Arrêt, Age Estimates, and ANOVA

A quantitative assessment of stop sign age and regional language in Montreal

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Abstract: The research concerns the relationship between language and the age of stop signs per municipality. Data on wear patterns of four types of stop signs were collected over seven municipalities in Montreal. It is assumed that wear can serve as an indicator for sign age. Average wear values is tabulated across the seven zones. Combinations of ANOVA and regression analyses reveal that average wear differs across both sign types and municipalities. Average wear is correlated with two linguistic attributes drawn from the Canadian census 1) mother tongue 2) major languages known. Regression analysis finds only one significant result between bilingual mother tongue and average wear values, but fails to account for the relationship. Suggestions for future research are presented.

Introduction

Questions of identity and language have characterized the political and social spheres of Quebec for generations. The longstanding tensions between French and English speakers have defined the cultural boundaries that any local has surely experienced in his/her daily life. Add to this the increasing number immigrants from many parts of the globe in the last half century, and we begin to see how some of the conflicts between linguistic groups have shaped the unique cultures that make up Quebec. As the power relationship between languages continuously shifts over time, one can only ask to what degree is the material culture of Quebecers affected. Archaeology is the ideal field for studying such a question, due to its central concern with the material past. One element of material culture that has received little attention is the STOP sign. Or rather in Quebec, the ARRÊT sign.

Empirical evidence amassed from Montreal residents' observations prior to this research has initially shown variability in the distribution of STOP and ARRÊT signs across boroughs and municipalities on the island. The *Stop: Toutes Directions* project is concerned with studying these distributions and identifying their sources. Ultimately, the analysis of stop signs in Montreal may allow us to improve our understanding of what influences political decisions at the municipal level; that is, who decides what language stop signs should be, and why?

This particular study is interested in the language of signs and of the people that surround them. The central question to this research is: are policies of traffic signage based on the linguistic composition of residents? More specifically, this research seeks answer, can we estimate the age of different stop signs, and do the differences in age correlate with the languages spoken per municipality? Based on the assumption that wear patterns can serve as a rough indicator for a stop sign's relative age, it is my hypothesis that areas with a primarily French speaking population will contain newer ARRÊT signs, while areas with larger English populations will contain newer STOP signs. The present research report serves to outline the basic methodology, results, and interpretations regarding the age of stop signs as they relate to the linguistic distribution of some municipalities in Montreal. This project serves as a case study for issues in creating relative chronologies, as well as reconciling selected cultural phenomena with the material record.

Methods

A major part of the project was data collection. Twenty-seven McGill University undergraduate students along with archaeology professor Dr. Stephen Chrisomalis spent a number of weeks compiling a large amount of data on stop signs in the island of Montreal. The areas of interest were delineated into 36 zones (arbitrarily assigned by roughly equal geographic extant). However, limited time only allowed the data collection teams to complete 31 of 36 zones (zones 1 – 29; 31), an impressive feat regardless. The attributes of interest included: zone, intersection, position of within the intersection, sign language, additional signage, presence of luminescence, degree of damage, and wear and vandalism on the face and back. Four of the attributes collected were done so according to an ordinal scale from 0 to 3, as defined by the research team (damage, wear, vandalism front, vandalism back). Photos were also collected for each sign. In total, 2817 stop signs were identified across seven municipalities (**Figure 1**). For the purpose of this research, Côte-des-Neiges is considered a separate municipality from Notre-Dame-de-Grâce, due to geographic extant and linguistic differences.

Figure 1: Municipal zones where sign data was collected on the Island of Montreal.
Yellow = completed zones, Orange = Montreal-Ouest, originally assigned but never completed.

Following the creation of the database, the first step was to assess the age of the four possible sign categories (ARRÊT, STOP, ARRÊT/STOP, STOP/ARRÊT). It was decided that wear would serve as the best indicator for age, since neither vandalism nor damage reflect natural degradation as close as wear can. Wear was coded by research teams according to the following legend:

0: None/Minimal: Clear, consistent unfaded red colour
1: Low: Slight fading / inconsistency visible from several metres distance
2: Mid: Significantly faded towards orange over much of surface
3: High: Extremely faded (pinkish/light orange)

However, it should be noted that this assumption is certainly not without flaws. A vandalized stop sign that is cleaned by city officials may result in fading, giving the impression that the sign is much older than it really is. Although possible, my limited knowledge of public works employees and municipal budget management leads me to assume that stop signs are more often replaced in such cases (or even ignored), thereby avoiding extra cleaning costs and added labour. In utter sincerity, it remains to be shown whether vandalized signs are more likely to be cleaned or replaced, leaving wear as the closest approximation of sign age until a more accurate method is identified.

Using census tract profile data from the Statistics Canada website, each stop sign was allotted to a specific CT according to the location of the intersection. Consequently, each CT was attributed to its respective municipal territory, thereby segregating all stop signs into one of seven possible municipalities:

- Côte-des-Neiges
- Côte-St.Luc
- Hampstead
- Notre-Dame-de-Grace
- Le Plateau Mont-Royal
- Ville-Marie
- Westmount

This allowed me to find the average total wear per municipality by adding all the wear values and dividing by the total number of stop entries per municipality. The resulting values were then tested for significance through a single factor Analysis of Variance test (ANOVA). This test was used to see whether the variation in wear *between* municipalities was larger than the wear variation *within* municipalities. The next step was to determine the average wear *per sign category* for each municipality. This was done much like the previous step; only in this case, all wear values per sign category were summed and then divided by the total for each respective category. In addition to the average sign values, the percentage that each sign type occupies within the zone was computed. Regression and single factor ANOVA tests were also performed for three of the four sign categories across the municipalities (STOP/ARRÊT signs were excluded because of small sample). Finally, the total average wear per sign type was computed, irrespective of municipality.

Language data was more readily available, thanks to the latest census data on the Statistics Canada website. Credit must be given to Claudine Gravel Miguel, who graciously shared the linguistic data that she spent hours searching for, recording, and tabulating for her own research. This linguistic data included percentage of mother tongue spoken per municipality (English, French, English & French, Other), as well as percentage of knowledge of major language per municipality (English, French, English & French, Neither).

Finally, these municipal language percentages were correlated with the average sign wear data calculated in previous steps. To test for significance, Pearson's R coefficients and related linear regression lines were computed for each relationship.

Results

The results are displayed through a number of informative tables and graphs, beginning with **Table 1**. This table shows the Average Total Wear of all stop signs per municipality. We may note that the range is 0.331055, the maximum is found in Côte-St.Luc at 0.713115, and the lowest average wear is in Ville-Marie at 0.38206. **Table 2** displays that with a single factor ANOVA test performed on these values, the resulting F-statistic of 10.96 greatly exceeds the F-critical of 2.10. The P is equal to 4.25E-12 (an extremely low chance of a random Type-1 error). Therefore, based on the ANOVA test with an alpha = .05, we reject the null hypothesis which states that the sample means of each group are similar. In other words, average total wear among signs between municipalities differs to statistically significant levels.

