VOICE ONSET TIME IN WINNIPEG: A COMPARISON OF FILIPINO AND TRADITIONAL WINNIPEGGERS*

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1. Introduction

The Filipino neighborhood in Winnipeg is distinct in that it is the largest visible immigrant community in the city. Filipinos make up nearly 10% of the entire population of Winnipeg, which is twice the proportion in other western cities and Toronto (Onosson et al., 2019). The Filipino community in Winnipeg is also different from the other Canadian Filipino communities in terms of their settlement patterns. Filipinos in Vancouver and Toronto reside in and are widely scattered across ethnically diverse neighborhoods (Kelly, 2014; Umbal, 2016), while Filipinos in Winnipeg have formed an ethnic enclave, geographically concentrated in the northwest area of the city. Such a residential pattern allows to develop close-knit social networks in the community, which may constrain speakers' linguistic behavior from assimilating to local dominant speech as well as promoting subsequent generations' speech to resemble more with their parents' generation demonstrating substrate transfer effects.

Rosen et al. (2015) examined Canadian Shift vowels in Filipinos and found that Filipino English first language (L1) and second language (L2) speakers in Winnipeg both participated in Canadian Shift and were even more advanced than the local European counterparts. One of the possible explanations for this observation is that there is language interference and transfer among L1 and L2 speakers, where L2 speakers have acquired vowels from the heritage languages (Tagalog, Kapampangan and Ilocano) spoken by L1s. However, this claim needs further investigation, particularly with regards to the vowel systems of each heritage language. To investigate potential language transfer effects, this study chooses Voice Onset Time (VOT), a phonetic feature that clearly contrasts between English and the Filipino heritage languages, and compares the production of English VOTs among Filipino Winnipeggers (hereafter FWs) and Traditional Winnipeggers (hereafter TWs)[1].

VOT is a phonetic cue that appears in stop consonants. It is the interval between the release of a stop and the onset of voicing before a following vowel (Lisker & Abramson, 1964). According to Keating (1984), stop consonants in languages have three phonetic types: voiced, voiceless unaspirated, and voiceless aspirated. The voiced stops have overall lead voicing (negative) VOT values. Voiceless unaspirated stops are a "swing" category and may have either short-lag (short positive) or lead VOTs (Keating, 1984:309). Voiceless aspirated stops in general have long-lag (long positive) VOT values. This phonetic feature

* I am most grateful to Dr. Nicole Rosen, who granted me access to the data in the Languages in the Prairies Project and provided useful insights and suggestions on this project. I would also like to extend my thanks to the audience at the *2021 CLA annual meeting*. All errors are, of course, my own.

[1] The terms *Filipino Winnipeggers* and *Traditional Winnipeggers* were chosen to respectively represent Filipino and European community members in Winnipeg. The term *Traditional* was taken from Hall-Lew's study (2009), in which study the linguistic market formed by European descendants was described as a Traditional Linguistic Market.

Actes du congrès annuel de l'Association canadienne de linguistique 2021.
Proceedings of the 2021 annual conference of the Canadian Linguistic Association.

has been found to vary across languages (Lisker & Abramson, 1964). English is an aspirating language, with voiceless stops having long-lag VOTs (>30ms), while voiced stops usually have short-lag VOTs (0-25ms) (Docherty, 1992; Lisker & Abramson, 1964; Morris et al., 2008). By contrast, as presented in the next section, the Filipino heritage languages and Philippine English have short-lag VOTs for voiceless stops and lead VOTs for voiced stops.

1.1 Voicing system in the Filipino heritage languages

The first-generation Filipino Winnipeggers are either bilingual or trilingual speakers, who speak English and at least one of the heritage languages (Tagalog, Kapampangan, Ilocano) fluently. In the speech community, Filipinos are exposed to heritage languages inside and outside of the home, which environment motivates the appearance of substrate transfer. This section gives an overview of the voicing system in each of the Filipino heritage languages and Philippine English and shows how they differ from English.

Tagalog is the most spoken mother tongue in the Filipino community. It has 16 consonant phonemes, seven of which are stops (Schachter & Reid, 2008): voiceless stops /p/, /t/, /k/,[2] and /ʔ/, and voiced stops /b/, /d/, and /g/. Unlike English, all of the voiceless stops and their allophones in Tagalog are produced without aspiration (Schachter, 1972), and all voiced stops are prevoiced, with long negative VOTs.

