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**EXPERIMENTAL RESEARCH INTO THE ACQUISITION OF ENGLISH
RHYTHM AND PROSODY BY FRENCH LEARNERS**

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Juin 2011

ACKNOWLEDGEMENTS

First of all, I would like to thank Maarten Lemmens for supervising this work and enabling me to explore a field that I truly like. I am very thankful to his help in every way. His constant good mood and kindness made this research very pleasant.

I am also very grateful to the French speakers who accepted to participate in my experiment: Nicolas, Julie, Ophélie, Amandine, Maggy, Mélanie, Lucas, Corentin, Maxime, and Sabrina. Without them, my project could not have been completed.

I wish to thank Jenny Salata, Anne Molloy, Sarah Christine Lloyd, and Kathleen O'Connor, thanks to whom I was able to recruit participants.

Many thanks to the three listener-judges: Tracey Evison, Sarah Christine Lloyd, and Rodica Calciu-Hanga, who kindly accepted the experiment despite the large amount of work and time that it implied.

Finally, I want to thank my family, and especially Nicolas, for having supported me and helped me as much as they could.

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INTRODUCTION

In everyday speech, it is very common to come across such phrases as *it's not what you said but the way you said it*, or a situation in which a mother disapproves of her child's *tone* (Wells, 2006). These simple instances seem to provide some evidence that not only phonemes, but the global structure of a spoken language, and more particularly its prosody, have a crucial role to play. When it comes to the acquisition of a foreign language, suprasegmental features¹, i.e. literally the features "above the segments" such as stress, rhythm, and intonation, thus play a major part in pronunciation skills, intelligibility, and foreign-accentedness. In this respect, Mennen (2006) contends:

Just as poor pronunciation [of individual sounds] can make a foreign language learner very difficult to understand, poor prosodic and intonational skills can have an equally devastating effect on communication and can make conversation frustrating and unpleasant for both learners and their listeners. (3)

It is true in both French and English that communication can easily be broken, e.g., if the intonation of such-or-such sentence is not realized properly – an intended polite request pronounced with a low pitch and a falling tone can be perceived as an abrupt command. Similarly, if rhythm and stress patterns are not respected as they are when one speaks a foreign language, the intelligibility and comprehensibility of the message will be affected. In fact, just like rhythm and beats in music – hence the borrowing of the words in phonology (Bertrán, 1999) –, rhythm and stresses in language constitute a basis for accurate pronunciation. By the same token, Busà (2008: 118) believes that "focusing on stress, rhythm and intonation can help learners to improve their overall pronunciation, and to sound more natural, and can lead to more comprehensible speech as well as better understanding of other people's speech". However, non-native speakers may not be quite aware of it and tend to focus on the production of vowels instead, especially if their native language differs considerably as far as rhythm and prosody are concerned.

The present study was motivated by the observation that French learners of English as a Foreign Language (abbreviated EFL) very often fail to be properly understood by native English speakers in spite of a sometimes impeccable pronunciation of segments (e.g. Birdsong, 2003). When French speakers attempt to speak English, most of the time they use a typically French rhythmic pattern, rather than take into account the English alternation between stressed and unstressed syllables and the vowel reduction phenomenon that naturally results from that. They also have difficulty with what Halliday (1967) calls tonicity, or the placing of the nuclear accent (also called nucleus, tonic, or tonic accent), which might cause a wrong focus on new or contrastive information, or simply a stronger, unpleasant foreign accent. The obvious differences between English and French phonologies are at the origin of the problems that French speakers have with English pronunciation. Not only the stress and accent systems, but more generally the prosodic structures of the two languages share hardly any characteristics. Moreover, contrary to written English, one of the difficulties

1 According to Roach's glossary (2009), the term *suprasegmental* was originally used by American writers, whereas *prosody* was more British. Throughout this work, the term *prosody* encompasses stress, rhythm, and intonation.

that arise about spoken English is that it may not be so easily understood by French learners, and even any foreign learners, who might first hear nothing but a single stream of sounds. Oral language does not seem, at first, to be segmented like written language and its clear-cut punctuation, and learners cannot rely on such things as orthographic similarities to understand a word. In this respect, French speakers do not notice the differences in stress patterns, rhythm, etc. Instead, they might only point that the English language has a different, particular – or peculiar – melody. That is why the role of foreign language teachers is to help learners overcome their difficulties and avoid recurrent errors.

In French secondary schools, where foreign languages and especially English are compulsory, there has been apparent priority given to the teaching of grammar and vocabulary. Teachers correct their students' lexical or grammatical mistakes, but not so often mispronunciation, apart from the unexpected irregular pronunciation of certain words such as *recipe* /'resəpi/ or *psychiatry* /saɪ'kaiətri/² (personal interview with two English teachers, March 2011). Ploquin (2009: 40) goes as far as saying that pronunciation teaching “is seen as some form of gilding” in language classes, which means that foreign language teachers intentionally dismiss the teaching of pronunciation as a superficial element. In addition, when pronunciation is taught, the articulation of individual sounds is emphasized, mainly with exercises on the distinction between lax vowels and tense vowels, at the expense of prosodic features. Still, one could argue that the role of suprasegmentals is just as important, all the more as a French learner of English is not naturally aware of the great differences between his/her native language and the target language.

As is specified in Derwing and Munro (2005: 386), “it is widely accepted that suprasegmentals are very important to intelligibility, but as yet few studies support this belief”. Separate studies on English and French phonologies, including an interest in prosody for a few decades, are not lacking. However, cross-linguistic studies on these two different systems are scarce. Vaissière (2002: 1) mentions “the lack of a comparable way of describing prosody in different languages”; giving the obvious prosodic differences between the two languages, it is hard, in the author's view, to analyze the two prosodic systems with the same tools. Very few experiments have been carried out on the acquisition of English phonology by French learners, and even fewer on the acquisition of suprasegmentals (e.g. Tortel, 2009). Accordingly, one of the central objectives of this project is to elaborate a pilot study, leading to a future full-scale one that will enable us to have evidence of the importance of prosody with respect to segments. A parallel between the acquisition of English segmentals and suprasegmentals by French EFL learners should be drawn so as to arrive at better EFL teaching methods.

The procedure of the pilot experiment that we mean to conduct is as follows: by use of carefully-created stimuli, and after a first control recording of their pronunciation of English, French speakers will be divided into two separate groups with a different focus each. One group will receive a standard training on English segments, and the other group will focus on rhythm and prosody. Then, after a second recording, native English speakers and experts in English phonology will rate the productions in a blind evaluation, and it will become possible to have a comparative insight into the effect of each training on the production skills of the subjects. The latter will be evaluated and compared to determine which aspect of

2 The phonemic transcriptions are from Wells's *Longman Pronunciation Dictionary*, 2007.

English pronunciation has the better effect on their production, but also to witness the evolution within the groups and the efficiency of a prosodic training in comparison with a segmental training. In the scope of this work, it is the elaboration of the stimuli and of the whole experimental protocol that is especially focused on, with an emphasis placed on read speech. With the results of the pilot experiment, the way will be open to future between- and within-groups experiments that will take into account the effect of longer trainings on perceptual skills, read speech, and spontaneous speech of a larger number of participants. Apart from the direct goal of the experiment, this research also involves the field of teaching and didactics. Future findings will bring into light which aspects of English pronunciation teachers should insist on rather than simply giving more importance to vowels and taking no, or at least little, heed of stresses, accents, rhythm, and intonation.

Therefore, the central hypothesis of this study is that prosody, i.e. suprasegmental features of English as a Foreign Language, are as important as, indeed more important than, segmental features in speech intelligibility, communication, and foreign-accentedness. Being understandable and understood by native English speakers is not necessarily a question of articulatory phonetics. Rather, producing rhythm correctly and placing stresses and accents where they should be may prove to have more weight in intelligibility and communication, if not to be sufficient. The underlying claim is that the teaching of rhythm and prosody in EFL class contexts should be re-evaluated, regarded as a primary aspect of English pronunciation, and no longer underestimated. The hypothesis will be verified through the elaboration and results of the experiment after reviewing the existing literature on the same research domain.

In Chapter 1, English pronunciation from the point of view of French EFL learners is examined. It is indeed necessary to single out learners' pronunciation problems before applying future findings to the field of teaching. The chapter includes the place of the teaching of pronunciation among the teachings of grammar and vocabulary, as well as a parallel between the teaching of segments and that of suprasegments when pronunciation happens to be present. Then, a descriptive overview of the most common segmental and suprasegmental difficulties that French speakers come up against will serve to analyze some typical production errors, and the extent to which they might lead to unintelligibility and stronger foreign-accentedness. Together with a brief word on the syllable-timing/stress-timing distinction, that will help us understand why French learners become discouraged when it comes to learning English pronunciation, and why the suprasegmental aspect of spoken English is overlooked by teachers. At the same time, the account of the most predictable errors by French EFL learners will go hand-in-hand with the creation of the stimuli of the experiment, detailed in Chapter 3.

In order to elaborate the experiment, it is necessary to have a clear view of previous and ongoing studies on the acquisition of English phonology. That is dealt with in Chapter 2. One section is devoted to the acquisition of English as a First Language (abbreviated L1), with a particular focus on the acquisition of segments compared with the acquisition of prosody in the first years of life. The development of both perception and production capacities in infants is looked at. The other section is on Second and Foreign Language (L2) Acquisition³. However, given the pivot of the present work, the acquisition of phonology in the context of

3 Throughout this work and in the several studies that are mentioned, the term *L2 acquisition* refers to both second language acquisition (SLA) and foreign language acquisition (FLA).

Foreign Language Acquisition is especially emphasized. The whole section comprises the acquisition of L2 segmentals, the acquisition of L2 suprasegmentals, and an account of the few comparative studies on their respective roles. The parallel between L1 and L2 acquisition will serve not only to have an insight into the processes of acquisition of segments and suprasegments, but also to compare L1 acquisition with L2 acquisition, leading to the question of the order of importance between segments and suprasegments in L2 teaching. The resulting overview will enable us to enhance how our project fits in the literature, and consequently to accentuate its interest and originality.

In Chapter 3, the objective and procedure of the pilot experiment are explained. Above all, the elaboration of the stimuli and trainings is detailed, and a description of all participants – subjects and listeners – is provided. Chapter 4 dwells on the results of the experiment, and therefore concludes on the possibility or not to use the experiment as a basis for future research in the context of the acquisition of English as a Foreign Language by French speakers.

Finally, Chapter 5 is a general conclusion on the whole experimental research, and it provides an answer to the central hypothesis. It also highlights the limitations of the study and gives perspectives for further work.

CHAPTER 1. ENGLISH PRONUNCIATION AND FRENCH LEARNERS

1.1. The status of English pronunciation teaching in France

1.1.1. The place of pronunciation in EFL classes

As Abercrombie (1967) puts it, spoken language and written language can be defined as two different yet complementary mediums of one and the same language. The learning of a language should include both of them equally, even if they may be taught separately in school context. In our view, the teaching of English pronunciation in France is very limited if compared with that of vocabulary or grammar.

In France, secondary schools necessarily offer the possibility to learn foreign languages, among which English is the only one that is always present and compulsory at some point or another, i.e. usually in the first year (*sixième*) or in the third year (*quatrième*)¹. This situation is undeniably due to the status of the English language in the world, as it is considered to be an international language that one can use almost anywhere one goes. In this respect, let alone English-speaking countries such as England, Ireland, Australia, etc., using English to communicate anywhere in the world implies using spoken language. It cannot be expected from a non English-speaking country to use written English for signs, notices, books, labels, or leaflets, and it is even less conceivable that a tourist would write in English on a notepad to communicate. This communicative feature of English is what has been highlighted by the Official Instructions for teachers of English as a Foreign Language in France. Nevertheless, it has not always been the case, and there is a risk of discrepancy between what should be taught and what is actually taught, hence an apparent priority given to vocabulary and grammar in EFL classes (Herry, 2001: 9).

Over the last few decades, several authors have described the teaching of pronunciation as the “Cinderella” area of foreign language teaching (e.g. Greenwood, 2002; Kelly, 1969). The place of pronunciation always depended, and still depends, on the Official Instructions by the French Ministry of Education. In the first part of the 20th century, pronunciation held a rather important place especially in the first years of secondary education, with such approaches as the Active Method or the Direct Method, in which the teaching of phonetics played a large part (Celce-Murcia, Brinton & Goodwin, 1996; Kelly, 1969; Silveira, 2002). But it also went through a decline and the absence of phonetics in curricula, for example during the development of the Cognitive Approach to language teaching. Up until today, the principal exercise in French *lycées* has always remained text comprehension, peppered with grammar points and sometimes translation. As evidence of the lack of pronunciation treatment, it should be noted that there is currently no compulsory oral exam – comprehension or expression – in English for the *Baccalauréat Général*, while written comprehension of especially literary texts is all pervasive. The teaching area is very limited.

The most recent approach to language teaching is the Communicative Approach, placing the emphasis on the teaching of written and oral production and comprehension alike, but this time aiming at intelligible rather than accurate pronunciation (Silveira, 2002). Furthermore, several authors agree that attaining native-like pronunciation “is not a realistic or even desirable goal” (Nakashima, 2006: 30). The place of pronunciation in EFL teaching

1 This statement does not take into consideration primary school, where the teaching of a foreign language is now also compulsory.

thus seems to be variable and not safe, as it has been prone to many changes. Nonetheless, an “ear-before-eye” method of teaching (Kelly, 1969), according to which the learning of spoken language should be put before that of written language, was sometimes recommended, albeit not necessarily followed.

1.1.2. *Segments vs. suprasegments in EFL pronunciation teaching*

Regarding English pronunciation teaching *per se* when it is taught, segmentals appear to be studied at the expense of prosody. Vowels and consonants are the basis for English pronunciation learning in French schools, however slight the teaching may be. Usually, it consists in the same repetitive exercises, that is, minimal pair drills (e.g. *beat* vs. *bit*, *leave* vs. *live*), spotting the odd one (e.g. *break*, *great*, *steak*, *breath*), or simply repeating words after the teacher (Kelly, 1969). Brown (1995: 169) challenges the very usefulness of the most widespread type of exercise that is the minimal pair drill (*cf.* 1.2.1. below), which he describes as a “not very meaningful exercise”. The scope of pronunciation teaching is all the more reduced as it displays not only an enormous advantage of segments over prosody, but also of vowels over consonants.

