Is There a Philippine English Vowel Space?

Nivea Jane Urdas, Jhon Rick Salvedia, Drew Dolot, John Meynard Sanchez, Jay Chester Usero, Ava Marie Villareal, Dewi Retnoningsih
Department of Linguistics
University of the Philippines Diliman Quezon City, Philippines
nivea_urdas2008@yahoo.com, {jhonsalvedia,dolotdrew,jmeynard.sanchez,jaychesterusero}@gmail.com, dreamywadaby@yahoo.com, dewiretno72@gmail.com

ABSTRACT

Philippine languages commonly exhibit three or four-vowel systems consisting of an open mid-front unrounded [a], a high front unrounded [i], a mid-front unrounded [e], and one back vowel orthographically representing as [o] and [u]. This finding is in contrast with the five (5) orthographic characters <a, e, i, o, u> that are believed to exist in the Philippine vowel inventory. This study initially surveys the positions of the Philippine vowels in the vowel space diagrams using JPlot to first establish their locations during phonetic articulation. Informants are then asked to pronounce English vowels found between consonants /h/ and /d/ in environments (hVd environment where V stands for vowel) and from the phonological data gathered, the writers compared their phonetic articulations to those of Hillenbrand et al. (1995) and Peterson & Barney (1952). The phonetic output suggests that: (1) a Philippine English vowel space exists; (2) there seemed to be no significant difference between the Philippine English vowel space and that of the native speakers of American English in the study of Hillenbrand et al. (1995) and; (3) the suggested Philippine English vowel space is heavily influenced by the first language of Philippine language speakers.

Keywords

Philippine English; Vowel Space; Praat Analysis; JPlot; Formant; Acoustic Features

1. INTRODUCTION

The Philippines, with approximately 7,641 islands, as officially announced by former Environment Secretary Ramon Paje during the Philippine Environment Summit in 2017 [9], may have resulted in a rich linguistic repertoire with an approximately 185 languages according to the Ethnologue [12]. Previous studies suggest that most of the Philippine languages employ a three or four-vowel system that is usually inconsistent with their orthographic representations. Only Tagalog has an extensive historical literature proving the existence of a three-vowel phonemes /a i u/ but has since evolved with the incorporation of Spanish and English loan words, thus coming up with a fivevowel system as stated in the Ortograpiyang Pambansa [1].

A study by Delos Reyes, et al. [4] in Ilokano, Tagalog and Cebuano language groups suggests that there is no significant acoustic difference between [u] and [o]. This inconsistency in vowel identification and orthographic representation will be further explained in this study.

Hillenbrand et al. [5], Peterson & Barney [8], as well as Baart [2], each provided plotted English vowels that resemble a traditional vowel diagram. This schematic diagram portrays English vowels in terms of height and space, place of articulation, and the degree of mouth opening. This is referred to as the vowel space area which mimics the cross-section of the human tongue in a twodimensional representation.

This paper offers an acoustic inventory of five Philippine languages: Bicol (Bik), Ilokano (Ilo), Pangasinan (Pag), Surigaonon (Sgd) and Waray (War) and the respective variations of each for male and female informants when pronouncing a set of English words in all possible /hVd/ environment, i.e. heed, hid, head, had, hod, hawed, hood, who'd, and hud. Brief descriptions of the five Philippine languages are as follows:

- The Bicol of Northern Catanduanes is classified under the Central Philippine subgroup. It is used in the province of Catanduanes, as well as in Bato, Caramonan, Pandan, Panganiban and Viga.
- The Ilokano language belongs to the Cordilleran subgroup of Austronesian language family spoken in the provinces of Ilocos Norte, Ilocos Sur, La Union, and Abra. Ilokano settlements are also found in Benguet, Pampanga, Cagayan, Isabela, Pangasinan, Zambales and Nueva Ecija. Presently, there are Ilokano communities found in Tarlac, Mindoro, Palawan, parts of Mindanao, and even as far as Hawaii.
- Pangasinan is identified as a South-Central Cordilleran language under the Austronesian family. It is spoken in the province of Pangasinan, as well as in the northern Tarlac region, and southwestern La Union. It is also understood in select municipalities in Benguet, Nueva Vizcaya, Nueva Ecija and Zambales.
- Surigaonon is a Bisayan language under the Central Philippine subgroup. It is spoken in the Caraga region particularly in the Surigao and Agusan provinces, as well as in Dinagat Islands.
- Waray is a language spoken in the eastern part of Leyte, the whole province of Samar and in Biliran. It is further classified as a Central Bisayan subgroup of Central Philippine languages.