Kapampangan also has seven stops. Voiceless stops include: /p/, /t/, /k/, and /ʔ/; voiced stops are /b/, /d/, and /g/ (Forman, 1971). Jovel (2015) measured VOTs in Kapampangan and found that voiceless stops are not aspirated and have short-lag VOTs, while voiced stops all have rather long prevoicing, suggesting that Kapampangan is a voicing language with a long-lead and short-lag contrast.

Ilocano has the same seven stops with Tagalog and Kapampangan. It is a two-category language with a two-way contrast among stops, voiced vs. voiceless (Yamamoto, 2017). The voiceless stops are unaspirated in all positions (Constantino, 1971). While the existing literature does not describe whether the voiced stops in Ilocano are prevoiced, the fact that the other two related languages (Tagalog and Kapampangan) have long prevoicing VOTs suggesting that Ilocano may similarly have a lead and short-lag voicing system.

Philippine English originates from American English, but it has adapted to the local linguistic and social settings and established its own distinct linguistic features (Llamzon, 1966; Tayao, 2004). As with other varieties of English, Philippine English also has three voiced stops (/b/, /d/, /g/) and three voiceless stops (/p/, /t/, /k/) (Lesho, 2018). Voiced stops, unlike most other varieties of English, are prevoiced with a mean VOT over -60 ms (Lesho, 2018). For voiceless stops, previous studies have different findings. Tayao's (2008) study rarely observed aspirated stops, while the more recent study by Lesho (2018) shows that speakers tend to produce more occurrences of aspirated tokens.

[2] /k/ has a fricative allophone [x], which appears intervocalically, especially before low and back vowels (Schachter, 1972).

Table 1. Mean VOT of the voiced and voiceless stops in Tagalog, Kapampangan, Ilocano and Philippine English

	Stops	**Tagalog** (Abella et al.,2015)	**Kapampangan** (Jovel, 2015)	**Ilocano**	**Philippine English** (Lesho, 2018)
Voiced stops	/b/	-65	-84	-	-86
	/d/		-79	-	-87
	/g/		-96	-	-78
Voiceless stops	/p/	20	12	-	41
	/t/		13	-	51
	/k/		52	-	73

As shown in Table 1, the heritage languages and Philippine English all have long negative VOTs, which clearly differs from the long-lag and short-lag contrast in English. These seemingly contrasting systems between English and Filipino heritage languages provide a conflict site within which to diagnose and investigate traces of substrate effects (Poplack, 1980; Rosen, 2006; Stewart, 2015).

This study seeks to answer these questions: 1) whether or not there are ethnic differences between FWs and TWs; 2) whether or not there is substrate transfer of VOT among FWs; 3) and whether or not it persists from first-generation to second-generation FWs. The structure of this paper is as follows. I first describe how VOT was extracted and measured in Section 2. I then present the results of VOTs produced by FW Gen.1s, FW Gen.2s, and TWs. I discuss the findings on ethnic and generational differences in Section 4. Finally, I draw my conclusion in Section 5.

2. Methodology

2.1 Participants

The data of this study come from the Languages in the Prairies Project (LIPP, Rosen, 2019). LIPP is a corpus that includes data collected from rural and urban communities across the Canadian Prairies. For this study, I have chosen 26 FWs and 17 TWs from the Filipino and white communities in Winnipeg. There are nine Gen.1 speakers, who immigrated to Canada after 18 of age and have resided in Winnipeg for over 20 years. Out of the nine Gen.1 speakers, four speakers' mother tongue is Tagalog, two speakers' mother tongue is Ilocano, and the other three speakers' mother tongue is Kapampangan. For Gen.2s, there are 17 speakers who were either born or raised in Winnipeg and are English monolingual speakers. TWs were all born and raised in Winnipeg and are English monolingual speakers. Table 2 describes the stratification of the speakers by gender.

