Accentual Transfer from Swiss-German to French
A Study of "Français Fédéral"

Mathieu Avanzi[1], *Pauline Dubosson*[1], *Sandra Schwab*[2], *Nicolas Obin*[3]

[1]Chaire de linguistique française, University of Neuchâtel, Neuchâtel, Switzerland
[2] École de langue et de civilisation françaises, University of Geneva, Switzerland
[3] IRCAM-CNRS UMR 9912-STMS, Paris, France

mathieu.avanzi@unine.ch, pauline.dubosson@unine.ch, sandra.schwab@unige.ch, nobin@ircam.fr

Abstract

This study aims at examining the accentual and phrasing properties of a variety of L2 French commonly called "Français Fédéral", a variety of French spoken in Switzerland by speakers who have a Swiss-German dialect as a mother tongue. For this, we compared the data of 4 groups of 4 speakers: 2 groups of 4 native French speakers from Neuchâtel and from Paris, and 2 groups of 4 Swiss-German French speakers from Bern and Zürich. The data are semi-automatically processed, and three main prosodic features relating to accentuation and phrasing are examined: prominence distribution and metrical weight of the Phonological Phrase, respect of Phonological Phrase formation constraints (Align-XP and No-clash), and realizations of sandhis phenomena within and across the Phonological Phrases boundaries. Our findings suggest that "Français Fédéral" share several features with a lexical accentuation system rather than with a supra-lexical accentuation system.

Index Terms: Accentual transfer, Phonological Phrase, "français fédéral", Align-XP, accentual clash, sandhis.

1. Introduction

In Switzerland, French and German speakers represent 20.4% and 63.7% of the entire population respectively (the two other languages (Italian and Romansh) constitute linguistic minorities [1]). Contacts between Swiss-German and Swiss-French speakers are very common. In this context, the expression "Français Fédéral" (FF) has been created to designate the varieties of French strongly influenced by a Germanic substrate [2]. To our knowledge, little is known about the prosodic properties which characterize this variety of L2 French, and if some transfers from Swiss-German to French exist. In this paper, we address the issue of prosodic transfer from Swiss-German to French by focusing on accentuation and phrasing. In the line of previous studies dealing with accentuation of hybrid varieties where French is in contact with a pitch accent language as Spanish [3], English [4] or a tone language as Sango [5][6], our purpose in this paper is to verify if FF accentuation system is closer to a lexical accentuation system (as it is the case in the Swiss-German dialects [7]) than a supra-lexical accentuation system (as it is the case of French, whose prosody system is known to be characterized by a "syncretism" between accentuation and intonation, see [8][9][10]). To this end, we focus on Phonological Phrase realization. More precisely, we compare FF productions with native French productions and

determine whether FF speakers (i) parse their speech flow in smaller prosodic groups than native speakers, (ii) respect in the same proportion phonological phenomena implicated in native French well-formed Phonological Phrases. Statistic tests and multi-dimensional scaling method are used to assess significant differences between the studied varieties as well as their degree of proximity.

2. Theoretical Background

Despite the different existing denominations used to designate the minimal prosodic unit of phrasing in French, there is a certain consensus on the definition of such a unit in the speech community. Rhythmic group [11], Accentual Phrase [12] or Phonological Phrase (henceforth PP, see [13]-[17]) is usually described as being composed of one lexical word and its dependent functional items (see the notion of "clitic group" proposed by [19]), with its rightmost syllable obligatorily marked by a pitch movement and a relative lengthening. In average, it is composed of 3 or 4 syllables, but never more than 7 (see [17] or [20]).

