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Looking at French schwa in initial position through the glasses of prosody

Anne Lacheret* and Chantal Lyche**

*MODYCO, Université de Paris X, Institut Universitaire de France

anne@lacheret.com

**Universitetet i Oslo

chantal.lyche@ilos.uio.no

Abstract

In the vast body of literature related to French schwa behavior, prosodic factors are sometimes mentioned, but never systematically studied. This paper proposes to investigate how the topological organization of a sequence influences schwa behavior. The empirical base for this study is extracted from the PFC (*Phonologie du Français Contemporain*) corpus where 20 speakers have been systematically coded for prosodic elements. In addition to obvious geographical differences, we show a clear distinction between so-called optional schwas in monosyllables and in polysyllables. This contrast will impact on the phonological analysis, favoring two distinct underlying representations.

1. Introduction

In what has been described as ‘reference French’ (RF) [12], schwa is traditionally claimed to be systematically absent, word internally and finally, while only optionally absent word initially and in monosyllabic words. Based on this dichotomy, a number of analyses propose to distinguish two classes of schwas leading to two distinct underlying representations [9], but they do not differentiate any further within each group. In particular, they do not discriminate between word-initial position in monosyllables and polysyllables. In parallel to representational analyses, extensive studies focus on various factors triggering the optional absence/presence of schwa, among which syllable position has been singled out. Hansen [5], for example, shows that schwas in initial syllables of polysyllabic words tend to stabilize. Among the numerous factors at work in the overall observed variation, prosody has often been evoked [8], but without definite results.

The purpose of this study is to show that a more systematic examination of prosodic elements, and of stress in particular, can shed some light on the behavior of schwa and thereby on its underlying representation. By ‘schwa in initial position’ we understand either a schwa in a monosyllabic word or a schwa in the first syllable of a polysyllabic word. Our study thus encompasses all ‘variable’ schwas. We assume [13] that, in normal speech, a stressed syllable stands out in relation to its surrounding elements, that it is perceived as more prominent. We hypothesize that a schwa maintained in a potential deletion site will fulfill the same function as stress, namely that its presence will single out the schwa bearing syllable within the discourse. That syllable will then appear as a figure emerging from its background. Given, in addition, that certain positions are psycholinguistically more privileged than others in the processing system [1], we propose that, in French, a word-initial position represents a prominent position whose strength depends on the word’s location within the

stress group. This entails that schwa will tend to be maintained when needed for processing pure linguistic but also pragmatic information. The organization of the paper is as follows: we will first present our corpus, then, in (3), will consider the different implications of positing word-initial positions as prominent. Section (4) will give the results of our study on the interactions between schwa and prosody, results which will be analyzed in (5) before concluding in (6).

2. The Corpus

The corpus for this study consists of a sub-corpus of the PFC corpus where over 220 speakers (for 22 investigation points), have been recorded, transcribed and coded (www.projet-pfc.net). The recordings follow a strict Labovian methodology including two reading tasks (a word-list and a short passage) and two conversations (semi-directed and informal) [3].

2.1. Building our corpus

We selected five PFC investigation points for this study: Treize-Vents (a small village in Vendée, in western France), Paris (upper-class speakers), Nyon (a village in French speaking Switzerland), and Douzens (a small village in southern France). Our choice aimed at guaranteeing a certain geographical spread, with two regions representing northern French, including Paris which exemplifies what is considered the accepted norm. From the 10 speakers recorded per investigation point, we selected 5 and partially coded their productions for prosody. The coding was performed on relevant excerpts of the read text and on one to two minutes of each conversation. By ‘relevant excerpts’, we mean passages including variable schwas located in various sentence positions, which may be present or absent.

2.2. Coding prosody

As a general framework for our endeavour, we attempted to pursue the procedures established for coding schwa and liaison within PFC: the coding is performed on a specific tier in Praat, it should be based on a wide theoretical consensus, the adopted system should be alphanumerical, theory independent, accessible to a (relatively) naïve coder and it should produce a preliminary sorting out of the data [7]. Coding prosody proves however a much more intricate endeavour than coding segments, taking into account the non discrete character of the object under investigation, the wide array of theoretical models in use [6], and the lack of consensus regarding the notion of prominence itself [11]. To partially meet these challenges, we propose that French is a language where stress is assigned at the group level and not at the word level, fulfilling a demarcative function but not a

contrastive one, a point of view largely accepted by phonologists. In addition, the coders are submitted to a few training sessions relative to the detection of prominences.