Table 2. FWs and TWs separated by gender

FW Gen.1 (age: 48-62)		FW Gen.2 (age: 19-41)		TWs (age: 18-70)	
Men	Women	Men	Women	Men	Women
4	5	9	8	7	10
Total: 9		Total: 17		Total: 17	
Grand total: 43					

2.2 Materials

Each elicitation in the LIPP corpus consists of three parts: a 45- to 60-minute sociolinguistic interview, a 220-long wordlist, and two reading passages. The wordlist recordings are used as the main data source of this study. From the wordlist, 82 words that begin with the stops /b/, /d/, /g/, /p/, /t/, /k/ were chosen. All tokens were in the onset position and were from stressed syllables. Tokens were discarded if they were mispronounced or recorded with background noise, or being too short to label the events. A total of 3350 tokens were selected and analyzed in the end.

2.3 Measurements

Acoustic measurements of VOT were made in Praat (Boersma & Weenik, 2017). The segmentation and annotation of speech events such as burst and voice onset were manually marked by displaying both the waveform and spectrogram of each word. The burst onset of VOT was defined as the first peak of an individual spike from a cluster of spikes that compose the transient noise energy of constriction release. The voice onset was recognized in the first voicing cycle that deviates from the zero crossing in the waveform (Netelenbos et al., 2014). VOT duration were taken by subtracting the time of voice onset from the burst onset when voicing began after the release (Figure 1) and prevoicing started before the burst release (Figure 2).

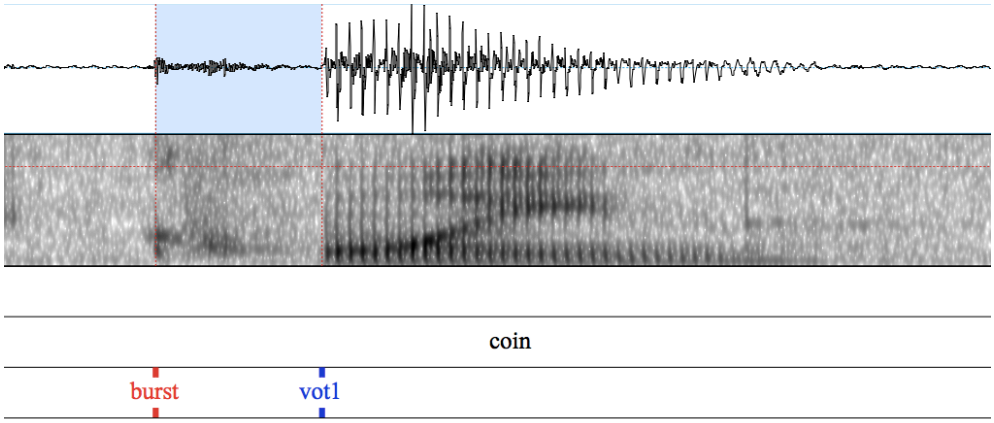

Figure 1. Illustration of positive VOT in the word “coin” produced by speaker 404

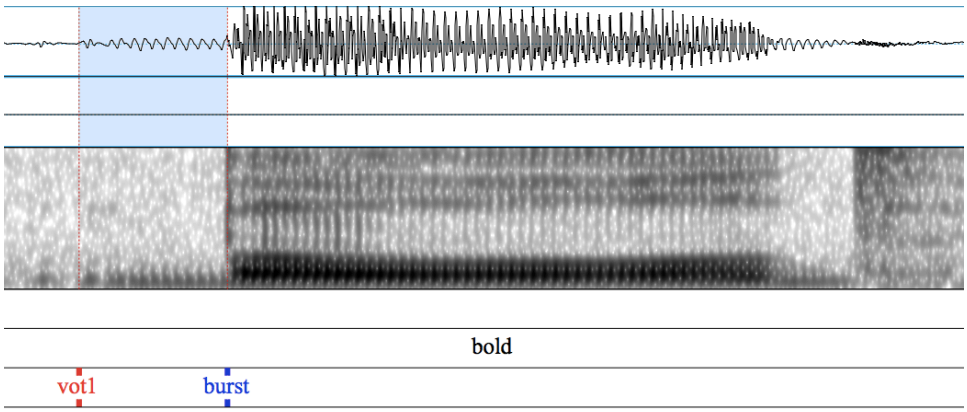

Figure 2. Illustration of prevoicing occurring before burst release in the word "bold" by speaker 409