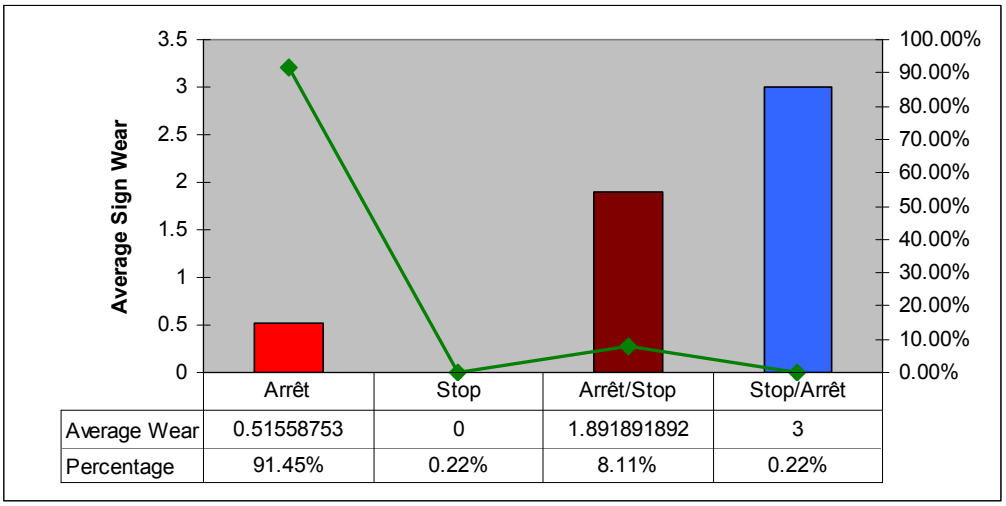
Municipality	Average Total Wear
Côtes-des-Neiges	0.630197
Côte-St.Luc	0.713115
Hampstead	0.554217
Notre-Dame-de-Grace	0.641479
Le Plateau Mont-Royal	0.515982
Ville-Marie	0.38206
Westmount	0.384793

Table 1: Average Total Wear values per municipality

Groups	*Count*	*Sum*	*Average*	*Variance*		
CDN	457	288	0.630197	0.694086		
CSL	366	261	0.713115	0.796923		
HAM	332	184	0.554217	0.700979		
NDG	622	399	0.641479	0.594283		
PLAT	219	113	0.515982	0.379331		
VM	300	115	0.383333	0.411093		
WEST	434	167	0.384793	0.375842		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	38.08218	6	6.347031	**10.96075**	**4.25E-12**	**2.101911**
Within Groups	1576.805	2723	0.579069			
Total	1614.887	2729				

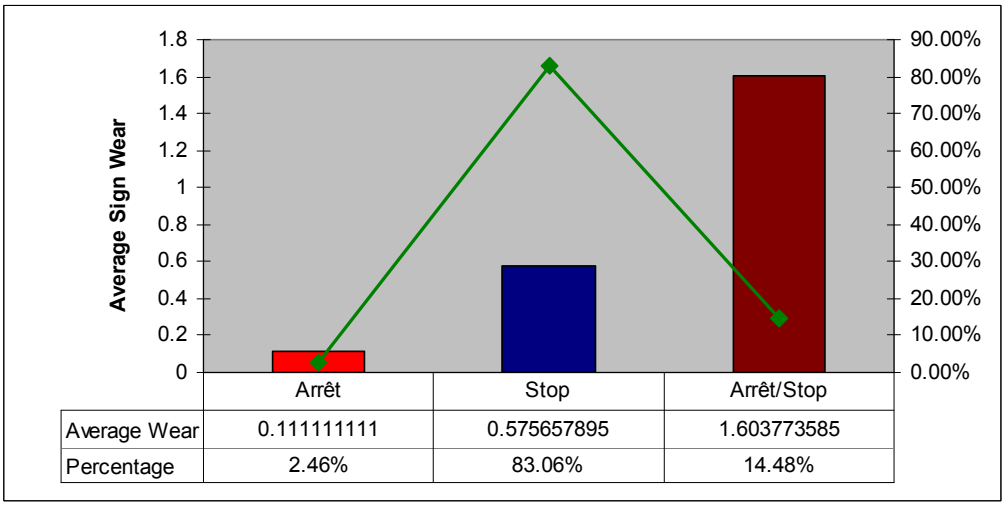
Table 2: ANOVA - Single Factor test for average sign wear over seven municipalities.

The proceeding graphs (**Figure 2–8**) illustrate the proportion of stop sign type per Municipality, as well as the average sign wear for each type. The bars represent the average wear (left y-axis), while the line segment represents the percentage (right y-axis). Based on these graphs, we see that in municipalities where ARRÊT/STOP signs are present (all except Le Plateau), they are on average the most worn. Of the five municipalities that contain STOP signs, four contain STOPs that have more wear than ARRÊTs (Côte-des-Neiges, Hampstead, Ville-Marie, Westmount). Côte-St.Luc is the only sector that has STOP signs more worn than ARRÊTs. However, we must also factor in proportions. Côte-des-Neiges contains just one STOP (18-6-a), which is on private property, while Ville-Marie has only 3% STOP signs. The two remaining municipalities – Hampstead and Westmount – both contain high proportions of STOP signs (75% and 98% respectively). Along with Côte-St.Luc, they are the only municipalities that have over 50% of their stop signs in English. Le Plateau Mont-Royal is the only municipality that contains 100% ARRÊTs, while Côte-des-Neiges, NDG, and Ville-Marie all have similarly high proportions of ARRÊTs with over 90%. It appears safe to conclude that since ARRÊT/STOP signs always exceed other signs in average wear value (except for one STOP/ARRÊT in Côte-des-Neiges), we can assume that they are the oldest signs in our study zones. However, since there is such a small sample of STOP/ARRÊT signs in the entire region, we can only hypothesize that they are in fact the oldest of all sign types, and have consequently been replaced where possible.



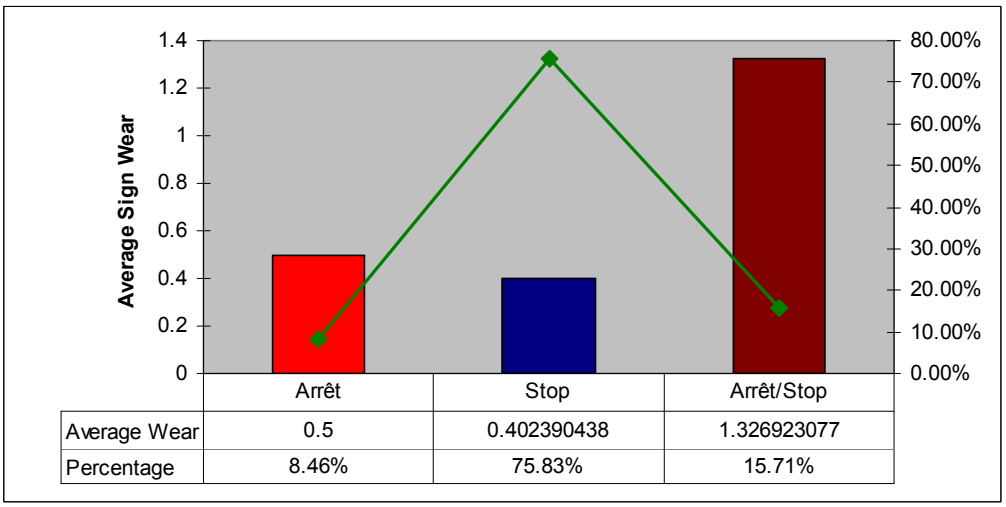
	Arrêt	Stop	Arrêt/Stop	Stop/Arrêt
Average Wear	0.51558753	0	1.891891892	3
Percentage	91.45%	0.22%	8.11%	0.22%

Figure 2: Côte-des-Neiges – Average Wear per Sign Type and Proportion of Municipality



