ANALYSIS OF SOCIO-DEMOGRAPHIC FACTORS - ASIAN SPEAKERS AND WHITE SPEAKERS

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The following factors are examined in this report:

- gender
- age
- birthplace
- grow-up province
- racial group
- number of language(s) spoken
- first language(s)
- year(s) of studying French
- French-speaking place(s) that participants used to live in
- month(s) of living in French-speaking place(s)
- preferred variety of French
- origin of French teacher(s)

Statistical analysis was performed using R version 4.0. To explore the effect of the socio-demographic factors listed above on participants' language attitudes towards various French accents, evaluation scores were cleaned and aggregated over different survey questions. For categorical socio-demographic factors, the mean evaluation scores of each accent were visualized using the *geom_line* and *geom_point* functions from the *ggplot2* R package, and the dispersion of scores of each group was plotted with the *geom_boxplot* function from the *ggplot2* R package, which was to simultaneously compare the means and medians in each group, as well as identifying the existence and extent of differences. In addition, to validate the empirical findings, corresponding hypothesis tests were implemented. Categorical socio-demographic factors of two levels were checked with Wilcoxon test using the *wilcox_test* function from the *rstatix* R package, and those of more than two levels were examined with Kruskal Wallis test using the *kruskal_test* function from the *rstatix* R package, with Dunn's test for post-hoc analysis using the *dunn_test* function from the *rstatix* R package. Then the distribution of numeric variables was visualized using the *geom_jitter* function and *geom_smooth* (age only) from the *ggplot2* R package. Specifically for numerical factors, factors including age, year(s) of speaking French were analyzed with Pearson correlation coefficients, and ordinal factors including the number of language(s) spoken and month(s) of living in French-speaking place(s) were explored with Spearman correlation coefficients using the *cor.test* function from the *stats* R package. The analysis of speaker races generally followed the same methodologies as the analysis of speaker accents.

1. Analysis of Socio-demographic Factors with Speaker Accent

1.1. **Gender.** Only female and male participants were considered in the following statistical analysis. 4 participants who identified themselves as non-binary or chose not to answer were excluded due to the concern of little statistical power caused by the small sample size. Plot (A) of Figure 1 shows the mean values, and plot (B) depicts the dispersion of scores in groups. It is shown in Figure 1 that African and Acadian accents on average were rated more favorably by males than females, otherwise, the scores given by both genders were very close. To ascertain the statistical

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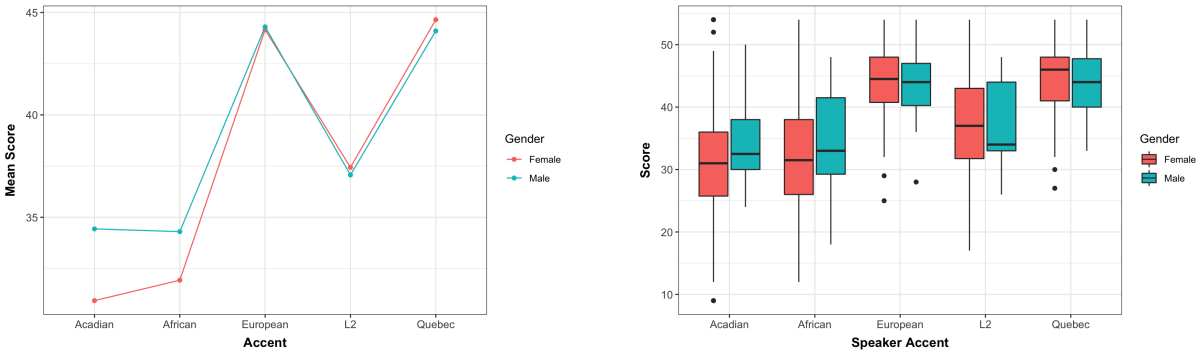
significance of the gender difference, a two-sample Wilcox rank-sum test across each French variety was adopted, which is a flexible non-parametric alternative to a two-sample t-test. Whereas the null hypothesis of the two-sample t-test is equal means, the null hypothesis of the Wilcoxon test is the two populations are equal. If we reject the null, that means we have evidence that one distribution is shifted to the left or right of the other. Since we're assuming our distributions are equal, rejecting the null means we have evidence that the medians of the two populations differ. As evidenced by Table 1, only the difference in the Acadian accent has statistical significance.



(A) Mean of scores by gender across each French accent (or variety)

(B) Dispersion of scores by gender across each French accent (or variety)

FIGURE 1. Descriptive graphs by gender across each French accent (or variety)

Variety of French	Test Statistic	p-value
Acadian	1456.0	0.040
African	1617.0	0.180
European	1928.5	0.972
L2	1958.5	0.866
Quebec	2100.5	0.424

TABLE 1. Results of Wilcoxon tests on gender for each French accent (or variety)

1.2. **Age.** The age of participants ranges from 17 to 46 years, with a mean of 20.4 years. Since most of the participants are under 30, 3 participants over 30 were treated as outliers when analyzing the relationship between age and evaluation scores. It is shown in Figure 2 that no linearity or specific patterns can be found. Additional correlation analysis was implemented, and no significant correlation exists.

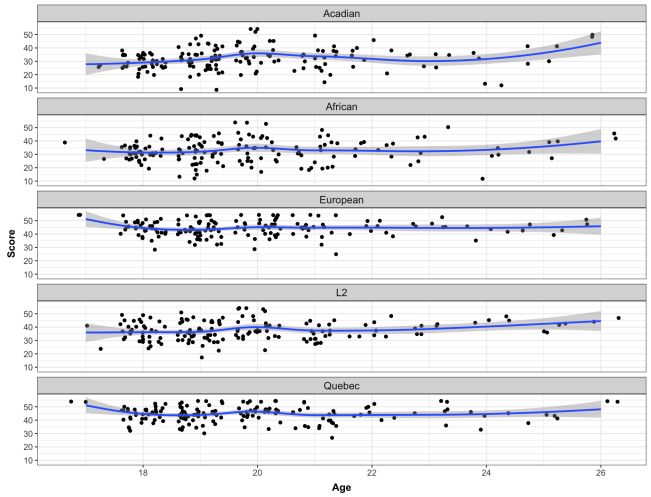
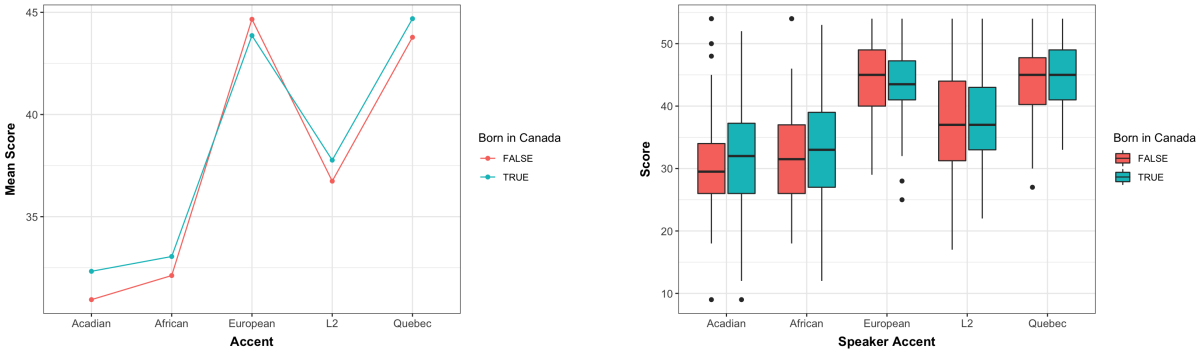