2. METHODOLOGY

2.1 Selection of Participants

For this preliminary study, the chosen participants are adult native speakers who have, at a minimum, attained college education. From a total of eight (8) informants from each language (four males and four females), the researchers selected the cleanest and most audible recordings from one male informant and one female informant. Each language thus has two (2) representatives, for a total of ten (10) participants. The participants' ages range from 23 to 58. The number of representatives for each language was intentionally set to two to illustrate the vowel space differences and similarities with that of the Hillenbrand, et al. results, as the latter's data also came from one male and one female informant. Note that the participants' language variety may not be the standard representation of the language, especially if the language is known to have a number of varieties. Information on the provinces of the informants are presented at the acknowledgment section at the end of this paper.

2.2 Procedure

A total of 30 to 45-minute recording was taken from two (2) native speakers of each Philippine language. Each speaker was asked to pronounce more than 150 basic words in the list adapted from the questionnaire of Comrie and Smith [3] which were translated to the informants' respective native languages. The word list and other elicitation materials were translated by the researchers who were either native or second language speakers, or assisted by language consultants (other native speakers).

The informants also read English words in all possible /hVd/ environments (except diphthongs), i.e. heed, hid, head, had, hod, hawed, hood, who'd, and hud, that were originally used in the study of Hillenbrand et al. The recordings were conducted either in the informants' home, school or workplace using Audacity 2.1.1 in standard mono recording channel. These were then purified using noise reduction before being subjected to speech analysis in the Praat software.

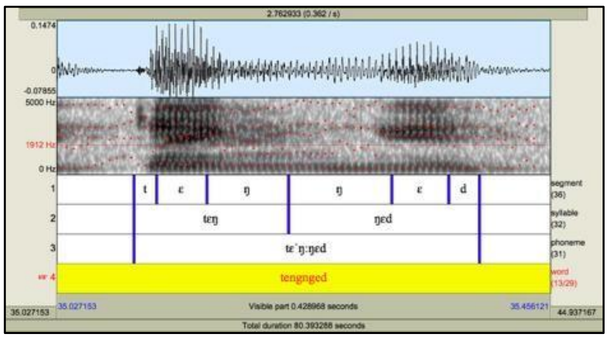

Figure 1. Sample spectrogram of Ilokano word *tengnged* 'neck' in the Praat software

The researchers analyzed and extracted the first and second formants of more than 50 instances of vowels in the Philippine languages, and of at least 9 instances in American English. The first formant (F1) corresponds to tongue height (high F1 value = high vowel) while the second formant (F2) corresponds to the position of the tongue, i.e. frontness or backness (high F2 value = front vowel). The F1 and F2 frequencies of the five vowels /a e i o u/ were measured and plotted using the UCLA JPlot Formants v1.4.

3. DISCUSSION

3.1 Vowel Space of American English

The illustration of Peterson & Barney (see Figure 2) shows the position of the American English vowels produced by a male speaker while those illustrations of Hillenbrand et al. show the vowel spaces of both male and female speakers producing the same set of vowels. Their vowel spaces were used by the researchers as bases for the analysis of this study.

Ladefoged [6] recommended the use of acoustic vowel space plots as they provide a visualization that is complementary to that of the IPA vowel chart and shows the distance of the vowels from one another.

Figures 3 and 4 are the illustrations in the study of Hillenbrand et al. (the continuous line) that were compared to the results of Peterson & Barney (the dotted line), based on the average formant frequencies from men and women informants. Both figures tend to have the same tongue placement but they differ in the range of their formants where the women informants have resulted to higher F1 and F2 values.

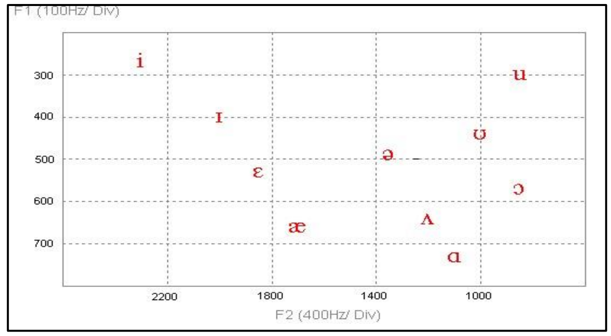

Figure 2. F1-F2 plot of average formant frequencies of American English vowels as produced by male speaker (Peterson & Barney 1952)

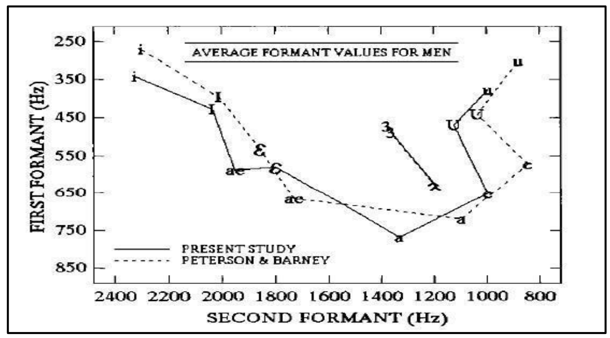

Figure 3. Acoustic vowel diagram showing the average formant frequencies of the male informants from the studies of Hillenbrand and Peterson & Barney

