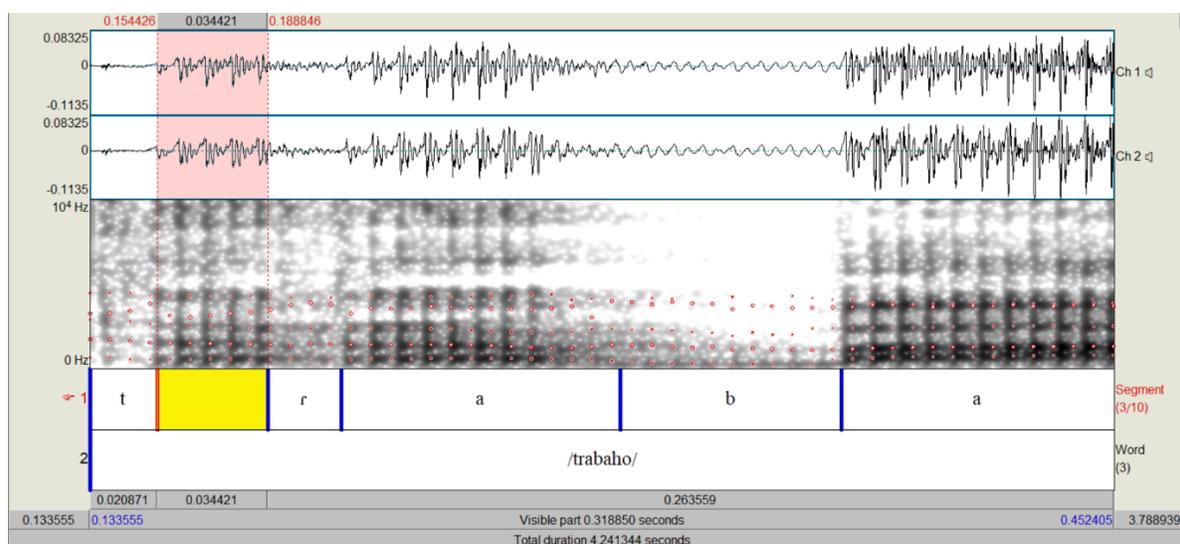


Figure 3. A screenshot of acoustic analysis for /tr/ produced by T4M

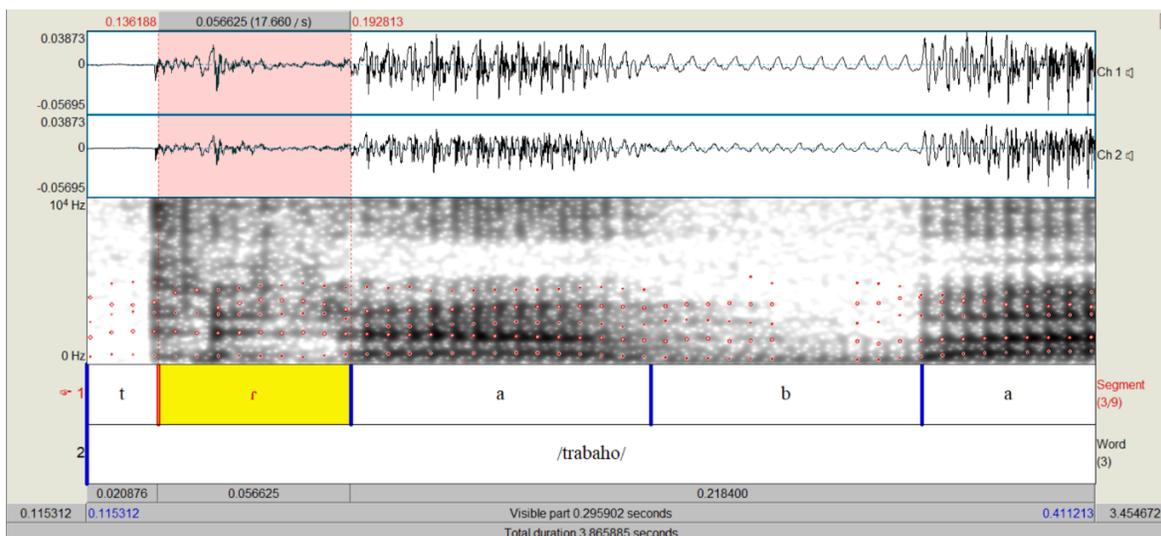


Figure 4. A screenshot of acoustic analysis for /tr/ produced by T1F

In addition, differences which may be attributed to voicing and place of articulation of plosives were observed. As shown in Table 5 and Table 6, vocalic elements occur more frequently when C<sup>2</sup> is voiced or coronal.