2.4 Statistical analyses

I use descriptive and inferential statistics to present the results. The descriptive statistic results show VOT mean values, standard errors, and its overall distribution across social groups. The inferential statistics were conducted in R (R Core Team, 2013) using linear regression mixed-effects (Bates et al., 2015). The dependent variable is VOT in milliseconds. The independent variables or fixed effects[3] include *place of articulation* (alveolar, bilabial, velar), *gender* (men, women), *ethnicity* (FW_Gen.1, FW_Gen.2, TW), and the interactions of these predictors. Random effects are *speaker* and *word*. The best-fit model was selected through stepwise forward elimination procedure (Schweinberger, 2020). In this procedure, predictors were included in the final mixed-effects model if they significantly improved the model fit; otherwise, they were eliminated. To achieve better comparisons between TWs and each of the generational group of FWs, the TW group was set as the intercept of the linear regression mixed-effects models by using the *as.factor* function as shown below:

Df$ethnicity <- as.factor(df$ethnicity, levels=c("TW", "FW_Gen.1", "FW_Gen.2"))

3. Results

In this section, I present both of the within-community and between-community results. For the within-community results, I focus on examining the social differences of VOTs among FW gendered and generational subgroups. Since the L1 of FW Gen.1s in this study is Tagalog (or Kapampangan or Ilocano), Gen.1s could produce either Tagalog-like or English-like VOTs, and possible substrate language transfer from Tagalog to English is

[3] Here, even though Filipino English L2 participants in this study speak three different heritage languages, Tagalog, Kapampangan, and Ilocano, *first language* was not included in the statistical analyses. A mixed-effects linear regression model was conducted with *first language* as a fixed effect and *speaker* and *word* as random effects. *First language* was not a statistically significant factor affecting the production of VOT (p = 0.54). In this case, in order to maintain concision and consistency, *Tagalog* is used to represent all languages spoken by the Filipino English L2 speakers.

expected. For the between-community results, I mainly present the effects of ethnicity on VOT by comparing the VOTs produced by FW Gen.1s, FW Gen.2s, and TWs. The results for the voiceless stops are presented first (Section 3.1), followed by the results for the voiced stops (Section 3.2).

3.1 Findings of the voiceless stops

Table 3 and Figure 3 show the VOT duration for the three voiceless stops (/p/, /t/, /k/) separated by generation, ethnicity, and gender. Across FWs and TWs, voiceless velars on average have the longest VOT duration, followed by alveolars and labials for all six groups, in line with previous literature showing that posterior places of articulation produce longer VOTs in English (Lisker & Abramson, 1964). Among FWs, the expected generational difference that Gen.1 participants use shorter positive VOT duration than Gen.2s is only found in the men. Gen.1 men have the shortest VOT values; in particular, the mean VOT duration of alveolar and bilabial tokens is close to the short-lag range (0 – 30ms) for voiceless stops. The mean VOT values of Gen.1 women are at a similar level to the VOTs of Gen.2s and TWs, who all show long-lag VOTs. What is more, the mean VOT of /k/-initial syllables produced by Gen.1 women is the highest compared to the other five groups.

Table 3. Mean VOT of voiceless stops among FWs and TWs

	FW_Gen.1		FW_Gen.2		TW	
	M	W	M	W	M	W
/p/	**35**	72	65	73	71	73
/t/	**39**	74	71	77	77	74
/k/	**57**	**92**	77	83	87	83