We consider that the relevant segmentation units are both the word and the syllable. Our coding procedure requires first that the coder segments the signal into syllables which are then transcribed in the SAMPA phonetic alphabet on the prosodic tier, the beginning and end of each lexeme being noted by the symbol '*'. The coding system consists of four fields: 1 = presence or absence of a perceived prominence, 2 = presence or absence of a long vowel, 3 = presence of a pause and its nature, 4 = first syllable or not in a new turn taking. When applicable, the schwa coding is duplicated in order to facilitate the automatic treatment of the data [7]. The following example will serve as an illustration: *viens!* *vjE~*_1022. The syllable is perceived as prominent (1), it is not perceived as long (0), it is followed by a long silence (2) and it corresponds to a new turn in the discourse (2).

3. The initial position as a favoured environment

Let us recall that in RF, schwa in polysyllables is systematically absent when it is not in the left edge syllable of the word. Thus, in the sentence *On discute soit demain soit samedi*, the final schwa of *discute* and the internal schwa in *samedi* do not surface in normal speech (*On discut' soit demain, soit sam'di*) while the initial schwa in *demain* is optional.¹ We thus observe that, in polysyllables, left edge syllables are stronger than right edge syllables since they may maintain their schwas. Given that privileged positions are typically root-initial syllables [1], given furthermore that they tend to preserve contrasts, and are resistant to elision, we consider that the word initial syllable is a strong position in French.² We pointed out in 1. that schwas in monosyllables are variable as well. If the root initial syllable is privileged, we expect initial schwas in polysyllables to be stronger than schwas in monosyllables where the right edge syllable, by definition, coincides with the left edge syllable of the word.

HYP(OTHESIS) 1: initial schwas in polysyllables are stronger than schwas in monosyllables.

Considering initial positions as strong positions entails further proposals to which we now turn.

3.1. Prosody and the compensation principle

We presume that schwas in initial word syllables are stronger than in medial syllables, a factor which bears upon their presence. We propose that the phonetic realisation of a schwa will suffice to single out that particular syllable from its context, that the syllable including schwa will not be affected by stress. If, as alluded to in 1., the mere presence of schwa fulfills the same function as stress, we do not expect to observe a stressed realized schwa unless the stress serves a pragmatic purpose. This follows from Grice's maxim of quantity [4] stating that an optimal discourse will include as

¹ This is obviously a gross oversimplification of the data and we will not take into account the segmental context.

² It might appear paradoxical to base a claim of positional strength upon the behavior of the weakest vowel of the French system. There exist however a series of phonological facts supporting such a claim [10].

much information as necessary, but no more than necessary. In this way, redundancy is best avoided in a discourse.

We know however that schwa can optionally delete in initial syllables, and when it does, we lose the information carried out by its positional presence. We then hypothesise that if a schwa is not realized, its absence will be compensated prosodically by a prominence on the following syllable, which now becomes initial.

HYP 2a: a schwa in an initial syllable cannot be both present and prosodically prominent.

HYP 2b: when a schwa is deleted word-initially, the resulting initial syllable is perceived as prominent.

3.2. Constraints hierarchy

Until now, we confined ourselves to simple environments, but when two contiguous syllables contain a schwa, positional faithfulness comes into conflict with other constraints. The standard realisation of a string $X C @ \cong 1 Y C @ 2 Z$ is that either @1 or @2 is deleted, but not both. In order to address this question, we appeal to two constraints: a prosodic constraint and a morphological constraint. The prosodic constraint states that when two schwas appear in contiguous syllables within a phrase, the syllable closer to final stress is weaker. The morphological constraint on the other hand, states that when two schwas appear in contiguous syllables, the schwa in a clitic is weaker than that of a full lexeme. These two constraints are not ordered and can produce different outputs. Consider the following examples: *tu le demandes, il est revenu*. When the prosodic constraint dominates the morphological constraint, *tu le d'mandes, il est rev'nu* are the generated outputs. On the other hand, the reverse order with the morphological constraint dominating the prosodic constraint will produce different strings: *tu l' demandes, il est r'venu*. In the latter case, morphological integrity is maintained when the root schwa is realised.