Table 5

*Rate of occurrences of vocalic elements between onset consonant clusters by voicing of C<sup>2</sup>*

C <sup>2</sup> = voiceless		C <sup>2</sup> = voiced			
78%		86%			
/pr/	/tr/	/kr/	/br/	/dr/	/gr/
74%	89%	71%	76%	94%	88%

Table 6

*Rate of occurrences of vocalic elements between onset consonant clusters by place of articulation of C<sup>2</sup>*

C <sup>2</sup> =	labial	coronal	dorsal
	75%	91%	79%

In the coda, on the other hand, no svarabhakti vowel was observed between consonant clusters, especially those that contain /s/ as C<sub>2</sub> such as /ks, ns, ls/ remain intact both in word-initial and word-medial position as shown in Figure 5.

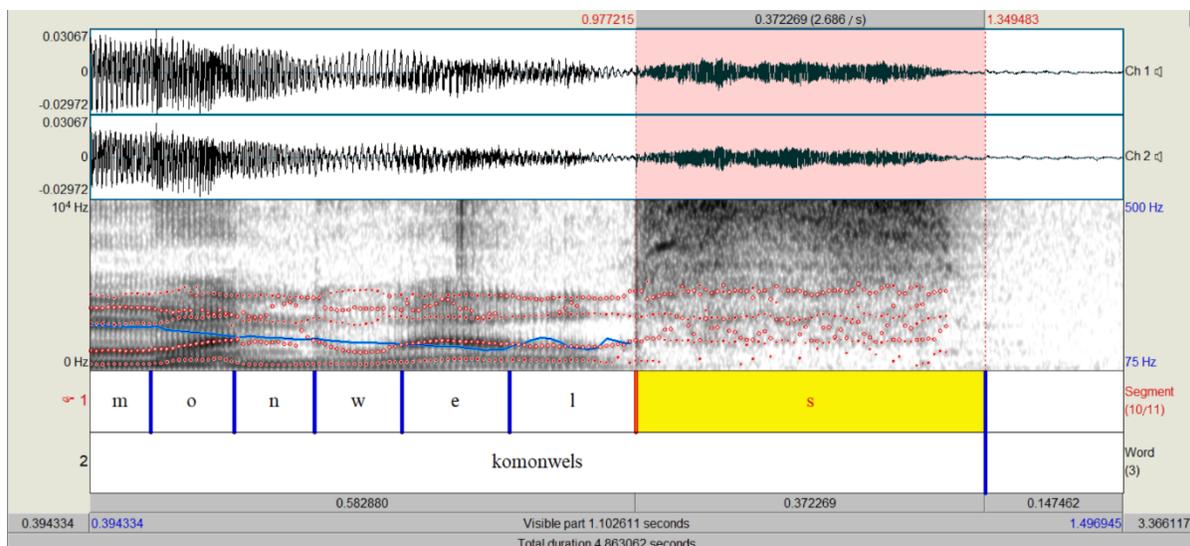


Figure 5. A screenshot of acoustic analysis for /s/ in /komonwels/ produced by T1F

However, when coda consonant clusters have a plosive as C<sub>2</sub>, the plosive is invisible in production as shown in Figure 6, but, when they are followed by a vowel, a slight explosion of the final plosive is observable in the spectrogram as indicated in Figure 7.