Today, with the new generation of the Communicative Approach, the International Phonetic Alphabet is re-introduced in textbooks. Concerning suprasegmentals, teachers do sometimes let learners know about the special rhythm of English as a stress-timed language (see 1.2.3. for more details) by giving regular taps on a desk, or by clapping their hands. Yet, a regrettable lack of a more thorough teaching of prosody is widely observable, even though English and French have totally different systems. McNerney and Mendelsohn (1992) point out:

Discussion with [ESL teachers] and an examination of some traditional pronunciation texts quickly reveal that the norm has been to devote the majority of time and effort to segmentals (individual sounds), and usually vowels. (185)

The authors assert that suprasegmental features are treated by teachers of English as a Second Language (ESL) as “peripheral frills” (*idem*: 185), and their remark is also applicable to EFL teaching. Thanks to a questionnaire, Burgess and Spencer (2000) found that EFL and ESL teachers very often see suprasegmental features as difficult to teach and learn, even if they are aware of their paramount importance. In fact, many authors and researchers acknowledge that suprasegmentals should be granted a more important status than segmentals in English pronunciation teaching, in as much as they are the basic structure of spoken language. McNerney and Mendelsohn (*idem*) further allege that “it is the suprasegmentals that control the structure of information”, and that they are “far more important” in communication (the authors' emphasis). As a justification to that, they remark that individual sounds can be inferred from the context, whereas suprasegmental errors cannot be helped or lessened by the context. For example, if a learner says *I cooked the meat in a pen*, with *pen* instead of *pan*, the context makes it possible to guess the intended word straight-away without too much mental correction from the listener. On the other hand, in response to *he went on holiday*, a rising intonation or misplacement of the nucleus in *where did*

he go? unequivocally expresses surprise or the need for confirmation, and not a real question asking for new information. As for French learners in particular, tones are not so major a problem, unlike nucleus placement and rhythmic patterns, as will be seen below (*cf.* 1.2.2.). At any rate, the role that suprasegmentals play is essential, and its being disregarded in EFL teaching is hardly comprehensible. In his article devoted to minimal pairs in pronunciation teaching, Brown (1995: 174) concludes that “minimal pairs should not be overemphasized at the expense of other aspects of pronunciation, such as stress, rhythm, intonation, and voice quality”, which means that there is no point in insisting on individual sounds, and prosody deserves more room in EFL teaching.

The need for a re-evaluation of the teaching of suprasegmentals in ESL and EFL contexts has been very much praised. A better place given to rhythm, stress, and other prosodic aspects is believed to make learners improve both their production and perception skills, and our experiment, described in Chapter 3, is an attempt at bringing support to that claim. As is very well summarized in McNerney and Mendelsohn (1992):

A short term pronunciation course should focus first and foremost on suprasegmentals as they have the greatest impact on the comprehensibility of the learner’s English. We have found that giving priority to the suprasegmental aspects of English not only improves learners’ comprehensibility but is also less frustrating for students because greater change can be effected. (186)

This view is supported by several other authors. In her book intended for French EFL learners and teachers alike, Huart (2002) recommends that the former should be made aware of the specific melody of English as early as the very beginning of the L2 learning process, even before vowels and consonants are studied. Similarly, Hodges (2006) has suggested the following order to teach English pronunciation to non-native speakers: word-level stress, sentence-level stress, intonation, consonants, vowels, and finally, linking. In the proposed patterns, segments are put in the background and are only attributed a secondary role. In reality, even in English studies at university level (*licence d’anglais*) where pronunciation is thoroughly taught, syllabi usually start with articulatory phonetics, the phonemes and the teaching of the International Phonetic Alphabet (IPA), then transcription practice, and only in last position is prosody taught, with syllable structure and stress in the middle position.

According to Ploquin (2009: 78), “it is clear that improvement of students’ production of rhythm must start with the improvement of our understanding, closely followed by a much-needed revision of what teachers are taught”. The origin of the problem here is what teachers themselves are taught, as is also defended in Herry (2001: 5). It is only when teachers have better knowledge of and training on the role and status of suprasegmental phonology that they will be able to teach what should be taught primarily, and assign to segmentals a more secondary role. In the competitive examination to pass in order to become a secondary school teacher of English in France (*Certificat d’Aptitude au Professorat de l’Enseignement du Second Degré*), candidates’ knowledge of phonetics and phonology is not examined at all. This just shows that English teachers are often not trained enough in phonology. One of the major problems that still subsists and is raised by many researchers is the lack of integration

between research findings and language classes (Silveira, 2002), i.e. the need for a collaboration between researchers and teachers (Burgess & Spencer, 2000; Klein, 1998; Pica, 1994). As is argued by Kelly (1969: 1), the approach to any discipline should be governed by “theoretical findings in the sciences on which the discipline rests”. Herry (2001) also underlines that, despite the growing research on prosody and the acknowledgement of its importance in communication, EFL teaching methods still do not integrate the findings.

Resulting from this overview of English pronunciation teaching, it appears that a revised version of EFL teaching should first and foremost put pronunciation before the teaching of grammar and vocabulary (*cf.* the “ear before eye” method, but also the very fact that a synonym for “language” is “tongue”, i.e. it should primarily be considered as something *oral*), and prosody before segments. Further research should investigate these claims in more detail. In addition, such a revision of the teaching of English pronunciation goes hand-in-hand with a close analysis of the recurrent difficulties that French learners come up against, as well as an account of the most frequent errors to avoid.

1.2. Phonological difficulties for French speakers

It is not rare to hear French students say that English pronunciation is “too difficult”, “too irregular”, or “too different”, hence very bad results in phonetics exams – the mean mark of students doing an English degree is sometimes around 5 out of 20. In this respect, Abercrombie (1967: 20) evokes the idea that a foreign language possesses “unpronounceable sounds”, but he specifies that those are just “myths”. Contrary to what L2 learners might think, there is no such thing as a typically English sound that French speakers are physically unable to pronounce, even though it is true that each language only uses a portion among all the existing human sounds. Abercrombie's argument is that from a biological point of view, all human beings have and use the same organs for speaking, heedless of their native languages, countries, religions, etc., and not to mention the universal language capacity of newborn infants, explained in more detail in Chapter 2.

Greenwood (2002) gives a list of problems that he believes to be the cause for the difficulties encountered by L2 learners as regards the pronunciation of the target language. Among them, he evokes personal factors: the lack of self-confidence, or sometimes a real embarrassment of speaking a foreign language in front of others. The true difficulty in hearing, and therefore producing L2 sounds and prosodic features also exists. Besides, the author points to methodology problems (see 1.1. above), added to conventional beliefs shared by the teacher, e.g. that students will pick up the right pronunciation by themselves over time, or that pronunciation is simply not so important. Without a change of those beliefs, learners will necessarily have difficulties and make pronunciation errors. Nakashima (2006) says that teachers are not really good judges of learners' performance anyway, since they are already used to hearing their students' productions. They do not have enough detachment to evaluate learners' pronunciation, and the result is a lack of error treatment (Corder, 1967). Finally, the seemingly minor question of choosing a model of accent, *viz.* mainly British or American English, is, according to Greenwood (2002), on the teachers' minds, but the lack of answer often generates the renouncement to a serious pronunciation

teaching, and therefore learners' misproductions. As a matter of fact, apart from their unavoidable French accent, learners often do not realize that there are several accents of English, and they mix British and American accents. This is linked to their difficulty in correctly identifying spoken English, and not only to the teacher's renouncement to pronunciation teaching. Greenwood's (2002) suggested solution to learners' problems is to focus on the difficulties that the specific learners, i.e. native speakers of French in the scope of this work, have with the pronunciation of English from both a segmental and suprasegmental point of view. That is reminiscent of Celce-Murcia, Brinton and Goodwin's (1996: 19) comment: "[...] we need to consider their [EFL and ESL students'] native language(s) in deciding on pronunciation priorities". Burgess and Spencer (2000), too, recommend that the teacher should be able to compare the phonologies of the source language and the target language so as to anticipate the difficulties that learners might encounter, although this necessity tends to be forgotten by EFL teachers.

The following analysis of the extent to which segmentals and suprasegmentals are a source of difficulty for French learners and how they lead to unintelligibility will enable us to compare the role and importance of each at a theoretical level, before discussing the experiment in Chapter 3 and the link with pronunciation teaching. Since a complete list of the phonological difficulties and errors is impossible, what is presented below is only an overview of the most common and typical ones, with a special focus on production. British English is the variety that is usually – but not exclusively – used as a model and taught in French schools and universities, and that is why it was chosen in the descriptions of English phonological features. Finally, the stress-timing/syllable-timing typology of languages is mentioned, as it concerns a basic difference in rhythmic structures of the two languages; it plays a large part in the understanding of the problems and errors of French EFL learners.

1.2.1. Segmental difficulties and recurrent errors

As is specified in Avery and Ehrlich (1992), many English words were borrowed from French after the Norman Conquest. Still today, the two languages share many vocabulary items, at least orthographically. As regards pronunciation, the difficulty encountered by French speakers is noticeable, and it partly originates in too great an influence of spelling (Burgess & Spencer, 2000). This idea is confirmed by Hodges' (2006: 4) statement: "French EFL students of novice proficiency often see words with the same spelling in their native language and assume that the pronunciation, stresses and even meaning are the same". Segmentals thus have an obviously important role when it comes to EFL pronunciation teaching, all the more as very few common features are to be found between the French and the English phonetic realizations, even of the most used phonemes like /t/, /l/, and /e/ (Birdsong, 2003). Although teachers emphasize the productions of vowels more than consonants – possibly because the former constitute the nucleus of a syllable –, both have equally visible differences with the French sounds, and the errors made by learners are as significant. Hodges (2006) goes even further and affirms that the problem French speakers have with the pronunciation of English sounds is such that many French-speaking English teachers never acquire some typically English phonemes. Consequently, they transmit incorrect pronunciation to their students.

In this subsection, the only segmental errors by French EFL learners that are considered as relevant are those that might lead to unintelligibility. After a descriptive account of learners'

difficulties and production errors at the level of consonants and vowels, the problem of minimal pairs, i.e. where clashes occur the most because of segmental errors, is worth being discussed, since it is one of the few consequences of the errors, if not the main one.

Consonants

At the phonemic level, English and French consonants do not seem to differ very much, and misproductions do not overly affect communication. That may explain why EFL teachers prefer to focus on English vowel sounds, which have more evident differences with French. Phonetically, however, English and French consonants are almost systematically articulated differently even as far as commonly used phonemes are concerned. For example, the phonetic system of RP (Received Pronunciation) English distinguishes between *clear* <l> [l], which occurs in syllable-onsets, and *dark* or *velarized* <l> [ɫ], which occurs in syllable-codas. Despite the presence of the same phoneme /l/, the French system does not have that allophonic distinction, so L2 learners only use a clear <l>. The phonemes /t/ and /d/, both present in the French and English inventories, too, correspond to different phonetic realizations in the two languages – they are usually alveolar plosives in English, and dental plosives in French (Birdsong, 2003; Mortreux, 2008). Furthermore, if they are produced as dental plosives in English, they *might* be misheard as <th> (/θ/-/ð/), just as they are realized in Irish English ([t̪]-[d̪]). In the same way, final plosives, or stops, are articulated differently in English and French, as is pointed out in Flege (1992: 568): “[...] French learners of English might give greater weight to release burst cues in word-final stops than native speakers of English because French stops, unlike English final stops, are usually produced with an audible release burst”. In other words, English final plosives are unreleased, or incomplete, as opposed to French ones.

All these phonetic differences among common phonemes do not really affect intelligibility and communication – the allophonic distinction between clear <l> and dark <l>, for one, is also absent in some varieties of English. Native speakers will therefore be quite tolerant to such misproduction of phonetic sound qualities (Lemmens, 2010). The production of normally silent consonants also seem to have little significance – it is not because a French learner says /^hwɔ:lk/ instead of /wɔ:k/ that a native English speaker will be totally at sea. The context plays a crucial role in such situations. Other difficulties for French EFL learners, triggering off more significant errors and sometimes grammatical mistakes (e.g. the non-pronunciation of the third person inflection -s) are noteworthy. One of the few that can be mentioned is the (non-)realization of the glottal fricative /h/. While this phoneme does not exist in French apart from interjections, Hodges (2006) notes that French learners frequently fail to pronounce it where it is present, and yet they have a tendency to place one before a word beginning with a vowel. As a result, the sentence *I'm happy* /aɪm 'hæpi/ regularly becomes /hajm 'api/. Such errors can cause clashes in minimal pairs, e.g. *heart* vs. *art*, *hair* vs. *air*, *hi* vs. *I* (see below for the importance of minimal pairs in intelligibility). According to Roach (2009), the lack of aspirated plosives [p^h], [t^h], [k^h] in languages other than English is another factor that affects intelligibility. In English, syllable-initial voiceless plosives /p/, /t/ and /k/ in stressed position contrast with syllable-initial voiced plosives /b/, /d/ and /g/

through aspiration, and hardly through voicing, which is why the former will be misheard as the latter if aspiration disappears. The French language having no aspirated plosives, *pack* might be understood as *back* by a native English speaker if the French learner has not been made aware of that feature of English phonology and keeps an unaspirated /p/.

The /θ/-/ð/ pair is one of the best-known and systematic instances of production difficulty for French speakers, as well as for many other foreign speakers (O'Connor, 2002). These dental fricatives do not exist in the French phonemic inventory – with the obvious exception of people with lisps –, and they are replaced, or “equated” (Flege, 1992), by /s-/z/, or more rarely /f-/v/ (Herry-Bénit, 2011) and /t-/d/. O'Connor (2002: 5) explains: “[t] is a good substitute because it preserves the mellowness, or lack of stridency, of /θ/, while [s] preserves the continuancy of /θ/”. Yet, the /s-/z/ substitution is the one that should be avoided the most, because it provokes unequivocal clashes in minimal pairs (*thin* vs. *sin*), whereas the labiodental fricatives /f-/v/ may still be assimilated with the Cockney English accent, and the dental plosives /t-/d/ with Irish English, for example². Similarly, the post-alveolar approximant [ɹ] sounds typically English to French ears, and it can take many years for an adult French speaker to acquire it (Hodges, 2006: 10). Usually, learners replace it by either their own <r> [ʀ] or some kind of /w/, so that *rain* [ˈreɪn] might be understood as *wane* [ˈweɪn]. This leads us to the occurrence of that phoneme and the problem of rhoticity; due to the influence of spelling, French learners pronounce the English <r> in all contexts, as in many accents of English for that matter. Notwithstanding, pronunciation teaching is often based on RP English, a non-rhotic variety of English, and learners get a mixed accent. For instance, the word *better* is produced as /ˈbetər/, a mixed RP /ˈbetə/ and General American (GA) /ˈbetər/. The consequence is a lack of coherence and merely a stronger foreign accent, though, which does not necessarily affect intelligibility (Nakashima, 2006).

Finally, French EFL learners come across difficulties with the syllabic consonants /l/ and /ŋ/, all the more as they are the consequence of the typically English rhythm (cf. 1.2.2. and 1.2.3.). The most common production error is the insertion of a full vowel, very close to the French phoneme /œ/, and not reduced enough to be identified with the otherwise correct /ə/. Apart from a stronger foreign accent to the native speaker's ears, this last point on syllabic consonants does not actually lead to utter unintelligibility or misunderstanding, but it gives an insight into the problem of vowel production and reduction.