In the Prosodic Theory framework (see among others [13]-[17]), two constraints are considered as particularly powerful in the definition of PP. The first one is a morpho-syntactic rule, and is called **Align-XP**. It stipulates that a PP must contain a lexical head and all the other branching elements on its left side. As a consequence, this definition predicts for example that all the adjectives on the left side of a noun should be phrased in the same PP than the noun they depend on (see [14] and [15] among many others). As an illustration, a chunk such as *un gros détachement* (*a large detachment*) will be phrased in two PPs, with the adjective modifying the noun and the noun included in the same PP (*un gros détachement*[PP] *de police*[PP]). The second rule, the **No-clash constraint**, stipulates that in the contexts where a monosyllabic word follows a lexical head, PP is restructured to avoid accentual clash. Therefore, a chunk such as *une patte blanche* (*a white paw*) will preferably be phrased in one PP (*une patte blanche*[PP]) rather in than two PPs (*une patte[PP] *blanche*[PP]). In addition, PP has been claimed to be the domain of the realization of obligatory sandhis phenomena. According to [13] or [15], **sandhis phenomena**, such as liaisons and resyllabification, should obligatory occur within the PP (see respectively *des activistes* (*some activists*) pronounced [*dezaktivist*] and not *[*dezaktivist*]; *une étape* (*a step*) pronounced [*y.ne.tap*] and not *[*yn.e.tap*]). It has also been claimed that sandhis should be avoided among two adjacent PPs,

but [17] and [21] showed that it was not that uncommon, even in controlled speech.

3. Data

3.1. Participants

We analyzed data from 16 speakers: 8 native speakers of French and 8 participants who were FF speakers. For this paper, we selected 4 Swiss-German speakers from the Emmental-Oberaargau area in the canton of Bern (in the west of the German-speaking Switzerland, henceforth BE), and 4 Swiss-German speakers from Zürich (in the east of the German-speaking Switzerland, henceforth ZH), having the Bernese dialect and the Zürich dialect as a L1, respectively. The speakers we selected learned French at school in the canton Bern or Zürich and moved to Neuchâtel (a Swiss French-speaking city) when they were young adults. At this time, they use French in their everyday lives but continue to regularly use their dialect at home or with friends. The other 8 participants were native speakers of French: 4 were from Neuchâtel (henceforth NE), and 4 were from Paris (henceforth PA). All the participants are between 55 and 78 years old. In all, 2 males and 2 females per variety participated to the experiment.

Participants were instructed to read a journalistic text (the text used in the PFC project, [22]) comprising 398 words, phrased into 22 sentences, and in which a certain number of target items were incorporated for the study of phonological processes implicated in the PP formation. Each participant was asked to read the text silently a first time, and then to read it aloud carefully.

3.2. Annotations

Sound files were semi-automatically processed within the Praat software [23]. They were first orthographically transcribed, and automatically aligned with the EasyAlign script [24]. All the alignments were manually checked and corrected by one of the authors. Prominent syllables were identified independently by two experts (two of the authors) on the basis of their perceptual judgment only. The inter-annotator agreement was statistically tested and considered as substantial ($\kappa = 0.71$). A third expert intervened in cases of disagreement between the two annotators and decided the final value of the syllable (+/- prominent). PP boundaries (clitic groups carrying a pitch accent on their rightmost syllables) were then identified by one of the author in a dedicated tier. Disfluencies (syntactic breaks, elongations due to a hesitation, etc.) were also coded by the two experts (disagreements were corrected by the third expert) and excluded from the analysis. Finally, the respect of phonological constraints and the distribution of sandhis phenomena were coded by two of the authors in a dedicated file.

4. Analysis

If Swiss-German speakers transfer accentual properties from their native dialect to French, we expect that the FF speakers of our corpus have an accentual system closer to a lexical accentual system rather than to a supra-lexical accentuation system. To examine this hypothesis, we focused on three features: the prominence distribution and PP metrical weight (§4.1), the proportion in which the participants respect the phonological rules associated to the formation of well-formed PP in native French (§4.2), and the distribution of sandhis phenomena (§4.3).

4.1. Prominence distribution and PP metrical weight

Our first hypothesis was that FF speakers would tend to parse the speech flow in smaller prosodic groups than native speakers, since they are supposed to have an accentual system closer to a lexical system than to a supra-lexical system. To verify if this was the case, we first compared the **ratio of prominent syllables** (number of prominent syllables/total number of syllables) for each group. We found a significant effect of the variety in the distributions (χ^2 (3, n = 9768) = 74.928, p < .001). FF varieties (BE and ZH together) produce significantly more prominences as than the two native varieties (PA and NE) (χ^2 (1, n = 9768) = 71.748, p < .001). On the other hand, no difference is observed between PA and NE speakers (35.5% and 38%, respectively; χ^2 (1, n = 4919) = 3.293, n.s.), nor between ZH and BE (45.3% and 45.1%, respectively; χ^2 (1, n = 4849) = 0.013, n.s).

