

# The Implicit Prosody Hypothesis applied to Foreign Language Learning: From oral abilities to reading skills

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## Abstract

This study investigates the positive influence of *oral* skills' training on *reading* abilities for learners of French as a foreign language. We hypothesize that teaching prosody, especially at an early stage of the learning process, will not only improve students' speech fluency and pronunciation skills, but also dramatically improve their strategies to decode written speech.

We conducted a longitudinal study over eight weeks with four English students of French, split into a *Control Group*, where the teacher focused on reading comprehension, and a *Test Group*, where she emphasized phonetic correction and prosodic abilities.

Both acoustic and perception data indicate an improvement in reading fluency within the *Test Group* only, especially for the beginner student.

**Index Terms:** Prosody, transfer of oral abilities on reading skills, Didactic of French as a Foreign Language, "Verbo-Tonal" Method.

## 1. Introduction

Prosody is the first element one acquires when learning one's native language [14]. The prosodic structures, the rhythmic and intonational characteristics of one's language, are the first linguistic features a child acquires before any other linguistic levels (phonemes, lexicon, syntax etc...). Recent studies have shown that newborns are able to distinguish their mother tongue from any other language relying on rhythmic cues only [15].

Prosody is thus the most deep-rooted linguistic element in one's system, which makes it hard for learners of a foreign language to get rid of. Foreign language teachers and teaching theoreticians constantly point out the difficulty for students to learn a foreign prosodic structure, which highly contributes to their foreign accent [16].

### 1.1. The place of prosody in foreign language teaching methods

Although prosody is a fundamental parameter in both language acquisition and language learning, traditional methods focused largely on written texts as a means to learn a foreign language. Only in the mid 60's did foreign language theoreticians take into account its role in language acquisition and its potential impact on foreign language learning. At this time, a teaching method called "*Méthode Structuro-Globale Audio-Visuelle*" or "*SGAV*" [11] was developed. It was the first method to suggest that phonetics, both segmental and supra-segmental, should be taught prior to any other linguistic aspects in a foreign language, especially at an early stage in the learning process. Oral skills are thus taught for 6 weeks before any written element is introduced. This proposition stems from an unusual view on auditory perception processes. Indeed, Guberina [11] made a parallel between hearing-impaired persons and learners of a foreign language: both will

structure the sound background with their own system. In the first case, the system is biased by pathological factors, in the second case the system depends on the learner's own language system. Language learners will thus perceive the prosody and the phonemes of a foreign language through their own prosodic and phonemic system (*cf.* the notion of "*crible phonologique*", ("*phonological sieve*") [12], [17]).

By recommending that oral abilities should be taught first, the SGAV emphasizes the phonetic features of languages. However, unlike the articulatory method which focus on teaching the proper articulatory gestures to language learners, the SGAV uses the prosodic structure of the target language as the 'shell' for pronunciation skills' improvement. More specifically, this prosodic-driven methodology (called the "*Verbo-Tonal Method*", henceforth *MVT*) uses the rhythmic pattern of the target language to bring to light the phonemic specificities of the target language. The third author uses this methodology with learners of French as a Foreign Language (henceforth *FFL*) of various linguistic backgrounds [2]. The teacher first helps the learners familiarize themselves with the prosodic structure of the target language through the repetition of prosodic patterns using logatoms (/dadada/). He then uses the prosodic structure to facilitate phoneme perception. For example, if the learner darkens the timbre of a target phoneme, the teacher will pronounce the phoneme in a prosodically brightening context (accented syllable) and have the learner repeat it in the same context, on the basis that there is a phonological loop between the production and the perception of phonemic features. Namely, a facilitating production context will help the learner perceive the proper phonemic features of the target language and thus it will help them to be able to correctly re-produce in any other prosodic contexts. The *MVT* thus focuses on implicit prosodic learning.

This teaching method was, however, gradually abandoned in the 80's with the arrival of the Communicative Approaches, stipulating that prosodic contours - as well as phonemes - are acquired naturally in the course of the learning process. Furthermore, and contrary to what the SGAV recommends, oral practice is not prioritized anymore: writing and reading activities are re-introduced at the very beginning of the learning process.

We argue that such theoretical choices are questionable, not only in light of our own teaching practice, but also when looking at some issues raised by research in cognitive sciences.

### 1.2. Questioning the practical experience of class

According to the *Common European Framework of Reference for Languages* (hereafter, *CEFRL*), advanced level students (level B) should speak without any accent, thanks to mere repeated contacts with the foreign language. The first author's own experience of teaching *FFL* to English students, however, is in contradiction to such a statement. Even though advanced, students still transfer the prosodic strategies of English onto French: pauses are shorter and more numerous than they

should be in French, and may appear in the middle of verbal phrase, which is non-grammatical in French but not in English [9]. The distribution and acoustic characteristics of accents are those of English rather than French. The length of rhythmic groups is also more erratic than it would be in native French [1].