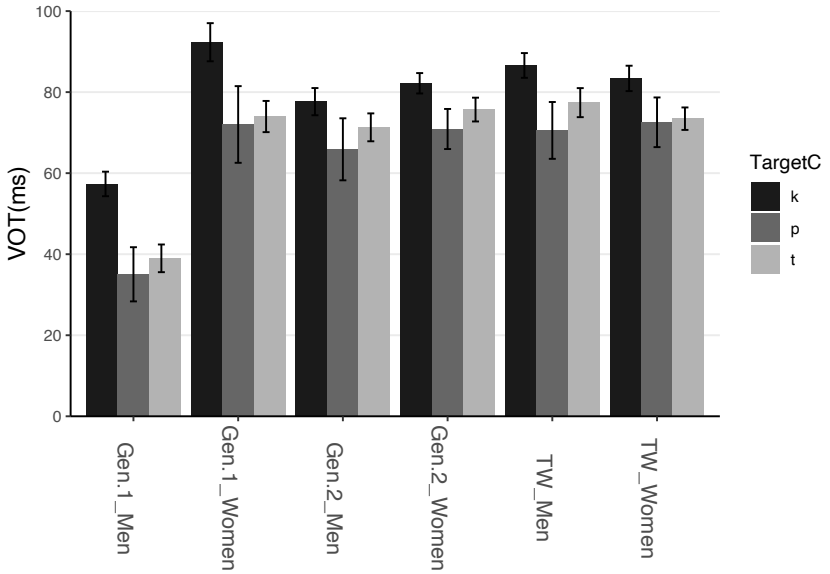

Figure 3. VOT of voiceless stops produced by FWs and TWs separated by gender

Linear regression mixed-effects models were fit to the dataset of VOT values for voiceless stop consonants (/p/, /t/, /k/). The best-fit model returned through a stepwise procedure contains two two-way interactions of *place of articulation*, *gender* and *ethnicity* as fixed effects. Random effects are *speaker* and *word*. The best-fit model is: Model1= lmer(VOT~PofA*Ethnicity+Gender*Ethnicity+(1|Speaker)+(1|Word), data=voiceless)

Table 4. Output of the best-fit model for voiceless stops among FWs and TWs

	Estimate	Std.Error	t value	Pr(>|t|)
Intercept	76.93	4.58	16.79	< 2e-16***
PofABilabial	-3.55	2.68	-1.33	0.19
PofAVelar	9.57	1.87	5.12	8.51e-07***
GenderWomen	-2.98	5.92	-0.5	0.62
EthnicityFW_Gen.1	-37.78	7.45	-5.07	1.08e-05***
EthnicityFW_Gen.2	-6.06	6.0	-1.01	0.32
PofABilabial:EthnicityFW_Gen.1	0.2	3.34	0.06	0.95
PofAVelar:EthnicityFW_Gen.1	8.62	2.33	3.7	0.00022***
PofABilabial:EthnicityFW_Gen.2	-2.23	2.86	-0.78	0.44
PofAVelar:EthnicityFW_Gen.2	-3.26	2.0	-1.63	0.1
GenderWomen:EthnicityFW_Gen.1	38.16	9.84	3.88	0.00043***
GenderWomen:EthnicityFW_Gen.2	9.56	8.21	1.16	0.25

As shown in Table 4, *place of articulation* has significant effects on VOT across the voiceless dataset, suggesting that velars have significantly longer VOTs than alveolars and bilabials. *Ethnicity* is a significant predictor of VOT, indicating that FW Gen.1s significant differentiate from TWs with respect to the production of VOT. Based on the significant interaction of *place of articulation* and *ethnicity*, the differences between Gen.1s and TWs are more pronounced in the production of velar /k/, as compared to the voiceless bilabial /p/ and alveolar /t/. Significant differences between FW Gen.2s and TWs were not found in neither of the three consonants. The statistical output also contains a significant interaction of *ethnicity* and *gender* ($t = 3.88$, $p < 0.01$), meaning that there is a significant discrepancy between men and women, and it is greater in the Gen.1 groups than the Gen.2 and TW subgroups, which is also supported by the observations in the Figure above.

3.2 Findings of the voiced stops

Table 5 and Figure 4 summarize the mean VOT duration for the voiced stops. There are clear differences between FW Gen.1s and other English monolingual speakers. Across the board, VOTs produced by FW Gen.1s have much higher negative VOT values, while VOTs produced by FW Gen.2s are more in line with those of TWs. Furthermore, the proportion of prevoiced stops produced by FW Gen.2s (159/527, 30.2%) and TWs (139/456, 30.5%) is almost identical. However, most of the word-initial voiced stops of FW Gen.1s show prevoicing (247/278, 88.8%). This seems to suggest that the first-generation FWs have transferred the long-lead VOT values of their first language(s) (Tagalog/Kapampangan/Ilocano) into their English.

There are differences between men and women across the three groups as well. The women in both of the two FW groups have shorter lead VOTs than men, while it is the

opposite for TWs, in that women have longer lead VOTs than men. This gender difference within each group is consistent for all three voiced stops /b/, /d/, and /g/.