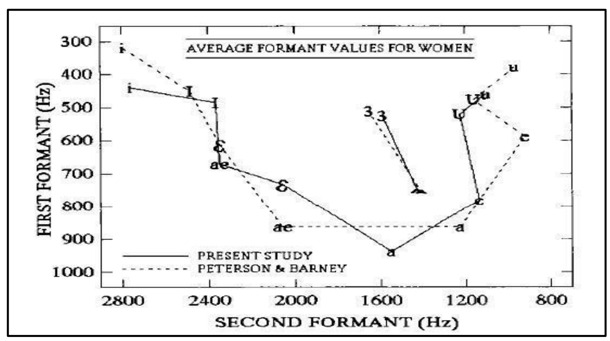

Figure 4. Acoustic vowel diagram showing the average formant frequencies of the female informants from the studies of Hillenbrand and Peterson & Barney

3.2 Vowel Space of Select Philippine Languages

Illustrations of the vowel spaces of five Philippine languages are shown below to provide an overview of the location of vowels produced by both male and female speakers during their production of words in their respective languages.

3.2.1 Bicol

As shown in the vowel space diagrams in figures 5 and 6, there are two overlapping phones, represented in the diagram by the symbols <o> and <u>. With this observation, it can be concluded that these phones have similar acoustic and articulatory features, and they can be deemed to be allophones of a single phoneme, which are conditioned by the phonetic environment of the phoneme. It may be posited that the Bicol Catanduanes (North) has a four-vowel system, which consists of [ɑ], [ɪ], [ə] and [ʊ].

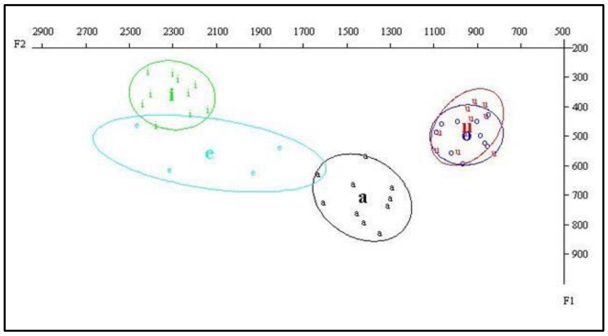

Figure 5. Vowel space of a male Bikolano informant

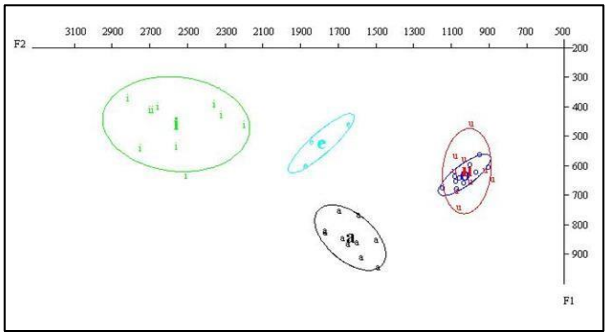

Figure 6. Vowel space of a female Bikolano informant

3.2.2 Ilokano

In Tarabay iti Ortograpia ti Pagsasao nga Ilokano [7], the orthography uses a five-vowel system /a e i o u/ for standard written texts. Rubino [11] cited that its back vowels /o/ and /u/ represented one phoneme but due to foreign loan words, these eventually became contrastive vowels as in *oso* (bear) and *uso* (fashion). However, figures 7 and 8 show that Ilokano speech has a fourvowel system: the open mid-front unrounded /a/, the high front unrounded tensed /i/, the mid front unrounded /e/, and the open mid-back rounded /u/. The vowels /i/ and /ɛ/, and /o/ and /u/ are allophonic whereas the back vowels /o/ or [ɔ] and /u/ or [u] overlap.