FIGURE 2. Evaluation scores versus ages of participants across each French accent (or variety)

1.3. **Birthplace.** Two dimensions of birthplace were examined: whether the participants were born in Canada and what continent they were born on. For the factor of whether born in Canada, Figure 3 reveals that participants born in Canada held more positive attitudes towards Acadian and African accents and less positive attitudes towards European accents, while the differences are minor in L2 and Quebec accents. However, the results of Wilcox tests did not indicate any statistical significance between the different countries of origin, with statistics summarized in Table 2.



(A) Mean of scores by birthplace (Canada or not) across each French accent (or variety)

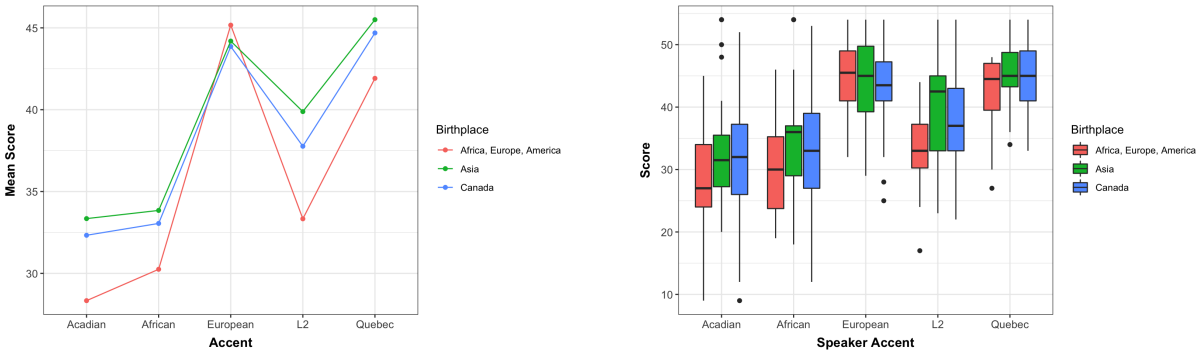
(B) Dispersion of scores by birthplace (Canada or not) across each French accent (or variety)

FIGURE 3. Descriptive graphs by birthplace (Canada or not) across each French accent (or variety)

Variety of French	Test Statistic	p-value
Acadian	2461.5	0.123
African	2641.5	0.363
European	3153.5	0.372
L2	2684.5	0.449
Quebec	2706.5	0.496

TABLE 2. Results of Wilcoxon tests on birthplace (Canada or not) for each French accent (or variety)

In addition, for participants who were not born in Canada, the birthplaces were further categorized based on continents. Due to the sample size consideration, participants who were born in Africa (n = 3), Europe (n = 4), and America ((n = 5; America refers to the Americas excluding Canada) were lumped together due to sample size constraints. From Figure 4, we can observe that participants who were born in Africa, Europe, and America rated all accents except the European accent apparently lower compared to those who were born in either Canada or Asia. To evaluate the statistical significance of the difference, the Kruskal-Wallis test was performed, which is a non-parametric alternative to the one-way ANOVA. The results of Kruskal Wallis tests in Table 3 indicate that the differences between the evaluation scores of these three birthplace groups in L2 accent are statistically significant. To locate which group(s) of birthplace is (are) different from the others in L2 accent, we conducted a Dunn's test for post-hoc analysis and found that participants who were born in Africa, Europe, and America held significantly more positive attitudes towards L2 French than those who were born in Canada or Asia.



(A) Mean of scores by birthplace (continent) across each French accent (or variety)

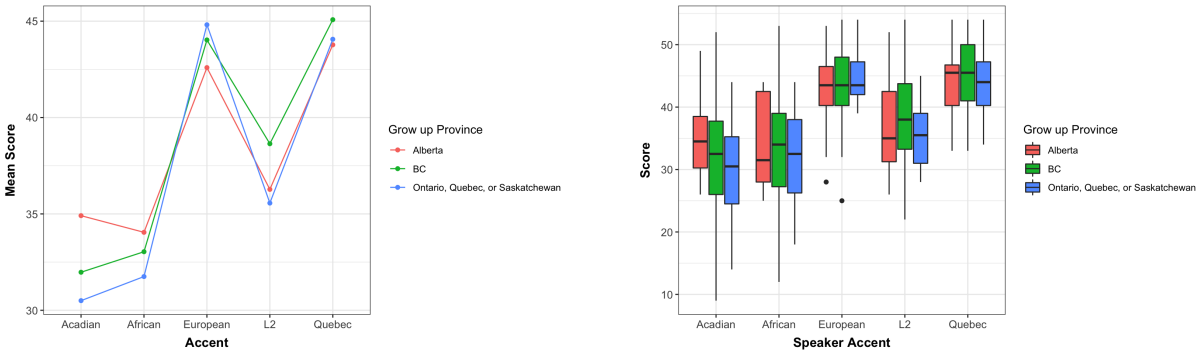
(B) Dispersion of scores by birthplace (continent) across each French accent (or variety)

FIGURE 4. Descriptive graphs by birthplace (continent) across each French accent (or variety)

Variety of French	Test Statistic	p-value
Acadian	5.17	0.075
African	2.92	0.232
European	1.30	0.521
L2	10.14	0.006
Quebec	3.64	0.162

TABLE 3. Results of Kruskal Wallis test on birthplace (by continent) for each French accent (or variety)

1.4. **Grow-up Province.** The surroundings may influence language attitudes; therefore, we also checked if the province where participants grew up may have some impact on the evaluation scores given by those who were born in Canada. Due to the small sample sizes, the provinces of Ontario (n = 4), Quebec (n = 2), and Saskatchewan (n = 2) were combined into one group. Visually, we can see from Figure 5 participants who grew up in Alberta tend to favor Acadian accents over the other two groups, and L2 accents were more favored by participants growing up in BC than by participants growing up elsewhere. Table 4 together reveals no significant difference exists between the various grow-up provinces.