Vowels

The English language makes a distinction between “pure vowels”, or monophthongs, on the one hand (i.e. lax vowels: /æ, e, ɪ, ʊ, ə, ʌ/, and tense vowels except diphthongs: /ɑ:, i:, ɜ:, u:, ɔ:/), and diphthongs on the other, which are all tense vowels: /əʊ, ɔɪ, ɪə, uə, aʊ, eɪ, eə, aɪ/³. As far as production skills only are concerned, diphthongs are not so problematic for EFL learners, since they are just glides from one vowel sound to another, and misproductions are

2 Also note the colloquial use of *da* for *the*, even in phrase-initial position.

3 Some phoneticians specify that /ɑ:, i:, ɜ:, u:, ɔ:/ are in fact slightly diphthongized, which amounts to saying that all tense vowels are diphthongs (see Deschamps *et al.*, 2004, or Roach, 2009).

mostly due to spelling influence. The real problem concerns pure vowels, i.e. the distinction between lax vowels and tense vowels that are not diphthongs, commonly (albeit not rightly: Roach, 2009) referred to as “short” and “long” vowels respectively. On the contrary, French only has a single type of vowel, and vowel duration is the same for all them. The two figures below show English and French vowels. The principal characteristics of vowel articulation are found, such as the places of articulation: backness (front *vs.* back), and height, or aperture (close *vs.* open). Lip roundedness is only relevant in the French vowel diagram because it is the only distinctive feature of some phonemes, while in English, the front/back distinction already implies unroundedness/roundedness respectively, except for unrounded /ʌ/ (Deschamps *et al.*, 2004). Thus, where there are two vowels in Figure 2, the one on the left is unrounded, and the one on the right is rounded. French nasal vowels are not represented:

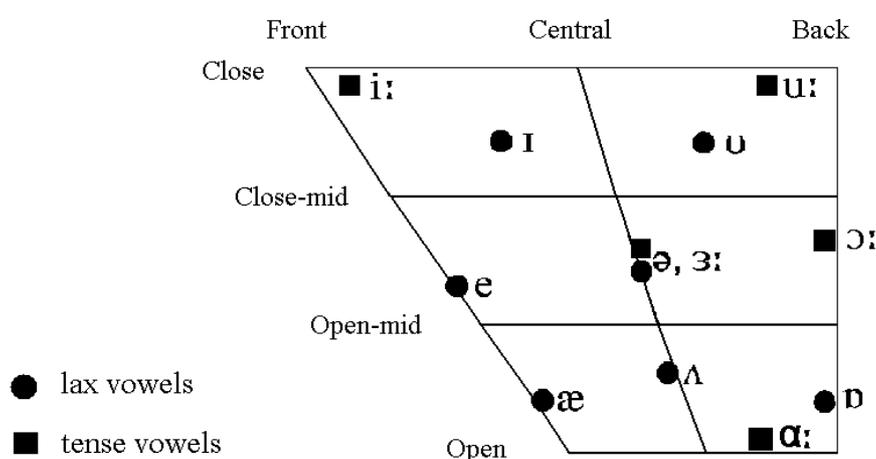


Figure 1: English monophthongs, adapted from Roach (2009)

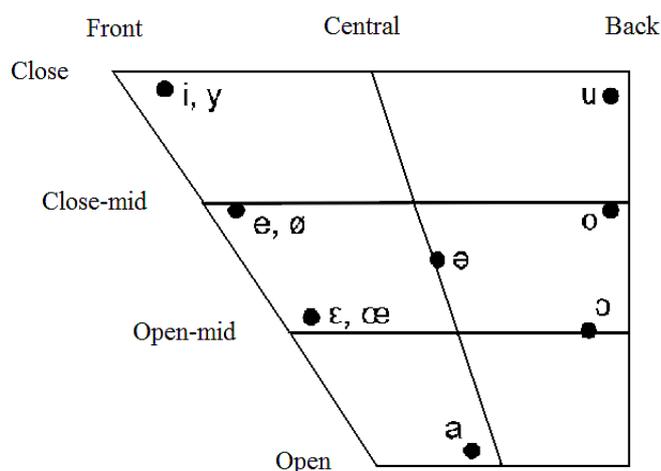


Figure 2: French oral vowels, adapted from Deschamps *et al.* (2004)

As is shown by these two figures, despite the frequent use of a unique phoneme in the two systems, most vowels are articulated differently in English and in French. For example, the one phoneme /e/ is much closer, or higher, in French than in English, which evinces the fact that the French word *bête* is by no means homonymous with the English word *bet* (not to mention the phonetic realizations of /b/ and /t/). It is thus acknowledged that it is the phonetic realizations that are a great source of problem for French EFL learners (Mortreux, 2008), and the latter are not conscious of the differences.

The unavoidable production errors are well-known; the lax/tense distinction is neutralized, and two English vowels become one French vowel. Mortreux (idem) carried out an analysis of the recurrent errors made by French learners by transcribing the recordings of two French students' productions of English, and using questionnaires to phonetics teachers. To quote just a few examples, the /æ/-/ɑ:/ pair is replaced by the French phoneme /a/; /i/-/i:/ become /i/; /ɒ/-/ɔ:/ become /ɔ/ (Herry-Bénit, 2011). As a consequence, one pronunciation has at least two possible corresponding words, creating confusion in minimal pairs: *live* and *leave* are both pronounced /'liv/. Contrary to what French learners usually think, this substitution will be more likely to be understood as *leave* – as is shown in Figures 1 and 2, the French /i/ is much closer to the English /i:/ than to /i/, which itself would be “better substituted” by a French /e/. In other words, instead of using the unique pronunciation /'liv/ for both *live* and *leave*, a substitution of *live* with French /'lev/ would turn out to be better understood by native speakers of English, provided that the rest of the utterance is grammatically correct. Collins and Mees (2008) explain that these two English phonemes are heard as if they were allophones of the one French phoneme by French speakers⁴, and that learners must learn to make contrasts. That may account for the use of minimal pair drills by English teachers in France. However, as is rightly noted by Brown (1995), the teaching of phonemic contrasts through minimal pairs has some shortcomings, and intelligibility is not necessarily affected by such neutralizations as the example of *live/leave*.

In most, if not all, cases implying a possible confusion in a minimal pair, such as pronouncing *leave* instead of *live*, Brown (idem: 171) notes that the context plays a significant role, as it enables the hearer to disambiguate the item. That is why he firmly believes that mispronunciation involving a minimal pair does not lead to unintelligibility. The fact that the verbs *live* and *leave* are followed by different prepositions and often occur in different grammatical tenses or aspects (*I live in London* vs. *I'm leaving for London*) is decisive and seems to preclude cases of misunderstanding or ambiguity. Similarly, Nakashima (2006) uses the example of Japanese EFL/ESL speakers, who would most likely substitute the English /r/ with /l/ in the sentence *I would like to eat rice*. If a Japanese speaker says *lice* instead of *rice*, the utterance is still understandable since Japanese people are not used to eating lice. Nonetheless, the author also points to the chance that a native English hearer who is not aware of the Japanese culture, might actually think that it is lice the non-native speaker is talking about. Lemmens (2010) takes up the *live-leave* pair, which he asserts can lead to misunderstanding even though the prepositions are different. If a French speaker says *he “leaves” in London* instead of *he lives in London*, an English speaker might conclude that the

4 For a more detailed explanation, see 2.2.1. and e.g. Flege's *Speech Learning Model*.

French speaker meant *he leaves for London*. In other words, it cannot be ascertained that a native speaker will mentally correct *live/leave*, but perhaps they will mentally correct the following preposition. Such an example implies that minimal pairs can lead to misunderstanding, but also to grammatical mistakes.

The impact of misproduction of English segments on intelligibility and communication often involves two members of a minimal pair. One of the few other consequences, also true of suprasegmental misproductions, is foreign-accentedness, which, as was said above, does not systematically cause unintelligibility. However, this seemingly unimportant detail can prove to be an impediment to communication. An EFL or ESL speaker's having a strong foreign accent might lead to the native English speaker's simply abandoning communication by dint of accumulating mental corrections (Lemmens, 2010). Furthermore, it is the cause for many stereotypes (Mennen, 2006; Vergun, 2006), be they good or bad.

This account of some segmental difficulties for French EFL learners and the impact on production and intelligibility has deliberately overlooked the widespread problem of the phoneme called "schwa". In fact, it corresponds to the phenomenon of vocalic reduction, itself being a consequence of the rhythm of English and the stressed/unstressed alternation (Huart, 2002). That is why Brown (1995) classifies vowel reduction and the schwa among suprasegmental features. The following subsections thereby deal with suprasegmental difficulties for French learners, including intonation – and particularly tonicity –, stress, vowel reduction, and rhythm. The stress-timing/syllable-timing typology of languages is also looked at, for it is a basis for the understanding of the difference between the English and French prosodic systems.

1.2.2. *Suprasegmental difficulties and recurrent errors*

Although most French EFL learners do not realize it, they have a number of problems with English rhythm and prosody (Mortreux, 2008), all the more as they often prefer to practise vowel production, thus producing full vowels only and not realizing vowel reduction naturally. Burgess and Spencer (2000) used questionnaires that they gave to EFL teachers and found that stress, rhythm, intonation and vowel reduction were all mentioned as major areas of difficulty experienced by learners. They remark that this is "all the more interesting as many pronunciation materials have tended to focus primarily on segmental features" (idem: 197). If one reasons that misproducing rhythm, for example, is "like being out of beat in music" (Lemmens, 2010: iii), it is easily understandable that suprasegmental errors are just as important as segmental errors. The prosody of a language should be seen as its basic structure. The major difficulty of acquisition lies in the fact that two different languages have differences at the suprasegmental level, and English and French are no exceptions. French learners automatically reproduce L1 prosodic features, and the resulting errors have a devastating effect on intelligibility, just as segmental errors do.

In this subsection, the extent to which suprasegmental features constitute a source of difficulty for French EFL learners is analyzed. The main suprasegmental components of the English phonological system – namely intonation, stress, and rhythm – are looked at. Also, the way they may become problematic to French learners, and therefore the more or less

important consequences they have on communication and foreign-accentedness even, are studied.

Intonation

The suprasegmental feature of English phonology that can be said to be the least problematic to French EFL learners is intonation. Roach (2009: 3) defines it as “the use of the pitch of the voice to convey meaning”. Halliday’s (1967) analysis of intonation is quite relevant and has been taken up many times in the literature. The author divides it into “the three T’s”: Tonality (the chunking of speech into intonational phrases, or tone-units), Tonicity (nucleus placement), and Tone (mainly, but not only: fall, rise, and fall-rise). There are some similarities between the French and English intonational systems, especially concerning tones and tone meanings. In a nutshell, a rising tone indicates incompleteness, non-finality, sometimes friendliness and positivity, while a falling tone usually means completeness, finality, and seriousness (Cruttenden, 1997; Deschamps *et al.*, 2004; Wells, 2006). Nonetheless, French learners do have a problem with the realization of the English fall-rise tone, probably out of embarrassment to produce such a different tone from those of their L1. As far as tonality is concerned, both French and English have “tone-units”, or intonational phrases (abbreviated IP). The only problem that can be mentioned, though, is the placing of tone-unit boundaries (| and || for longer pauses) where punctuation is absent. Commas usually align with tone-unit boundaries, but there can be a tone-unit boundary where there is no punctuation, e.g. after a long subject or in sentences like: *Would you like tea | or coffee?*

The most problematic component of intonation for French EFL learners is tonicity, or the placement of the nucleus (also called nuclear stress, nuclear accent, tonic accent, or primary accent), i.e. which word/syllable receives main prominence. The nucleus represents the focus domain of the intonational phrase, where the information can be new or contrastive. Vallduví (1991, cited in Rasier & Hiligsmann, 2007: 49) categorizes the accentuation of Germanic languages as “plastic”, which means that prominence serves to show information focus, while Romance languages have “non-plastic” accentuation. Contrary to English, the most prominent syllable in a French IP is the last syllable, regardless of the word. That is why Vaissière (2002: 11) points out: “In French, focusing, topicalisation and the theme-rheme distinction are all related to word order and phrasing (there is morpho-syntactically marked focus), not to differences in prominence”. If French relies on morpho-syntactic devices to mark information that is in focus, it is understandable that French EFL learners misplace nuclei when they speak English. The nucleus in the latter language can even be the first syllable of an IP; such a sentence as *C’est moi qui l’ai fait* (literally: *it is I who did it*) is the direct equivalent of *I did it*, with oral emphasis, i.e. the nucleus, on *I*. Besides the recurrent error of stressing given information instead of new, it is just as common to hear a French speaker misplace the nucleus in so-called “event sentences”, where the tonicity is unexpected. For example, in *The phone’s ringing*⁵, the place of the nucleus is unexpected, but possibly explained by the fact that the event is seen as a whole, and therefore the noun bears the nucleus (Deschamps *et al.*, 2004; Wells, 2006). As is specified in Rasier and Hiligsmann (2007), it is easier for a speaker of a language with “plastic” accentuation like English, to produce a

5 The underlining shows the syllable bearing the nucleus.

language with non-plastic accentuation like French, than the other way round, hence the difficulties that French learners have with English tonicity.

Mennen (2006: 1) alleges that “impressions based on intonation may lead to ill-founded stereotypes about national or linguistic groups”. The contribution of intonation to foreign-accentedness and the intelligibility of a message is indeed undeniable. As was said above, the placement of the nuclear syllable is one of the most significant elements in the realization of English intonation. While any syllable in French can be prominent and bear the nucleus provided it is in phrase-final position, in English it is first and foremost bound to word stress patterns. That is why in order to make sure that native speakers will understand the message and produce correct tonicity, it is necessary to be aware of the notion of lexical stress: “Prerequisite for the description of intonation, we have to know which syllables are stressed in words so that we then know which syllables are potentially accentable in utterances” (Cruttenden, 1997: 15). Di Cristo (2004: 88) says that nuclear accent is in fact at the interface of the notions of intonation and lexical stress. Consequently, the latter can be regarded as a basis for intonation, and the problems that French speakers have with it are of paramount importance in the understanding of the intonational difficulties.

Lexical stress

English and French have totally different views of stress, hence the frequency of errors. Vaissière (2002: 6) describes how French speakers perceive stress: “The notion of (lexical) stress is indeed very elusive for French natives. They only discover the existence of that unnatural and unnecessary complication when they have to learn a foreign language”. Still, French learners must be aware of the existence of lexical stress in English, as it is a very different feature from their L1, but also a very important feature for intelligibility. As a matter of fact, it is one of the few prosodic features of English pronunciation that are taught in French secondary schools, albeit still rarely. That is probably because lexical stress is directly linked to some segmental features – e.g. reduced forms of function words and the schwa. The way the French system differs from the English one can be summarized by Henry, Bonneau and Colotte's (2007) remark:

The French lexical accent is essentially correlated to a lengthening of the last syllable of the word. Thus French learners will tend to keep this lengthening to English realizations even on unstressed syllables. [...] The English lexical accent is strongly marked on an acoustical point of view whereas the French one is relatively weak. [...] English lexical accent is characterized by a pitch modification, an increase of intensity and a lengthening of the vocalic nucleus of the stressed syllable. (1595)

As is specified here, the transfer of the L1 pattern on the L2 production is almost systematic and unconscious with French speakers, who simply assign equal stress and weight to all syllables when they speak English. These mis- (or non-)realizations of English stresses can be illustrated by the widespread overuse of the English word *people* in French, with the restricted meaning of “celebrity(ies)”. In this word, apart from the gallicization going as far as using *un people* (“a celebrity”) and *des people(s)* (“celebrities”), the influence of the French

prosodic system made the word be pronounced as /pi'pœl/, or even /pi'pɔl/⁶, in which the vocalic reduction – i.e. to a schwa /ə/ or a syllabic consonant /l/ – in the second syllable has been replaced by a typically French full vowel. Similarly, in polysyllabic words ending in -age (e.g. *village*, *sausage*), French speakers very often use a tense vowel /ei/ and stress the ending, which at the same time is possibly due to the influence of the word *age* /'eɪdʒ/. This example illustrates how such a suprasegmental feature as lexical stress may be at the origin of segmental errors. Hodges (2006) illustrates the difficulties that French learners come across through the series of words derived from *'democrat*: *demo'cratic*, *de'mocracy*. Even though all three words are closely related, both semantically and morphologically, several stress rules (e.g. the stress-imposing ending -ic, and the Greek origin of the components) force the lexical stress to fall on a certain syllable, and that is something that French learners do not understand easily.