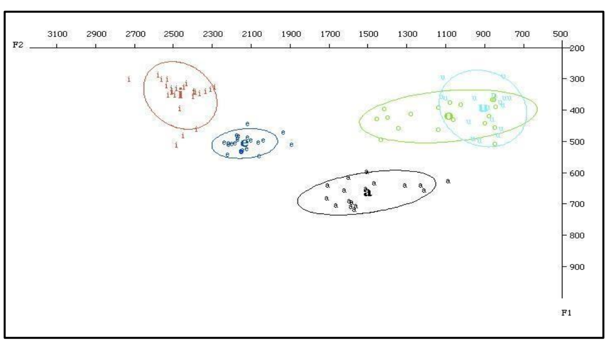

Figure 7. Vowel space of a male Ilokano informant

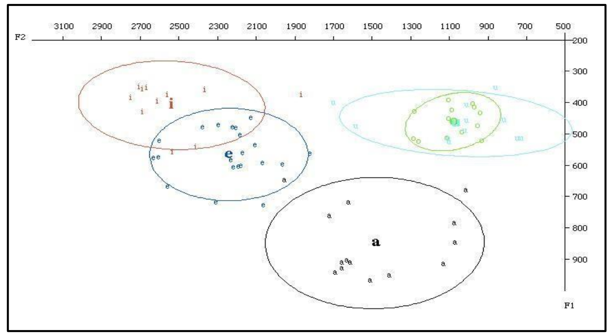

Figure 8. Vowel space of a female Ilokano informant

3.2.3 Pangasinan

Pangasinan has a four-vowel system consisting of /i/, /e/, /a/, and a back vowel, and affirms the findings of Rosario. Pangasinan does not produce the phonetic /e/ just like when producing the sound /e/ in Tagalog word "penge." Based on the accumulated data, orthographical <e> is produced as a schwa [ə]. The sounds represented by /o/ and /u/ are allophonic in this language. In terms of English vowel space, the data present that the first language influences the production of the English vowels. For instance, in the word "head," the researcher needed to repeat the recording of the production of /e/ several times for the informants to produce it fluently.

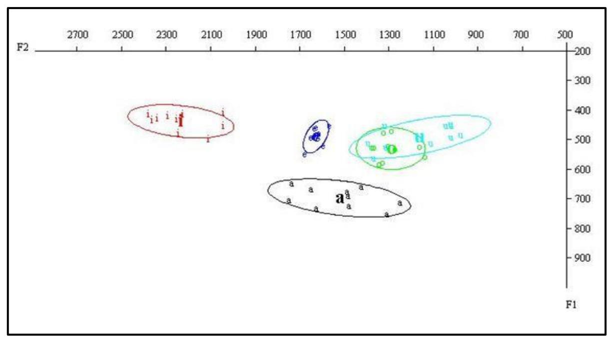

Figure 9. Vowel space of a male Pangasinense informant

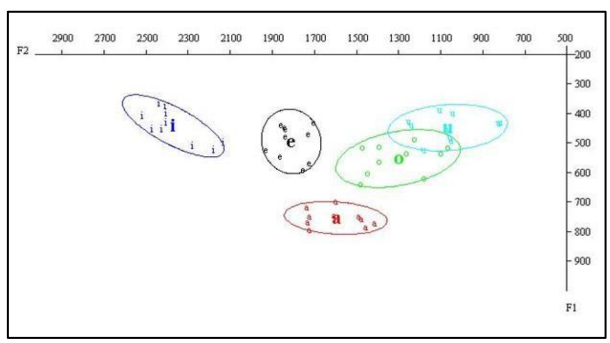

Figure 10. Vowel space of a female Pangasinense informant

3.2.4 Surigaonon

Figures 11 and 12 show the vowel spaces of a male and a female Surigaonon informants. It can be inferred that, in general, there is a three-vowel system in Surigaonon. The vowels <o> and <u> appear in the Surigaonon orthography as different vowels but the figures show that they are the same back vowel occurring in specific kinds of environments. This implies that the two sounds may be allophonic. It is also evident from the chart that the vowel space of female informants is wider than the male informants.

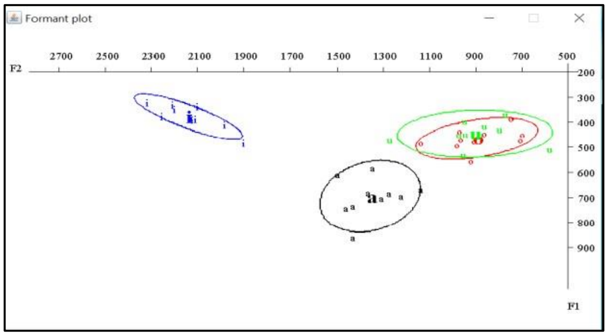

Figure 11. Vowel space of a male Surigaonon informant

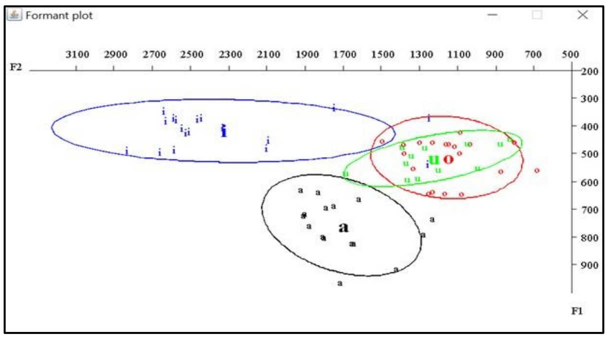

Figure 12. Vowel space of a female Surigaonon informant

3.2.5 Waray

Figures 13 and 14 show the vowel spaces of a Waray male speaker and a Waray female speaker, respectively. It can be inferred that, in general, there are only three vowels in the language. However, an additional vowel /e/ is present because there are Spanish loan words in Waray that are spelled with /e/. Also, /o/ and /u/ appear in the Waray lexicon as different vowels but the figures show that they overlap. This implies that there is little distinction between the two and that one may be a suspect free variation of the other.