(A) Mean of scores by grow up province across each French accent (or variety)

(B) Dispersion of scores by grow up province across each French accent (or variety)

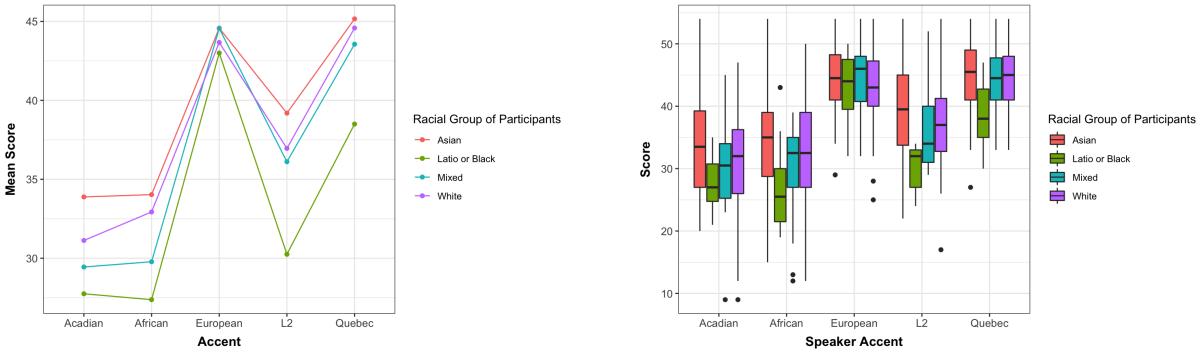
FIGURE 5. Descriptive graphs by grow-up province across each French accent (or variety)

Variety of French	Test Statistic	p-value
Acadian	3.01	0.222
African	0.41	0.816
European	0.77	0.679
L2	4.62	0.099
Quebec	0.89	0.641

TABLE 4. Results of Kruskal Wallis test on grow up province for each French accent (or variety)

1.5. **Racial Group.** To investigate if the ethnicity of participants affected how they rated recordings, we further categorized the self-reported racial groups of the participants as follows: Asian ($n = 34$), Latio or black ($n = 4$), mixed-race ($n = 9$)¡ and white ($n = 36$). It is shown in Figure 6

that four racial groups gave similar ratings to European French. Interestingly, the highest-to-lowest ranking of mean values or median values of each racial group in the other four accents all follows the same order: Asian, white, mixed, and Latino or black.



(A) Mean of scores by racial group across each French accent (or variety)

(B) Dispersion of scores by racial group across each French accent (or variety)

FIGURE 6. Descriptive graphs by racial group across each French accent (or variety)

Due to the small sample size for statistical tests and to allow for a more thorough scan, more groupings were applied to these four racial groups. Firstly, we were interested in the differences between Asians and non-Asians. The cluster of Asians includes single-race Asians and mixed-race Asians. It is demonstrated in Table 5 that L2 French was significantly more favored by Asian participants than non-Asian participants. Then we further broke down the group of Asian participants into mixed-race Asians and single-raced Asians. As indicated by Table 5, single-race Asians rated Acadian French and L2 accents significantly differently compared to non-Asians. A complimentary one-sided Wilcoxon test confirms that single-race Asians held significantly more positive attitudes towards the Acadian accent ($p = 0.023$) and L2 accent ($p = 0.003$) than non-Asian participants. For the comparison between mixed-race Asians and non-Asians, recordings of African accent received significantly higher scores from mixed-race Asian participants (one-sided $p = 0.021$)) than non-Asian participants. Then, comparing single-race Asians and mixed-race Asians, we can see that those single-race Asian participants tended to rate African accents significantly more positively than mixed-race Asian participants. Otherwise, no other significant differences were detected.

Grouping	Asian vs Non-Asian		Single-raced Asian vs. Non-Asian		Single-race Asian vs. Mixed-race Asian		Mixed-race Asian vs. Non-Asian	
Variety of French	**W**	**p**	**W**	**p**	**W**	**p**	**W**	**p**
Acadian	3992.0	0.074	2374	0.045	337.0	0.341	518.0	0.987
African	3497.5	0.854	2678	0.371	220.5	0.012	327.5	0.041
European	3697.0	0.406	2720	0.458	423.0	0.845	569.0	0.569
L2	4177.0	0.017	2169	0.006	317.5	0.225	498.0	0.849
Quebec	3764.0	0.295	2585	0.217	356.5	0.491	501.0	0.875

TABLE 5. Results of two-sided Wilcoxon Tests on Racial Groups for each French accent (or variety)

1.6. **The Number of Language(s) Spoken.** We were also interested in whether participants who were able to speak more languages had different language attitudes. Aiming to visually explore the relationship, we displayed the distribution of evaluation scores using jitter plots with smoothed regression lines in Figure 7, where we can observe that the evaluation scores are positively associated with the number of languages spoken in European and Quebec accent, while slightly negatively associated in Acadian and L2 accent, with almost no inclination in the African accent. To quantify the potential association, a correlation analysis was performed for each French accent (or variety). Since the factor of the number of language(s) spoken is ordinal, we used Spearman's rho to assess the association, which is a non-parametric alternative to Pearson's correlation. Spearman's correlation coefficient ranges from 1 to 1. To interpret, the larger the absolute value of the coefficient is, the stronger the relationship between the two factors would be, and the p-values check whether the result is meaningful or by chance. With results summarized in Table 6, we can see a weak but significant negative correlation exists in the European accent ($p = 0.029$), from which we can infer that people who can speak more languages tend to hold more favorable attitudes towards European French.