Comprehensibility can be affected by errors involving lexical stress (McNerney & Mendelsohn, 1992). With stress-alternating pairs, e.g. *'present* vs. *pre'sent*, the primary stress is on the first syllable if the disyllabic word is a noun or an adjective, but it is on the second syllable if the word is a verb. When the two words are closely related (e.g. *'absent* vs. *to ab'sent*, *an 'insult* vs. *to in'sult*), understandability cannot be overly affected by misplacement of the stress. However, when the two words are only homographs, but in no way related (e.g. *present*), a native English speaker might have to think a little before realizing what word was intended. Similarly, when a compound stress, such as in *'English* *ˌteacher* (= a teacher who teaches English), can involve a confusion with a simple phrase stress pattern (adjective + noun), such as *'English* *'teacher* (= a teacher who is English), French learners make errors that have an impact on understandability. As a consequence, native speakers might simply stop communication by dint of mental corrections. It is therefore crucial that teachers should teach the correct stress pattern of a word immediately when the word is first learned, as is suggested by Roach (2009: 76): “it would be easier to go back to the idea of learning the stress for each word individually”.

Even beyond the correct understanding of a word, the primary and secondary stresses of English words contribute to the overall rhythm of the language. If they are not realized properly, the whole rhythm is spoiled, English melody is broken, and communication can become even harder.

Rhythm

Abercrombie (1967: 96) remarks that “all human speech possesses rhythm”. The rhythm of a language is mainly constituted by the way the language uses stresses (sometimes called rhythmic beats) and accents (or pitch prominences). Bertrán (1999: 126) reminds the reader that “in linguistics, the word *rhythm* is a metaphor, borrowed from music”. If a music had no rhythm, then it could not be called “music”, and that is exactly the same for the rhythm of a language. If it is not correctly produced, native listeners will not recognize their language.

6 The word *people* is now present in monolingual and bilingual dictionaries – e.g. it is in the 2010 French-English *Robert & Collins* dictionary, translated as “celebrity” and transcribed /pi'pœl/. The pronunciation /pi'pɔl/, with a closed <o> /o/, has also been heard by some French TV presenters.

That is why the respect of a language's rhythm is crucial in the learning of the L2 pronunciation.

According to Cruttenden (1997), English rhythm has three degrees of stress/accent: (a) primary stress/accent – called “nucleus” above – is the principal pitch prominence; (b) secondary stress/accent is a subsidiary pitch prominence, and is often called the “onset”, i.e. the first stressed syllable of an IP; (c) tertiary stress (not “accent” this time, as it is not a pitch prominence) corresponds to the rhythmic stresses of the IP, that is, in the head or tail. In Wells's (2006: 229) terms, this third type of stress is said to be “downgraded” in rapid, casual speech, according to the “rule of three”; the rhythmic stresses between the onset accent and the nuclear accent are pronounced rapidly along with the other unstressed syllables. However, it is necessary for French EFL learners to know about the traditional alternation between stressed and unstressed syllables, especially because it is also linked to segmentals (i.e. weak forms and strong forms) that French speakers are not familiar with (Mortreux, 2008).

The notion of “foot” given by Halliday (1967: 12) is defined as the component of English rhythm. Contrary to the foot in poetry, here the foot is a unit of rhythm that consists of an ictus – one stressed syllable –, and a remiss – the following unstressed syllable(s) before the next stressed syllable. The rhythm of English is produced by a succession of feet, i.e. of stressed and unstressed syllables (Abercrombie, 1967: 36). Then, what is a source of difficulty for French learners is to know what to stress (content words: nouns, verbs, adverbs, adjective, and demonstratives, question words, etc.), and what is unstressed (function words: pronouns, articles, conjunctions, etc.). The French system is indeed very different, as has already been seen with lexical stress. Ploquin (2009: 94) explains that “French differs from Latin and other Romance languages in that its stress domain is the phrase rather than the word”. Therefore, when learning English as a foreign language, French learners must become aware of the difference between the rhythm of their L1 and that of the target language. The interference of the L1 as far as rhythm is concerned is such that Hahn (2004) believes that it cannot be avoided. While rhythm is among the earliest things that are acquired by infants, it is one of the most difficult things for adults to modify when they learn a foreign language.

Very often, suprasegmental errors lead to segmental errors, e.g. when an error of stress assignment prevents vowel reduction from occurring naturally (*cf.* words like *village*). Rhythm and prosody are the basic structure of a language, but they are also among the most difficult features to acquire for an L2 learner. The big differences between the English and French prosodic systems are at the origin of the difficulties that French EFL learners come across. The difference between the two languages, and the resulting errors of production, can be illustrated by the stress-timing and syllable-timing theory.

1.2.3. French vs. English: syllable- and stress-timing theory

The terms “syllable-timing” and “stress-timing” are used in the theory of isochrony, according to which some languages have isochronous syllable-durations, and others have isochronous inter-stress intervals (Pike, 1945; Abercrombie, 1967, among others). The aim here is not to debate over the existence or not of isochrony, but rather to enhance the

difference between the prosodies of French and English, which are often regarded as the prototypical examples of, respectively, syllable-timed languages and stress-timed languages (Bertrán, 1999)⁷. An account of this theory will help us understand why French EFL learners have difficulty in acquiring the English rhythm.

The notion of isochrony has often been used as an attempt to characterize and classify languages according to how their rhythm comes into being, i.e. whether rhythmic stresses occur at relatively regular intervals (stress-timing), or stressed and unstressed syllables are treated similarly (syllable-timing). However, no experiment has actually proved the existence of strict isochrony in any language so far. Roach (1982) conducted an experiment with six speakers of six different languages, among which three were supposed to be syllable-timed like French, and three stress-timed like English. The first claim of the author was that syllable length is more variable in stress-timed languages. The second claim concerned the presence of regular stress beats in stress-timed languages, and their absence in syllable-timed languages. Roach measured the duration of tone groups without preheads and tails; the duration was divided by the number of feet in order to reach the ideal isochronous interval, and it was then compared with the actual durations of feet. The results of the experiment gave no support to the classification of these languages as stress-timed or syllable-timed. On the basis of the measurement of time intervals in speech, the main conclusion was that the distinction between stress-timing and syllable-timing is auditory and subjective – a language is classified as syllable-timed if it *sounds* syllable-timed. Isochrony tends to be apparent rather than real.

Another interesting experiment has been carried out by Bertrán (1999) on speakers of seven languages, including French and English. The stimuli used were utterances with the same kinds of stressed vowels and consonants, but the distance between the stressed syllables varied. The author then measured the absolute duration of the feet, concluding:

Languages considered stress-timed, and others considered syllable-timed give a rather similar response to the tests, with results that openly contradict the typological models they are supposed to represent. There is no compensation at all to balance the duration of the units composed of different number of elements. On the contrary, the rhythmic units not only demonstrate a strong temporal inequality, but even certain parallels with their morphological inequality, a phenomenon which is the antithesis of both rhythmic types. (125)

In the same way as Roach (1982), a lack of accentual or syllabic isochrony was detected in all seven languages. There seems to be no phenomena of compensation or compression in the feet, nor in the syllable. More particularly, the measurements of French revealed that syllabic duration was not uniform, while English did not fit either of the rhythmic schemas.

Since no clear evidence of strict, “strong” isochrony has been provided, the term “weak isochrony” has emerged to refer to the relative, seemingly equal amount of time between stresses or syllable durations. This term enables one to get an insight into the rhythmic structures of languages, without going as far as advocate a perfect equality between inter-

⁷ As the objective here is to compare French and English and highlight their specific differences, the third type of language, i.e. mora-timed languages, is not discussed.

stress intervals or syllable lengths. The analysis given by Dauer (1983) is now widely accepted (Nava & Zubizarreta, 2009), because it offers a solution to the contradiction between the perceived isochrony and the measured lack of isochrony. She established a timing continuum thanks to comparisons of data from continuous texts in English, Thai, Spanish, Italian, and Greek. These showed that inter-stress intervals in English are no more isochronous than inter-stress intervals in, e.g., Italian, which is supposed to be syllable-timed. Instead, Dauer claims that the tendency for stresses to occur regularly is more a language-universal property, no matter if the language is traditionally considered as stress-timed or syllable-timed. The difference between stress-timed and syllable-timed languages has to do with such things as differences in syllable structure complexity, vowel reduction, and the phonetic realization of stress and its influence on the linguistic system. That is why languages should be treated as more or less stress-based, depending on their characteristics. Therefore, the timing continuum is a scale that goes from maximally stress-timed to maximally syllable-timed, and each language has its place on it.

As Ploquin (2009) rightly points out:

After all, we don't expect to find categories of languages according to their segmental inventories. Trying to find rhythmic categories might [sic.] the same as calling a language 'nasal' because it includes nasal vowels or 'fricative' because it makes use of more fricatives than any other type of consonants. (49)

Even if there is no such thing as strong isochrony, the theory gives an interesting insight into how English rhythm is structured, and it highlights the difference with French and the difficulties that French EFL learners have to face. In fact, the stress-timing/syllable-timing theory seems to account for many suprasegmental difficulties for L2 speakers. Auer (1993) explains that one of the main consequences of stress-timing is vocalic reduction, while in syllable-timed languages, there is no phonemic reduction and very little phonetic reduction. That is why in a syllable-timed language like French, assimilation – of place of articulation, especially – is rarer than in such a stress-timed language as English. According to this reasoning, some segmental problems are due to the fact that French learners do not realize the English stress-timed rhythm properly. As for the problem of nucleus misplacement, Nava and Zubizarreta (2009: 175) specify that “in order to acquire the Germanic NS [nuclear stress] algorithm, the L2 learner must have moved from a syllable-timed to a stress-timed rhythm”. Once again, one of the major difficulties for French learners, i.e. English tonicity, may find its origin in the rhythmic difference between the two languages, and it may be good that English teachers introduce this notion of weak isochrony and rhythmic typology to learners.

1.3. Conclusion

Although they are treated in separate sections in this work, segmentals and suprasegmentals are interdependent, whatever the language, since together they form the phonological system of a language. For example, the learning of lexical stress and rhythm implies the notions of vowel reduction, schwa, etc. Errors and difficulties involving both individual

sounds and prosody have an impact on intelligibility and foreign-accentedness and may become an impediment to communication, hence the necessity to include both aspects in L2 pronunciation teaching.

Even if prosody is often overlooked in EFL pronunciation teaching, its importance is just as undeniable as that of vowels and consonants. Furthermore, it has been seen that suprasegmental errors actually lead to many segmental errors, thus pointing to a more significant role played by the global structure of the language than by segments. The Swedish phonetician Thorén (2008: 21) affirms: “a large number of teaching colleagues agree that certain prosodic elements in L2 Swedish tend to conceal many segmental deviations”. If suprasegmental features have such importance, which is increasingly acknowledged by experts, then one may wonder why it is the segments that are mainly taught in L2 pronunciation teaching. English teachers in France may be wrong to focus on that particular aspect of phonology, going as far as ignoring rhythm altogether, sometimes. A possible explanation for that is suggested by Jilka (2000):

Seen from a strictly linguistic point of view, one might assume that the native speakers of a language that itself is not very sensitive to linguistically relevant aspects of prosody will pay not as much conscious attention to such features in the foreign-accented productions of non-native speakers. (2)

The fact that prosody in French does not have the same function as it does in English is probably one of the main reasons why French-speaking learners and sometimes teachers of English do not realize the importance of acquiring the L2 prosody.

This first chapter has been a theoretical account that illustrates the need for a shift in focus in English pronunciation teaching, and our experiment, explained in Chapter 3, is an attempt at providing evidence for that. A suprasegmental training including stress-timing and tonicity may have a better effect on learners' production skills than a standard segmental training, and accordingly, suprasegmental errors may have a worse effect to the native speaker's ears than segmental errors. The account of recurrent difficulties by French learners reported above serves as a basis for the elaboration of stimuli through which it will become possible to compare the weight of segmental errors with that of prosodic errors in communication.

Before giving ample detail about the experimental procedure, the next section is an overview of the existing literature on the acquisition of English phonology as a first language and as a second/foreign language. A constant parallel between the acquisition of segments and the acquisition of suprasegments is drawn.

CHAPTER 2. PHONOLOGY AND LANGUAGE ACQUISITION

2.1. Phonology and First Language Acquisition

In order to understand how speakers of a certain language acquire the phonology of a second or foreign language (L2), the linguistic development and the acquisition process of the L1 phonology in infants should first be surveyed. Crystal (1970: 77) points out that “the study of prosodic features – of intonation, in particular – had received but sporadic mention in the context of research into first language acquisition”. As in many other domains such as didactics and L2 phonology, prosody has been somewhat neglected in L1 phonology acquisition studies. Still, its major importance is undeniable, as will be confirmed in the analysis of the steps in the language acquisition process. Since the development of computer technology, though, Gerken (1996) claims that a growing interest in the role of prosody in language acquisition has been noted.

In this section on the acquisition of the L1, the natural acquisition order in “normal” children (i.e. with no disorder or delay) will be followed. The description of the various stages in the acquisition of English segments and suprasegments at the perception level will be looked at, before their acquisition at the production level.

2.1.1. Perception of English: from suprasegments to segments

The acquisition of the L1 phonology occurs in different stages, roughly corresponding to different ages of the infant. As far as perception capacities are concerned, Kaplan and Kaplan (1971) notice that the division into distinct stages is not so clear as it can be for production (cf. 2.1.2. below). Nevertheless, general patterns seem to be recurrent in normally developing systems. It is increasingly accepted that prosody constitutes the very first contact that the human being has with language, even intra-uterine. That is why children are believed to start acquiring prosodic features at a pre-linguistic stage, long before the acquisition of segmentals. It is only at the end of the first year of life that segments become more important, especially because they help the child form his/her first words. The infant's receptive control over the suprasegmental system emerges before the control over the segmental system of the language (idem). Even if still in the mother's belly, the infant can hear the melody that is created by the prosody of the ambient language. Then, although he/she cannot distinctly make out individual sounds immediately, rhythm, stress beats, accents, intonation, contribute to the infant's first perception of the mother tongue.

Crystal (1970) emphasizes the contribution of prosodic patterns to the development of grammatical competence. Intonation, particularly, helps the early learner organize utterances into chunks. Similarly, Gerken (1996) discusses how infants use prosodic information to infer syntactic structure. It serves to segment the speech stream into major units and to locate the linguistically relevant ones, so that the child is more and more familiar with the linguistic system. The experiment¹ by Christophe, Melher and Sebastián-Gallés (2001) illustrates this prosodic segmentation hypothesis. They found that French newborn infants manage to discriminate Spanish through phonological phrase boundaries: “Phonological phrase boundaries often coincide with boundaries of syntactic constituents. Therefore, they may

1 Most of the experiments on the perception of language by infants are conducted thanks to close examinations of head-orientation responses to natural speech.

provide some information as to the syntactic structure of sentences” (idem: 386). Prosodic features are more and more acknowledged to be acquired very early by infants. Johnson and Reimers (2010: 94) observe: “Studies have shown that newborns can discriminate languages with different rhythms [...], but not languages belonging to the same linguistic rhythm group”. Not only does this prove that early learners greatly rely on prosodic features, but it is all the more interesting as it involves the typological distinction among stress-timed, syllable-timed, and mora-timed languages. Nonetheless, more investigations of the role of suprasegmental features at the perception level – whether cross-linguistically or not – need to be carried out.