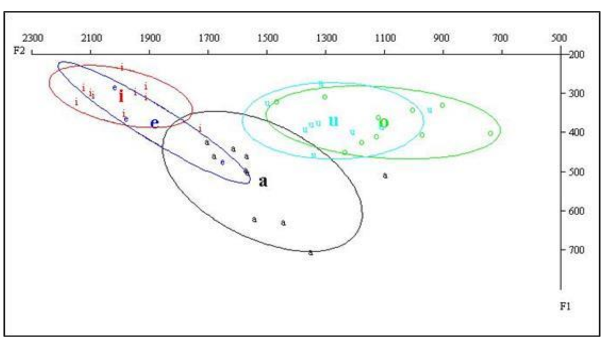

Figure 13. Vowel space of a male Waray informant

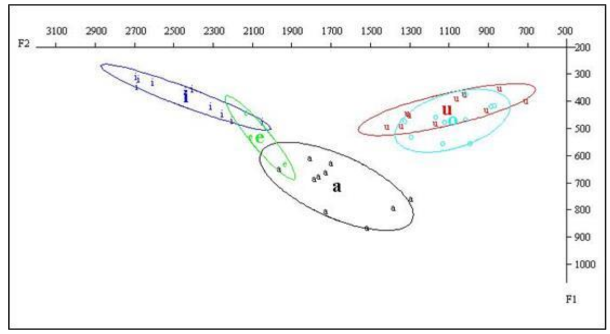

Figure 14. Vowel space of female Waray informant

3.3 American and Philippine English Vowel Spaces

Many linguists have observed that the bilingual's first language always affects the production of the second language, and this can be clearly observed in the pronunciation of vowels. This section shows the English vowel space as created by the informants. The American English vowel space is also presented here. The following figures 15 and 16 are the vowel space diagrams of Hillenbrand et al.

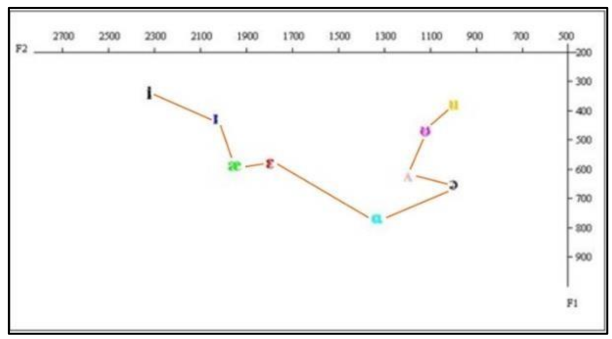

Figure 15. Vowel space of a male in the study of Hillenbrand, Getty, Clark and Wheeler

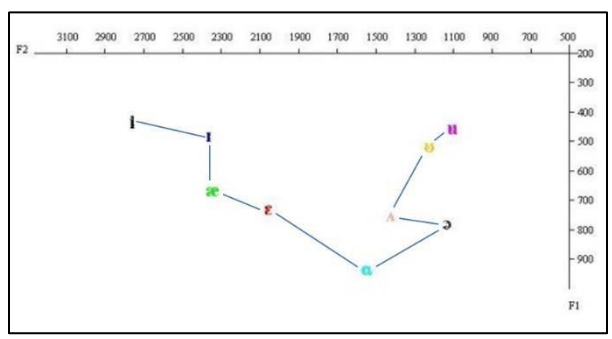

Figure 16. Vowel space of a female in the study of Hillenbrand, Getty, Clark and Wheeler

The phonetic output provides acoustic evidence of the existence of a Philippine English vowel space characterized by the neutralization of distinctions made by first language speakers of English and influenced heavily by the first language of Philippine language speakers.

The following are the acoustic vowel space diagrams produced by the Filipino speakers of Bicol, Ilokano, Pangasinan, Surigaonon, and Waray as compared to the Hillenbrand, et.al. acoustic vowel spaces of American English vowels.

3.3.1 Bicol

The acoustic vowel space diagrams in figures 17 and 18 of Bicol Catanduanes speakers of English show that the articulation of most vowel sounds approximate that of the native speakers of English as reflected on the vowel charts of Bicol Catanduanes when compared to the results of Hillenbrand, et al. Among the distinct differences between Bicol speakers of English and the native English speakers, however, is the sound production of the high front unrounded lax vowel /ɪ/.