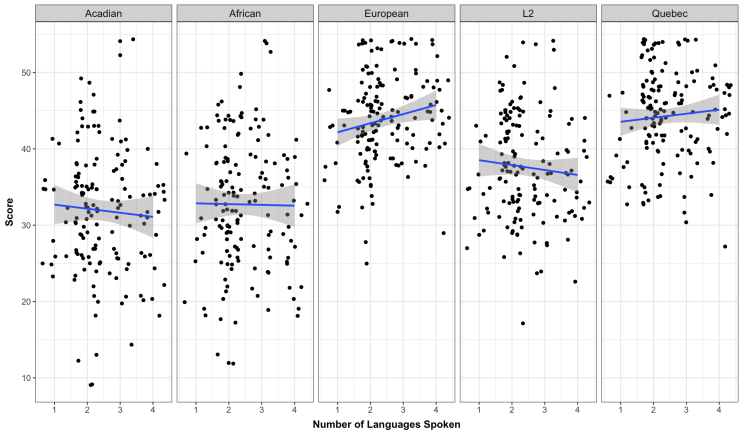


FIGURE 7. Evaluation score of participants versus the number of languages spoken across each French accent (or variety)

Variety of French	Rho	p-value
Acadian	-0.060	0.456
African	0.001	0.989
European	0.176	0.029
L2	-0.086	0.287
Quebec	0.099	0.224

TABLE 6. Results of Spearman correlation between the number of languages spoken and evaluation score (language attitude)

1.7. **Year(s) of Studying French.** For the number of year(s) studying French, it is shown in Figure 8 that the evaluation scores are positively associated with years of studying French in the groups of European French and Quebec French, while an apparent negative regression line is present in the group of L2 French. Otherwise, the slopes in the group of Acadian French and African French are not evident. To quantify the magnitude and statistical significance of the relationship, we calculated the Pearson correlation coefficient for each French accent after verifying the normality assumption. However, no significant correlation can be found in Table 7.

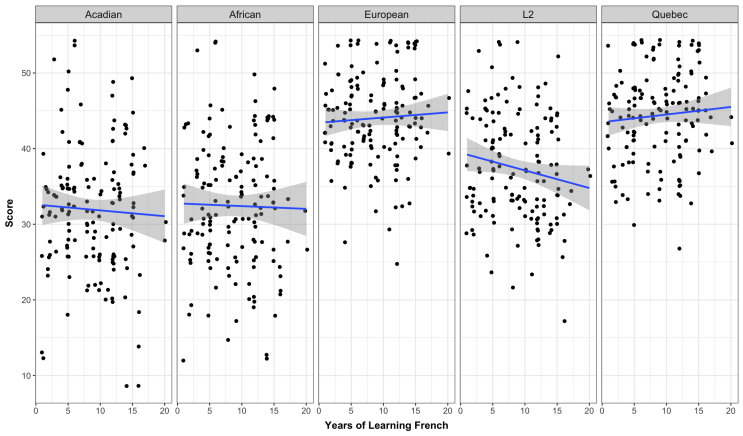


FIGURE 8. Evaluation score of participants versus the number of year(s) studying French across each French accent (or variety)

Variety of French	Rho	p-value
Acadian	-0.043	0.604
African	-0.020	0.809
European	0.054	0.510
L2	-0.153	0.062
Quebec	0.077	0.348

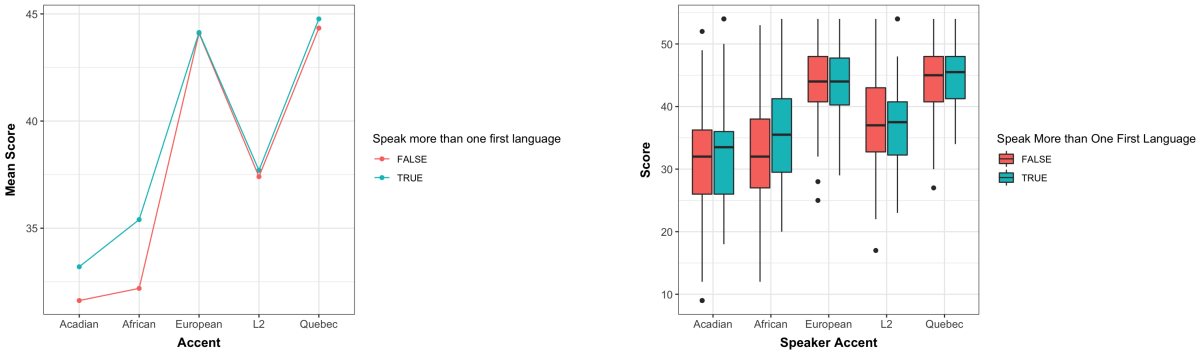
TABLE 7. Results of Pearson correlation between the number of year(s) studying French and evaluation scores (language attitude)

In the meantime, to mitigate the effect of the large dispersion in years, we also encoded the years of learning French in the following way: $0-5$ years as 1, $5-10$ years as 2, $10-15$ years as 3, and over 15 years as 4. Treating the encoded values as ranks, the Spearman coefficients were summarized in Table 8. Table 8 indicates that there is a significant but weak positive correlation between the European accent (($p = 0.023$). The more five years people learn French, the more positive their language attitudes towards the European accent become.

Variety of French	Rho	p-value
Acadian	-0.055	0.519
African	0.022	0.794
European	0.193	0.023
L2	-0.066	0.442
Quebec	0.118	0.169

TABLE 8. Results of Pearson correlation between the number of year(s) studying French and evaluation scores (language attitude) on five-year intervals

1.8. **First Language.** As mentioned in the profiling descriptions of the participants, most of them have English as their first language, and some of the participants spoke more than one first language (15 speak more than one first language; 68 speak one first language). We are interested to see if a multilingual environment will affect language attitudes. From Figure 9 we can see that participants who speak more than one first language gave higher ratings to Acadian and African accents. However, no statistically significant differences were found by Wilcox tests in Table 9.