As regards the infant's perception of segmental features, Jusczyk (1992: 20) claims that the capacity of recognizing voicing contrasts of especially initial stops (e.g. /pa/ vs. /ba/) starts as early as one month of age: “Infants have the capacity to do some preliminary grouping of speech sounds into different perceptual categories”. The developing research on the perceptual skills of infants shows that during the first six months of life, infants can perceive more phonetic contrasts than merely onset plosives (Johnson & Reimers, 2010: 74). The reason defended by many researchers is that humans are born with a universal capacity of categorizing sounds – they have the ability to perceive speech in terms of phonemes (idem: 78). This means that infants can perceive phonetic contrasts that occur in the L1, but also in any language of the world, as opposed to adults (Werker, 1995: 89). The influence of and exposure to the mother tongue, however, appear very quickly. Around the age of six months, speech sound categories that are based on the L1 sounds are formed and develop. While the newborn has the capacity to discriminate both L1 and L2 contrasts (Carlotti, 2007), this capacity gradually loses ground, in keeping with the language input to which the child is exposed in his/her everyday environment. Depending on the ambient language(s), the influence of the latter will be increasingly important. Yet, the ability to discriminate contrasts that are not in their environment does not disappear altogether, but children start to perceive less even at that stage.

Kuhl's (1991, for example) work is often taken up by other researchers. The author put forward the Perceptual Magnet Effect hypothesis (abbreviated PME), according to which there is a strong influence of the L1 phonology on the child's perception of sounds. As a consequence, the hypothesis holds that infants create mental representations of the sounds that they hear, and the most representative sounds of a certain category – called the “prototypes” – function like perceptual magnets on other sounds of the same category. By the end of the first year of life, infants thus stop being universal listeners. Their speech perception performance declines and increasingly matches the L1 sound properties (Werker, 1995: 89). As a result, the child starts responding differently to foreign sounds that he/she hears. In fact, this loss of sensitivity is prone to debate and arguments; some think that it is permanent and absolute, and others claim the opposite. That is why it is referred to as the Maintenance/Loss View (idem: 95).

In the L1 acquisition process, the infant is often said to be a universal listener. He/she can perceive prosodic and phonetic contrasts of any language in the world. Prosody is the very first linguistic element with which the infant has a contact. It is only later that he/she starts to make out individual sounds, which also constitutes the first steps of production.

2.1.2. Production of English segments and suprasegments

Children begin to speak between eighteen and twenty-four months of age (Kaplan & Kaplan, 1971: 358). The “primitive lexical items”, that is, what sound like first words, are “the result of the imitation of adults' forms” (Crystal, 1970: 80). Concerning the chronology of early vocalization, Abercrombie (1967) attests that it can be divided into several overlapping stages. During the first six months of life, the basic form of crying goes on. At three weeks, pseudo-cry and non-cry vocalizations appear, and they evince a greater variety of temporal and frequency patterns than simple crying. Until the end of the first year, the latter two types of vocalizations gradually develop into babbling and intonated vocalizations. They increasingly sound like actual speech, with more vowel-like and consonant-like sounds on the one hand, and more adult-like intonation patterns on the other hand. The last stage of early vocalization, for Abercrombie, is patterned speech, occurring between nine and twelve months. As the author puts it, this final stage corresponds to the close of the pre-linguistic period and the onset of true speech. The question of the (dis)continuity between the stage of babbling and the stage of actual speech may then be asked.

The literature on first production mainly deals with phonemes and phonotactics, but not so often with prosody, which is thought to be easy to acquire. As for the production of the first words, it is not immediately accurate and perfect, as is reminded in Johnson and Reimers (2010: 3): “What happens when children are confronted with target forms that they are not able to reproduce accurately is that they have a choice of not producing anything at all or changing the forms into those that they can manage in production”. In fact, young children simplify target words in order to match their production capacities. That is why a certain number of recurrent processes are at work. Reduplication is one of the major steps in the linguistic development, whatever the language; it refers to the doubling of one simple syllable as a substitution for a more complex, polysyllabic word. A well-known French example is the child-like word *dodo* for *dormir* (“sleep”), actually found in most dictionaries. The simplification strategies differ from one child to another, though, since they depend on their own production capacities. Another common process in L1 first production is segmental deletion, implying that a segment is not realized at all – e.g. /bʊ/ instead of /buk/, or the simplification of consonant clusters, e.g. *friend* becomes *fen*. Johnson and Reimers remark that word-final deletions, and especially consonant deletions, are the most frequent ones. The phenomenon of weak syllable deletion, *viz.* strong syllable retention, can be illustrated with the example of the word *banana*, realized as /'nanə/ instead of /bə'nɑ:nə/ (idem: 8). Although English is a stress-timed language, unlike French, weak syllable deletion occurs in early learners of any L1, including French. Finally, the modification of a phonemic feature is widespread. This comprises the (de)voicing of a segment – e.g. /bɪk/ for /bɪg/ –, and de-affrication – e.g. /ʃɪp/ for /tʃɪp/.

The production of English in the L1 acquisition process has some similarities with the development of perceptual capacities. Although very few studies exist on the production of L1 suprasegmental features by infants, prosody usually does not pose a problem to them and is said to be acquired quite early. Yet, Watson, Grabe and Post (1998) found that perfect, adult-like realization of English rhythm is harder and takes more time to acquire than segments. Thanks to a cross-linguistic experiment based on both French-speaking and

English-speaking mother-and-child recordings, the authors first show that English rhythm is acquired later, and is therefore harder to acquire, than French rhythm. But even further than that, they observe that English rhythm is not totally acquired before segments: "Some authors suggest that children have acquired the prosody of their mother tongue by age 1. The results of our rhythm study do not support this claim. English children have not acquired the rhythm of English by age 4" (idem: 34). This finding is all the more interesting as it runs counter to the general beliefs concerning the acquisition order of English phonological features. Thereby, even if infants are capable of producing the L1 prosody early, through intonated vocalizations among others, the adult-like realization of it is only complete later, indeed after the total acquisition of segments.

Psychologists and linguists underline the incredible rapidity of the L1 acquisition process. By the age of three years, children have acquired many of the syntactic and phonological components of their mother tongue. Apart from segmental difficulties, prosody is considered to be acquired early, which may be why it is hardly studied by L1 acquisition researchers. However, given the experiment conducted by Watson, Grabe and Post (1998), one may wonder about not only the difficulty in acquiring suprasegmental aspects of a language, but also their role and function with respect to segments. Further research on the acquisition of L1 prosody and comparative studies on L1 segmental and suprasegmental features should be done.

2.1.3. Conclusion: from L1 to L2

Just like perceptual capacities, the influence of the mother tongue on the infant's production capacities appears quickly. Johnson and Reimers (2010) note that the L1 influence is already present as early as babbling. Following Best's (1995, for example) Perceptual Assimilation Model (PAM), the close link that exists between perception and production accounts for the way children reproduce adults' articulatory gestures in their babbling, hence the recurrent debate on whether babbling should be considered to be linguistic or pre-linguistic. Albeit present, the influence of the L1 is still very recent in the early linguistic behaviour of children, and the ability to learn a wide range of languages goes on up to a certain age. At first, infants' perception and production skills are said to be universal. Young children can acquire any language with no foreign accent, contrary to older children and adults (Werker, 1995). This may also explain why a lot of children are less embarrassed to speak a foreign language than older humans are. According to most authors, infants produce all the possible human sounds during their early vocal behaviour (Kaplan & Kaplan, 1971: 359), even in the babbling stage. As is well summed up in Abercrombie (1967):

A child, provided it has sufficient incentive, can attain effortless perfection in the pronunciation of any language with which it may come into contact. When we grow older, however, and have a foreign language to learn, a level of performance comparable to that reached by the child is something for which we have to work very hard. The exact age at which children lose their remarkable aptitude for copying speech sounds is not known, and much research on the subject remains to be done. (20-21)

This statement is reinforced by Johnson and Reimers's (2010: 45): "Any normally developing child is capable of mastering any one of the thousands of languages of the world equally well, within a relatively short period of time, without any instruction". In France, one notices that more and more bilingual toys designed for very young children are sold, probably to make the most of this language universal capacity and to reinforce the child's overall intelligence.

If the influence of the mother tongue touches perception skills very early, and is present even in the babbling stage of the early learner's productions, then one might have misgivings about the possibility to attain native-like production and perception capacities when it comes to the acquisition of a foreign language. As will be seen in the next section, the hypothesis of a critical period for language acquisition (Lenneberg, 1967), among other theories and experimental studies, runs counter to the view according to which late learners of a language can attain native-likeness.

2.2. Phonology and L2 acquisition

Although the one abbreviation "L2" is generally used, it is important to keep in mind the difference between the acquisition of a second language, implying that the language is learned in the target country, and a foreign language, i.e. it is learned in one's home country, typically as an academic subject. Just like the acquisition of L1 phonology, the study of L2 phonology acquisition has been neglected (Busà, 2008), which may be why studies on second language and foreign language phonology often go together. As a matter of fact, some handbooks on second/foreign language acquisition do not even mention the acquisition of pronunciation at all (Derwing & Munro, 2005: 382). Much theoretical and empirical research is still needed in that field.

In this section, an overview of major theories and experiments in L2 acquisition of segments and suprasegments will be given, before we go on with an account of comparative studies on the latter two. That will lead to the elaboration of our own comparative experiment on the acquisition of English segments and suprasegments by French EFL learners.

2.2.1. Segmentals and L2 acquisition

As was said in the previous section, the influence of the L1 phonological system starts very early in newborn infants. In the first years of life, while the L1 influence develops rapidly but is still quite recent, the acquisition of an L2 remains easy for these early learners, contrary to late learners like teenagers or adults. Celce-Murcia, Brinton and Goodwin (1996) explain:

It is undoubtedly the case that adults will acquire the phonological system of a second language in a manner different from that of their first language, given that the acquisition of the new sounds in the second language must be integrated into already existing neural networks. (16)

Thereby, Flege (1992) underlines the obvious difference between the acquisition of L1 sounds and the acquisition of L2 sounds. While L1 acquirers are newborns and have no other linguistic influence – hence their universal capacity previously mentioned –, late L2 learners already possess a whole phonetic system based on the L1, as the L1 influence has kept growing over time (Corder, 1967: 163). Therefore, L2 production errors are inevitable. In fact, late learners tend to analyze L2 phonemes in terms of the L1 phonetic inventory quasi-systematically, and that triggered off the emergence of some famous theories in the field of L2 phonology acquisition.

The Critical Period Hypothesis, put forward by Lenneberg (1967, cited in e.g. Celce-Murcia, Brinton & Goodwin, 1996), is well-known and often debated. According to it, when someone has passed a certain age, it is no longer possible for him/her to attain native-like pronunciation of a language. This is redolent of Corder's (1967: 163) supporting comment: “[...] the learning of the mother-tongue is part of the whole maturational process of the child, whilst learning a second language normally begins only after the maturational process is largely complete”. More and more studies affirm that the critical period occurs around the age of six. At the onset of puberty, that is, the alleged end of the critical period, the huge influence of the L1 existing phonemic categories, but also brain lateralization – or the loss of plasticity of the brain – prevent the prepubescent from achieving complete mastery of a language at the phonological level. The fact that the productions of L2 sounds by early learners are better if compared with those by late learners is said to be evidence of the Critical Period Hypothesis (Flege, 1992).

The Contrastive Analysis Hypothesis (CA) proposed by Lado (1957, cited in e.g. Pica, 1994: 52) also inspired many other theories of L2 acquisition. It holds that the elements in the L2 that are similar to those in the L1 are simple for the learner to acquire, whereas the elements that are different are harder to acquire. Thereby, L2 acquisition involves a degree of cross-linguistic similarity, and the L2 sounds are filtered through the L1 system. In the cases of dissimilar structures, the phenomenon of interference occurs, that is, the influence of the learner's linguistic knowledge on the acquisition of the L2 (Cebrian, 2003: 2). In Rasier and Hiligsmann (2007), this is referred to as “negative transfer”. Conversely, when the L1 influence (i.e. transfer) enhances L2 acquisition, then it is “positive transfer”. The term “interlanguage” has been coined to refer to the ever-evolving language system that L2 learners mentally create. It consists of transfers from L1 to L2, input from the L2, and “universals”, i.e. forms that are present neither in the L1, nor in the L2 (Vergun, 2006: 11). If a negative transfer “fossilizes”, the future correction of the error becomes almost impossible. The Contrastive Analysis hypothesis was often disfavoured, however, because it fails to predict which particular L2 sounds are easy to acquire, and which are difficult and likely to become fossilized.

Similarly, Kuhl's (1991) Perceptual Magnet Effect theory (PME), already mentioned in 2.1.1. about the influence of the L1 on the child's perceptual capacities, implies that the sound prototypes that are formed and based on the L1 interfere with adult learners' ability to perceive L2 contrasts. The underlying concept is that the L1 predetermines the perception – and thereby production – of the L2. The L1 prototypes act as perceptual magnets that attract not only other members of the same category, as was explained in 2.1.1., but they also attract L2 sounds. This theory was motivated by the fact that infants are universal listeners and can discriminate any phonetic contrasts, whereas adults have difficulty in discriminating

contrasts that are not in their L1. Age is therefore an important factor in language acquisition, and a young age seems better for acquiring a second/foreign language. Baker and Trofimovich's (2005: 3) experimental study also confirms that "in late bilinguals, L2 perception and production are often influenced by the L1 at least in the beginning stages of L2 learning".

This theory is in total agreement with Flege's (1992, for example) Speech Learning Model (SLM) of second language sound acquisition. According to it, non-native phonemes are classified in terms of L1 phonemes on the basis of similarity. If an L2 sound is *similar* to an L1 sound, then the learner will classify it in an already existing phonetic category that was developed during L1 acquisition, and the acquisition of the actual L2 sound will not be easy. On the contrary, if an L2 sound does not resemble any L1 sound and is considered as *new*, then it is acquired more easily because the difference is more obvious. This automatic process is referred to as the Equivalence Classification Hypothesis (Flege, 1992: 572). L1 and L2 speech sounds thus interact through two distinct mechanisms (Flege, Schirru & MacKay, 2003): phonetic category assimilation – the formation of a new category is blocked as long as the L2 sound is identified, or "equated", with an L1 sound –, and phonetic category dissimilation – a new phonetic category is established for the L2 sound. If an L2 sound happens to be *identical* to an L1 sound, no new phonetic category needs to be created, and the sound is produced correctly. Contrary to Lado and the Contrastive Analysis Hypothesis, Flege (1992) mentions a possible factor that enables one to determine if an L1 sound and an L2 sound will be perceived as similar or not; if they are represented by the same symbol in the International Phonetic Alphabet, then they might be classified as similar, and vice versa. Flege's model confirms that the earlier the L2 is learned, the better perception and production skills will be. Yet, it has some limitations, because it focuses on the production of vowels especially.

Very close to Flege's SLM is Best's (1995) Perceptual Assimilation Model (PAM), briefly mentioned in 2.1.3. This theory centres on the discrimination of non-native phonemes at the level of perception, as opposed to the SLM. The major point is that non-native sounds may be perceptually assimilated in three ways. They can be: *categorized* exemplar of some native phoneme – the similarity between the L1 sound and L2 sound is very strong; *uncategorized* consonant or vowel that is similar to two or more L1 phonemes; *non-assimilable* non-speech sound, with no detected similarity to any native phonemes. As an illustration of this theory, Best's team conducted experiments with English speakers' perception of Zulu and Tigrinya contrasts. The listeners who participated perceptually assimilated and discriminated the non-native consonants with respect to their phonetic similarity to native contrasts, in accordance with predictions from the PAM.