Although there is a similarity in the quality of prosodic errors in spontaneous speech and reading aloud, the students' performances are noticeably worse in reading than in spontaneous speech activities. This may seem quite surprising considering that students are provided with a script and no planning is involved. Their decoding of the script is also facilitated by punctuation, which provides some structural indication, even though punctuation does not encompass the richness of the prosodic structure ([10]; [13]).

In the Communicative Approaches, reading and writing activities are introduced at the beginning of the learning process, without any preparation. It is as if higher-level competence (such as grapheme/phoneme correspondence or lexical access) is expected to be automatically transferred from one language to the other. Lower-level competence (such as phonetic skills) is neglected, when the use of the phonologic code is actually the most important basis for good reading [8]. Billières [3] poses that an audio-phonatory practice introduced early in the learning process will help students access the phonological conscience of the target language. Once this phonological code is mastered, the acquisition of the other levels of linguistic competence will more easily fall into place.

### 1.3. Looking for cognitive insights

This proposition echoes some recent findings on native language writing decoding strategies. It's been argued that prosody is used in silent reading (*Implicit prosody hypothesis* [6]; [7]). More specifically, readers project a prosodic structure onto the text, indicating that prosody is treated as part of the input of the written material.

Thus, in language learning, one could argue that if the prosodic structure of the target language is not mastered, the learner will project the prosodic structure of its native language on the text, hindering considerably the decoding process of the written text and its comprehension.

Recent data in cognitive sciences using brain imaging bring an additional insight to this issue [4]. Anatomical and functional characteristics of the brain may hint to a possible transfer of auditive skills onto writing and reading skills: not only are visual and auditive areas interconnected *before* children learn to read, but also the Wernicke's area - where oral and written language comprehension is allegedly processed- is located at the crossroads of those two areas. Hence, any linguistic process that has been learned prior to the development of reading and writing skills could 'feed' the visual modality.

Because prosody is so deep-rooted in our linguistic experience, and since it allegedly governs speech encoding and decoding processes [5], we argue that prosody is at the center of language learning abilities.

### 1.4. Research questions

On the basis of these observations, we argue that foreign students' fluency in both spontaneous *and* read speech will depend on their capacity to encode the prosody of the target language. The implicit training of prosodic parameters via the *MVT* could have a positive incidence on their speech fluency, and thus on the decoding of written speech. Moreover, should the cognitive processes underlying language learning and language acquisition be comparable, the impact of this training

should be more important at an early stage of language learning.

## 2. Material and procedure

### 2.1. Material and experimental design

This pilot study is based on the analysis of the reading of a short argumentative text by 4 English speakers (3 females; mean age: 29; age range: 18-40). They were living in France but were not attending any French class at the time of the experiment. They all had at least school basic knowledge of French, and some of them had attended classes at the French Alliance in Toulouse. A short oral interview allowed the first author to evaluate their level in French according to the *CEFR*. Speakers MM and SR were judged to have an elementary level in French (level A), whereas speakers DR and AM had an advanced level in French (level B).

To test whether a specific training in prosody prior to any reading/writing activity is a condition to better fluency in decoding a written text in the target language, we chose to compare the impact of two radically different teaching methods. The speakers were divided into two groups of classes, both of which lasted 2 hours a week over a period of 8 weeks. In the first class, based on the Communicative Approaches, the teacher (first author) focused on reading activities: global text comprehension, reading out loud and creative writing (*Control Group*). In the second class, based on the *MVT*, she emphasized on phonetic correction and prosodic abilities, through oral practice exclusively: repetition of tongue-twisters and rhymes, rhythmically balanced sentences, improvisation and role games etc. (*Test Group*).

In order to test the level at which the type of training is most beneficial, each class was composed of an A-level and a B-level student. Hence, speakers SR and AM were in the *Control Group*, and speakers MM and DR were in the *Test Group*.

The speakers were tested twice - before and after the 8 weeks' training - on the same text material. The text was created specifically for this study around an argumentative theme (the benefits of bikes over cars in cities). It was adapted from an exercise found in a *FFL* teaching method. It contains 11 sentences organized in 4 paragraphs. The argumentative structure of the text is meant to help the students get involved in their rendering of the out-loud reading.

Speakers were asked to read the text for themselves as many times as they needed before reading it aloud to be recorded. The tests were taken in the same conditions in the two recording sessions 8 weeks apart.

### 2.2. Experimental procedure

Speakers were tested individually and recorded with head microphones using an audio-recording software (Soundtrack-Pro ©; 16 bits/44kHz).