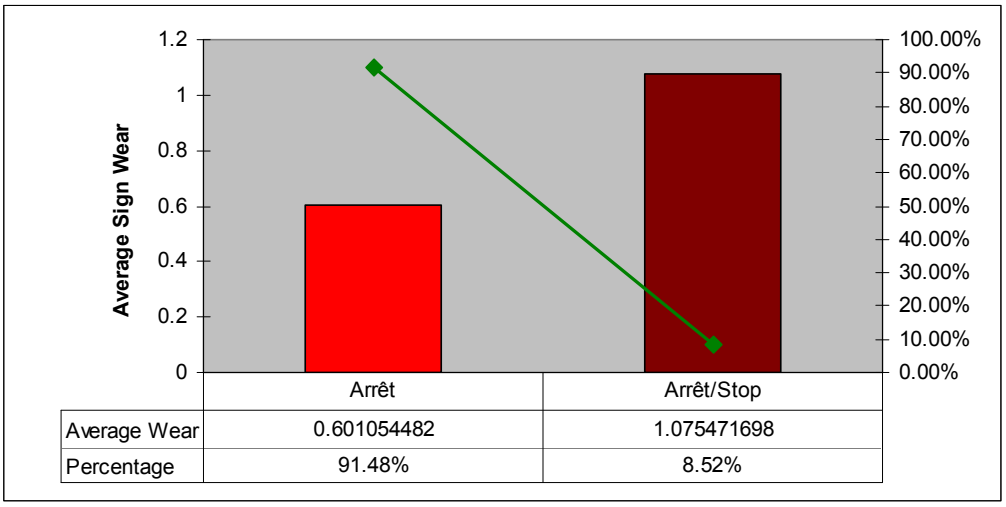
	Arrêt	Stop	Arrêt/Stop
Average Wear	0.111111111	0.575657895	1.603773585
Percentage	2.46%	83.06%	14.48%

Figure 3: Côte-St.Luc – Average Wear per Sign Type and Proportion of Municipality



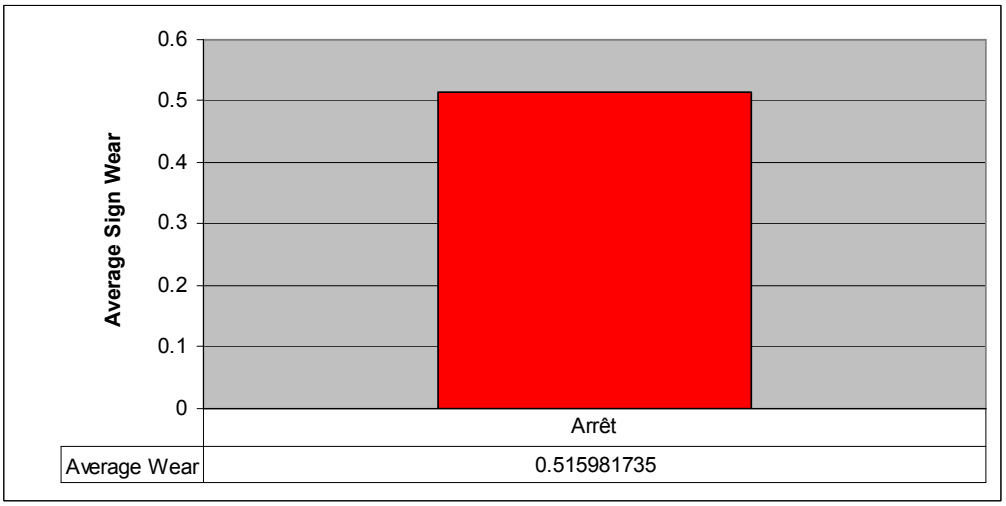
	Arrêt	Stop	Arrêt/Stop
Average Wear	0.5	0.402390438	1.326923077
Percentage	8.46%	75.83%	15.71%

Figure 4: Hampstead – Average Wear per Sign Type and Proportion of Municipality



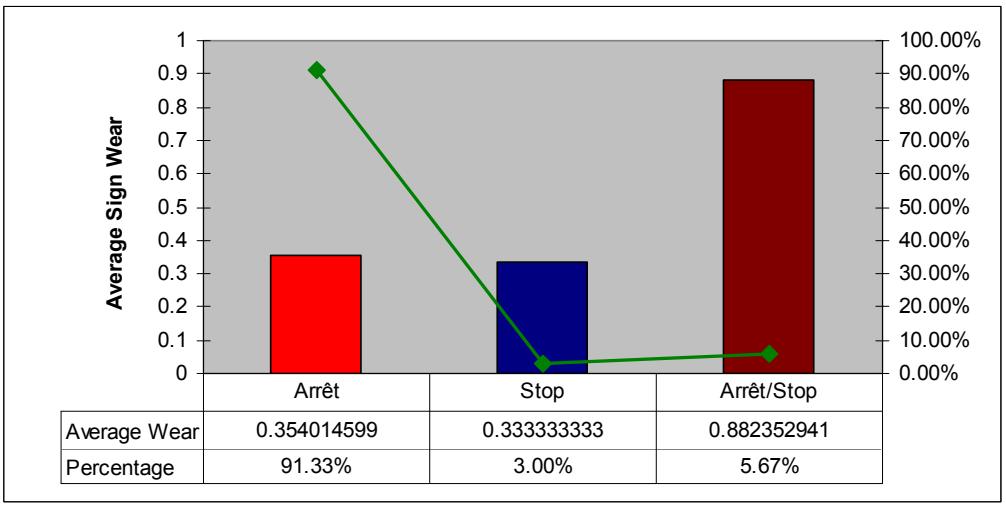
	Arrêt	Arrêt/Stop
Average Wear	0.601054482	1.075471698
Percentage	91.48%	8.52%

Figure 5: Notre-Dame-de-Grâce – Average Wear per Sign Type and Proportion of Municipality



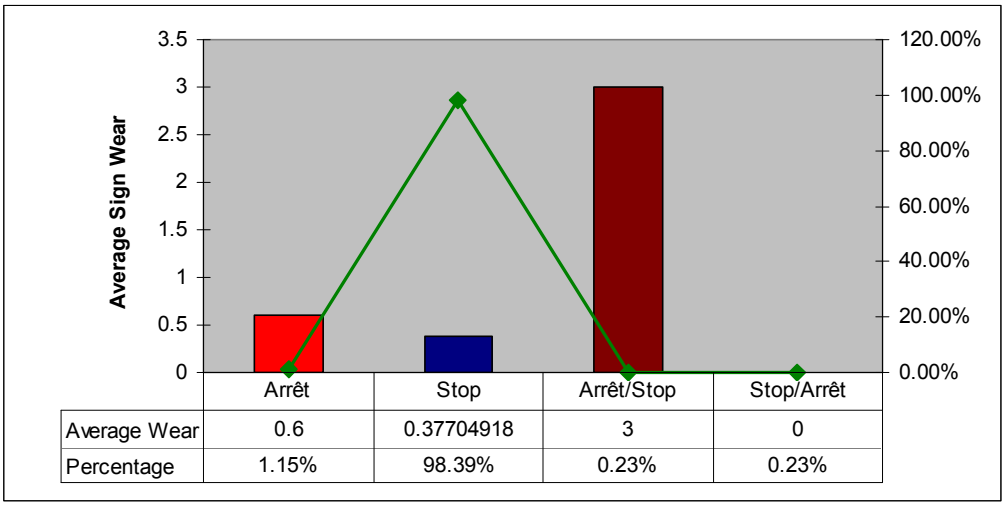
	Arrêt
Average Wear	0.515981735

Figure 6: Plateau Mont-Royal – Average Wear per Sign Type and Proportion of Municipality



	Arrêt	Stop	Arrêt/Stop
Average Wear	0.354014599	0.333333333	0.882352941
Percentage	91.33%	3.00%	5.67%

Figure 7: Ville-Marie – Average Wear per Sign Type and Proportion of Municipality



	Arrêt	Stop	Arrêt/Stop	Stop/Arrêt
Average Wear	0.6	0.37704918	3	0
Percentage	1.15%	98.39%	0.23%	0.23%

Figure 8: Westmount – Average Wear per Sign Type and Proportion of Municipality

There are fewer chronological certainties about ARRÊT and STOP signs based on the preceding graphs. Three regression analyses were performed on the proportion of sign type and sign wear for the three major sign types. **Figure 9**, **10** and **11** display the results. Interestingly, there is a significant correlation between STOP sign wear and % per Municipality (**Figure 10**), with a Pearson's R2 equal to 0.5237, a significant value. The other two regressions display insignificant R2 coefficients, and therefore show little or no correlation.