Best, MacRoberts and Goodell (2001: 776) underline that Best's, Flege's, and Kuhl's models "all presume that adults' discrimination of non-native speech contrasts is systematically related to their having acquired a native speech system". The difficulties encountered by L2 learners are indeed linked with the proximity between L1 sounds and L2 sounds. As far as empirical studies are concerned, the production of vowels has especially been at the core of the studies on the acquisition of segments (Carlotti, 2007). Ploquin's (2009) experiment, for one, investigated the perception of English vowels by French L2 learners, with a discrimination task involving pairs like *He want fish* and *He won't fish*. The difficulty in recognizing English phonemic contrasts was confirmed. In addition, Flege (1992) points out

the lack of studies on the link between the perception and the production of an L2, so that it is not always clear whether difficulties find their source at a motoric level or at a perceptual level.

A parallel between the aforementioned theories and Lenneberg's Critical Period Hypothesis can be drawn. According to the latter, brain lateralization before puberty makes it impossible for late learners to achieve native-like L2 production. The various models that were looked at above seem to confirm that the acquisition of L2 segments is hard, all the more as the L1 influence is stronger and stronger with age. L2 sounds are constantly analyzed according to the L1 existing phonetic system. Nonetheless, some researchers like Birdsong (2003) attest that native-likeness is possible even in late learners. Thorén (2008) noticed that some adults have acquired native-like pronunciation, and some learners who started learning an L2 before the age of six display a foreign accent. In the experiment conducted by Bongaerts *et al.* (1997), very good Dutch-speaking learners of English, i.e. late L2 learners, and a control group of native English speakers, were recorded and rated by linguistically inexperienced native English speakers on a 5-point scale. Some of the L2 learners actually received the same scores as native speakers. Therefore, the authors conclude that it is not impossible to achieve authentic, native-like accent. Still, the experiment was limited to Dutch speakers, and perceptual skills were not tested.

Whether late learners can attain native-likeness or not, the influence of the L1 phonetic inventory on the perception and production of L2 sounds is undeniable. Furthermore, as is assumed in many theories, young acquirers form mental phonetic categories that are based on the L1, hence the problems that late learners have with the acquisition of the L2 phonology. Although these theories focus on the perception and production of L2 phonemes, and especially vowels, Thorén (2008: 20) emphasizes that the "category building" phenomenon could also apply to prosodic contrasts and categories. Yet, very few studies have investigated prosodic features in the L2 acquisition process.

2.2.2. *Suprasegmentals and L2 acquisition*

As is reported by Mennen (2006):

In a survey of major international journals in second language acquisition of the past twenty-five years carried out by Gut (personal communication), it was found that as few as nine studies investigated intonation and tone. Only four of these studies were concerned with perception of intonation, the other five were production studies. (4)

Just like studies on L1 phonology acquisition, most of the studies on the acquisition of L2 phonology have concerned individual phonemes so far, disregarding suprasegmentals (Rasier & Hilgsmann, 2007: 41). For that matter, many other researchers in the field of L2 phonology acquisition agree about the discrepancy between segmental focus and prosodic focus. Ploquin (2009: 25) notes a sharp contrast between the growing interest in prosody and the lack of studies on its acquisition in L2 context. Trofimovich and Baker (2006: 2), too, stress the following point: "Given the important role of prosody (hereafter, suprasegmentals) in language learning and use, the scarcity of research investigating second language (L2)

acquisition of suprasegmentals is striking". The possible explanation put forward in Vaissière and Boula de Mareüil (2004) lies in the experimental difficulties and equipment problems that researchers have to cope with. Experiments on L2 prosody, and prosody in general, usually require specific materials and they depend on the evolution of technology. Furthermore, studies on prosody must be conducted before studies on its acquisition so that cross-linguistic experiments may be carried out.

Despite the lack of theoretical and empirical studies on the acquisition of L2 suprasegmentals, Trofimovich and Baker (idem: 22) observe: "The acquisition of L2 suprasegmentals is akin to L2 segmental learning in that both likely represent a gradual learning process that often requires extended amounts of experience with, or exposure to, the L2". As far as the perception of L2 prosody by learners is concerned, the number of studies is extremely limited, and experiments involving French learners of English as a Foreign Language are even scarcer. Atoye's (2005) experiment, e.g., was interested in the identification – and interpretation – of English intonation by Nigerian learners. The conclusion was extended to the field of L2 teaching in that English pronunciation teaching should take into account not only the phonological dimension of intonation, but above all its function and social dimension. This finding confirms the paramount importance of suprasegmentals in EFL/ESL acquisition, whatever the learner's L1, since it reminds one that they also have specific pragmatic functions, besides their basic phonological roles. In France, EFL pronunciation teaching completely disregards this major aspect of intonation and other prosodic features.

Experimental studies on the production of L2 suprasegmentals are slightly more frequent than they are on perception, even though too few of them involve French learners of English – both as a second and foreign language. In Ploquin's (2009) experiment, French learners of English participated in a recording task in which they had to read rhythmically simple items (monosyllabic words), and rhythmically more complex items (sentences). Native speakers of and experts in North American English evaluated the productions, focusing on prosody and purposely ignoring the segmental aspects. The results of the experiment showed that lexical stress was not so problematic to French learners, who globally assimilated that notion, while pitch accents caused more trouble. On the other hand, Hahn's (2004) experiment, involving L2 learners of English of various linguistic backgrounds, highlighted the importance of lexical stress in L2 production. Native speakers evaluated the productions of the learners, who either misplaced primary stress or did not produce it at all. The results and comments made by the listeners enhanced the fact that primary stress is crucial in comprehension, but also that when listening to productions with misplaced or missing primary stresses, native speakers respond far less positively.

As regards the production of English nuclear syllables, the experiment conducted by Nava (2008) mainly examined event sentences, which are usually problematic to French EFL learners (*cf.* 1.2.2.). Although the reading task was done by Spanish learners, the findings give an insight into how French learners produce English prosodic features, as French and Spanish have a very similar prosodic structure as far as main prominence realization is concerned. The author concludes that there is a predictable, indeed unavoidable, prosodic transfer from L1 to L2. Spanish speakers systematically assign main prominence to the last syllable of an utterance – just like French speakers –, hence their difficulty in acquiring the correct L2 pattern. Another study by Nava and Zubizarreta (2009: 175) provided further

evidence that “in order to acquire the Germanic NS [nuclear stress] algorithm, the L2 learner must have moved from a syllable-timed to a stress-timed rhythm”. As was explained in 1.2.3., the two radically different rhythmic structures of English and French – and by extension Germanic languages and Romance languages – prevent learners of English from achieving native-like production of rhythm, including stresses and accents.

Finally, some studies have looked at the impact of bad production of L2 prosodic features on foreign accent. Contrary to what is usually believed, it is not only the bad realization of phonemes and phones that contributes to foreign-accentedness, but the contribution of L2 suprasegmental errors may actually be stronger (Herry, 2001: 4; Trofimovich and Baker, 2006: 3-4). In fact, even an impeccable production of segments is not enough to attain native-likeness and avoid unintelligibility. Jilka's (2000: 2) study focuses on the role of intonation in the perception of a foreign accent. The author notices: “The involvement of prosody in foreign accent is even more prominent when a French accent is concerned [...]. As a consequence, prosodic features should not be regarded in advance as inherently less relevant to foreign accent”. Given the sharp differences between the English and French prosodic structures, L2 prosody should not be dismissed as irrelevant to foreign-accentedness, especially by French learners, as intelligibility greatly depends on it (Thorén, 2008).

Given the account of the previous experimental studies on the acquisition of English suprasegmental features, the question of L2 pronunciation teaching may be raised. Following the various experiments examining L2 prosody, Thorén (2008: 28) argues in favour of a Basic Prosody (BP) approach, at least concerning L2 learners of Swedish: “The present BP-approach claims that correct temporal realization of stress and quantity in Swedish is a prerequisite of listener friendliness, i.e. a comfortably intelligible Swedish”. The problem of the place of prosody in English pronunciation teaching in France will be addressed through our experiment, a detailed account of which is given in Chapter 3. Nevertheless, it is first necessary to have an overview of the previous comparative studies on the roles of segments and suprasegments in L2 acquisition.

2.2.3. Comparative studies of L2 segmentals and suprasegmentals

While many researchers and even foreign language teachers acknowledge that the acquisition of L2 suprasegmentals has more importance in intelligibility than the acquisition of L2 segmentals, very few experimental studies compare the role of each, whether in perception or production. Instead, it seems as if the importance of one over the other had only been assumed so far. According to Birdsong (2003: 2), native-likeness at the segmental level is necessary but not sufficient to guarantee native-likeness at the suprasegmental level. The experiment conducted by the author thus raised the issue of the link between the production of prosody and the production of segments. English learners of French as a Second Language, who had lived in France for at least five years, recorded a list of isolated French words and three small paragraphs two or three sentences long. Three native French speakers then evaluated the (randomized) productions on a 5-point scale. Apart from a few subjects, it turned out that native-like production of suprasegmentals did not predict native-like segmental production, and vice versa, and more research on link between segmental and suprasegmental productions – and perception – is needed.

The experiment by Derwing, Munro and Wiebe (1998) compared the production of English by two groups of ESL students, who had lived in English-speaking Canada for at least seven months. All the participants – of various linguistic backgrounds – evidenced both segmental and suprasegmental production difficulties. They were divided into two groups; one of the groups received global – i.e. prosodic – content in their classroom instructions, and the other group focused on segments. The courses lasted for twelve weeks. A third control group received no specific instructions. After each group recorded read speech (sentences) and extemporaneous speech (picture narrative task) before and after the courses, native Canadian speakers blindly evaluated the randomized productions – which also included control recordings by four Canadian speakers. They had to rate the accentedness, comprehensibility, and fluency of each speaker. The results indicated that both experimental groups improved in accentedness and comprehensibility in the reading task. As expected, the control group that received no instructions did not improve, and the four native speakers got high scores. Interestingly enough, only the group with global focus improved in the extemporaneous narrative task, which is first evidence in support of our own claim about the importance of suprasegments in intelligibility.

A similar experiment was conducted by Missaglia (1999). The production skills of two groups of native Italian learners of German were compared, after they had received either a prosody-centred training, or a segment-centred training. The group that received a prosodic training turned out to have improved significantly more than the other group. The proximity between the prosodic structure of French and Italian, and that between English and German, makes it possible to draw a parallel between these results and how French EFL learners would respond to similar trainings on English prosody/segments. That will be answered with our experiment.

As far as we know, no similar comparative study of segments and prosody has been done on French learners of English as a Foreign Language, i.e. who have learned English in school context only and represent the great majority of L2 learners of English in France. The effect of segmental and prosodic trainings on the perception of an L2 should also be examined in the future, as the acquisition of a language does not consist of production skills only.

2.3. Conclusion

In L1 acquisition, prosody has an important place in so far as it is the first linguistic element that infants can perceive, long before they can discriminate phonemic contrasts. As far as production is concerned, the first words are usually associated with the articulation of phonemes. Yet, prosody is also present at that stage, and many authors agree that prosodic patterns of the mother tongue have strong influence even at the babbling stage of the baby. Despite the huge contribution of the L1 to the development of language capacities, early learners are capable of acquiring any language of the world, both at the perception and production levels.

As for the acquisition of a second or foreign language in late learners, the difficulties are much more numerous, especially because the influence of the L1 has grown rapidly in the first years of life. Lenneberg's (1967) Critical Period Hypothesis claims that the loss of the brain plasticity is an impediment to the attainment of native-likeness after a certain age.

However, some researchers maintain that native-like pronunciation is possible because all humans possess the same speech organs (Abercrombie, 1967). If the latter hypothesis is true, albeit seldom proved, then it may be that it is the L2 teaching to non-native speakers that is not quite appropriate. It is not only necessary to take into consideration the prosodic structures of the learner's L1 and the L2, but also to focus on *what* to teach, rather than *how* to teach as is often the case (Thorén, 2008). If prosodic features are acquired extremely early in the L1 acquisition process, then one may wonder why L2 teachers usually teach segments first and overlook prosody. In fact, studies on the acquisition of segments are more abundant than studies on prosody, in L1 and L2 contexts alike, possibly implying that the knowledge on L2 prosody is rather limited.

There is also a regrettable lack of comparative studies investigating the role of segments vis-à-vis the role of suprasegments in L2 acquisition, and thereby their place in L2 teaching. If some authors take it for granted that prosody is often disregarded but still has as much importance as segments, no real comparative study has drawn a clear parallel between the importance of the acquisition of L2 prosody and that of L2 segments in learners' skills. Besides, the few studies that compared L2 learners' production skills after either a segmental training or a prosodic/global training involved speakers other than French learners of English as a Foreign Language. That is why our experiment aims to evaluate the importance of English segments and prosody as produced – and later, perceived – by French EFL learners.

Given the need for studies examining the link between the production of prosody and the production of segments in L2 acquisition (Birdsong, 2003), a pilot comparative experiment will enable us to find out whether prosodic accuracy can actually help learners avoid some segmental errors – although the reverse is rejected by Birdsong. Even further, the findings of our comparative experiment, described in detail in the next two chapters, will contribute to the field of EFL teaching in France.

CHAPTER 3. PILOT EXPERIMENT: OBJECTIVE AND PROCEDURE

3.1. *Objective and hypothesis*

As was said in the conclusion of Chapter 1, it is important to bear in mind that segments and prosody are interdependent. Given the true difficulties that French speakers encounter with English pronunciation, the teaching of both aspects should be included in L2 pronunciation lessons in France. Although the production of phonemes is focused on in EFL teaching, prosody also greatly contributes to the improvement of communication between a non-native speaker and a native speaker. In fact, suprasegmentals such as stress and rhythm are at the origin of many segmental errors. Thorén (2008: 17) claims: “there has been the realization that not all phonetic features are equally important to make the L2-pronunciation intelligible and “listener friendly” in the field of adult instruction”. This statement is a good starting point as to the motivation of this research project. As is further explained in Busà (2008: 114), “it is not clear whether it is the segmental *vs.* suprasegmental aspects of L2 speech which are more likely to affect L2 speakers’ intelligibility”.

As far as we know, no comparative experiment on the role of prosody vis-à-vis the role of segments in the production and perception of English by French EFL learners has been conducted. Our experiment aims at finding out whether a good production of English prosody by French learners is as important as, indeed more important than, a good realization of phonemes to native speakers' ears. By the same token, we hypothesize that prosodic errors have a worse effect on communication than segmental errors do, and conversely, we believe that suprasegmental accuracy can lessen phonemic errors. In the scope of this work, a model for an experiment that aims at comparing the importance of segments and prosody is developed. It is thus a pilot experiment that we conducted, and as such, the number of subjects is not large and only production was tested. A certain number of French-speaking (non-specialist) learners of English as a Foreign Language recorded English words and sentences before and after either a training on segmentals, or a training on prosodic features, which is reminiscent of Derwing, Munro and Wiebe's (1998) and Missaglia's (1999) experiments. The goal was to have native English listeners and experts in English phonology evaluate the productions, in order to compare the scores of the groups (between-groups design), but also to examine the evolutions within the groups, first independently (within-groups design), and then again in comparison with each other.

