

REGISTER USED AS A SOCIOGEOGRAPHIC INDICATOR

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ABSTRACT

The notion of register here corresponds to that of the voice F_0 level (mean F_0) as well as that of the F_0 range (F_0 max - F_0 min). These prosodic parameters are studied through a spontaneous corpus of male voices in two varieties of French, the French from Quebec and the French from France. The results obtained tend to show that the register may be a sociogeographic indicator. In fact, the register appears to be a social indicator : a low register voice and a wide F_0 range are in most cases characteristic of speakers who have a high socioprofessional status. Then, we observe that the register may also act as a geographic indicator to distinguish the two dialectal varieties studied : the France voices are generally not as low, but have a slightly wider F_0 range than the Quebec voices, if we eliminate the outer values of the F_0 .

1. INTRODUCTION

Any francophone can easily notice the difference between the commonly called *Quebec accent* and the *French accent*. The segmental differences, or the way a given sound is pronounced, are obvious. It is generally also fairly easy to identify the social origin of the speaker by the words as well as by the syntax that he uses. There is, however, a general hypothesis that states that the prosodic differences (intonation in the broad sense) may also be important in the identification of a dialect and a sociolect.

The prosodic parameter considered in the present study is the register. This notion does not cover the same reality for all the authors (for a detailed review, see [2]). The *register* here corresponds to the voice F_0 level (mean F_0) and to the voice F_0 range (difference between F_0 max and F_0 min).

1.1 What we know about the register as a geographic indicator

The question of prosodic differences, especially that of the voice F_0 range between the France variety and the Quebec variety, was studied by Quebec phoneticians a few decades ago. However, these first studies [4, 7, 8, 19] show a limited descriptive base (from 3 to 7 speakers, cultured, mostly in reading context). A certain ideology then led to consider the French spoken in Quebec as a subproduct of the French spoken in France. Since approximately forty years, the distinctive prosodic characteristic that was mentioned most often is the "sentence melody" : Quebec French is considered "monotonous" whereas the France French is more "singsong" like. However, we must highlight the fact that this characteristic is more an impression than quantitative analytical results. The results obtained by Boudreault [4] and Holder [8] lead them to suggest hypotheses other than a reduced F_0 range to explain this monotony (individual whims, context or high cultural level, clearer vocal tones, etc.). Moreover, a recent study [2], from a corpus of news bulletins read, tends to show that the Quebec variety would have a wider F_0 range than that of the France variety. We must therefore adopt a cautious approach.

1.2 What we know about the register as a social indicator

As previously mentioned, the studies from Quebec that bear on the prosodic distinction between the Quebec and France dialectal varieties were mostly carried out with speakers from a high social group. To my knowledge, there are few specific prosodic studies on the eventual relationship between register (F_0 level and F_0 range of the voice) and the various social statuses. However, wider prosodic studies allow to establish a few reference points on this subject.

1.2.1 F_0 level. Regarding the F_0 level, Ohala [15] states that the use of the fundamental frequency follows a "frequency code" in which the high frequency is associated with the "small" and with "subordination" whereas a low frequency is associated with the "large" and with "domination" (as also found in studies such as those by Fairbanks and Pronovost, 1939 ; Uldall, 1960, 1964 ; Williams and Stevens, 1972 ; Brown *et al.* 1974 – quoted by Ohala ; and more recently, van Bezoooyen, 1988 [1]). We may thereby state that the probability of finding a high frequency will be greater with speakers who belong to a low socioprofessional environment.

1.2.2 F_0 range. As for the F_0 range, the observations are varied, even contradictory. First, from a linguistic point of view, the tendency is to believe that the role of intonation becomes negligible when the sentence syntax is close to what is written [10, 12]. We can then conclude that in the common language, especially with the speakers who are in a low social group, a wider F_0 range would generally be used. We must however specify that the intonation in this case is considered in a broad sense because it groups numerous prosodic factors other than those studied here.

Secondly, we find, in a certain number of studies, a perspective that we could call sociocultural. Already in 1892, Sweet [17] noticed that in the English language, the larger the melodic deviations are, the more the tone is emphatic. Léon and Martin [11] concluded from this that the cultural groups with a smaller F_0 range would consider the cultural groups with a wider F_0 range as "somewhat snobbish". By the same way, Boudreault [4] made the hypothesis that the speaker with a "high cultural level" could have a more "varied" melody. In a perceptual analysis on the English language, Brown *et al.* [5] observed that a decrease in the F_0 variation results in a decrease in the attribution of "competence". Another perceptual analysis by van Bezoooyen [1] on the Dutch language shows that a wide F_0 range is highly associated to "dominance" and to "self-confidence", etc. Mora [14], in an analysis of Venezuela Spanish speech, observed that the high social group spoke with higher intonative modulations. According to these studies, it seems that a wider F_0 range would be linked to a speaker from a higher socioprofessional environment.