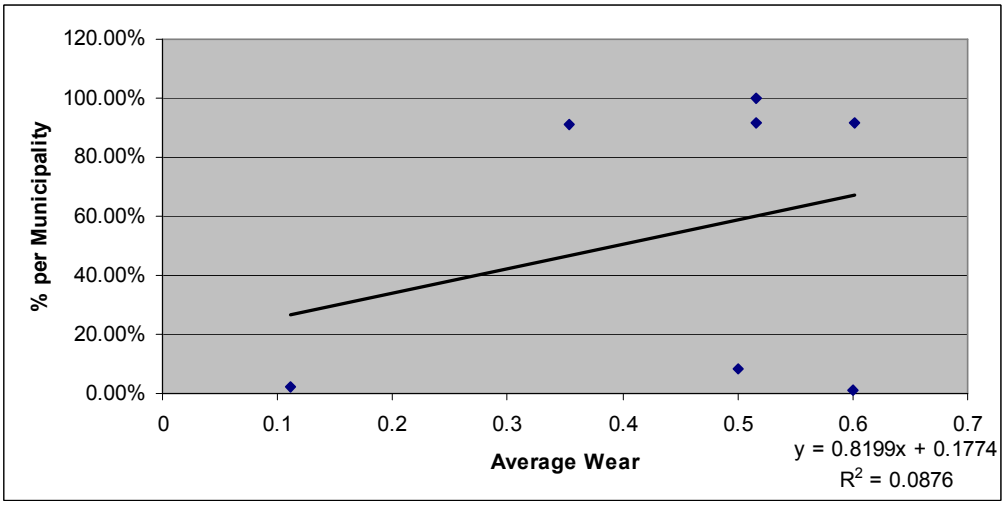


Figure 9: Correlation between ARRÊT sign wear and % per Municipality with calculated regression (n=7)

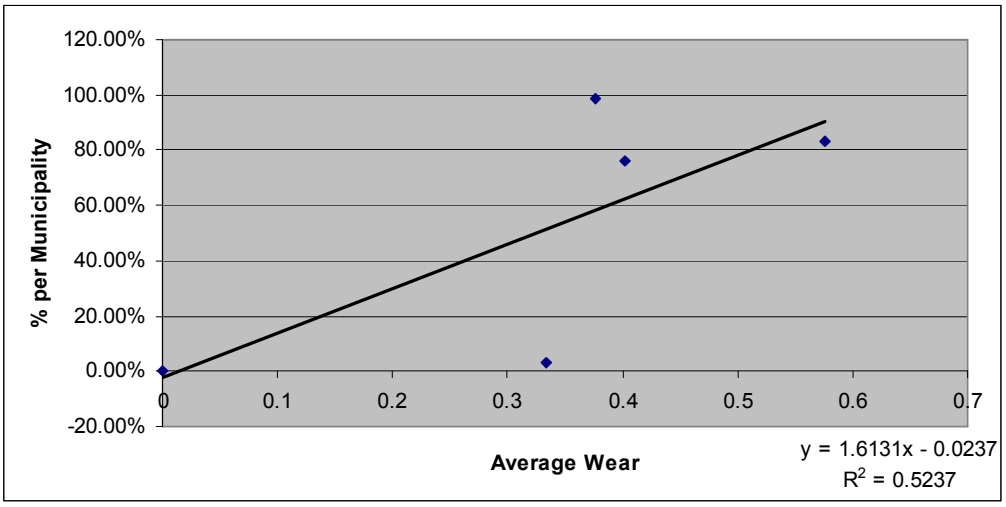


Figure 10: Correlation between STOP sign wear and % per Municipality with calculated regression (n=5)

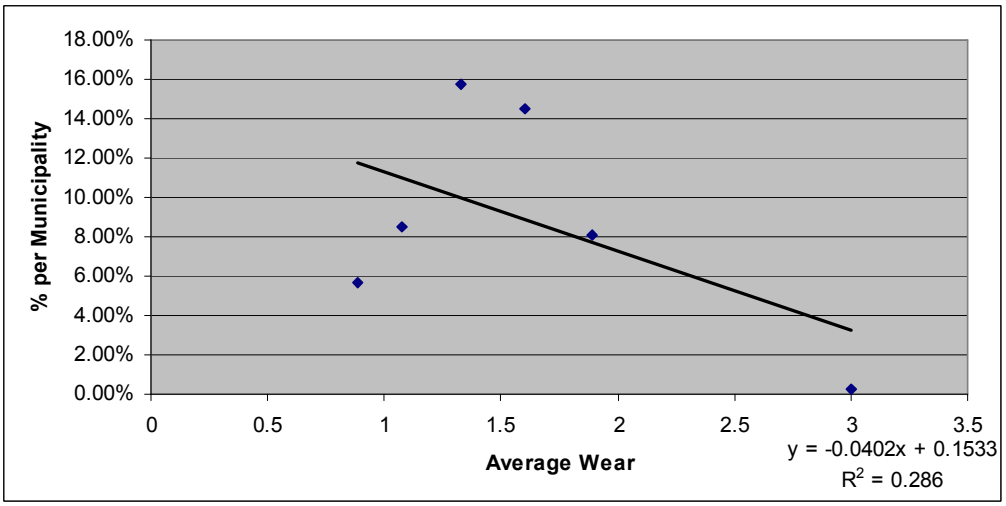


Figure 11: Correlation between ARRÊT/STOP sign wear and % per Municipality with calculated regression (n=6)

The resulting sign wear values per Municipality were assessed for significance using the single factor ANOVA test. The results are displayed in **Table 3**, **4** and **5**. In all three tests (ARRÊT, STOP, ARRÊT/STOP), the F-statistics were found to be greater than the F-critical, and the p-values found to be far below 1%. This means that based on the ANOVA tests with an alpha = .05, we reject the null hypothesis which states that the sample means of each sign type per municipality are similar.

Groups	*Count*	*Sum*	*Average*	*Variance*		
CDN	417	215	0.515588	0.529204		
CSL	9	1	0.111111	0.111111		
HAM	28	14	0.5	0.333333		
NDG	569	342	0.601054	0.511337		
PLAT	219	113	0.515982	0.379331		
VM	274	97	0.354015	0.361394		
WEST	5	3	0.6	0.8		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	12.82377	6	2.137296	**4.589674**	**0.000126**	**2.10456**
Within Groups	705.0316	1514	0.465675			
Total	717.8554	1520				

Table 3: ANOVA - single factor test for ARRÊT signs across seven municipalities.