Table 5. Mean VOT of voiced stops among FWs and TWs

	FW_Gen.1		FW_Gen.2		TW	
	M	W	M	W	M	W
/b/	-90	-74	-21	-7	-9	-20
/d/	-94	-81	-30	-13	-8	-14
/g/	-81	-57	-5	-1	18	-7

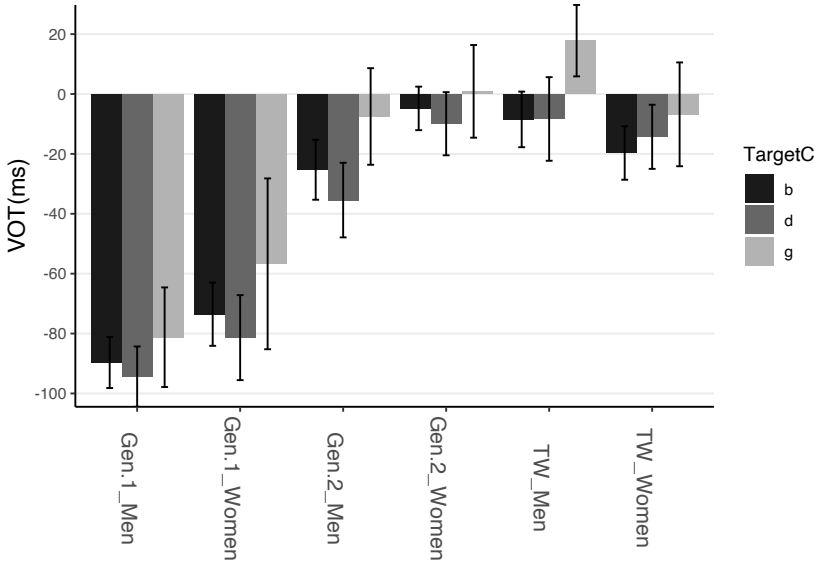

Figure 4. VOT of voiced stops produced by FWs and TWs separated by gender

Statistical analyses were carried out using a stepwise procedure in linear mixed-effects regression models. The best-fit mixed-effects model contains two fixed effects: *place of articulation* and *ethnicity*. Random effects are *speaker* and *word*. Gender and the interactions of gender, place of articulation and ethnicity were discarded as they did not improve the model fit. The best-fit model is: Model 2 = lmer(VOT ~ PofA+Ethnicity+(1|Speaker)+(1|Word), data= voiced)

Table 6. Output of the best-fit model for voiced stops among FWs and TWs

	Estimate	Std.Error	t value	Pr(>|t|)
Intercept	-14.39	8.96	-1.61	0.12
PofABilabial	2.66	3.45	0.77	0.44
PofAVelar	17.76	4.74	3.75	0.00046***
EthnicityFW_Gen.1	-70.85	14.51	-4.88	1.78e-05***
EthnicityFW_Gen.2	-5.17	12.13	-0.43	0.67

As summarized in the Table 6 above, VOT correlates significantly with *place of articulation* (t = 3.75, p < .001), indicating that the voiced velars in general have significantly shorter durations than the voiced alveolars and bilabials. The largest effect observed in the model is for *ethnicity* (t = -4.88, p < .0001), with FW Gen.1 men and women producing considerably longer negative VOTs than TWs and FW Gen.2s. This finding is also supported by the descriptive statistics. Comparisons of FW Gen.2s and TWs are not significant, which is the same result with voiceless stops. With respect to the effect of gender on VOT, even though Gen.2 men have longer mean negative VOT duration than Gen.2 women, these differences are not significant.

3.3 Summary of VOTs in FWs and TWs

As presented in Section 3.1 and Section 3.2, one of the main findings is that velar stops (/g/, /k/) have significantly longer VOT durations than alveolars (/d/, /t/) and bilabials (/b/, /p/), and this holds true across all FW and TW subgroups. Another main finding is that first-generation FWs produce significantly different VOTs from TWs, while second-generation FWs are more in line with TWs. For voiceless stops, there are considerable differences between first-generation FW men and women. First-generation FW men produce much shorter VOTs than second-generation FWs and TWs. In contrast, first-generation FW women have similar VOT distributions to second-generation FWs and TWs. For voiced stops, first-generation FWs show strongly contrasting VOT values with second-generation FWs and TWs. Both first-generation FW men and women produce significantly longer negative VOTs than the other groups.