Of course, many factors other than the geographic and socioprofessional belonging may be the cause of the variations in the F_0 level and the F_0 range of the voice : the situational context, the type of statements, as well as the age and sex of the speakers¹. The corpus used is intended to neutralize these factors. The analysis bears on spontaneous speech on the same subject and consists of nearly all affirmative statements ; the speakers are all males in their working life age. The following section provides more details.

2. METHODOLOGY

2.1 Corpus

The study bears on 30 male voices of 15 Quebecers and 15 Frenchmen in their working life age (between 26 and 58 years old), who represent three social levels (low, mid, high)². The Quebec corpus is the *Corpus Montréal 84* [18] and the French corpus is the *Corpus Paris 97*. The Paris corpus was gathered by the author and set up according to the same rules using the same questionnaire as for the *Corpus Montréal 84*.

The analysis is the result of excerpts from semi-structured interviews. All the excerpts kept are on the subject of jobs, those they held previously, those they had at the time of the interview, as well as, in most cases, the degree of satisfaction with their professional life. For each of the speakers, the excerpts analyzed are at least 60 seconds. However, the composition of these excerpts in frequency values and in the number of statements is variable from one speaker to the other. The duration of each statement may also be subjected to intra-speaker variations. The outer F_0 range values and the mean are as follows : between 2282 and 4315 frequency values (mean is 3477) ; between 6 and 19 statements (mean is 10) ; between 0,29 s and 16,42 s (mean is 6,32 s).

2.2 Instrumental processing

The voices were recorded on cassettes with a Sony TC-142 recorder for the Quebec corpus and a Marantz PMD-201 recorder for the French corpus. An ECM-16 clip-on microphone was used for the two corpora. The acoustic analysis was made on a *Computerized Speech Lab* speech processing software from Kay Elemetrics Corp.

Sometimes the automatic extraction of F_0 produces strange values. All the values were therefore reviewed and adjusted when required, according to the length of the period.

2.3 Statistical processing

The variables considered are the mean of the statements of each speaker for the F_0 level, the measured F_0 range, the estimated F_0 range and the modal classes that were the most used by the speakers from the sample.

The values for F_0 level were obtained using the arithmetic mean of all the values for the laryngeal frequencies (mean of F_0). As an additional indicator, we also considered the modal class used (by intervals of 10 Hz) as well as the frequency distribution in the various frequency classes.

The F_0 range values correspond to the values of the measured F_0 range and the values of the estimated F_0 range. The values for the measured F_0 range were obtained from minimum and maximum real values from each of the statements. The F_0 range in Hz is converted into tones using the following formula [3] :

$$(1) \text{ Measured tonal range} = 19,93 * \log (F_0 \text{ max} / F_0 \text{ min})$$

This conversion into tones allows comparing speakers with a different frequency. To this value of the measured F_0 range we add that of the estimated F_0 range by using the standard deviation. The estimated F_0 range corresponds to the frequency band in which 96% of the laryngeal frequency values are found. It is calculated with formula [3] as follows :

$$(2) \text{ Estimated tonal range} = F_0 \text{ mean} \pm (2,05 \text{ std. dev.})$$

This range was then converted into tones.

Variance analyses with two factors (social and geographic) were carried out to determine the effect of these factors on the variables used. The underlying basic hypotheses are met, that is, normality and homogeneity of the variances.

3. RESULTS

3.1 Social indicator for the France French speakers

The first analysis bears on register as a social indicator in the France French corpus. It is carried out using the mean of F_0 , the modal class, the measured F_0 range and the estimated F_0 range. The results are shown in *Table 1*.

France sociolects	F_0 level (Hz)	Modal class (Hz)	Measured F_0 range (tones)	Estimated F_0 range (tones)
Low (L)	133,28	110-119	7,37	6,85
Mid (M)	110,12	100-109	8,41	7,98
High (H)	104,27	100-109	8,52	8,01

Table 1. Results for the France sociolects.