(A) Mean of scores by first language across each French accent (or variety)

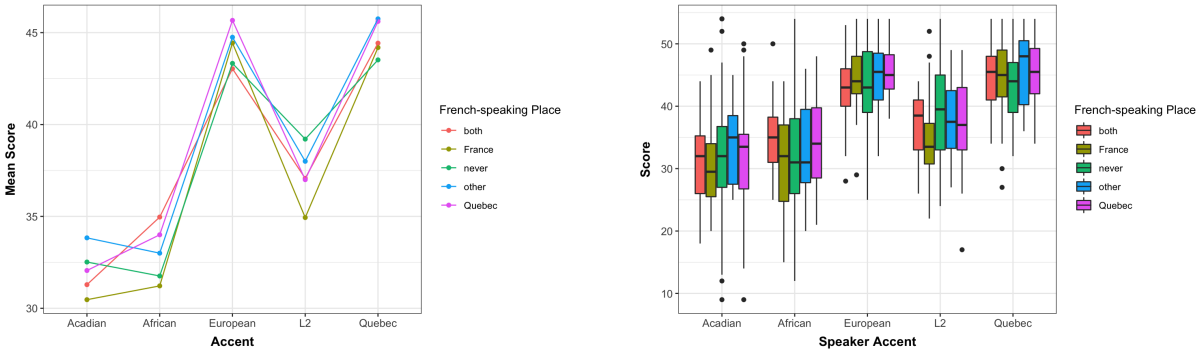
(B) Dispersion of scores by first language across each French accent (or variety)

FIGURE 9. Descriptive graphs by first language across each French accent (or variety)

Variety of French	Test Statistics	p-value
Acadian	1931.5	0.650
African	1635.5	0.090
European	2068.5	0.906
L2	2027.0	0.958
Quebec	1973.5	0.781

TABLE 9. Results of Wilcox test on first language for each French accent (or variety)

1.9. **Live in French-speaking Place(s).** Many of the participants have lived in French-speaking places, so we recategorized the free-text answers into the following categories: France ($n = 16$), Quebec ($n = 18$), both ($n = 29$; both France and Quebec), never ($n = 29$; never live in French-speaking places), and other ($n = 6$; live in other French-speaking places). It is shown in Figure 10 that the scores in each group of French accents are very close, and the results of the Kruskal Wallis tests in Table 10 confirms that none of these minor differences is of statistical significance.



(A) Mean of scores by living in French-speaking place across each French accent (or variety)

(B) Dispersion of scores by French-speaking place across each French accent (or variety)

FIGURE 10. Descriptive graphs by living in French-speaking place across each French accent (or variety)

Variety of French	Test Statistics	p-value
Acadian	3.16	0.531
African	4.17	0.384
European	4.251	0.373
L2	7.78	0.100
Quebec	3.63	0.458

TABLE 10. Results of Kruskal Wallis test on living in French-speaking places for each French accent (or variety)

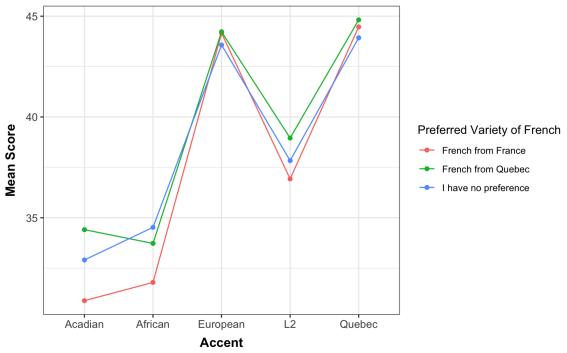
1.10. **Month(s)of Living in French-speaking Places.** Except for 19 participants who did not answer this question, most of the participants used to live in French-speaking places, over a half only lived there for less than a month ($n = 37$). To quantify how the increment in months of living in French-speaking places affects language, we encoded the intervals into ranks and then conduct correlation analysis with Spearman correlation coefficients. However, due to the sample size restriction, the groups of $1-3$ months ($n = 10$), $4-6$ months ($n = 2$), and $7-12$ months ($n = 3$) were combined into one group, and then there were three groups analyzed in the correlation analysis: < 1 month, $1-12$ months, and > 12 months. As evidenced by Table 11, no meaningful correlation was found. Moreover, with a complementary analysis using the Kruskal-Wallis test, no significant difference exists in each group across every French variety.

Variety of French	Test Statistics	p-value
Acadian	-0.079	0.377
African	0.069	0.441
European	0.051	0.564
L2	-0.015	0.864
Quebec	0.003	0.970

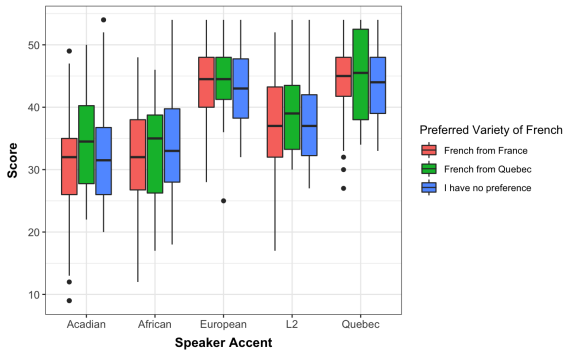
TABLE 11. Results of Spearman correlation between the months of living in French-speaking places and evaluation score (language attitude)

1.11. **Preferred Variety of French.** Over half of the participants reported that they preferred to learn French from France ($n = 48$) than French from Quebec ($n = 11$), and there was also a

decent number of participants who indicated no preference ($n = 21$). It is shown in Figure 11 that the ratings given to European and Quebec accents by participants with different preferences are very similar, while participants who preferred French from France appear to hold less favorable attitudes towards Acadian and African accents compared to other participants with other preferences. However, no statistical significance comes with the difference discussed above, based on the p-values in Table 13.



(A) Mean of scores by Preferred Variety of French across each French accent (or variety)



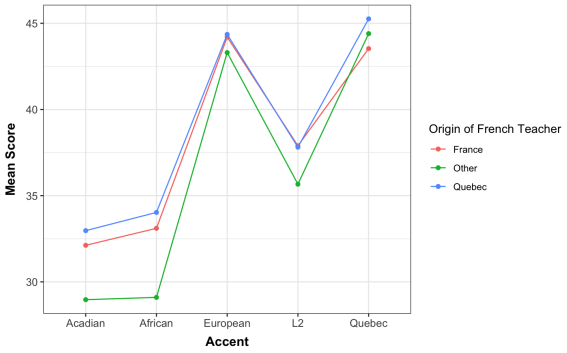
(B) Dispersion of scores by Preferred Variety of French across each French accent (or variety)

FIGURE 11. Descriptive graphs by preferred variety of French across each French accent (or variety)

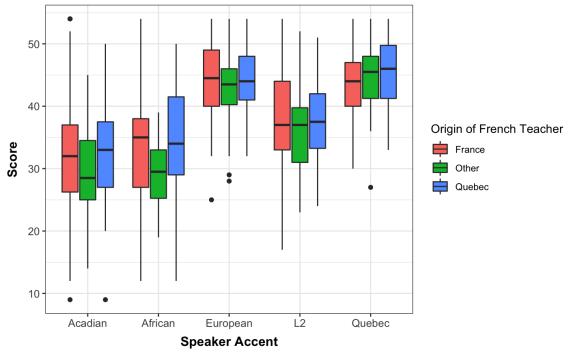
Variety of French	Test Statistics	p-value
Acadian	2.58	0.275
African	1.80	0.406
European	0.74	0.691
L2	1.00	0.605
Quebec	0.39	0.822