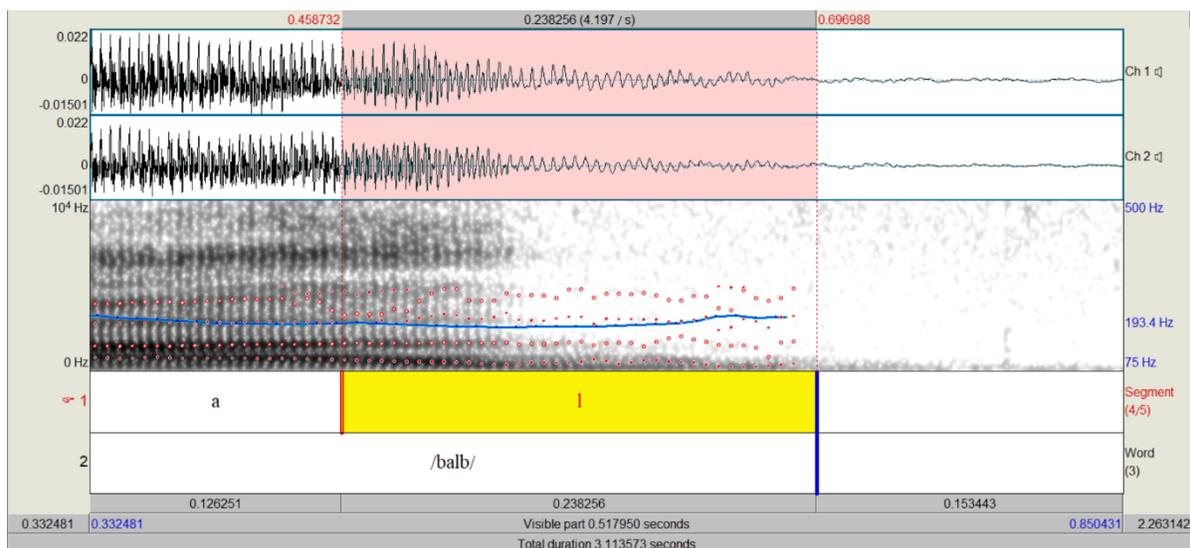


Figure 6. A screenshot of acoustic analysis for /lb/ in /balb/ produced by T2F

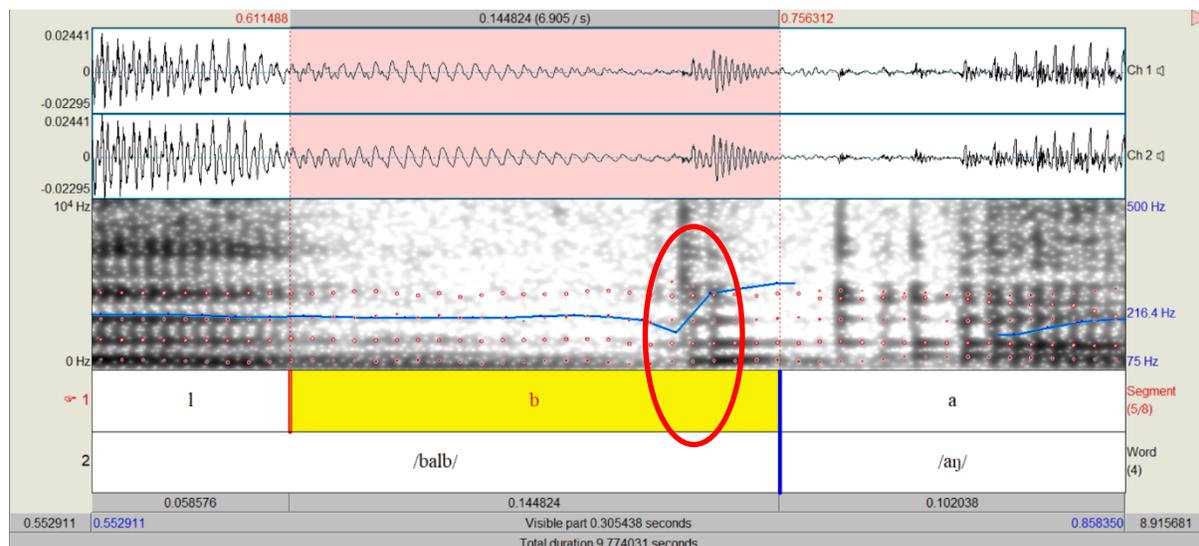


Figure 7. A screenshot of acoustic analysis for /lb/ in /balb aj sinasabi ko/ produced by T2F

In summary, the acoustic analysis has given answers to the research questions given in the beginning of this section. For (I), a svarabhakti vowel occurs between consonant clusters when they are in the onset. For (II),  $C_2$  of consonant clusters in the coda are not omitted phonologically, but just unreleased in phonetic realization when it is a plosive.

## 5. Discussion and recommendation

Based on the acoustic analysis in Section 4, Tagalog speakers have been reported to produce a svarabhakti vowel between consonant clusters in the onset. More svarabhakti vowels are observed when the cluster is formed with /r/ than with /l/. This is consistent with the findings in Spanish and French as pointed out in Section 3.3. Different behavior which may be attributed to voicing and place of articulation of plosives are also observed. However, little is known about the phonetic environment or conditions where a svarabhakti vowel appears between consonant clusters. Although Colantoni and Steele (2005) suggested a dissimilation hypothesis as a cause of this phenomenon: “a strategy to increase the articulatory and perceptual distance between two segments” (p.80), other factors should be investigated in future analysis with a larger number of tokens, for example, voicing and place of articulation of  $C^2$ , stress, speakers’ attributes, etc.

Here, potential research questions which should be studied in the future are provided. More acoustic analyses will be required to investigate the phonetic realization of Tagalog consonant clusters.

- (1) What is the phonetic environment where a svarabhakti vowel appears between consonant clusters in Tagalog? Statistical analyses between frequency of a svarabhakti vowel and the phonetic environment are required.
- (2) Can speakers of Tagalog perceive a svarabhakti vowel that appears between consonant clusters? Perceptual analyses are also required. Whether speakers are aware of this phenomenon may affect discussion on the phonology of consonant clusters in Tagalog.