When two clitics with schwas are contiguous, the morphological constraint is inactive leaving the floor to the sole prosodic constraint. Thus, we predict that the string *tu le retrouves*, where both *le* and *re* are clitics, will have one and only one realisation: *tu le r'trouves*. However, this is not the case, and the variant *tu l' retrouves* is equally possible, implying that other factors are at play, factors that we will not pursue here. We now turn to the results of the codings before confronting them to the hypotheses developed in this section.

4. Interactions between schwa and prosody: results from a corpus

Although our coding procedure included transcribing and coding syllables with or without schwas in all word and utterance positions, we confine our study to the segments we have termed variable schwas (#C@# and #C@X) examining whether they are perceived as prominent or not (fields 1 and 2 in our coding system).

4.1. Schwa: presence vs. absence

Figure 1 below, shows that schwa is preferably absent in our corpus.

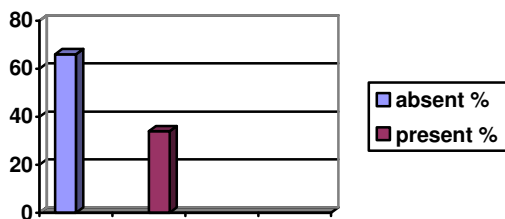


Figure 1: Variable schwas in the corpus

We need to separate monosyllables from polysyllables since our corpus contains twice as many monosyllables (187 tokens) as polysyllables (97 tokens). When we consider monosyllables and polysyllables separately, two distinct systems emerge.

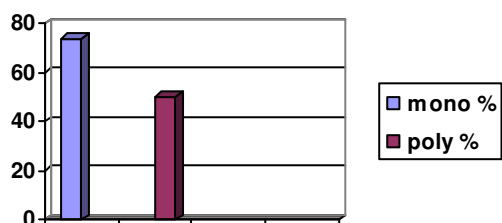


Figure 2: Variable schwas absent in the corpus

Figure 2 shows that a schwa is more likely to be absent in monosyllables than in polysyllables, a 24% difference being significant enough to require accounting for.

4.2. Schwas present and perceived prominence

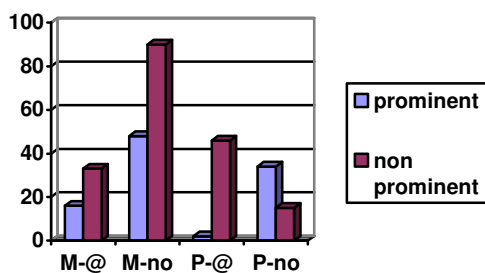


Figure 3: Perceived prominence

In figure 3, a striking opposition between mono and polysyllables emerges. Comparing columns 1-2 (monosyllables with a realized schwa) with 5-6 (polysyllables with a realized schwa), we note that while half of the monosyllables with schwas (16/33 tokens) are perceived as prominent, only 2 schwas in initial position of polysyllables out of 46 are likewise said to be prominent. When schwa does not surface, the same type of distinction prevails: columns 3-4

(mono. without schwa) indicate that, parallel to the situation observed when schwa is present, half of the monosyllables without schwas are perceived as prominent (48/90). Columns 7-8 (polysyllables without schwas) contrast blatantly with columns 3-4, as initial syllables of polysyllables are overwhelmingly perceived as prominent (34/15) when schwa is not realized.

4.3. The physical manifestations of prominence

Figure 4 brings further support to the basic distinction we have established between mono- and polysyllables. It also sheds some light on the different acoustic correlates of prominence in French.