Groups	*Count*	*Sum*	*Average*	*Variance*		
CSL	304	175	0.575658	0.62792		
HAM	252	101	0.400794	0.543904		
VM	9	3	0.333333	0.25		
WEST	427	161	0.377049	0.3575		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	7.763918	3	2.587973	**5.315009**	**0.001231**	**2.613912**
Within Groups	481.0748	988	0.486918			
Total	488.8387	991				

Table 4: ANOVA - single factor test for STOP signs across four municipalities.

Groups	*Count*	*Sum*	*Average*	*Variance*		
CDN	37	70	1.891892	0.71021		
CSL	53	85	1.603774	0.936139		
HAM	52	69	1.326923	0.969457		
NDG	53	57	1.075472	1.301887		
VM	17	15	0.882353	1.110294		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	21.56504	4	5.39126	**5.33579**	**0.000414**	**2.415267**
Within Groups	209.1519	207	1.010396			
Total	230.717	211				

Table 5: ANOVA - single factor for ARRÊT/STOP signs across five municipalities.

Figure 12 shows the distribution of average wear values for all three major stop signs types within the study area. ARRÊT/STOP signs are clearly the most worn overall, but again, it is harder distinguish ARRÊT from STOP signs. Despite a slight difference in average wear, we do not know if the difference is statistically significant. In order test this, a z-test was run between the two samples, and the results are displayed in **Table 6**. With a two-tailed z-test, we get a Z-statistic of 2.57 that exceeds the Z-critical of 1.96, with a P = 0.01. Based on the z-test with an alpha = .05, we reject the null hypothesis which states that the sample mean of wear among ARRÊTs is equal to the sample mean of wear among STOP signs.

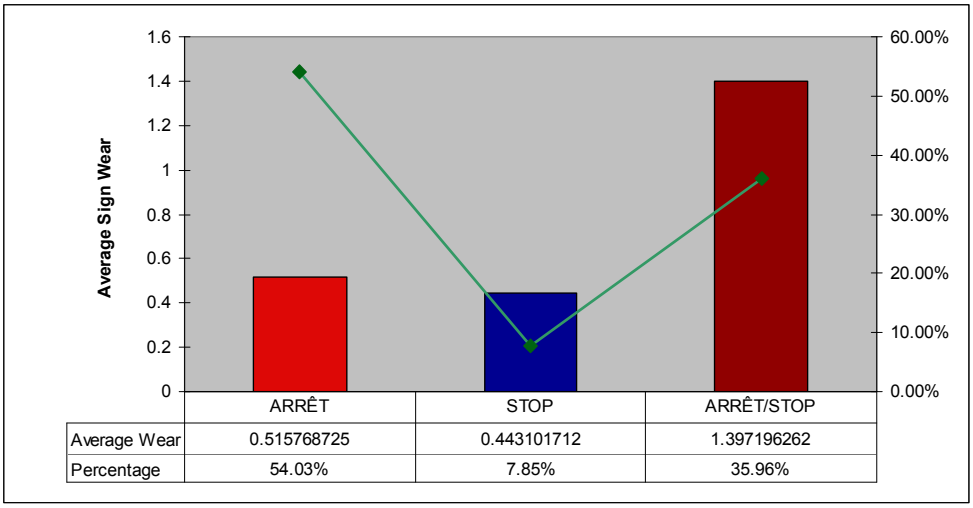


Figure 12: Average Wear and % of Sign Type among all Municipalities

	ARRÊT	*STOP*
Mean	0.516107824	0.443101712
Known Variance	0.472273262	0.492979079
Observations	1521	993
Hypothesized Mean Difference	0	
Z	**2.570006795**	
P(Z<=z) one-tail	0.005084826	
Z Critical one-tail	1.644853627	
P(Z<=z) two-tail	**0.010169652**	
Z Critical two-tail	**1.959963985**	

Table 6: z-Test for Two Sample for Means

The language data was compiled into **Table 7** and **8**, and **Figure 13** and **14**. Table 7 and Figure 13 display the distribution of mother tongue reported by Canadian citizens within the seven defined municipalities. Table 8 and Figure 14 show the distribution of reported major languages known by Canadian citizens per municipality. Of note, Hampstead and Westmount have the highest percentages of English as mother tongue, while also showing the highest percentages regarding knowledge of both major languages. The lowest proportions of English as mother tongue are reported from Cote-des-Neiges and Le Plateau, which also appear to have some of the lowest percentages regarding knowledge of both English and French. CSL and Hampstead have the lowest proportion of French mother tongue respondants, while the highest concentration of respondents with French as mother tongue come from Le Plateau. Although CSL and Hampstead have a mid to high percentage of reported bilinguals, Le Plateau Mont-Royal has a relatively low percentage of people who claim to have knowledge of both major languages.

	English	French	French & English	Other
CDN	22.85	21.10	0.82	55.21
CSL	44.66	15.66	1.07	38.63
Ham	60.90	13.94	0.64	24.59
NDG	38.39	24.11	1.27	36.24
Plat	21.62	47.37	0.99	29.99
VM	27.27	24.00	3.90	44.78
West	54.13	21.31	1.54	23.00

Table 7: Proportion of mother tongues across seven municipalities.

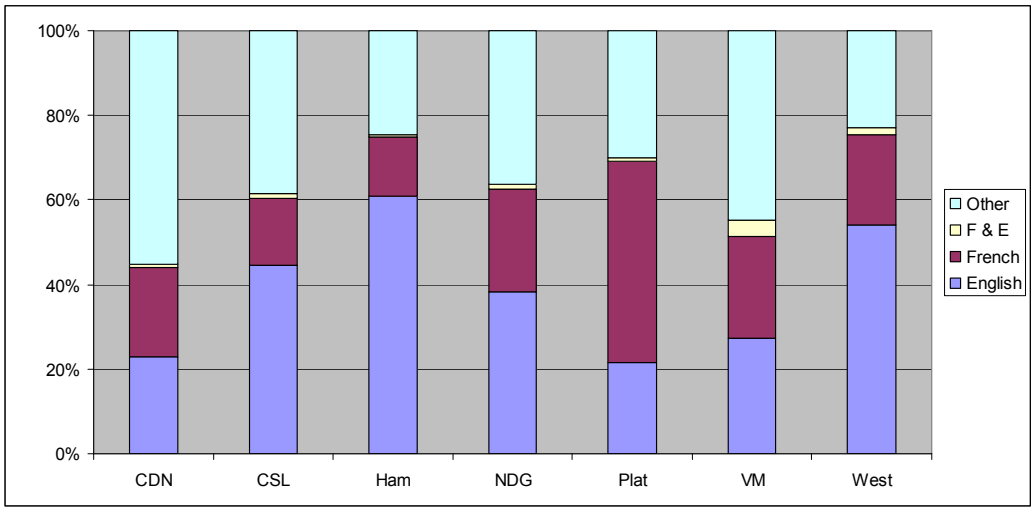


Figure 13: Relative distribution of mother tongues across seven municipalities

	English	French	French & English	Neither
CÔTE-DES-NEIGES	30.87	12.70	52.50	3.90
CSL	28.33	4.76	65.27	1.62
Ham	21.37	3.07	74.91	0.71
NDG	24.14	9.32	63.85	2.63
Plat	12.37	22.85	62.53	2.25
VM	29.19	7.98	60.82	2.70
West	18.73	3.76	76.75	0.73