The results show a major difference in the F_0 level between the low and high social subgroups (29 Hz). Considering the difference in F_0 level, it is not surprising to find that the modal class of these mid and high subgroups is lower than that of the low subgroup. The 100-109 Hz class groups respectively 25% and 18% of the frequencies in the mid and high subgroups, compared to 9% for the low subgroup ($L/M = p < 0,01$). This 100-109 Hz class is the only parameter to show a significant interaction between the France French sociolects.

As for the measured F_0 range, we observe that the tonal band of the mid and high subgroups is comparable whereas the one from the low subgroup is narrower by 1 tone, which represents a deviation of about 12%. The estimated F_0 range is smaller since the outer values should be eliminated. It was nevertheless necessary to check the effect of these latter. In this case, we find that the relationships observed from one subgroup to the other remain approximately the same as for the measured F_0 range.

To summarize, in the sample of the France French variety, the low social subgroup distinguishes itself overall from the two other by a higher pitched voice and a narrower F_0 range.

3.2 Social indicator for the Quebec speakers

The same type of analysis as the one shown previously was carried out with Quebec sociolects (*Table 2*).

Quebec sociolects	F_0 level (Hz)	Modal class (Hz)	Measured F_0 range (tones)	Estimated F_0 range (tones)
Low (L)	104,96	90-99	6,58	5,69
Mid (M)	104,91	90-99	7,41	5,39
High (H)	98,6	90-99	8,69	6,87

Table 2. Results for the Quebec sociolects.

In this dialectal variety, the results reveal a slight difference in the voice F_0 level of the low, or mid subgroups, and those of the high subgroup (about 6 Hz). As for the modal class, it does not vary from one social subgroup to the other.

The difference in the measured F_0 range is notable (2 tones or a deviation of 24%) between the low and high subgroups. Moreover, the difference in the estimated F_0 range between these same social subgroups is in the order of 1 tone. For Quebec French, hesitation pauses (*uh*) are relatively frequent and often produced with very low frequencies (*creaky voice*). Consequently, the estimated F_0 range here should give a more accurate evaluation of the sociolectal and dialectal differences.

In the Quebec variety sample studied, as in the France French variety sample, it seems that the F_0 level and the F_0 range of the voice may have an influence, although to various degrees, in a social indicator role. A light lower voice and a wider F_0 range are characteristic of the high socioprofessional status subgroup.

Regarding the F_0 level, a variance analysis reveals that the limit observed for the interaction between dialect and sociolect has a trend ($p = 0,07$), indicating that perhaps the effect of the social factor is linked to the geographic factor. A larger sample is required. For the measured F_0 range, no significant effect has been noticed.

3.3 Geographic indicator

We know that the register may vary from one language to the other. For example, in a study by Scherer [16], there is an observed difference in the mean of the F_0 for American English (128 Hz ; 28 speakers) relative to that for German (161 Hz ; 29 speakers) ; ($p < 0,001$). In other studies, such as the one by Iivonen *et al.* [9], we also observe differences from one dialectal variety to the other, specifically a difference between the American English F_0 range (6 speakers) relative to the British English (4 speakers), respectively 9,55 tones and 7,95 tones. For the French language, as mentioned previously, the Quebec phoneticians generally have the impression that the French voice is higher pitched and more "singsong" than the Quebec voice. The results from the sample studied are shown in *Table 3*.

French varieties	F_0 level (Hz)	Modal class (Hz)	Measured F_0 range (tones)	Estimated F_0 range (tones)
France variety	118,80	100-109	8,19	7,43
Quebec variety	103,16	90-99	7,44	5,90
Variance analysis	$p < 0,05$	-	ns	$p < 0,01$

Table 3. Results for France and Quebec varieties.

First, it appears that the two varieties are distinguished as much by their voice F_0 level as by the voice F_0 range. This reveals that French male voices from the corpus studied have a higher pitch (more than 15 Hz ; $p < 0,05$) and have a wider F_0 range (more than 1,5 tones for the estimated F_0 range ; $p < 0,01$). Considering that there were many hesitation pauses at very low frequencies for the Quebec corpus (section 3.2), the measure for estimated F_0 range seems to be more representative for comparing the tonal bands of each variety.

Moreover, we must highlight that the use of the 100-109 Hz class is distinctive of the low subgroups of the two varieties. In the France variety, this class is less used (9%) than in the Quebec variety (19%) : French low/Quebec low = $p < 0,05$.

4. DISCUSSION AND CONCLUSION

4.1 Social indicator

The results of the present study on register as a social indicator tend to confirm the results of other various studies on personality (section 1.2.2) : a low pitched voice and a wide F_0 range are most often indicators of a high socioprofessional status and vice-versa. In fact, it seems that these characteristics are nearly archetypal.