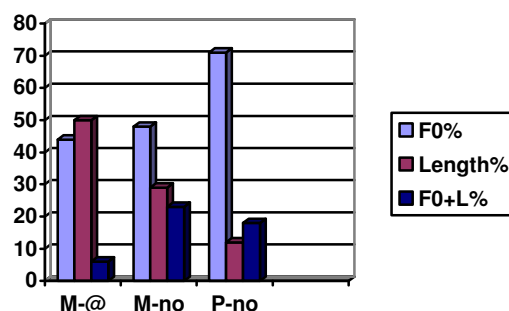


Figure 4: Acoustic correlates of prominence

Figure 4 clearly points out to the major role played by F0 in detecting prominence in polysyllables (column 7), while F0 and length are equally significant in monosyllables. Most theoretical models (for example [6]) rank F0 highest among determining factors for detecting prominence in French. That length alone can fulfil this task requires closer examination, but it might part of a general tendency in current French to lengthen segments.

5. Discussion

We now re-examine to our hypotheses and evaluate how they fare when confronted with our results.

5.1. Monosyllables and polysyllables: two systems at work

We presented in 3 three hypotheses based upon two intertwined assumptions. We proposed that a syllable maintaining a variable schwa, similarly to a stressed syllable, is perceived as standing out of its environment, and that initial positions were privileged in French. This led us to predict that monosyllables and initial syllables in polysyllables would exhibit different behaviors. Our results fully concur with this prediction: figure 2 shows that monosyllables lose their schwas more easily than polysyllables.

According to HY 2a, a schwa cannot be both present and prominent, and although this is true of polysyllables, it is in contradiction with our results concerning monosyllables. To account for these cases, we propose to extend the notion of positional faithfulness to units larger than the word. A monosyllable initial within a prosodic phrase carries a heavier functional load than if it is confined to the middle of a phrase.

In this particular case, redundancy is expected and the vowel is stressed. A polysyllable, on the other hand, seldom appears phrase initially and therefore no redundancy mark is called for. The compensation principle (HY 2b) is responsible for the observed prominence on initial syllables resulting from the loss of a schwa. The loss of a segment is compensated by a stress mark. Monosyllables and polysyllables both exhibit variable schwas susceptible to be stressed, but the presence of a prominence proceeds from two distinct sources. Stress in monosyllables finds its motivation in discursive factors while stress in polysyllables finds it in structural factors. Taking into account all these observations leads us to posit that variable schwas do not make up a homogeneous class; initial schwas are underlying, which is confirmed by the positive results concerning HY 2b. Nothing in our results on the other hand, supports an analysis with underlying schwas for monosyllables, and they might be the result of insertion strategies, [2] (whatever the correct formalisation).

5.2. F0, length and prominence

When prominence proceeds from discursive factors, a certain amount of redundancy is expected (by the maxim of quantity) and we anticipate that its acoustic correlates will be a combination of F0 and length. This is not the case. Figure 4 indicates that F0 and length share the task on an equal footing. An in-depth study of the data will show whether there exists a one to one correspondence between length and prominence, or whether length is the result of hesitations.

6. Conclusion

This study unveils a few promising paths on the long road leading to a better understanding of schwa behavior. We examined the relevance of prosody in variable schwas' behavior. 25 speakers were selected and coded for a reading task and two types of interviews. Our preliminary analysis brings forth substantial differences within variable schwas leading us to postulate the existence of two separate classes: schwas in monosyllables, or discursive schwas, and schwas in polysyllables, or structural schwas. These distinctions will be later refined by taking into consideration the other fields in the coding system. Among other things, analysing the size of stress groups and the impact it has on the presence of schwas are two tasks awaiting completion.

Our corpus brings to light another element that the scope of this paper did not permit us to develop. There exist marked geographical differences in our corpus. It comes to no surprise that southern French speakers maintain most of their schwas, and further study of the corpus will show whether two classes of variable schwas are warranted for these speakers. Frequency is another parameter which deserves attention. Our corpus includes numerous examples of frequent locutions indicating that frequency of usage intervenes strongly in the absence of schwas and might be responsible for the transition between a conservative dialect (southern French) and a more standard one (Parisian French).

We hope to have shown however, that segmental analysis - and in particular French schwa - benefits from inviting prosody in its midst. Prosody cannot and should not be dissociated from analyses of variable speech phenomena.

7. Acknowledgments

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