Then we calculate the average of the **PP metrical weight** (i.e. the number of syllables per PP) for each of the varieties. Generalized linear models revealed that there was an effect of the variety on the PP weight (Wald χ^2 (3) = 19.967, p < .001). As can be seen in Figure 1, while PA, NE and ZH speakers produced in average a similar PP weight (3.5, 3.3. and 3.2 syll/PP, respectively), BE speakers produced significantly shorter PP (3.0 syll/PP).
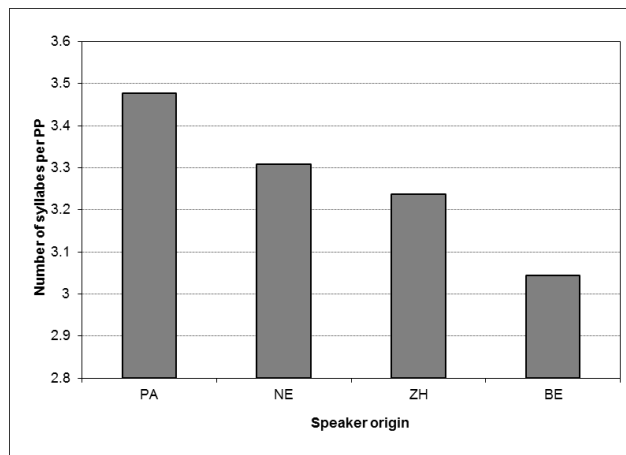

Figure 1: *Number of syllables per PP as a function of variety (PA, NE, ZH and BE).*

Moreover, results showed FF speakers (ZH and ZH grouped together) parse their speech flow in significantly smaller prosodic groups than native speakers (PA and NE grouped together) (Wald χ^2 (1) = 8.638 p < .01).

4.2. Respect of PP formation constraints

4.2.1. Align-XP

The text used for this study contains 10 target items, in which the Align-XP rule applies, i.e. 10 sites of prenominal adjective, as in *grand honneur* (*great honor*) or *grand émoi* (*great stir*). According to the Align-XP constraint, such prenominal adjectives should not be bearing a pitch accent on their final syllable (*ce grand]PP *honneur*]PP; *grand]PP *émoi*]PP). The data

show that in the PA and NE productions, the Align-XP constraint is respected in 45% and 40% of the cases, respectively, while in ZH and BE productions, the prenominal adjective and the noun are phrased in the same PP in only 10% and 2.5% of the cases, respectively. Statistical tests show that there is an effect of the variety on the Align-XP constraint (χ^2 (3, n = 160) = 29.396, p < .001). Post-hoc analyses show no difference between PA and NE speakers (χ^2 (1, n = 80) = 0.205, n.s.) as well as no difference between ZH and BE (χ^2 (1, 80) = 1.920, n.s.). Nevertheless, a difference is observed between the native and the non-native speakers (χ^2 (1, n = 170) = 23.814, p < .001); FF speakers extent the Align-XP rule to a significantly lesser respect than native speakers.

4.2.2. No-Clash

We extracted 11 sites of potential accentual clashes from our data. As an illustration, we expect that chunks as *une journée chaude* (*a warm day*) or *il ne sait plus* (*he doesn't know anymore*) should be phrased in the same PP (i.e. the realizations **une journée*]$_{PP}$ *chaude*]$_{PP}$; **il ne sait*]$_{PP}$ *plus*]$_{PP}$ are predicted as impossible). The data distribution shows that there seems to be a difference between the native and the non-native speakers: PA and NE speakers tend to avoid clashes in 80% of the cases in average; while ZH and NE speakers avoid clashes in 30% of all the cases. Statistical tests confirm the significance of these observations (χ^2 (3, n = 176) = 46.217, p < .001). Furthermore, post-hoc tests show no difference between the PA and the NE speakers (χ^2 (1, n = 88) = 0.067, n.s.) as well as no difference between the ZH and the BE speakers (χ^2 (1, n = 88) = 0.000, n.s.), but they show a significant difference between the native and the non-native speakers (χ^2 (1, n = 176) = 46.172, p < .001).