Recordings were analyzed both acoustically and perceptively. The acoustic analysis allowed us to determine the prosodic parameters that are most representative of *FFL* speakers' fluency before and after training. The perceptual analysis allowed us to complement the acoustic analysis with a qualitative appreciation of their fluency, more representative of a practical class evaluation.

#### 2.2.1. Acoustic analysis

The first two authors listened to the recorded texts and labeled manually the syllables and pauses for each speaker, using

Praat. The prosodic parameters chosen to best reflect speakers' fluency are the following:

- Number, distribution and duration of the different types of pauses (breathing and empty pauses, vocal hesitations and false starts). Break phenomena that were found inside a word or phrase were labeled as non-grammatical, whatever their type.
- Number, distribution (initial vs. final) and duration of perceived accents, and duration of unaccented syllables. Final accents were labeled according to the strength of the associated prosodic boundary (minor vs. major) [1].

*Statistics:* For each speaker, one-way Anovas were conducted on each type of accents and each type of breaks separately, with the Log Duration and Occurrences as dependent variables, and the State (before/after training) as the independent variable (two-level factor).

### 2.2.2. Perception test

12 native French subjects, all prospective French teachers, took part in the experiment. They were presented with 264 sentences in 3 different runs: 11 sentences \* 4 speakers \* 2 States (before/after training), randomized within each run. Six different randomized runs were created and each participant listened to a different combination of three runs. They were asked to judge the fluency of the speakers' production on a magnitude scale from 1 to 7 (1 = poor fluency or beginner; 7= good fluency or native speaker). The perception test was run using Presentation© and lasted approximately 50 minutes, including a training phase and a two minute pause between each run.

*Statistics:* To test for the influence of the training method on subjects' judgment of speaker's fluency, we used a linear mixed model with a random intercept to account for the variability across the 12 judges and a random intercept to account for the variability across the 11 sentences. The dependent variable was the response (1 to 7), with the training method (*Control* vs. *Test Group*) and the State (before vs. after 8 weeks) as factors. To test for the incidence of the training method according to the speakers' level in French, we performed paired t-tests for each speaker, with the mean response of each listener according to State (before and after training).

## 3. Results

### 3.1. Acoustic results

Statistical analyses revealed no significant difference for Occurrences of types of accents and types of break for both groups of speakers.

The Duration of all accent and break types (including non-grammatical breathing and silent pauses) was shortened for the *Test Group* speakers after training, but not for the speakers of the *Control Group*. The Duration variable however reached significance for one speaker of the *Test Group* (MM) only, and for a subset of prosodic phenomena. More specifically, this speaker exhibited significantly different strategies before and after training for the durational control of grammatical breathing and silent pauses, as well as Final accents at minor boundaries, and unaccented syllables. The duration of breathing pauses was divided by two between the 2 tests ( $F(1; 62) = 34.04; p < .001$ ), and significantly shortened for silent pauses ( $F(1; 55) = 5.17; p = 0.03$ ). Minor final accents and unaccented syllables were also significantly shortened (respectively,  $F(1; 145) = 7.80; p = 0.006$ , and  $F(1; 500) = 13.65; p < .001$ ).

### 3.2. Perception test's results

Participants' responses were concentrated around the middle of the magnitude scale (mean scores = 4) in their judgment on speakers' sentences before and after training in both groups. However, the interaction coefficient was highly significant ( $\beta = 0.336, t = 3.52, p < .001$ ), indicating that the score for the *Test Group* was 0.336 superior to the score of the *Control Group* after training (cf. Figure 1).

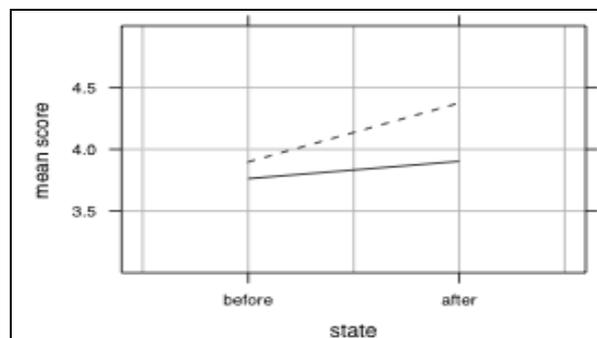


Figure 1 Mean score before/after training in both groups (dotted line = *Test Group*; full line = *Control Group*)

As shown in Table 1, the mean scores for the *Control Group*'s speakers did not significantly improve before and after training, whatever their level (+ 0.14 for both speakers:  $t\text{-test} = 0.5863; t = 0.5606; df = 11$ , for the A-Level speaker SR; and  $t\text{-test} = 0.08; t = 1.9149; df = 11$  for the B-level student AM). For the speakers of the *Test Group*, conversely, the mean scores were significantly improved, especially for the beginner speaker (+0.62:  $t\text{-test} = 0.0069; t = 3.3166; df = 11$  for the A-Level speaker MM; and + 0.45:  $t\text{-test} = 0.0116; t = 3.0225; df = 11$ , for the B-Level speaker DR, respectively).