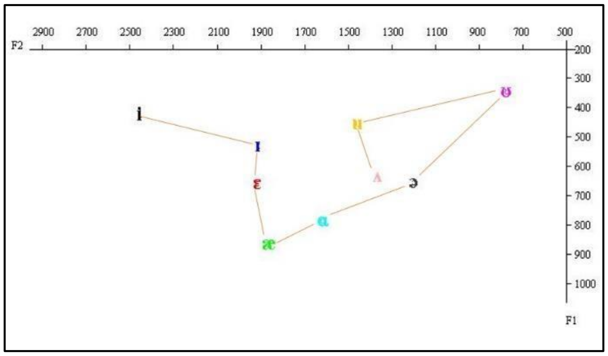

Figure 17. Vowel space of a male Bikolano informant

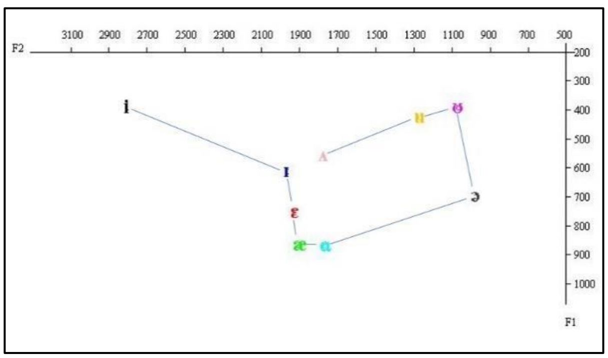

Figure 18. Vowel space of a female Bikolano informant

3.3.2 Ilokano

The female informant's vowels closely approximate the Hillenbrand, et al. data, while the male informant's vowels register a cluster of three vowels /i u a/ and mid front /e/ leaning more towards the Ilokano vowel sound system. Moreover, the central vowel schwa [ə] did not clearly materialize given the limited data.

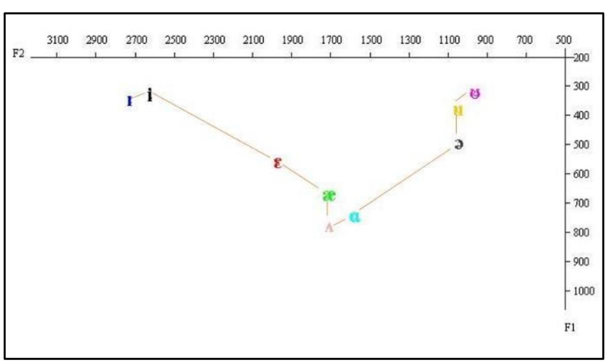

Figure 19. Vowel space of a male Ilokano informant

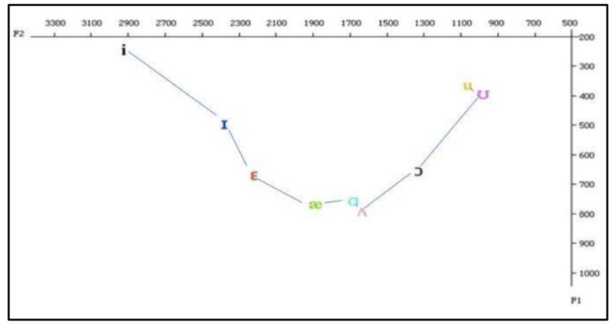

Figure 20. Vowel space of a female Ilokano informant

3.3.3 Pangasinan

Pangasinan does not exhibit other kinds of vowel phonemes that the English phonemic inventory has, such as /e/. Since the said informants were not exposed to vowel phonemes of English, the data illustrates non-distinctive features in the production of American English vowels.

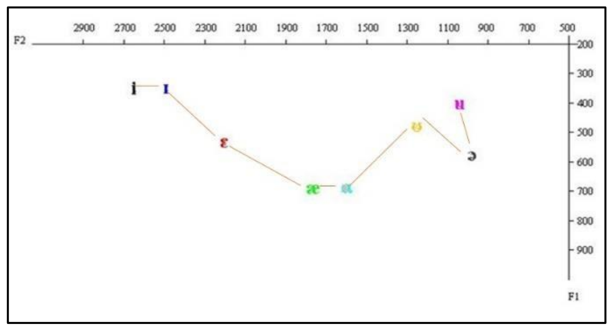

Figure 21. Vowel space of a male Pangasinense informant

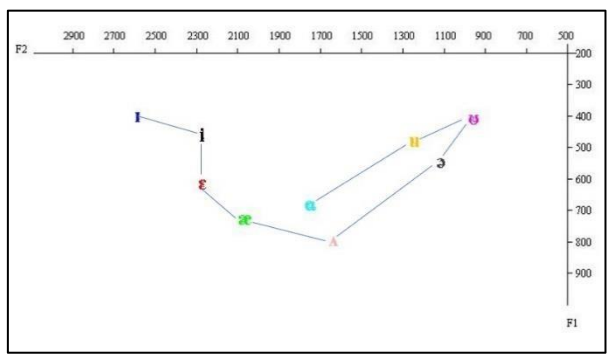

Figure 22. Vowel space of a female Pangasinense informant

3.3.4 Surigaonon

The Surigaonon data in figures 23 and 24 show the same curving distribution of vowel space as exhibited in the American English data for the female informant. However, the male informant's data reveal a tendency in clustering of front vowels and with back vowels gravitating towards outer periphery.