Table 8: Proportion of known major languages across seven municipalities**.**

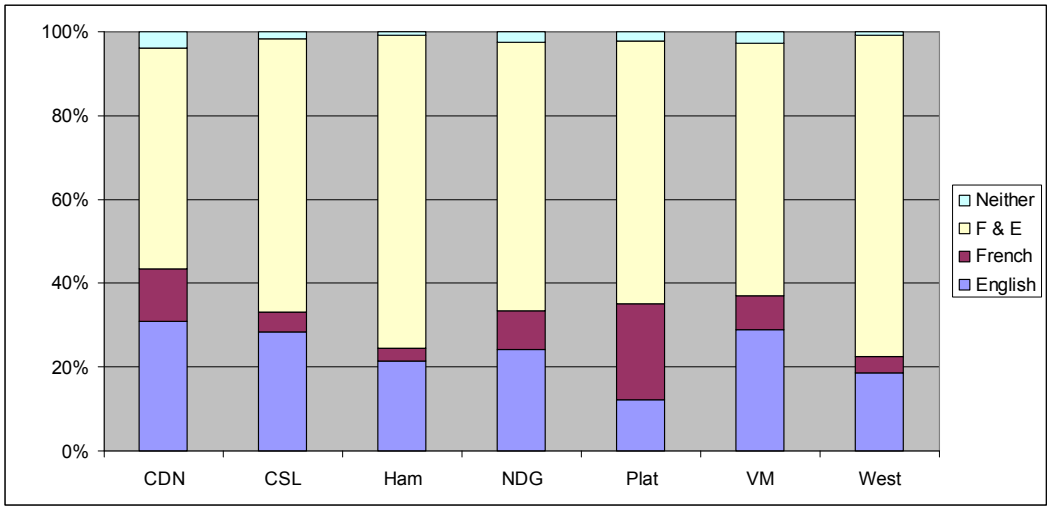


Figure 14: Relative distribution of known major languages across seven municipalities.

The correlations between mother tongue and average sign wear, as well as those of knowledge of major language and average sign wear are summarized in **Table 9**. Of the eight resulting coefficients, only one proves to be somewhat significant, that is % of English & French as mother tongue paired against average sign wear, with an R2 = 0.4026 and an equation in the form of y = -5.5261x – 4.4809 (**Appendix A**).

Language Attribute	Sign Attribute	Pearson's R2 coefficient
% of English (Mother Tongue)	Average Sign Wear	**0.0007**
% of French (Mother Tongue)	Average Sign Wear	**0.0547**
% of English & French (Mother Tongue)	**Average Sign Wear**	**0.4026**
% Other (Mother Tongue)	Average Sign Wear	**0.1049**
% of Knowledge of English	Average Sign Wear	**0.1062**
% of Knowledge of French	Average Sign Wear	**0.0012**
% of Knowledge of French & English	Average Sign Wear	**0.1168**
% of Knowledge of No Major Language	Average Sign Wear	**0.0683**

Table 9: Pearson's coefficient values for linguistic and wear correlations

Discussion

The research project began with an examination of isolating differences in wear. As a general observation, we may note that stop sign type correlates with different degrees of wear. ARRÊT/STOP signs are clearly the most worn in every region where they're present (**Figure 2–5**; **7–8**), and if we exclude the two STOP/ARRÊTs, overall as well (**Figure 12**). The small sample size of STOP/ARRÊT signs may indicate that they were replaced (making them the oldest sign type), or that they were never popular traffic signs to begin with. Nonetheless, if we work under that assumption that increased wear = older, than we may safely conclude that the average ARRÊT/STOP sign type is relatively older than average ARRÊT or STOP. As for the average difference in wear between ARRÊTs and STOPs, the z-test in **Table 6** reveals that there is indeed a significant difference between the average wear of each sign. With an overall average wear value of 0.44, STOP signs are generally less worn than ARRÊTs at 0.52. Does this mean that they are necessarily older? Based on the results of the ANOVA tests in **Tables 3, 4** and **5**, we know that the answer is no, since variability exists *within* sign types across municipalities. In other words,

there are age differences *within* similar language signs, as well as *between* similar language signs. The results do not put us in a position to distinguish which type of variability is more significant. This makes relative dating increasingly problematic and absolute dating nearly impossible.

There was an interesting result once the proportion of a sign type was regressed against the sign's average wear. **Figure 10** showed an R2 coefficient of 0.5327, a significant correlation. This means that under the assumption of more wear = older, municipalities with more STOP signs are likely the ones that have had them there for longer periods of time. In other words, certain areas with a large proportion of STOP signs like Côte-St.Luc, Hampstead and Westmount have, at present, chosen not to replace existing STOPs in favour of the provincially regulated ARRÊT sign. Contrary to the hypothesis, it does not seem to be an issue of adding new English signs, but rather, leaving up old STOP signs.

The central concern of this study is on the relationship between the age of signs and language (**Table 9**). The results neither confirm nor deny the hypothesis, since regions with French and English as the primary languages do not correlate with any average wear values. The only strong correlation, percentage of both English & French as mother tongue paired against average sign wear (0.4026), does merit an explanation. At present, the author can find no meaningful way to explain why an increase in wear value (older signs) correlates with areas that have smaller proportions of French & English mother tongue individuals. Do less bilingual parents reside in areas that have older stop signs? As one hypothetical explanation, let us assume that older stop signs correlate with areas with longer residential histories. Let us also assume that bilingual couples were less common 40 – 50 years ago. Under these two hefty assumptions, one could imagine a situation where there has been a rise in bilingual couples over the last half a century in Montreal, who have chosen to reside in newer residential areas. This would, to some degree, reflect the inverse relationship of increased sign wear with less bilingual mother tongue individuals. Now, before I am accused of unruly academic bullshit, consider that this situation was only a suggestion. Further tests (and quite a few assumptions for that matter) would need to be rigorously tested if any truth were to come from this.

In this author's humble opinion, we cannot explain the observed differential wear based on these two linguistic attributes, and it is clear that there are more factors at play than simply referring to mother tongue and knowledge of major language. One attribute this research should have considered – but did not due to time constraints – was language spoken in the home. This may more accurately reflect the linguistic landscape of particular Montreal municipalities, since it represents the contemporary language spoken by the people within each zone. Mother tongue really just reflects the first language someone learned, and does not account for those people who lost the language (i.e. 3rd generation immigrants). In addition, knowledge of a language does not necessarily equate with being able to speak the language. It should be evident that there are a sufficient number of cautions to be aware of if we consider language as part of the analysis.

Future Research and Conclusions

This project was ambitious, in that it sought to find significant linguistic explanations to the distribution of stop signs in Montreal. This is inherently problematic; first, because what little correlations were found in this analysis do not necessarily translate to causal explanations, and second, because this research has certainly neglected a myriad of other possible factors. Although the former has already been addressed in the discussion regarding the relationship between French & English mother tongue and sign wear, it must be stressed that correlations do not imply causation. Good research must always consider that there may be multiple ways to explain the results, and that one approach is not necessarily the best one. With regards to other factors, there was only so much that could be examined within the time constraints of this project. An inconclusive, yet simpler model serves as an excellent first step for those that wish to continue studying the distribution of stop signs in Montreal. Some additional factors that may be included for stronger research include the differences in wear for stop signs located on private versus municipal property, the attribute of luminescence in helping to identify age, the inclusion of language