TABLE 12. Results of Kruskal Wallis test on Preferred Variety of French for each French accent (or variety)

1.12. **Origin of French Teachers.** Interestingly, the numbers of participants with French teachers from France ($n = 33$) and those with French teachers from Quebec ($n = 35$) are roughly the same, and there are 15 participants taught by French teachers who originated from neither France nor Quebec. From Figure 12 we can see that on average participants taught by teachers from either France or Quebec evaluated the European and L2 French almost the same, and participants with teachers from Quebec held slightly more positive attitudes towards Acadian, and African and Quebec accents compared to those who were taught by teachers from France. In the meantime, participants whose teachers were from places other than France and Quebec rated the Acadian, African, and L2 accents apparently lower than the other two groups. Again, Kruskal Wallis tests were implemented to verify the statistical significance of the observed difference. It is shown in Table 13 that significant differences only exist in the group of African accent. Following up with a Dunn's test, we found that when evaluating recordings in the African accent, participants who were taught by teachers from France ($p = 0.048$) or Quebec ($p = 0.009$) held significantly more positive attitudes than participants who were taught by teachers from neither France nor Quebec.



(A) Mean of scores by origin of French teacher across each French accent (or variety)



(B) Dispersion of scores by origin of French teacher across each French accent (or variety)

FIGURE 12. Descriptive graphs by origin of French teacher across each French accent (or variety)

Variety of French	Test Statistics	p-value
Acadian	5.19	0.0746
African	8.94	0.0114
European	0.29	0.8650
L2	2.61	0.2710
Quebec	3.16	0.2060

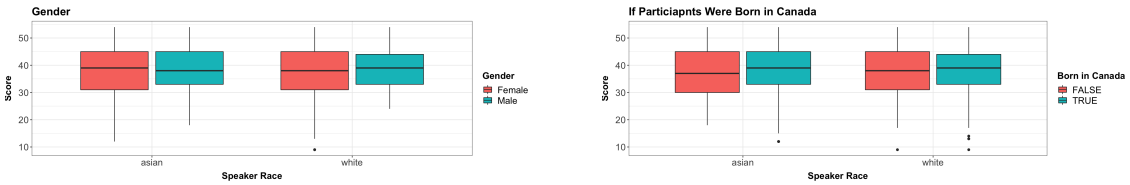
TABLE 13. Results of Kruskal Wallis test on origin of French teacher for each French accent (or variety)

2. Analysis of Socio-demographic Factors with Speaker Race

In this section, we explored the effect of socio-demographic factors on participants' language between two speaker races – Asian and white. Following the same methodology as the analysis of speaker accents, the ratings of recordings recorded by speakers of the same race will be summed up for each respondent. To break down the effect of speaker race, we implemented two ways of analysis below.

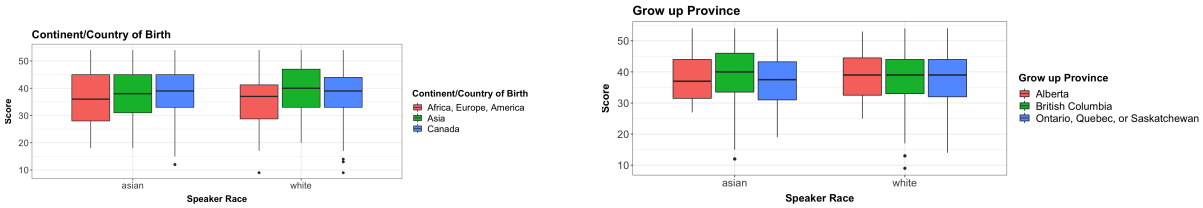
2.1. Comparison of Language Attitudes across Each Level of Categorical Factors within One Speaker Race Group.

For categorical socio-demographic variables, we started by visually exploring the distribution of evaluation scores with grouped side-by-side boxplots and examined whether various groups rated recordings by speakers of a certain race significantly differently using statistical tests. Plot (A) of Figure 13 shows that the median of scores given to Asian speakers by female participants is slightly higher than that of male participants, while no obvious difference was observed in the group of white speakers in terms of the median. For the birthplace of participants, those who were born in Canada reacted more positively to Asian speakers than those who were not. After further classifying the birthplaces by continents except for Canada, we can observe from the plot (A) of Figure 14 that the more favorable attitudes held by Asian participants stand out in response to white speakers, while the difference is less obvious in response to Asian speakers. In addition to birthplace, we also drilled down to the grow-up province for participants who were born in Canada. It is shown in plot (B) of Figure 14 that the patterns of the three groups for white speakers are very similar, while recordings by Asian speakers were more favored by participants who grew up in British Columbia than those who grew up in Alberta, Ontario, Quebec, or Saskatchewan.



(A) Gender (B) If born in Canada

FIGURE 13. Dispersion of scores by gender and country of birth across each speaker race



(A) Continent/Country of Birth (B) Grow up Province

FIGURE 14. Dispersion of scores by continent/country of birth and grow-up province across each speaker race

For the racial group of participants, plot (A) of Figure 15 displays that, although in general Asian participants tended to give higher ratings than non-Asian participants, the difference is more visible in the group of Asian speakers. Comparing single-race Asians and non-Asians in plot (B) of Figure 15, single-race Asian participants held far more positive attitudes towards Asian speakers than non-Asian participants, while the difference is minor in response to white speakers. If single-race Asians were replaced with mixed-race Asians, non-Asian participants gave higher ratings than mixed-race Asians in both groups, while the difference is bigger in response to Asian speakers than white speakers. Lastly, comparing single-race Asian and mixed-race Asian speakers in plot (D) of Figure 15, we can see that the extent to which single-race Asian participants held more positive attitudes than mixed-race Asian participants is larger.