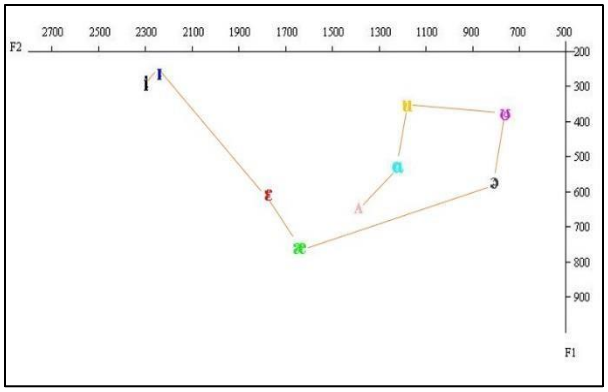

Figure 23. Vowel space of a male Surigaonon informant

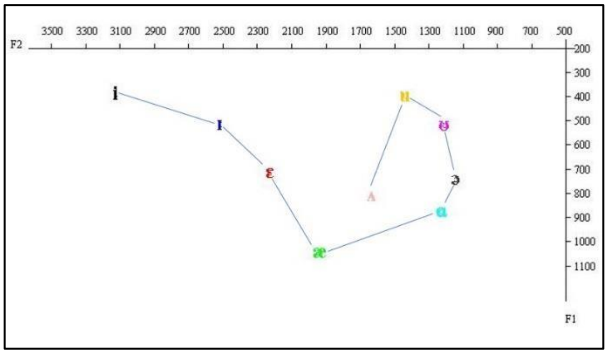

Figure 24. Vowel space of a female Surigaonon informant

3.3.5 Waray

Figures 25 and 26 show the vowel spaces of Waray male and female pronouncing words with English vowels, similar to the data used by Hillenbrand, et al. One distinct observation is that the vowels /u/ and /ʊ/ in both male and female informants have close F1 values. On the other hand, the male informant's F2 values are almost identical while for the female informant, the vowel /ʊ/ has a higher value than the vowel /u/. The difference in the F2 values of the female informant shows that the position of the tongue when pronouncing /u/ is at the back and at the near middle during /ʊ/.

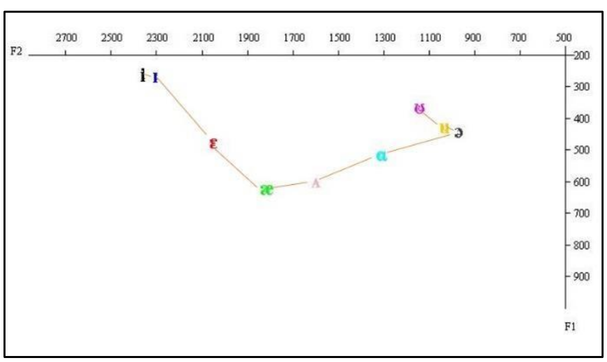

Figure 25. Vowel space of a male Waray informant

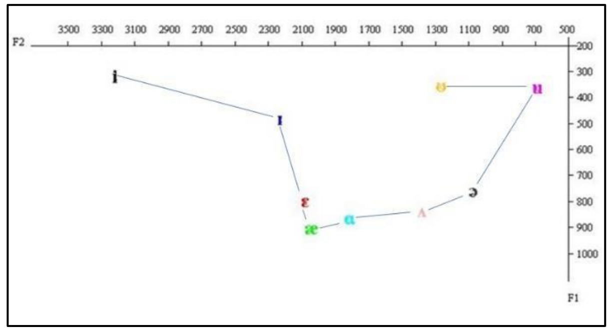

Figure 26. Vowel space of a female Waray informant

4. FORMANT ANALYSIS

The frequencies for F1 and F2 from the five Philippine language informants per gender were averaged to find the Philippine English first and second formants.

Table 1. Formant frequencies from Bicol (Bik), Ilokano (Ilo), Pangasinan (Pag), Surigaonon (Sgd) and Waray (War) female speakers for hVd environments for 'head.'

	head /ɛ/	
	F1	**F2**
Bik	752	1929
Ilo	676	2220
Pag	615	2274
Sgd	713	2229
War	802	2081

The vowel spaces of the Philippine English and the American English were compared by finding the difference of formant frequencies. The closer to 0 value the difference is, the closer the vowel spaces of the two English varieties are.

Basing from the current data, the differences between the formant frequencies in the Philippine English and American English range from -165 to 155 Hz for F1 and from -171 to 363 Hz for F2 for female speakers, and from -111 to 77 Hz for F1, and from -194 to 363 Hz for F2 for male speakers.