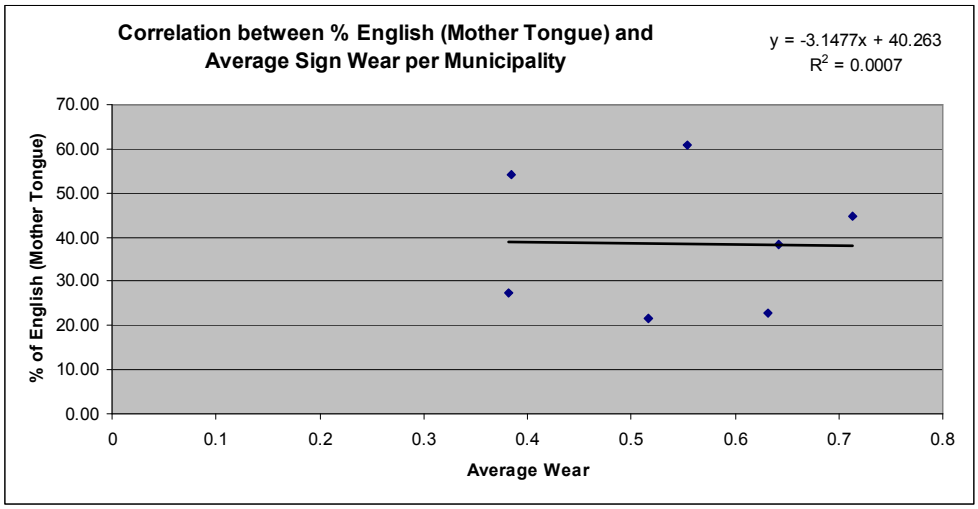
spoken at home into regression analysis, and the inclusion of more municipalities to increase the sample size.

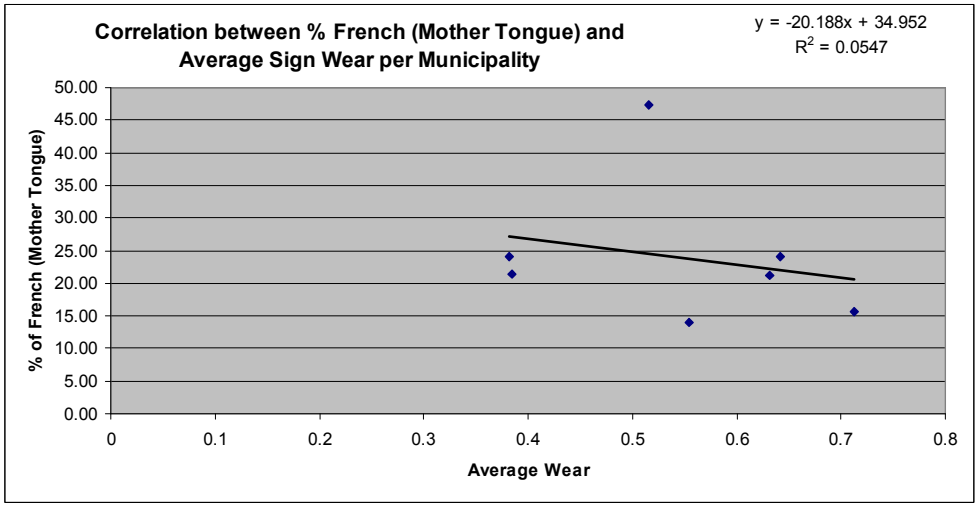
To conclude, this study served as a brief overview of some of the procedures and problems involved in using the contemporary material record to infer modern cultural behaviour. It may be somewhat disheartening to the aspiring archaeologist to see such a report. This research has shown that it is hard enough to make sound conclusions about the present using modern data. How can we possibly seek to explain the past using material culture that has been separated from its context for hundreds if not thousands of years? The answer lies in continued, systematic research. When one approach fails, attempt another. When one explanation falls short, explore further ones that receive less attention. Just like the fact that this report is part of a larger whole – the Stop: Toutes Directions project – so too should each piece of archaeological research contribute to the larger body of archaeological understanding. This is really the only way in which we can use the material past to uncover knowledge about past human culture and behaviour.

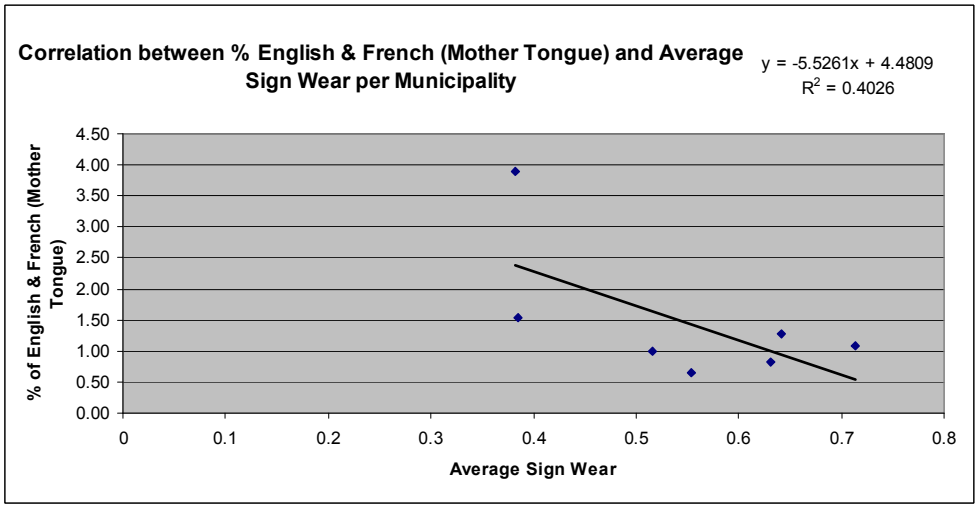
References

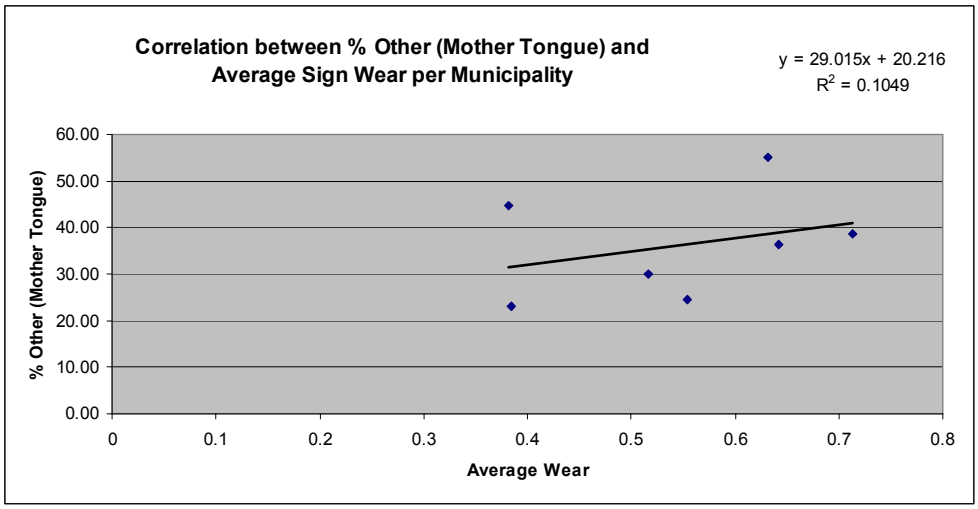
Territory [map]. 2006. Scale not given. "Official Portal Ville de Montreal". http://ville.montreal.qc.ca/pls/portal/docs/page/portail_fr/media/documents/Cartejanvier2006_mairie.pdf (14 April, 2008)