4.3. Sandhis distribution

The sandhis were identified on the basis of perceptual and acoustic examination of the data by two authors of the paper. We considered a sandhi as realized when a liaison was present (i.e. the consonant between the vowels was clearly audible; e.g. *grand émoi* pronounced [$g\textrm{ʁ}\tilde{a}\underline{t}emwa$]) or when re-syllabification occurred (i.e. adjacent consonant and vowel were not separated by a pause and/or a glottal stop; e.g. *le village entier, as in* [$vi.la.ʒ\tilde{a}.tje$]). We distinguished internal sandhis that occur inside the realized PP boundaries (§4.3.1) from external sandhis that occur across the realized PP boundaries (§4.3.2).

4.3.1. Internal sandhis phenomena

There are 25 sites of potential internal sandhi in the text (13 sites of liaison and 12 of re-syllabification). Results reveals that PA produce 100% of the potential sandhis and the NE speakers 95% of the potential sandhis, whereas ZH speakers and BE speakers produce 78% and 74% of the potential sandhis, respectively. As an illustration for a case of liaison, let's consider the NP *un grand émoi*: while it is always pronounced [$g\textrm{ʁ}\tilde{a}.te.mwa$] by the native speakers, it tends to be pronounced [$g\textrm{ʁ}\tilde{a}.e.mwa$] by the non-native speakers. A global effect of the variety was found (χ^2 (3, n = 400) = 41.999, p < .001). Post-hoc analyses show a difference between the PA and the NE speakers (χ^2 (1, n = 200) = 5.128, p < .05): the latter produced significantly less internal sandhis than the former. On the other hand, the difference between the two FF varieties is not significant (χ^2 (1, n = 200) = 0.439, n.s.). Moreover, FF speakers

produce significantly less internal sandhis than native speakers (χ^2 (1, n = 400) = 40.215, p < .001).

4.3.2. External sandhis phenomena

Fourteen sites of potential external sandhi (5 cases of liaison and 9 cases of re-syllabification) were extracted from the text. PA and the NE speakers globally produce more than ~~the~~ half of the possible sandhis across the PP boundaries (80% and 54%, respectively), while ZH and the BE speakers globally produce a quarter of the possible sandhis across the PP boundaries (27% and 21%, respectively). As an illustration for liaison, let's consider the NP *les pâtes italiennes* (*Italian pasta*): while it mainly pronounced [$le.pat.zi.ta.ljɛn$] by the native speakers, it is preferentially pronounced [$le.pat.i.ta.ljɛn$] by the non-native speakers. Statistic tests reveal that there is a global effect of the variety regarding external sandhi (χ^2 (3, n = 224) = 46.092, p < .001). Furthermore, in addition with the internal sandhis, the difference between PA and NE speakers is significant (χ^2 (1, n = 112) = 9.081, p < .01), but there is no difference between ZH and BE speakers (χ^2 (1, n = 112) = 0.047, n.s.). Finally, there is a significant difference between the native and the non-native speakers in regards to the external sandhis (χ^2 (1, n = 224) = 37.979, p < .001). To sum, FF speakers produce significant less external sandhis than native speakers.