Individually, it may be observed how close the Philippine English speakers can pronounce several American English vowels. For instance, the female Bicol speaker's "head" /ɛ/ registered F1 752 Hz/F2 1929 Hz or slightly higher tongue height and backed compared to F1 731 Hz/ F2 2058 Hz of American English. This may be due to the resemblance of the vowel /ɛ/ to the Bicol /e/. Meanwhile, there are many possible reasons that may account for the (±)300 difference, one of which is the lack of familiarity to the signal, say, "hawed"/hɔːd/ which is often read /hoʊd/. For instance, in table 1, the female Bicol speaker's "head" /ɛ/ registered F1 752 Hz/F2 1929 Hz or slightly higher tongue height and backed compared to F1 731 Hz/ F2 2058 Hz of American English.

The scatter plots for female and male vowel spaces (Figures 27 and 28) indicate that the Philippine English vowel space closely approximates the same inverted "C" curve as that of the American English vowel space. However, there was no overlap in the squares and circles meaning there was not an instance where the Philippine English and the American English had a similar vowel space.

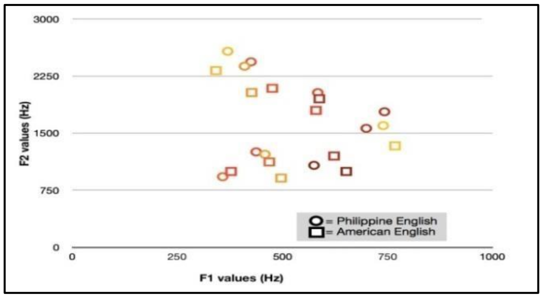

Figure 27. Scatter plot showing average male Philippine English and American English vowel spaces

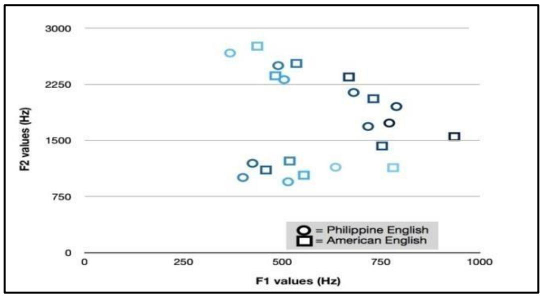

Figure 28. Scatter plot showing average female Philippine English and American English vowel spaces

5. CONCLUSION

Proponents of Philippine English have consistently held that the variety of English spoken in the Philippines exhibits features that are unique not only in pronunciation but in morphosyntax and semantics as well. This study has shown to be the case, as far as phonetics is concerned.

The data in this preliminary study suggest that a Philippine English vowel space appears as it is clearly distinct from the American English, noting the fact that foreign vowels that are not native in the informants' first languages appeared differently during the results of acoustic analyses. The consideration of the presence of such vowel space may account for what is now considered the Philippine English variety which cannot be generalized as having one or few features but will always have to be weighed against the speaker's mother tongue.

6. ACKNOWLEDGEMENT

The researchers would like to thank the people who have provided the data from which the analyses of this preliminary study came from.

7. REFERENCES

[1] Almario, Virgilio. 2013. Ortograpiyang Pambansa. Komisyon sa Wikang Filipino.

[2] Baart, Joan L.G. 2001. A Field Manual of Acoustic Phonetics. SIL International, 52.

[3] Comrie, Bernard and Norval Smith. Linguistic descriptive studies: questionnaire. Lingua 42 (1977), pp. 1-72.

[4] Delos Reyes, J., Santiago, P.J., Tadena, D., and Zubiri, L.A. 2010. Acoustic Characteristics of the Filipino Vowel. Online: http://www.academia.edu/1196760/Acoustic_Characteristics_of_the_Filipino_Vowel_Space.

[5] Hillenbrand, J., Getty, L., Clark, M., and Wheeler, K. Acoustic characteristics of American English vowels. Journal of the Acoustic Society of America. 97, 5 (May 1995), 3099-3111.

[6] Ladefoged, Peter. 2003. Phonetic Data Analysis. An Introduction to Fieldwork and Instrumental Techniques. Oxford; Blackwell Publishing.

[7] Lopez, Joel. 2012. Tarabay iti Ortograpia Ti Pagsasao nga Ilokano.

[8] Peterson, Gordon E., & Harold L. Barney. 1952. Control methods used in a study of the vowels. *Journal of the Acoustical Society of America*, 24, 175-184.

[9] Philippine Primer, The Expats' Guide to the Philippine Lifestyle. 2017. Total Number of Philippine Islands is now 7,641. Retrieved from http://primer.com.ph/blog/2017/03/11/total-number-of-philippine-islands-is-now-7641/

[10] Rosario, F.C. Jr. 2012. The Vowel Space of Pangasinan. *Frontiers of Language and Teaching*, Vol. 3, 264-270.

[11] Rubino, Carl Galvez. 1997. A Reference Grammar of Ilocano. PhD Dissertation. University of California, Santa Barbara.

[12] Simons, Gary F. and Charles D. Fennig (eds.). 2018. Ethnologue: Languages of the World, Twenty-first edition. Dallas, Texas: SIL International. Retrieved from http://www.ethnologue.com.