Nevertheless, if there is, in a general way, a "frequency code" that reflects fairly well the characteristics of the various social subgroups, various factors may still cause a certain variation relative to the "archetype".

4.2 Geographic indicator

The results obtained in some France studies (F) and Canadian studies (Q for Quebec French ; O for Ontario French, the study by Holder) for the voice F_0 level and measured F_0 range are compared in *Table 4*.

Studies on French language				
F_0 level (Hz)	Cont ext *	N. of speakers	France variety	Quebec variety
F-Lucci (1983)	R	1 F	138	-
Q-Bissonnette (1999)	R	5 F+5 Q	135	117
F-Boë <i>et al.</i> (1975)	R + Sp	30 F	118	-
F-Lucci (1983)	Sp	1 F	123	-
Q-Demers (1999)	Sp	15F+15Q	119	103
Measured F_0 range (tones)				
F-Contini and Boë (1973) [6]	R	5 F	6,6	-
Q-Boudreault (1968)	R	7F+7Q	5,3	6,5
Q-Bissonnette (1999)	R	5F+5Q	9,1	10,3
O-Holder (1968)	Sp	6F+6O	6,1	8,4
Q-Demers (1999)	Sp	15F+15Q	8,2	7,4

* Context : reading (R) and spontaneous speech (Sp).

Table 4. Studies on F_0 level and measured F_0 range for France and Canada French.

First, it is important to compare the results of the French studies and the Canadian studies on the France variety. For the F_0 level, according to the situational context for reading (R) or for spontaneous speech (Sp), the results are very comparable (respectively 138 and 135 Hz for reading and 118, 123 and 119 Hz for spontaneous speech). This reveals that the Quebec voices are lower pitched than the France voices.

For the measured F_0 range, the variations are wider from one study to the other, regardless of the situational context (6,6, 5,3 and 9,1 tones for reading ; 6,1 and 8,2 tones for spontaneous speech). This parameter appears to fluctuate more than the one for F_0 level. We find this same trend for the estimated F_0 range.

If we compare the results of one variety to the other in the two studies that allow it, the results show the same trend for the F_0 level : the French speakers have a higher pitched voice than the Quebec speakers do. Moreover, a perceptual analysis by Ménard [14] shows that the F_0 level ranks first in the distinctive prosodic markers for the two varieties (the measured F_0 range ranks third).

For the measured F_0 range, in three of the four studies that allow comparison, the F_0 range of the Quebec variety is wider

than that of the France variety (respectively 1,2, 1,2 and 2,3 tones). We must specify here that in the studies by Boudreault [4] and Holder [8], the data for the F_0 range is given only in Hz measurements. The calculation in tones highlights a difference between the two varieties, a difference that was not revealed with the measurements in Hz only. We must remember (section 1.1) that the authors had then suggested other hypotheses to explain the Quebec "monotony". So in the spontaneous corpus studied here, for all the social groups, the France voices would have a slightly wider F_0 range (0,8 tones ; 1,5 tones if we consider the estimated F_0 range more appropriate (section 3.3). However, considering the social composition of the other corpuses, the comparison with the only high social subgroup is more appropriate (estimated F_0 range : F = 8,01 tones and Q = 6,87 tones). This nevertheless reveals that in the present spontaneous corpus, the France voice remains wider in F_0 range than the Quebec voice by more than 1 tone.

To this difference in the F_0 range, we must add a difference in the frequency distribution, a difference observed in reading [2] as well as in spontaneous speech. In fact, the Quebec speakers have a tendency to use the low frequencies more whereas the speakers from France use the range of low to high frequencies a little bit more symmetrically or with a more even distribution. All of the results tend to confirm the often stated impression that the Quebec voice is lower pitched and more monotonous than the France voice.

The register therefore appears as a sociogeographic indicator, at least with the male speakers. A study on the female voices is presently being carried out.

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NOTES

1. A study by W. Majewski, H. Hollien and J. Zalewski (1972. *Phonetica*, vol. 25, p. 119-125) shows that neither weight nor height has a significant influence on the voice F_0 level.
2. The classification criteria refer to schooling, taking into consideration the schooling period. It also refers to the job occupation. The high socioprofessional level is represented by the liberal professions or company managers and employed university graduates ; the mid level by technicians, foremen, white collar workers, people from small businesses ; the low level, by blue collar workers or people without a permanent job. For more details, see Thibault et Vincent (1990 :17-21).

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