4.4. Multi-dimensional Scaling

Figure 2 was obtained by estimating a distance for each pair of speakers (cumulative sum of the differences of the parameters used above, i.e. prominence distribution, PP metrical weight, respect of phonological constraints of the PP formation and sandhi distribution) and by using Multi-Dimensional Scaling [25]. A dotted line clearly separates the group of non-native speakers (ZH and BE) from the group of native speakers (PA and NE) regarding the accentuation and phrasing. MDS also gives a representation of the effective distance which separates the speakers of each group and shows that there is more dispersion within the ZH groups than within the BE group, but that these two groups are nevertheless homogeneous.
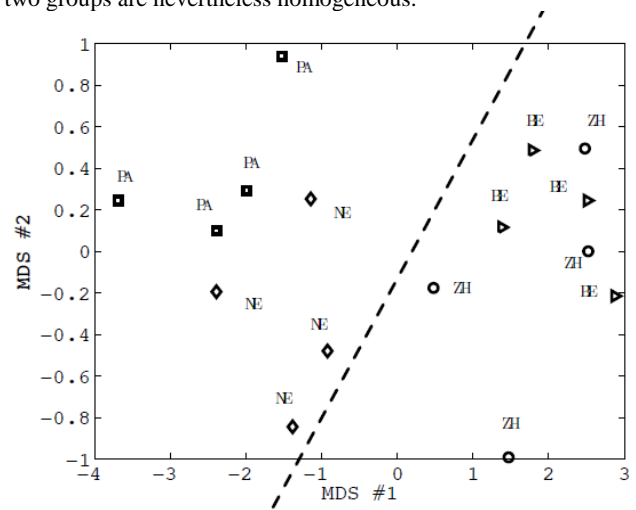

Figure 2: *Multi-dimensional scaling. Representation of the 16 speakers' characteristics of the 4 varieties in a 2-dimensional space.*

5. Discussion

This study shows that FF varieties behave differently than native French speakers in regards to accentual and phrasing features. The number of prominences in the non-native varieties is higher than in the native varieties, which could be interpreted as an influence of the mother tongue of the FF speakers: [3] demonstrates, for example, that Spanish learners of French encounter difficulties to produce lexical words without a pitch accent. Regarding PP metrical weight, we found differences between the FF and the native varieties, but also differences within the FF varieties: BE speakers produced shorter PPs than ZH speakers. Such a result could be interpreted as an influence of the mother tongue: it has been shown in the literature dealing with Swiss-German (see for example [7] and [26]) that native Bernese speakers tend to produce shorter prosodic groups than Zürich speakers. Regarding the Align-XP and the No-Clash constraints, our study confirms that the FF speakers did not acquire the subtleties of native French accentuation, since they present difficulties in de-accenting sites that are predicted to be unaccented in native productions. Finally, the fact that BE and ZH speakers of French produced less sandhis (liaisons, resyllabifications) than native speakers strengthens the hypothesis according to which their accentual system is more lexically constrained (as it is the case in their L1) than supra-lexically determined (as it is the case in native French).

6. Conclusions

The aim of this study was to determine whether "Français Fédéral" speakers transferred accentual features from their L1, a language with lexical pitch accent, into their variety of French. The analysis of PP features produced by 2 groups of 4 non-native speakers and 2 groups of 4 native speakers lead to two major conclusions: (i) native speakers show a strong tendency to of supra-lexical accentuation, even if the regional speakers (NE) and the speakers of the standard variety (PA) differ regarding sandhis distribution (the latter realizing less external sandhis than the former); (ii) non-native speakers behave in a similar way: they phrase their productions in minimal prosodic units (even if ZH speakers are closer to NE native speakers since they produce heavier prosodic groups than the BE speakers). FF speakers also present the same difficulties to de-accentuate lexical items and to link their prosodic groups by realizing systematically potential sandhis phenomena. Therefore, these observations strengthens the hypothesis according that to which Swiss-German speakers of French manifest a strong tendency to a lexical accentual system. It also brings new evidence in favor of [27]'s Markedness Differential Hypothesis (MDH), which stipulates that a typological marked system (as is French lack of a lexical-prosody system) fails to be maintained when it is in contact with a typological unmarked system (such as is the Swiss-German lexical pitch-accent system). Future work is needed to assess if the findings of this study are still valid for spontaneous speech.

7. References

[1] Lüdi, G., Werlen, W., Sprachenlandschaft in der Schweiz – Eidgenössische Volkszählung 2000. Neuchâtel: Bundesamt für Statistik (BFS), 2005.

[2] Kolly, M.-J. "Regionale Spuren in 'Français fédéral' und 'Schweizerhochdeutsch'. Eine Untersuchung im Schnittfeld von Akzent und Einstellung bei Schweizer Dialektsprechern", PhD Master, Universität Bern, 2010.