- (3) Does a svarabhakti vowel appear between consonant clusters cross-linguistically? If this is the case, investigating this phenomenon in various languages may have implications in articulatory phonetics.

Further studies with larger number of various speakers of Tagalog (and other languages) will be conducted to deal with the aforementioned questions.

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## Appendix: A list of sample words in the acoustic experiment

Table 7

*A list of samples for plosives + /r/ clusters in the onset*

Consonant Cluster	Position	Sample	Orthographic Form	Meaning	Donor Language(s)	Original Form
/pr/	initial	/prito/	prito	fried	Spanish	frito
		/pranela/	pranela	frannel	Spanish	franela
		/probinsja/	probinsya	province	Spanish	provincia
	medial	/impresarjo/	impresaryo	impresario, theatrical manager	Spanish	empresario
		/komprobante/	komprobante	voucher	Spanish	comprobante
		/kompromiso/	kompromiso	commitment	Spanish	compromiso
/tr/	initial	/tren/	tren	train	Spanish	tren
		/trabaho/	trabaho	work	Spanish	trabajo
		/trono/	trono	throne	Spanish	trono
	medial	/obstetriks/	obstetriks	obstetrics	English	obstetrics
		/kontrata/	kontrata	contract	Spanish	contrata
		/kontrol/	kontrol	control	English /Spanish	control
/kr/	initial	/krema/	krema	cream	Spanish	crema
		/krajola/	krajola	crayon	Spanish	crayola
		/krus/	krus	cross	Spanish	cruz
	medial	/konkreto/	kongkreto	concrete	Spanish	concreto
		/demokrasja/	demokrasya	democracy	Spanish	democracia
		/sepulkro/	sepulkro	sepulchre	Spanish	sepulcro
/br/	initial	/britanja/	Britanya	Britain	Spanish	(Gran) Bretaina
		/braso/	braso	arm	Spanish	brazo
		/bruha/	bruha	witch	Spanish	bruja
	medial	/sombbrero/	sombbrero	hat	Spanish	sombbrero

Consonant Cluster	Position	Sample	Orthographic Form	Meaning	Donor Language(s)	Original Form
		/sombra/	sombra	shade or shading in a drawing or painting	Spanish	sombra
		/libro/	libro	book	Spanish	libro
/dr/	initial	/dril/	dril	military drill or exercises	English	drill
		/dramatika/	dramatika	dramatic	Spanish	dramatica
		/drowiŋ/	drowing	drawing	English	drawing
	medial	/londri/	londri	loundry	English	loundry
		/madre/	madre	a woman living in a religious congregation	Spanish	madre
		/madrina/	madrina	godmother	Spanish	madrina
/gr/	initial	/grado/	grado	grade	Spanish	grado
		/gripo/	gripo	faucet	Spanish	grifo
		grupo/	grupo	group	Spanish	grupo
	medial	/konsagrasjon/	konsagrasyon	consecration	Spanish	consagración
		/kongreso/	kongreso	congress	Spanish	congreso
		/kongresista/	konggresista	congressman	Spanish	kongresista

Table 8

*A list of samples for plosive + /l/ clusters in the onset*

Consonant Cluster	Position	Sample	Orthographic Form	Meaning	Donor Language(s)	Original Form	
/pl/	initial	/plete/	plete	freight	Spanish	flete	
		/plato/	plato	plate	Spanish	plato	
		/plorera/	plorera	female florist/flower vase	Spanish	florera	
	medial	/kompleto/	kompleto	complete	Spanish	completo	
		/implasjon/	implasyon	inflation	Spanish	inflación	
		/impluensja/	impluensya	influence	Spanish	influencia	
/kl/	initial	/klima/	klima	climate	Spanish	clima	
		/klase/	klase	class in school	Spanish	clase	
		/klub/	klub	club	English /Spanish	club	
	medial	NA					
		/eksklamasyon/	eksklamasyon	exclamation	Spanish	exclamación	
		/konklusjon/	konklusyon	conclusion	Spanish	conclusión	
/bl/	initial	NA					
		/blanġket/	blanġket	blanket	English	blanket	
		/blusa/	blusa	blouse	Spanish	blusa	
	medial	/kable/	kable	cable, strong	Spanish	cable	
		/entablado/	entablado	stage	Spanish	entablado	
		/dijablo/	diyablo	devil, demon	Spanish	diablo	
/gl/	initial	/gliserina/	gliserina	glycerine	Spanish	glicerina	
		/glab/	glab	glove	English	glove	
		/glorja/	glorya	glory	Spanish	gloria	
	medial	NA					
		NA					
		NA					