Table 1: Mean scores before/after training for each speaker

Training Methods	Level	State	
		Before	After
Test Group	A-Level (MM)	2,46	3,08
	B-Level (DR)	5,22	5,67
Control Group	A-Level (SR)	3,33	3,47
	B-level (AM)	4,20	4,34

## 4. Discussion

The aim of this study was to evaluate the impact prosodic training on reading abilities of *FFL* learners, using the *MVT* training method. The main hypothesis was that a training exclusively dedicated to oral skills' development, with emphasis on the prosodic characteristics of the target language, would facilitate the decoding of the written code of the target language.

The prosodic structure can be seen as the 'shell' of a given language, structuring the verbal material at the phonemic, lexical, syntactic and pragmatic levels of the linguistic system. Ontogenetically, the prosodic structure is the first linguistic level the child acquires before all other levels. Because it is so deep-rooted into the speaker's linguistic experience, it is also the most difficult feature to get rid of when speaking a foreign language.

Moreover, following Fodor's *Implicit Prosody Hypothesis*, postulating that the prosodic structure is mapped onto the text to encode the written word-string in silent reading, it is

probable that prosody helps access higher-level competencies by creating encoding automatisms in the target language. Thus, the earlier the FL learner is familiarized with the prosodic structure of the target language, the easier it will be for him to access other levels of the linguistic system. This facilitation of the decoding process will have direct incidence on the reading fluency in the target language, with less occurrences of break phenomena in the speech string, and shorter duration, as well as less accentual density and shorter accent duration.

We ran a pilot study on four English learners of French, divided into two groups: a *Control Group* where the language training was based on traditional teaching methods, and a *Test Group* based on a prosodic oriented teaching method (*MVT*).

Globally, our acoustic data revealed limited impact of language training on speakers' fluency. Speakers exhibited the same number of non-grammatical pauses, false starts and vocal hesitations before and after training, whatever the training method. As far as the Duration variable was concerned, there was a clear tendency for a shortening of grammatical and non-grammatical breathing and silent pauses for the speakers of the *Test Group* only, as well as a tendency to shorten the duration of accents and unaccented syllables. Because pausing and final lengthening are indicative of the planning process, these results suggest a better fluency of the reading of the *Test Group's* speakers. The reduction of unaccented syllables' duration also indicates a faster, more fluent speech rate. These prosodic parameters however reached significance for the A-Level speaker only, indicating that the *MVT* training is most efficient at an early stage of the FL learning. For the *Control Group*, the duration of breaks and accents did not vary before and after training. Their reading fluency was thus not improved.

The perception test confirmed these results insofar as the fluency of the *Control Group's* speakers was not better scored after than before training. Conversely, the perceptual test revealed a significant improvement for the *Test Group's* speakers, with a higher score (stronger improvement) for the beginner student. Globally, the *MVT* improved both speakers' fluency, but more significantly so for the A-Level student. This result supports the second part of our hypothesis postulating that prosody should be taught at an early stage of the learning process.

## 5. Conclusion

Our results tend to confirm our hypotheses: implicit training of the prosodic structure in the target language improves reading fluency. Indeed, only the two speakers of the *Test Group* showed significant improvement in their reading fluency revealing a better planning and understanding of the written text. This was particularly true for the A-Level, beginner student. Following up on Fodor's *Implicit Prosody Theory*, these results indicate that prosody helps the reader access higher-level competencies by creating encoding automatisms in both native and foreign language - especially when prosody is introduced before any writing or reading activity. This could also have implications for teaching reading to native children. Namely, it could well be that working on oral skills could improve children's reading skills, and help prevent reading difficulties such as grapheme/phoneme correspondence for example.

The follow-up of this study is planned at two levels: first, we'd like to confirm these results on larger groups of English *FFL* learners, since we are conscious that, at present, our Level Variable is confounded with individual speakers. The training phase will also take place over a longer period of

time. More prosodic parameters will also be tested, such as F0 patterns on accented syllables. Also, the syntagmatic distribution of break and accent phenomena will be closely investigated. Second, we plan to test the incidence of oral skills' training on *silent reading comprehension*, hypothesizing that mastering prosody of the target language will not only help the FL students be more fluent, but also help them understand the written text better and quicker.

## 6. Acknowledgements

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