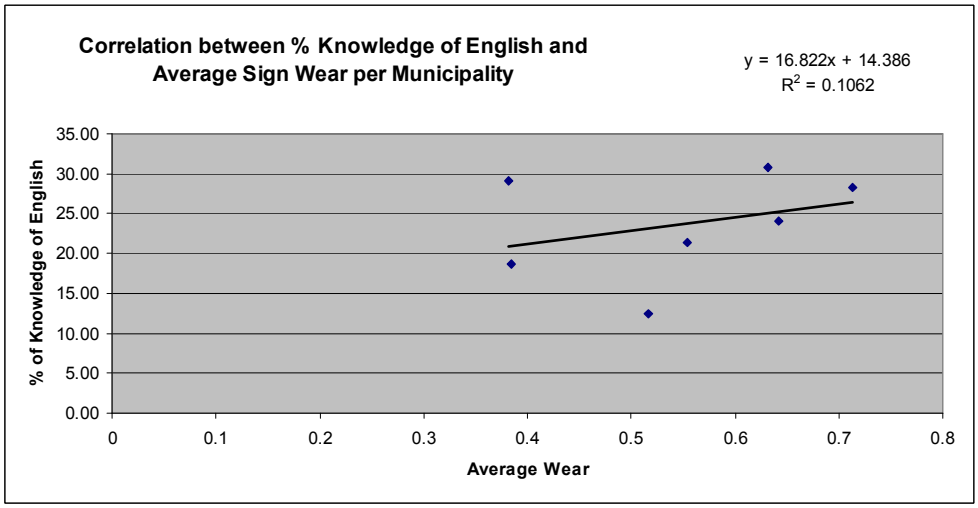
Appendix A: Scatter Plots for Linguistic and Sign Data with resulting Regression Equations

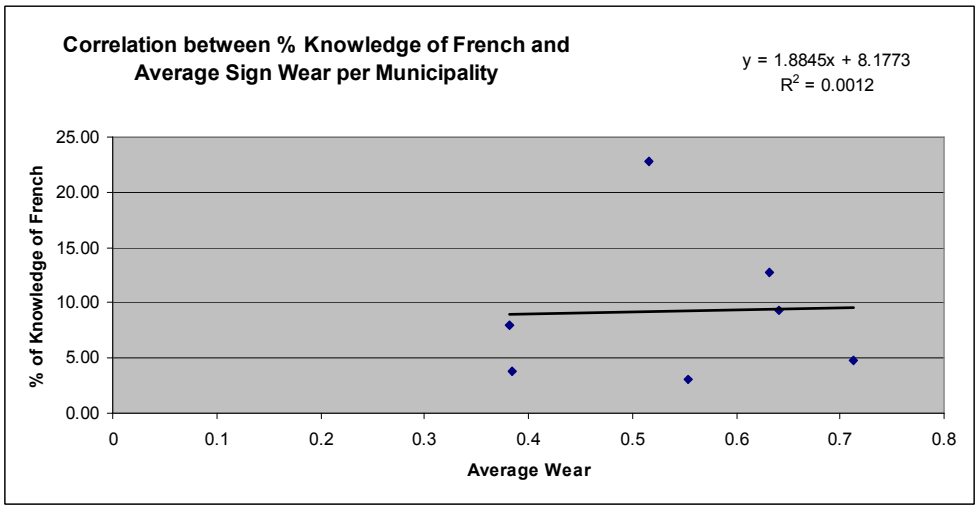


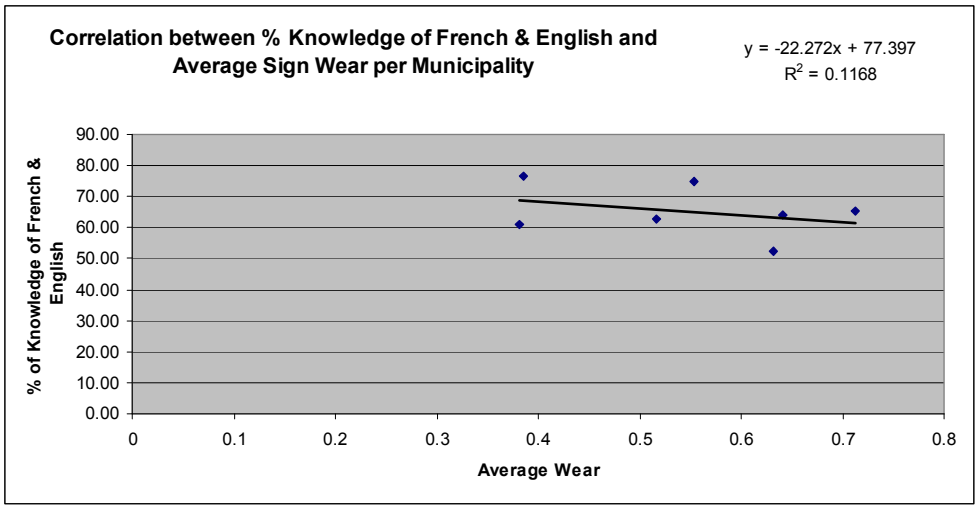


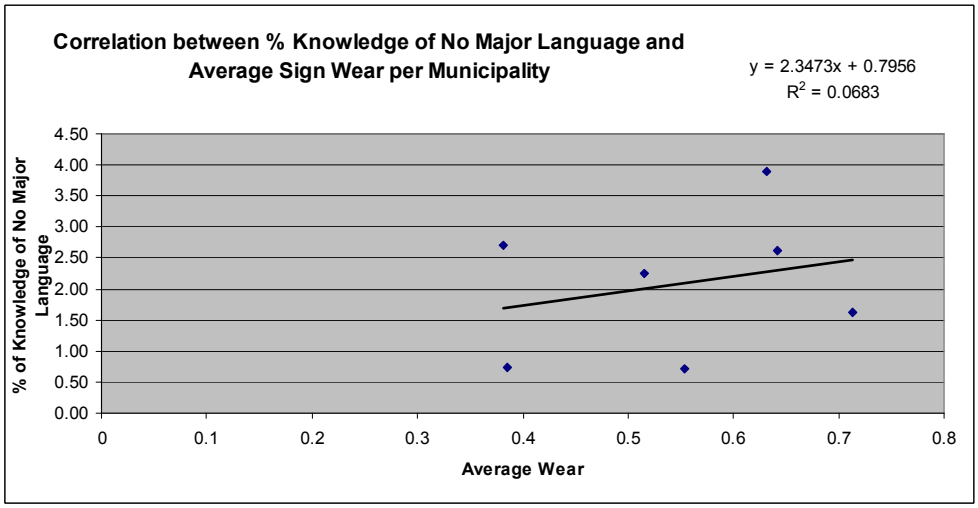



Correlation between % Other (Mother Tongue) and Average Sign Wear per Municipality
y = 29.015x + 20.216
R2 = 0.1049
% Other (Mother Tongue)
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Wear


Correlation between % Knowledge of English and Average Sign Wear per Municipality
y = 16.822x + 14.386
R2 = 0.1062
% of Knowledge of English
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Wear


Correlation between % Knowledge of French and Average Sign Wear per Municipality
y = 1.8845x + 8.1773
R2 = 0.0012
% of Knowledge of French
25.00
20.00
15.00
10.00
5.00
0.00
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Wear


Correlation between % Knowledge of French & English and Average Sign Wear per Municipality
y = -22.272x + 77.397
R2 = 0.1168
% of Knowledge of French & English
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Wear


Correlation between % Knowledge of No Major Language and Average Sign Wear per Municipality
y = 2.3473x + 0.7956
R2 = 0.0683
% of Knowledge of No Major Language
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Average Wear