[3] Barquero Armesto, M. "A Comparative Study on accentual structure between Spanish learners of French interlanguage and French native speakers", Proc. of Speech Prosody, Shanghai, 2012, 250-253.

[4] Bullock, B. "Prosody in Contact French: A case study from a heritage variety in the USA", The International Journal of Bilingualism, 13(2): 165-194, 2008.

[5] Bordal, G. "Prosodie et contact de langues : le cas du système tonal du français centrafricain", PhD, Oslo University, 2012.

[6] Bordal, G., Avanzi, M., Obin, N., Bardiaux, A. "Variations in the realization of the French Accentual Phrase in the light of language contact", Proc. of Speech Prosody, Shanghai, 2012: 442-445.

[7] Leemann, A., Swiss-German Intonation Patterns. Amsterdam/ Philadelphia, Benjamins, 2012.

[8] Hyman, L. "Word-prosodic typology", Phonology, 23(2): 225-257, 2006.

[9] Rossi, M. "Le français, langue sans accent?" Studia Phonetica, 15: 13-51, 1979.

[10] Vaissière, J. "Rhythm, accentuation and final lengthening in French", in Music, Language, Speech and Brain, Sundberg, J. (ed.). Macmillan Press, 108-121, 1990.

[11] Delattre, P. "L'accent final en français : accent d'intensité, accent de hauteur, accent de durée", French Review 12(2): 141-145, 1938.

[12] Jun, S. A., Fougeron, C. "Realizations of Accentual Phrase in French intonation", Probus, 14: 147-172, 2002.

[13] Selkirk, E. Phonology and Syntax: The Relation between Sound and Structure. Cambridge: MIT Press, 1984.

[14] Verluyten, P. "Recherches sur la prosodie et la métrique du français", PhD, Antwerpen Universiteit, 1982.

[15] Nespor, M., Vogel, I. Prosodic Phonology. Foris: Dordrecht, 1986.

[16] Delais-Roussarie, E. "Phonological phrasing and accentuation in French", in Dam Phonology, Nespor, N., Smith, N. (eds). La Haye: Holland Academic Graphics, 1-38, 1996.

[17] Post, B. Tonal and phrasal structures in French intonation. The Hague: Thesus, 2000.

[18] Post, B. "The multi-facetted relation between phrasing and intonation contours in French", in Intonational Phrasing in Romance and Germanic: Cross-linguistic and bilingual studies, Gabriel, C., Lleó, C. (eds), Amsterdam/Philadelphia: John Benjamins, 43-74, 2011.

[19] Garde, P. L'accent. Paris: PUF, 1965.

[20] Martin, P. "Prosodic and Rhythmic Structures in French", Linguistics, 25: 925-949, 1987.

[21] Miller, J., Fagyal, Zs. (2005). "Phonetic cues to common and special cases of liaison. Looking for a prosodic domain", in Theoretical and Experimental Approaches to Romance Linguistics, Randal, G., Edward, R (eds), Amsterdam/Philadelphia: John Benjamins, 179-196, 2005.

[22] Durand, J., Laks, B., Lyche, C. "Phonologie, variation et accents du français". Paris: Hermès, 19-61, 2009.

[23] Boersma, P., Weenink, D. "Praat", www.praat.org, 2012.

[24] Goldman, J.-P. "EasyAlign: an Automatic Phonetic Alignment Tool under Praat", Proc. Interspeech, 3233-3236, 2011.

[25] Borg, I., Groenen, P. Modern Multidimensional Scaling: theory and applications. Springer-Verlag, 2005.

[26] Siebenhaar, B., Forst, M., Keller, E. "Prosody of Bernese and Zürich German: What the development of a dialectal speech synthesis system tells us about it", in Gilles, P., Peters, J. (eds), Regional Variation in Intonation, Linguistische Arbeiten, Tübingen, 219-238, 2004.

[27] Eckman, F. "Markedness and the Contrastive Analysis Hypothesis.", in Interlanguage Phonology: The Acquisition of a Second Language Sound system, Ioup, G., Weinberger, S.H. (eds). Cambridge: Newbury House, 55-69, 1977.