

VARIATION IN ARTICULATION RATE IN NEW BRUNSWICK FRENCH

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1 Introduction

This study examines articulation rate (AR) in French spoken in five regions of New Brunswick. French is a minority language in this province, and the demographic concentrations of French speakers vary across regions, suggesting that the regions have different degrees of French–English contact. The main research question explored in this paper is how AR varies across the different language contact situations.

Research on contact varieties of various languages – including French [1], Spanish [2], and Swiss German [3] – has found that AR tends to be slower in contact varieties than in majority language varieties. Similarly, ongoing research on varieties of French spoken in Canada [4] has observed that AR is slower in varieties where there is a mid to high degree of language contact and faster in varieties with a low degree of contact.

In the present study, the main predictor factor of AR is region. The degree of language contact is gauged by demographic concentrations of French speakers in each region of New Brunswick; these are as low as 35% in the Moncton-Dieppe urban area and as high as 94% in the NorthWest region [5]. The study includes consideration of other factors that can affect variation in AR: speaker’s gender and age, and the length of inter-pause intervals (IPIs).

2 Method

2.1 Speakers and speech materials

Materials are from the RACAD speech corpus of New Brunswick Acadian French, originally designed for speech recognition applications [6]. The corpus consists of recordings by 136 speakers from the five main regions of New Brunswick where there is a sizeable proportion of Francophones. While the corpus is not evenly balanced with respect to region, each region has a reasonably large representation: NorthWest (26 speakers), North (26), NorthEast (39), Moncton-Dieppe (24), SouthEast (21). The sample has a good distribution of gender and age for all five regions. Speakers’ ages range from 18 to 69 years.

Each speaker read 12 sentences chosen from a large set of 212 sentences that included two ‘calibration’ sentences that contain segmental shibboleths. In the present study, we focused analysis on the two calibration sentences because all speakers read both sentences, allowing us to control segmental and syntactic content. The sentences are :

Je viens de lire dans l’Acadie Nouvelle qu’un pêcheur de Caraquet va monter une petite agence de voyage. C’est le même gars qui, l’année passée, a vendu sa maison à cinq Français d’Europe.

2.2 Measurements and statistical analysis

Acoustic analysis and segmentation into phones, syllables, pauses were carried out with Praat. Syllable boundaries were established based on actual pronunciations (and not on orthographic or phonological representations). Pauses were defined as periods of silence longer than 70 msec. Excluded from analysis were filled pauses, false starts, and repetitions. About 25 minutes of continuous speech were examined.

AR was calculated as the number of syllables in an inter-pause interval (IPI) and was measured in syllables per second. This local measure of AR was made for each IPI for each speaker. IPI length was defined as the number of syllables in an IPI.

Linear mixed effects modeling was carried out to assess the relationships between AR and five predictor factors: age and IPI length (both are continuous variables), and region, gender, and sentence (categorical variables). The model was fit using observations with IPI > 2. Age was centered around the median age of 40; IPI values were transformed and the log of IPI was centered around the median value of log(10).

3 Results

3.1 Preliminary descriptive statistics

A summary of mean ARs for the five regions is given in Table 1. Overall mean AR was 4.72 syll/sec (SD = 0.84); the ARs were relatively normally distributed (skewness was 0.09).

Table 1: Mean articulation rate for each region.

NorthWest	North	NorthEast	Moncton-Dieppe	SouthEast
4.74	4.74	4.85	4.58	4.61

Figure 1 is a preliminary plot of the correlation between mean ARs and the demographic concentrations of Francophones in the regions; it shows a direct association between the two. We briefly mention some of the other preliminary observations. There were clear trends between AR and gender, age, logIPI, and sentence. As an example, the plot in Figure 2, which aggregates data from gender and age, shows that average AR is faster for males speakers than female speakers, and that AR decreases with age.

3.2 Modeling for articulation rate

The results of the linear mixed effects modeling indicated

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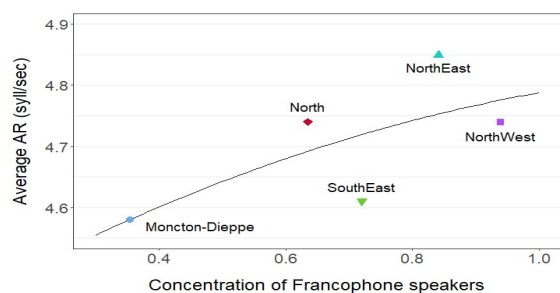


Figure 1: Plot of average AR vs. concentration of Francophone speakers by region.

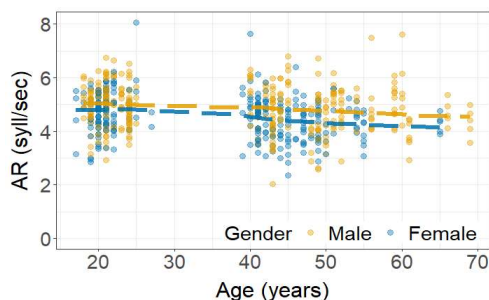


Figure 2: Plot of AR vs. age, grouped by gender.

that there are significant relationships between AR and four of the predictor factors: speaker gender ($p < .001$), age ($p < .001$), log of IPI length ($p < .001$), and sentence ($p < .001$). However, region was not significant ($p = .64$) nor were there any significant interaction effects with region. No interactions among the four predictor factors were significant at the 5% level.

4 Discussion

The goal of this study was to examine variation in AR across five regions of New Brunswick. The main research question asked how ARs vary across the different language contact situations in these regions. A preliminary correlation between average AR and the concentration of French speakers in each region suggested that regions with greater concentrations of Francophones have higher ARs. However, a more formal analysis with linear mixed effects modeling showed that ARs are not significantly different across the regions. Thus, differences in degree of language contact across the five regions – indicated here as demographic concentrations of Francophones – are not related to AR variation in New Brunswick French. This result is comparable with [4]’s findings for other varieties of Canadian French; these authors note that regions in minority situations tend to have similar ARs, regardless of whether the degree of language contact is low or high.

The statistical modeling also showed that the other predictor factors are significant. These effects are generally consistent with patterns established in previous research [4], [7–9]. With respect to gender, many – but not all – studies also find that males have faster ARs than females. As for age, a frequent result is that younger speakers have faster ARs than older speakers. These findings suggest that female and older speakers may be reading more carefully – and thus with a slower AR – than other speakers. The results also confirm the

significant role of the log IPI factor: average AR increases as IPI length increases.

An important limitation of this study is the use of sentences in the research design. Several speakers had only one IPI per sentence. This meant that sentence could not be treated as a random effect in the statistical analysis, requiring that the effect of sentence on AR be the same for each speaker. Future research should consider a corpus with several (longer) reading passages. These could be treated as a random effect, which might better account for the variability in AR.

5 Conclusion

The results revealed significant effects of gender, age, and IPI length on AR variation in New Brunswick French. These effects are generally consistent with findings from research on both majority and minority language varieties. However, region is not a significant predictor; that is, ARs do not differ across the different contact situations. Overall, these findings contribute to a description of the temporal properties of varieties of Canadian French, an area that remains relatively under-documented.

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