Such empirical evidence of the role of prosody in L2 acquisition could enable learners to have less to learn and still avoid some segmental errors, as defended by Busà (2008: 118): “focusing on stress, rhythm and intonation can help learners to improve their overall pronunciation, and to sound more natural, and can lead to more comprehensible speech as well as better understanding of other people’s speech”. Accordingly, the status of prosody in the teaching and learning of English as a foreign language may have to be modified. Rather than insisting on the lax/tense vowel distinction through isolated minimal pair drills, suprasegmental features should become known to EFL learners as early as the very beginning of the acquisition process. This pilot study is to allow future comparative experimental research into the acquisition of both the perception and production of English segments and suprasegments.

3.2. Procedure

3.2.1. Subjects

As the objective of the experiment is to investigate the importance of prosody in the production of English by French EFL learners, in comparison with the importance of segments, it was necessary to find an even number of native French speakers. The subjects who participated in the experiment were recruited through oral announcements at the beginning of English classes¹, posters that were hung around the buildings of the University of Lille III, and personal contact. Then, those who were interested were given a questionnaire of selection in French to fill in (Appendix A), enquiring about their native language, age, current course of study, and age at which they started English, among other things. The first important condition to be selected was that they had never studied English phonetics at university level, so that they could not be influenced by phonetic lessons in their production of English. Given the objective of this study, French nationality and French as their native language, with no second language, were required. These major criteria also served to allow future application to the field of EFL teaching in France.

After a careful reading of the questionnaires, ten adult students were selected (see Appendix B for more details about them) at the University of Lille III and the secondary school *Lycée Fernand Darchicourt* in Hénin-Beaumont (Pas-de-Calais). Six of them were females, and four were males. They all were between 18 and 22 years old, with a mean age of 20.2 years. They were either in the last year of secondary education (*Terminale*), or had just finished it and started higher education. None of them was, e.g., a middle-aged person taking up his/her studies after a break. The subjects that were chosen had continuously studied English as a Foreign Language, and exclusively in school context. They had never been to an English-speaking country for more than two weeks, and had no English relatives; they were not bilinguals. None of them was doing an English degree; they were non-specialists and had a similar level of English – with an average mark of 12 out of 20 in English at school. The mean age at which they started English was 9.8 years, corresponding to the end of primary school for all of them. If one follows Lenneberg's (1967) theory, the subjects used in the experiment had passed the Critical Period and were considered as late learners, so they were supposed to be unable to attain native-like pronunciation. The participants were unpaid to do the experiment.

The real difficulty that we came up against in finding only ten volunteers, especially male ones, is quite telling. It brings further evidence that French speakers face problems and difficulties with English pronunciation (*cf.* Chapter 1). Most of the time, students said that they would not participate either because they simply did not like spoken English, or because they were ashamed of their “bad pronunciation”, even though it was made perfectly clear that this was not to be a problem to become a subject of the experiment.

1 I wish to thank Sarah Christine Lloyd, Anne Molloy, and Jenny Salata, who allowed me to come and make announcements during their classes.

3.2.2. Experimental procedure

Stimuli

Just as in Birdsong's (2003) experiment, both words (W) and phrases (P) were used to avoid bias towards either group – one group worked on prosody, i.e. especially at the sentence-level, whereas the other (segmental) group mainly worked at the phoneme-level and word-level. For that matter, it is crucial to use both types of item because this is a pilot experiment. Therefore, what served as stimuli in the experiment was a set of twenty English words and sentences – ten words and ten sentences. Appendix C contains a list of all twenty items; the words are transcribed phonetically, with stress markings, and the phrases are transcribed phonemically, with stress and nucleus markings.

Both words and phrases illustrated difficulties that French learners typically encounter with English pronunciation. Following the theoretical account of recurrent production errors by French EFL learners in Chapter 1, major problematic aspects of English phonology were selected for the creation of the stimuli. Roughly 50% of the problems were segmental, and 50% were related to prosody. The ten words were either monosyllabic (six of ten), or disyllabic (four of ten). The ten phrases consisted of eight or nine syllables, and some of them were taken or adapted from examples in Wells (2006). Among the segmental problems, the following appeared: the realization of dental fricatives /θ/-ð/ (e.g. W09 “either”, P04 “other”); the lax/tense vowel distinction (e.g. P02 “live” vs. P10 “leaving”); the velar nasal /ŋ/ (e.g. W08 “thinking”). Among the prosodic problems: unexpected nucleus placement; deaccenting of function words; word stress (e.g. W10 “hel'lo”, P06 “'interesting”). The phrases displayed auxiliaries in both full and reduced forms, which was designed to observe if the subjects of the prosodic group could reduce them by themselves. The tables in Appendix C give a more detailed account of the type of segmental and suprasegmental difficulties of the stimuli, and the number of syllables in each item. To choose the words, a balance in their use was kept, so their frequency per million words in the spoken part of the British National Corpus (BNC) is also given. It should be noted that although it is the segmental problems of each word and the prosodic problems of each phrase that are listed in the tables, the phrases obviously contain segmental difficulties that reflect those in the words (e.g. <th> realization in P02), and conversely the disyllabic words triggered prosodic difficulties (e.g. the stress pattern of W10 “hel'lo”).

For lack of time, extemporaneous production and perception capacities could not be tested. As a pilot experiment, read speech only was evaluated through the recording of the twenty items by the ten French learners of English, and Bertran's (1999: 109) comment brings support to this choice: “we believe that a laboratory corpus, made up of several “artificial” utterances created *ad hoc* is more reliable, since it permits the isolation of the variables under study as well as the neutralisation of other factors”. In this respect, no figures were used, and grammatical or lexical mistakes and hesitations were avoided, all the more as this might have had an impact on the listeners' judgements.

Group formation

The ten French-speaking volunteers were divided into two groups of five (see Appendix B), each consisting of three female French speakers and two male French speakers in order to

avoid inequality. Group A – from Subject 1 to Subject 5 – was the segment-based group, and Group B – from Subject 6 to Subject 10 – was the prosody-based one. In Group A, the average age of the subjects was 19.8 years; their length of study of English was comprised between 8 and 13 years, with an overall mean length of 10 years. In Group B, the average age was 20.6 years – i.e. less than one year of difference with Group A –, and their length of study of English varied from 9 to 13 years; the mean length was 10.8 years.

Pre-training recordings

The first step of the experiment was to have all French-speaking participants record the stimuli a first time, so as to have control recordings and allow subsequent comparisons between the pre-training productions and the post-training productions within each group. The recordings took place in a quiet room at the University of Lille III. The materials used were a microphone and a computer, and the recording application was the software *Audacity*. The subjects were left alone while they were recording to avoid any background noise or perturbation by other people. In turn, they sat at the computer, and they could see a full-screen slide presentation in which the twenty words and sentences appeared one by one, in a randomized order – different for each subject. The randomizations were done thanks to a spreadsheet in OpenOffice Calc. The numbers of the stimuli (W01, W02, ..., P01, P02, ...) were typed into a table and randomized twenty times – i.e. two recordings (pre- and post-training) by ten subjects – with the RAND function. The resulting orders were thus used for the creations of the twenty slide presentations (OpenOffice Impress).

When the slide presentation was open and the recording application was on, the instruction first appeared; what the subject had to do was read out the item in the microphone, and click on the space bar to go to the next one, until the word “the end” appeared in French (*fin*). The participants were allowed to read the item mentally before saying it out loud in the microphone. Thanks to the software *Audacity*, it was then possible to divide the recordings of the twenty items into separate sound files (.wav format) for each stimulus and each speaker. Once all ten subjects had recorded the twenty items, and the divisions into separate files were completed, there were two hundred sound files, corresponding to twenty items recorded by ten speakers.

Trainings

When the pre-training recording sessions were over, the trainings could start. Group A received a training on English individual sounds, and Group B received a training on English rhythm and prosody. The trainings took place in an empty room at the University of Lille III, and they lasted a few hours each. Since all five subjects of each group could not be free at the exact same time and day, the two trainings had to take place in two sessions each – three subjects in one session, and the two subjects left in another session.

The two trainings were based on the phonology of RP English, that is, the variety that is mostly used in school context in France. All the participants had mentioned in the questionnaires that they did not think they spoke any particular variety of English. Training A, with segmental focus, included: vowel quality, with an emphasis on the lax/tense distinction and realization; <r> production and rhoticity; /h/ production; the aspiration of voiceless plosives; the realizations of the dental fricatives /θ/-/ð/; dark <l> and clear <l>; the

production of the velar nasal /ŋ/. Training B, with prosodic focus, consisted of: (at the word-level) lexical stress, the realization of word prominence; (at the sentence-level) the principal rules of accentuation of content words *vs.* deaccentuation of grammatical words; stress-timing realization and (natural) vocalic reduction; quickened tempo; nuclear accent placement. Overall realization of the stress-timed rhythm of English was especially practised during Training B. Both trainings consisted of numerous common examples outside the stimuli and much oral practice. They were done in French, and no technical vocabulary, such as “nucleus” or “allophone”, was used as the aim was not to increase the subjects' theoretical knowledge in English phonology, but rather to help them improve their pronunciation.

Post-training recordings

The post-training recordings were carried out in the exact same conditions as the pre-training recordings. For the second recording sessions, the subjects were supposed to take into account all that was done during their respective trainings, although this was not made clear or explicitly compulsory to them. That method reinforced the similarity with a typical English class, where the teacher cannot force his/her students to apply the lesson, even though they attended it. Once again, the software *Audacity* made it possible to divide the recordings into separate sound files for each recorded item. In the end, there were four hundred items, i.e. twenty English words and phrases recorded twice – before and after the trainings – by ten French speakers.

3.2.3. Listener-judges and rating procedure

For the ratings of the productions, we followed Derwing, Munro and Wiebe's (1998), Missaglia's (1999), and Birdsong's (2003) experiments, in so far as we resorted to subjective evaluations by listeners. Three listener-judges kindly accepted to score all four hundred items, despite the large amount of work and time that it implied² – using the scores of only one listener would have been insufficient and possibly too much biased. The chosen raters were perfectly familiar with the pronunciation of English. Two of them (Judge 1 and Judge 2) were native speakers of English who are linguistically and phonetically untrained: a middle-aged British speaker who came from Lincolnshire (England), and an American speaker in her twenties, from Tennessee (United States of America). The former did not speak any foreign language, and the latter knew French and Spanish as foreign languages. Judge 3 was a non-native expert in English phonology, who has been teaching it to French-speaking English students at university level for several years.

Just like Derwing, Munro and Wiebe's (1998) experiment, which is very close to this one, the evaluation of the productions was blind. The four hundred items (i.e. pre-training and post-training productions alike) were randomized, renamed and numbered from 1 to 400 in a special folder named under the simple label “sound files”, before they were given to the listener-judges. The latter were not made aware of the aim and procedure of the experiment. They were just given instructions (see Appendix D) in which they were asked to score four hundred productions of English by French speakers. Contrary to Ploquin's (2009) experiment (*cf.* 2.2.2.) investigating the production of English prosody by French learners, our three

2 Many thanks to all three judges who accepted to do this task.

judges were not to focus on any particular aspect of phonology – they had to rate the *global* English quality of the speakers, that is, a whole mixture of overall intelligibility, foreign-accentedness, and segmental and suprasegmental accuracy. The number of speakers was not told to them, either. The rating task took place in a quiet room at the University of Lille III. The judges sat at a computer, and had headphones to listen to the sound files in the folder. They wrote down the scores in a two-column table – one column with the numbers of the files, and one column for the scores – on a piece of paper. What they had to do was listen to one recording/sound file at a time, and give it a score on a 7-point scale, with the lowest score being 1 (= terrible/strong foreign accent/unintelligible), the highest being 7 (= native-like/no foreign accent), and various shades in-between. The scale did not include 0. The raters were advised to stick to their very first idea when they hesitated. They were allowed to listen to the sound file a second time if they had not heard it the first time, for example if they had been surprised by the sudden start of the file (sometimes very short in the case of words). To go to the next file, they simply had to double-click on it. Each judge did the rating task alone, and on a different day each. The evaluations lasted between an hour and a half and two hours.

3.3. Summary

Thanks to the ten participants and the three listener-judges, this pilot experiment was carried out in good conditions. Despite some people's constraints of time, every recording and rating was completed well. Typical French-speaking non-English students participated. Furthermore, the trainings of the experiment were redolent of typical pronunciation classes in a secondary school or to non-specialists. That will help us draw more general conclusions regarding L2 pronunciation teaching in France. As for the results, the experiment will enable us to answer our main hypothesis, that is, whether having a training on English prosody has a better effect on pronunciation skills – *viz.* read speech in the scope of this work – than having a training on individual sounds.

As is pointed out in Flege, Bohn and Jang (1997: 451): “one can never be certain that the listeners chosen for an intelligibility test adequately represent the variety (or varieties) of the target language that one's non-native subjects have heard and presumably learned to some degree”. That is why, even though three judges did the rating task, it is unsafe to affirm that their judgements are a hundred percent reliable to make more general and objective conclusions about the importance of prosody. Nevertheless, using three different kinds of people, who all know English pronunciation full well, whether theoretically or practically, is an advantage. As a matter of fact, three different yet interesting points of view are given and can be compared with one another. In this respect, the results of the experiment will be even more reliable, and the mean scores will be more objective.

CHAPTER 4. RESULTS AND DISCUSSION

In this chapter, a detailed analysis of the results of the experiment is provided. After the three listener-judges had finished giving the four hundred scores, the latter were typed into tables, found in Appendix E. A close examination of these scores, as well as the calculation of each group's mean scores, will enable us to confirm – or invalidate – the central hypothesis of this work. Although the experimental procedure only included read speech, the results will offer an insight into the actual role and importance of suprasegmentals in the acquisition of English as a Foreign Language by French learners, with respect to the role and importance of segments.

In section 4.1., the between-groups design of the experiment is focused on, with a comparison of the post-training scores of Group A with the post-training scores of Group B. The other section, 4.2., centres on the within-groups design and the – independent, and then compared – evolutions of the two groups before and after their respective trainings. Finally, section 4.3. is a discussion of the results, which also comprises a parallel between our findings and those reported in previous similar studies, and an account of the methodological limits of the whole protocol.

4.1. Between-groups design

4.1.1. Hypotheses

The verification of the central hypothesis about the results of the experiment implies a cross-group comparison of the scores (a thorough account of which is given in Appendix E). The first way of looking at the completed experiment is to compare the post-training scores of Group A with those of Group B. Thereby, knowing which group has received the better scores will enable us to know which of the two trainings – segmental or prosodic – has had the better effect on the pronunciation skills of the French EFL learners who participated. If French speakers' productions of English are better evaluated by native speakers and experts after they received a training on prosodic features, then it means that enhancing prosody in EFL pronunciation teaching may actually be more sensible than focusing on phonemic aspects only. Accordingly, the training that has had a better effect on the learners' productions will correspond to the aspect of English phonology that has more impact on intelligibility, communication, and foreign-accentedness even, than the other, given that the listeners had to rate the global English of the subjects.

Hypothesis 1

Our first claim about the results of the experiment is that the group that received a training on suprasegmental features (Group B) will have obtained better scores than the segmental group (Group A). Although prosody is mostly overlooked by EFL teachers, prosodic features such as stress and rhythm are at least as important as phonemes and phones in the acquisition of English pronunciation. As far as the final results are concerned, there are three possibilities. If the hypothesis proves to be true, then the mean score of Group B will be higher than the mean score of Group A. In other words, a prosodic training has a better effect on production skills of French speakers than a segmental training. However, if the

hypothesis is wrong, then either Group A will have better scores than Group B, or the two groups will be at the same level. In the former case, it is a training that is based on segmentals that helps French learners improve their pronunciation skills more than a training on prosody.