4. Discussion

VOTs of FWs is primarily predictable by generation, and the effect of language transfer is stronger among first-generation Filipinos. First-generation FWs produce nearly exclusively long-lead VOTs with voiced stops, patterning with Filipino heritage languages. The first-generation FWs are all bilingual speakers and all came to Canada in the 1970s and 1980s when they were in their 20s. It is thus expected for them to produce the VOTs of /b, d, g/ distinctly from the local English dialect.

What is interesting is that there is a gender-differentiated pattern among the first-generation FWs for the VOTs of voiceless stops. First-generation women produce long-lag VOTs for voiceless stops, which aligns with second-generation speakers and TWs, while first-generation men show significantly shorter VOTs. It appears that the VOTs of first-generation women do not transfer the short-lag VOTs from their L1s into their VOTs in English. The differences between first-generation men and first-generation women might be explained by their social connections and engagement with the local community. First-generation Filipino women have more positions in clerical occupations and the healthcare industry, which require more linguistic interaction with non-Filipino interlocutors, whereas first-generation Filipino men are more likely to work in services and manufacturing sectors (Bonifacio, 2013; Statistics Canada, 2006). In this case, as compared to first-generation men, women may be quicker in assimilating to mainstream language patterns and integrating more mainstream linguistic variants into their speech.

In addition, first-generation women in general arrived in Canada earlier than first-generation men did. They played a leading role in sponsoring the immigration of their husband, children, and parents. They would have therefore received longer exposure to

Winnipeg English, since the longer the speaker's L2 experience, the closer their VOT productions are to the VOT of their L2 (Flege, 1987). It would be worthwhile to compare their results with other first-generation women speakers who arrived in Canada more recently.

Language transfer was not found in the VOTs produced by second-generation FWs. Substrate language transfer may appear in the speech community of ethnic groups when the linguistic behavior of subsequent generations shows similar linguistic traits with the first generation and differs from the majority population (Chambers, 2003; Hoffman & Walker, 2010; Labov, 2008). However, in the data of this study, second-generation FWs overall use short-lead VOTs for voiced stops, which resembles the VOT production patterns of TWs and significantly differs from the long-lead VOTs of first-generation FWs. This observation suggests that language traits appearing in first-generation FWs are not passed along to the second generation, at least for VOT. This result also corresponds to Hoffman and Walker's (2010) study on Canadian Shift and t/d-deletion among Chinese and Italian Torontonians, which showed that there are large discrepancies between first-generation and second-generation Chinese and Italians, where second-generation speakers pattern more like British heritage speakers.

The absence of substrate transfer in second-generation speakers should not necessarily come as a surprise. On the one hand, in general, subsequent generations of ethnic groups tend not to acquire the foreign accents of their parents (Labov, 2008). The second-generation FWs in this study were all born or raised in Winnipeg, and are all English L1 speakers who use English as their dominant language. They show more accommodations to the speech patterns of TWs. On the other hand, the fact that second-generation speakers are adopting and assimilating to the local norms might suggest that second-generation speakers are not necessarily behind in any different linguistic behaviors. If anything, second-generation speakers are well integrated into the mainstream speech patterns, and sometimes are even more advanced and at the forefront of linguistic variation and change (Onosson et al., 2019), with the occasional exception of second-generation men.

5. Conclusion

The main goal of this study was to investigate potential language transfer effects among FWs. VOTs produced by first- and second-generation FWs are expected to be similar to their heritage languages and Philippine English, while differing from Canadian English spoken by TWs. The main finding is that second-generation speakers produce VOTs patterning with TWs, while first-generation speakers produce long-lead VOTs for voiced stops, resembling their first languages. The results suggest that traces of language transfer only appear in first-generation FWs and do not persist in second-generation FWs. Another noticeable finding is that first-generation women produce long-lag VOTs for voiceless stops, patterning with second-generation FWs and TWs, while first-generation men have significantly shorter VOTs. This observation suggests first-generation women are more integrated into the local mainstream linguistic system than first-generation men.

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