Moreover, four other categorical variables were also examined. For living in French-speaking places, plot (A) of Figure 16 shows that the rating behaviors of the five groups are mostly similar, except that participants who have lived in other French-speaking places (neither France nor Quebec) held more positive attitudes towards Asian speakers than those who have never lived in French-speaking places, compared to their almost identical median ratings in response to white speakers. When it comes to the preferred variety of French to study, compared to Asian speakers, it is shown in plot (B) of Figure 16 that white speakers were given higher ratings by participants who preferred to learn French from Quebec than those who had no preference. As for the origin of French teachers, in plot (A) of Figure 17, three groups demonstrated alike distribution for white speakers, while participants who were taught by French teachers from neither France nor Quebec held less favorable attitudes towards Asian speakers compared to the other two groups. Lastly, recall that we have participants who spoke more than one first language, it is shown in plot (B) of Figure 17 that the patterns of two race groups are alike, and in general, participants who have more than one first language tended to give higher scores.

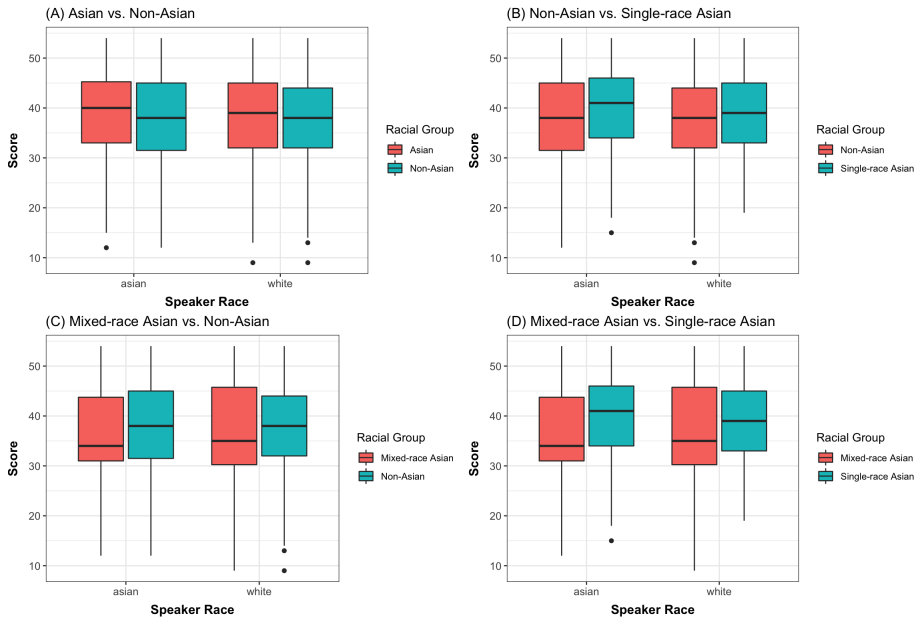
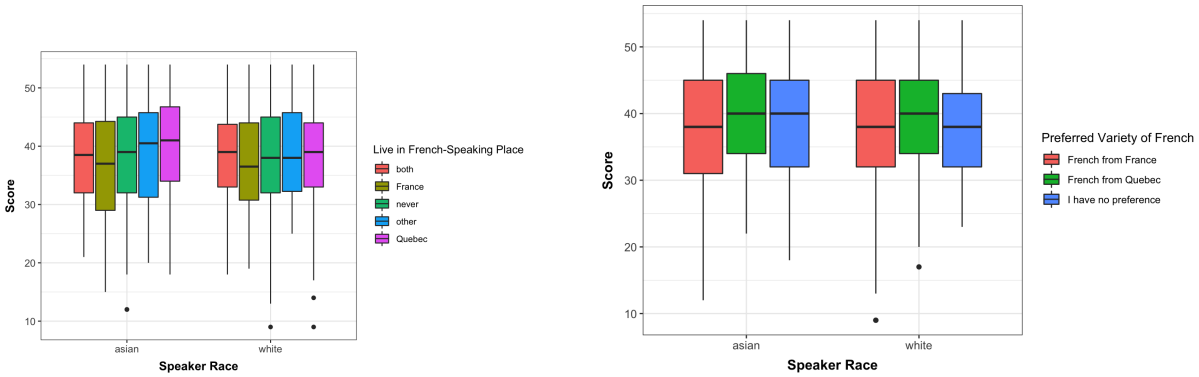


FIGURE 15. Dispersion of Rating Scores by racial groups of participants across each speaker race

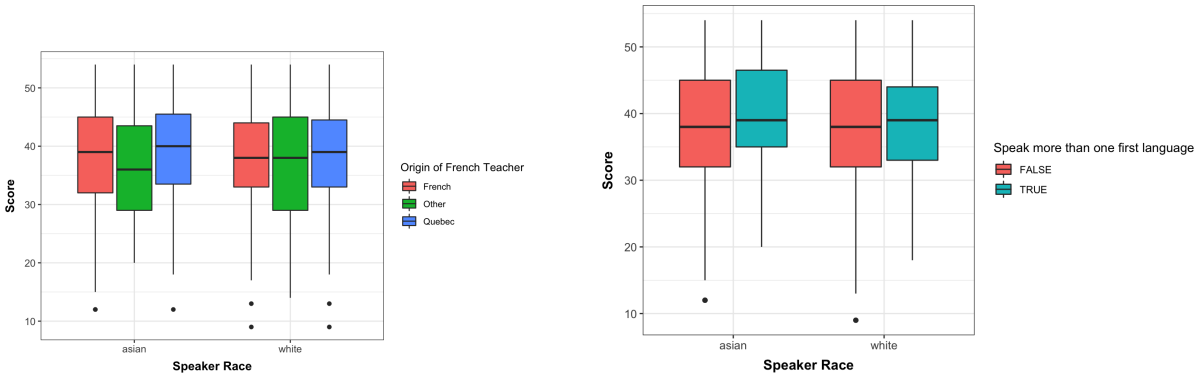


(A) Live in French-speaking Place

(B) Preferred Variety of French

FIGURE 16. Dispersion of rating scores by continent/country of birth across each speaker race

To ascertain our empirical findings above, Wilcox tests were performed on categorical variables with two levels, and Kruskal Wallis tests (denoted as "KW") were recruited for categorical variables with more than two levels. Table 14 summarizes the results of statistical tests within each speaker race, with p-values smaller than 0.05 in red. Starting with Asian speakers, results with statistical significance were presented when comparing single-race Asian participants to mixed-race Asian participants and non-Asian participants. In other words, single-race Asian participants held significantly more positive attitudes to Asian speakers than non-Asian participants and mixed-race Asian speakers. When the speaker race was identified as white, the statistical significance remains when comparing single-race Asian participants with non-Asian participants, but the difference is no longer significant between single-race Asian participants and mixed-race Asian participants. Other than racial groups of participants, statistical significance also appears in the analysis of the origin of French teachers for Asian speakers and continent/country of birth for white speakers. To interpret, participants who were taught by French teachers from neither France nor Quebec rated Asian



(A) Origin of French Teacher (B) Speak more than one first language

FIGURE 17. Dispersion of rating scores by origin of French teacher and first language across each speaker race

speakers significantly less positively than those who were taught by French teachers from Quebec (Dunn's test; $p = 0.045$). And participants born in Asia held significantly more favorable attitudes towards white speakers compared to those who were born in Africa, Europe, or America (excluding Canada).

Speaker Race	Grouping Variable	Test	Test Statistics	p-value
Asian	Gender	Wilcox	11645.5	0.691
	Continent/ Country of Birth	KW	2.36	0.307
	Born in Canada	Wilcox	17088	0.355
	Grow up Province	KW	1.756	0.416
	Racial Group (Asian vs. Non-Asian)	Wilcox	23548	0.093
	Racial Group (Single-race Asian vs. Non-Asian)	Wilcox (one-sided)	15883	0.014
	Racial Group (Single-race Asian vs. Mixed-race Asian)	Wilcox	2000	0.030
	Racial Group (Mixed-race Asian vs. Non-Asian	Wilcox	2881	0.344
	Live in French-speaking Place	KW	2.55	0.636
	Preferred Variety of French	KW	1.03	0.599
	Origin of French Teacher	KW	6.08	0.048
	Speak more than one first language	Wilcox	1.38	0.241
White	Gender	Wilcox	11378.5	0.485
	Continent/ Country of Birth	KW	7.67	0.022
	Born in Canada	Wilcox	17698	0.703
	Grow up Province	KW	0.12	0.941
	Racial Group (Asian vs. Non-Asian)	Wilcox	23415.5	0.117
	Racial Group (Single-race Asian vs. Non-Asian)	Wilcox (one-sided)	16233	0.030
	Racial Group (Single-race Asian vs. Mixed-race Asian)	Wilcox	2204	0.237
	Racial Group (Mixed-race Asian vs. Non-Asian	Wilcox	3098.5	0.729
	Live in French-speaking Place	KW	2.06	0.725
	Preferred Variety of French	KW	1.37	0.504
	Origin of French Teacher	KW	2.45	0.287
	Speak more than one first language	Wilcox	0.36	0.548

TABLE 14. Results of statistical tests on categorical grouping variable with one speaker race group

2.2. **Correlation Analysis of Socio-demographic Numeric Variables on A Certain Race.** For numeric variables, we examined the correlations with two-tailed tests of significance to explore the relationship between speaker race and language attitudes. Using the same methodology as the analysis of numeric variables on speaker accent, the result statistics were summarized in Table 15, in which no significant difference was detected.

Variable	Speaker Race	Correlation Type	Rho	p-value
Year(s) of Speaking French (Continous)	Asian	Pearson	-0.008	0.873
	White	Pearson	-0.028	0.584
Year(s) of Speaking French (Interval)	Asian	Spearman	0.075	0.164
	White	Spearman	-0.014	0.799
Month(s) of Living in French -speaking Places (Interval)	Asian	Spearman	-0.016	0.769
	White	Spearman	0.028	0.617
Number of Spoken Language	Asian	Spearman	0.617	0.226
	White	Spearman	-0.025	0.630
Age	Asian	Pearson	0.019	0.608
	White	Pearson	0.012	0.811

TABLE 15. Result of Correlation Analysis on Numeric Socio-demographic Variables across Race

2.3. **Comparison of Language Attitudes between Two Speaker Race Groups within Each Level of categorical variables.** To examine the effect of speaker race from a different perspective, this section investigated whether participants from a certain group held different attitudes towards speakers of dichotomous race. For each level of a categorical variable, we calculated the mean value of evaluation scores (denoted as μ_{Asian} amd μ_{White} and performed two-sample tests to check if participants gave significantly different scores. With results summarized in Table 16 that the mean values by speaker races are extremely close at each level, and correspondingly, the large p-values in the following statistical tests reveal that no statistical significance exists.

	μ_{Asian}	μ_{White}	**Test Statistic**	**p-value**
Gender				
Female	38.09	37.55	52882.0	0.472
Male	38.80	38.88	2872.5	0.823
Continent/Country of Birth				
Africa	33.13	32.73	119.0	0.803
America (Canada excluded)	36.48	34.24	349.0	0.484
Asia	38.66	40.05	1950.0	0.450
Canada	38.62	38.06	43704.5	0.412
Europe	38.90	38.10	213.5	0.725
Born in Canada				
True	38.62	38.06	43704.5	0.412
False	37.60	37.70	7733.0	0.890
Grow up Province				
Alberta	38.33	38.31	1532.0	0.909
British Columbia	38.97	38.13	20218.5	0.278
Ontario	39.10	37.95	213.0	0.735
Quebec	35.50	36.70	42.0	0.570
Saskatchewan	35.60	36.80	41.5	0.545
Year(s) of Learning French				
0-5	38.11	37.58	8183.0	0.517
5-10	38.71	38.75	5017.5	0.967
10-15	38.45	38.22	8620.5	0.779
15+	35.25	32.30	232.5	0.386
Racial Group				
Asian	39.63	39.11	15110.0	0.466
Latio or Black	33.35	33.40	200.0	1.000
Mixed	36.42	36.96	957.0	0.657
White	38.09	37.61	16714.5	0.602
Mixed Racial Group				
Mixed-race Asian	36.03	36.67	420.0	0.662
Single-race Asian	39.63	39.11	15110.0	0.466
Non-Asian	37.59	37.21	23669.5	0.666
Speak more than one first language				
True	39.47	38.61	2992.5	0.499
False	38.06	38.61	58814.0	0.692
Live in French-speaking Place				
France	37.21	36.89	3296.0	0.744
Quebec	39.42	38.31	4322.0	0.437
Both	38.07	38.24	2440.5	0.970
Other	38.93	39.20	445.0	0.947
Never	38.22	37.91	10711.0	0.781
Preferred Variety of French				
French from France	37.71	37.58	29072.0	0.858
French from France	39.18	39.27	1492.0	0.905
I have no preference	39.27	38.18	5865.5	0.423
Origin of French Teacher				
French	38.46	37.88	14219	0.484
Quebec	39.14	38.63	2722	0.735
Other	36.07	36.51	15932	0.513

TABLE 16. Mean of scores of each level by speaker race and results of Wilcox tests