Hypothesis 2

The second hypothesis is that the segmental group may tend to be slightly better at words (Hypothesis 2 #1), since the segmental training and its oral practice focused on the word-level. However, one should not exclude the possibility that a prosodic training may help L2 speakers improve at the segmental level as well, as is maintained by Birdsong (2003). This would imply that the prosodic group would be better at word reading. In addition, we claim that the prosodic group will have obtained better scores in phrases (Hypothesis 2 #2), as the prosodic training and oral practice was mainly at the phrase-level.

4.1.2. Results

Overall post-training scores (Hypothesis 1)

Interestingly enough, the overall comparison of the post-training scores (marked out of seven: cf. 3.2.3.) obtained by the two groups reveals that neither group is better than the other after the trainings. As a consequence, neither training has had a better effect on the French EFL learners' read production capacities than the other. The detailed scores that were given to each speaker by each judge are listed in the tables of Appendix E.

The following table (Table 1) shows the mean post-training scores of Group A and Group B given by the three listener-judges, as well as the general mean score of each group and the conclusion that can be drawn from that (in the "result" column):

	Group A	Group B	RESULT
Judge 1 (British speaker)	3.37	3.3	<i>Non-significant</i>
Judge 2 (American speaker)	4.29	4.24	<i>Non-significant</i>
Judge 3 (expert)	3.24	3.37	<i>Group B/non-significant?</i>
MEAN SCORE	3.63	3.64	<i>Non-significant</i>

Table 1: Overall post-training scores

Concerning the mean scores of Judge 1 – the British English speaker –, Group A has obtained 3.37 out of 7, and Group B has got 3.30 out of 7. Even though Group A, i.e. the segmental group, has a slight advantage of 0.07 over Group B, it is impossible to draw significant conclusions from such results. The gap between the two scores is far too small (inferior to 0.1), and it is therefore non-significant. Judging by the scores given by the British English speaker, neither a prosodic training, nor a segmental training helps French EFL learners improve their (read) production skills more than the other.

Although higher than the scores given by Judge 1, the mean scores given by Judge 2 – the American English speaker – are just as inconclusive. While Group B has a mean score of 4.24 out of 7, the slightly higher score obtained by Group A, that is, 4.29, cannot be said to

provide evidence that a segmental training has a better effect on production skills and global intelligibility than a prosody-centred training. Again, the difference from 4.24 to 4.29 is too little, i.e. 0.05. The two groups may be considered to be at the same level.

As for the mean scores that Judge 3 – the academic expert in English phonology – has given to each group, they seem to point to a slight advantage of Group B over Group A. The former has obtained a mean score of 3.37, whereas the latter has obtained 3.24. The difference between the two is superior to 0.10, i.e. 0.13. Still, it is too little to ascertain that Group B is better than Group A according to Judge 3.

When the mean score of each group is worked out from the three judges' mean scores, the closeness between the general levels of the two groups is even more striking. As Group A obtains 3.63, and Group B obtains 3.64, the surprisingly tiny difference of 0.01 is of even less significance than it is with the mean scores of each judge separately. As a conclusion, the two groups can be said to be at the same level after their respective trainings. Neither the prosodic training, nor the segmental training has helped the French EFL learners more than the other. Consequently, it seems that as far as read speech skills are concerned, prosodic features are not more important than individual sounds. Instead, they have the same weight in intelligibility, indeed foreign-accentedness.

Albeit it is still very risky to jump to conclusions, it is worth noticing is that the segmental group has obtained slightly better scores than the prosodic group in the two native speakers' judgements (Judges 1 and 2), and only to the expert's ears (Judge 3) is the prosodic group better. One may thus wonder if the native speakers' judgements should not be followed, and segments are actually *slightly* more important than prosody. Nevertheless, such a conclusion is far too hasty, since the experiment only tested read speech capacities of French learners, and the gaps between the scores of Group A and Group B according to both native speakers are, once again, too insignificant (i.e. 0.07 and 0.05). Further research needs to investigate the spontaneous speech capacities and the perception skills of French EFL learners after either a prosodic training or a segmental training.

Even though the two groups turn out to have similar capacities of read production after their trainings, it is interesting to have a look at the scores of each group in the production of the words only, and then the productions of the phrases only.

Scores for the words (Hypothesis 2 #1)

Given that Group A received a training at the phoneme-level and the word-level, the participants of this group should have better scores at individual words than those in Group B, who received a training that was more centred on the whole phrase. Yet, if Birdsong's (2003) claim about the link between prosody and segmentals is true, then one should not dismiss the idea that the prosodic training has helped the learners improve their pronunciation at the segmental level, as well. In that case, Group B may have higher scores than Group A.

As a matter of fact, just like the general post-training scores, neither group was better evaluated than the other for the reading of isolated words. Table 2 below shows the mean scores of the groups as given by each judge for the words only:

	Group A	Group B	RESULT
Judge 1 (British speaker)	3.04	3.08	<i>Non-significant</i>
Judge 2 (American speaker)	4.6	4.26	Group A (<i>slight difference</i>)
Judge 3 (expert)	3.42	3.46	<i>Non-significant</i>
MEAN SCORE	3.68	3.6	<i>Non-significant</i>

Table 2: Post-training scores for words

For Judge 1, the two groups have similar levels regarding the read production of words. The slight advantage of Group B – 3.08 – over Group A – 3.04 – is of no great significance, as the gap is only 0.04. However slight the advantage of Group B over Group A may be, it actually runs counter to the hypothesis that the segmental group would be better at words than the suprasegmental group. A little tendency towards the opposite can be observed, pointing to the other possibility that prosodic training may improve the learner's pronunciation at the segmental level.

On the contrary, an examination of Judge 2's mean scores confirms the claim that the segmental group should have better scores for words than the suprasegmental group. The difference between the two is superior to 0.30, i.e. 0.34, with 4.60 out of 7 for Group A, and 4.26 for Group B. It must be borne in mind that such a difference is small all the same.

Judge 3's mean scores for words are close to Judge 1's, in so far as Group B is slightly above Group A, with 3.46 and 3.42 respectively. Once again, the difference of 0.04 is non-significant, even though it points to the invalidation of the hypothesis that Group A should obtain better scores for words. However, the hypothesis that a prosodic training prevents segmental errors is not safely validated, either.

On the whole, it cannot be said that Hypothesis 2 #1 is confirmed. The mean score of Group A is 3.68, which is more than Group B's 3.60, but still insufficient to draw safe conclusions and generalize. In other words, neither a segmental training, nor a suprasegmental training has a better impact on French EFL learners' production of isolated words than the other.

Scores for the phrases (Hypothesis 2 #2)

As Training B was based on prosodic features and thereby implied oral practice at the sentence level, Group B should have obtained better scores for phrase reading than Group A. The analysis of the mean post-training scores for phrases, detailed in Table 3 below, indeed seems to confirm Hypothesis 2 #2, contrary to the mean scores for words.

	Group A	Group B	RESULT
Judge 1 (British speaker)	3.7	3.52	Group A (<i>slight difference</i>)
Judge 2 (American speaker)	3.98	4.22	Group B (<i>slight difference</i>)
Judge 3 (expert)	3.06	3.28	Group B (<i>slight difference</i>)
MEAN SCORE	3.58	3.67	Group B (<i>/significant?</i>)

Table 3: Post-training scores for phrases

On the one hand, the mean post-training scores given by Judge 1 for the phrases are 3.70 for Group A, and 3.52 for Group B. The hypothesis is invalidated because it is the segmental group that has got the better mean score. The difference of 0.18 is superior to 0.10, but the question of the significance of such a difference may be raised.

On the other hand, if one follows the scores that were given by Judge 2, Hypothesis 2 #2 appears to be confirmed. Group A has obtained 3.98, and Group B, 4.22. The (small) difference of 0.24 enables us to note that a suprasegmental training *may* help French learners in phrase reading more than a segmental training.

Similarly, Group B is better at phrase reading than Group A according to Judge 3's scores, with 3.28 against 3.06 respectively, and a difference of 0.22. This advantage of the effects of a prosodic training over a segmental training confirms the hypothesis.

As regards the mean score of each group, it is Group B, i.e. the prosodic group, that has obtained the better score (3.67). With 3.58 out of 7, Group A has 0.09 less than Group B. The hypothesis is therefore confirmed as far as phrase reading is concerned, yet the difference between the two groups is so slight that generalizing about the importance of prosody vis-à-vis segments is too risky. Finally, what is noteworthy is that among the one hundred phrases that were recorded after the trainings, only one phrase has obtained the full score (7 out of 7, i.e. native-likeness). It was given by Judge 2 to the reading of Phrase 5 by Subject 9, that is, one participant of the prosodic group. If the prosodic training is the cause for that, then our central hypothesis may be close to the truth. The analysis of the evolutions of the groups (within-groups design) will provide more answers and confirmations – or invalidations.

4.2. Within-groups design

4.2.1. Hypotheses

First and foremost, it should be reminded that the rating task was blind, and the pre-training and post-training recordings were completely randomized before being given to the listener-judges. In order to investigate the importance of prosody with respect to segments in EFL acquisition, we should now consider how the French subjects' production skills evolved from before the trainings to after the trainings according to the listeners. An independent comparison of the pre-training scores with the post-training scores within each group will be carried out so as to determine whether the trainings have helped the learners improve their read production capacities (Appendix E contains all the results in detail), and by extension, if French learners are able to understand and apply what is taught to them. Furthermore, if a prosodic training has a better effect on learners' pronunciation skills than a segmental training, as we have claimed so far, then the prosodic group should evince a stronger evolution. The within-groups design will serve to find out whether or not the evolution within Group A is similar to the evolution within Group B.

Hypothesis 3

Given that the ten French-speaking participants were neither specialists of English nor bilinguals, and had never studied English phonetics and phonology before the experiment took place, their pre-training scores should be lower than their post-training scores, no

matter which training they attended. Through the within-groups analysis and the calculation of the evolution of each group independently, we hypothesize that the subjects of Group A will have obtained better scores after their training (Hypothesis 3 #1), and so will the speakers of Group B (Hypothesis 3 #2).

Hypothesis 4

From the answer to Hypothesis 3 and the examination of the within-groups evolutions, it will be possible to compare the overall pre-training to post-training evolution of Group A with that of Group B. In keeping with Hypothesis 1, our claim is that the segmental group will have evolved less than the suprasegmental group, since we believe L2 prosodic features to have more weight in intelligibility and the development of learners' pronunciation capacities (Hypothesis 4 #1). However, given the unexpected findings of the previous section (4.1.), we must not preclude the option that the pronunciation capacities of both groups will have evolved in a similar measure.

In addition (Hypothesis 4 #2), we hypothesize that the evolution of Group B for phrases will be higher than that of Group A, as the prosodic training focused on the whole phrase. As for the evolution for isolated words, two possibilities can be envisaged: (a) Group A will show a stronger evolution for word reading, since the segmental training was based on words; (b) the evolution of Group B for words will be higher than, or at least the same as, Group A, which would mean that a training in L2 prosody helps learners improve their pronunciation skills at the segmental level, as well. In the latter case, the hypothesis that was put forward by Birdsong (2003) about the link between L2 suprasegmental features and L2 segmental features in production would be validated.

4.2.2. Results

In order to calculate the evolution of the learner's pronunciation skills within each group from the first recordings to the second recordings, the following mathematical formula was used:

$$\left(\frac{\text{target value} - \text{source value}}{\text{source value}} \right) \times 100$$

The source value corresponds to the the pre-training score, and the target value is the post-training score. The result gives the pre-training to post-training evolution, expressed in percentage.

Evolution of Group A (Hypothesis 3 #1)

As expected, the subjects belonging to Group A have obtained better scores after the training than before the training. This result proves that the segmental training has helped them increase their pronunciation capacities concerning read speech.

Table 4 below shows the mean pre-training scores and post-training scores that were given to Group A by the three listener-judges. The last column shows the global evolution in percentage:

	Pre-training	Post-training	Evolution (%)
Judge 1	2.61	3.37	+29%
Judge 2	3.37	4.29	+27%
Judge 3	2.83	3.24	+14.5%
MEAN SCORE	2.94	3.63	+23.5%

Table 4: Pre-training to post-training evolution of Group A

When looking at the mean scores of Judge 1 and Judge 2, one can observe that Group A evolved in a similar way for the two listeners. From the pre-recordings to the post-recordings, the mean scores of Group A as given by Judge 1 changed from 2.61 to 3.37 out of 7, which corresponds to an evolution of +29%. Our claim that the groups will have evolved positively after their trainings is confirmed with this first result. Judge 2's scores show a very similar evolution within Group A of +27%. From 3.37 before the training, the participants of Group A went up to 4.29 after the training. As to Judge 3's mean scores, the evolution is slightly weaker than it is with the two other judges. With a change from 2.83 to 3.24, the evolution corresponds to +14.5%.

The calculation of the overall mean scores within Group A confirms Hypothesis 3 #1. The global score of the group has increased from 2.94 in the pre-training productions to 3.63 in the post-training productions. For that matter, the evolution of +23.5% is quite strong. The hypothesis is confirmed, and the segmental training has helped the subjects improve their overall pronunciation. By the same token, it may be concluded that French learners do not have much difficulty in understanding and applying theoretical knowledge on English segments.

Evolution of Group B (Hypothesis 3 #2)

Concerning the evolution within Group B, the hypothesis is also confirmed, as can be seen in Table 5, which presents the detailed mean scores before and after the suprasegmental training and the evolutions in percentage, whether it is an increase (+) or a decrease (-):

	Pre-training	Post-training	Evolution (%)
Judge 1	3.35	3.3	-1.5%
Judge 2	3.79	4.24	+11.9%
Judge 3	2.96	3.37	+13.8%
MEAN SCORE	3.37	3.64	+8%

Table 5: Pre-training to post-training evolution of Group B

Surprisingly enough, the mean scores of Judge 1 alone invalidate our hypothesis. They show that Group B has a lower mean score after the training, however little the difference may be, i.e. -1.5%. This may be due to the fact that the scores of one subject of Group B (Subject 7) significantly decreased from the pre-training session to the post-training session, and according to all three judges. While this surprising decrease has lowered the overall

mean score of the group, it may be explained by many extra-linguistic factors, such as the excitement, tiredness, or real comprehension difficulty of the participant. All this is discussed later, in the subsection devoted to the discussion of the results. The evolutions as presented by the mean scores of Judge 2 and Judge 3 are in agreement. Following Judge 2's scores, Group B's score has changed from 3.79 to 4.24, with an evolution rate of +11.9%. Judge 3's scores present a slightly weaker evolution of +13.8%, i.e. from 2.96 to 3.37.

Despite the decrease in mean score of Judge 1, Group B globally has a higher score after the training (from 3.37 to 3.67). The evolution of +8% confirms Hypothesis 3 #2, and the prosodic training has helped the learners improve their read production skills.

Although both groups increased from the pre-training recordings to the post-training recordings, the rates of evolution of the two groups are quite different, which is why a comparison of the two evolutions is relevant.

Overall evolutions of Group A vs. Group B (Hypothesis 4 #1)

Analyzing which of the two groups has evolved more than the other after the trainings enables us to get further insight into whether prosodic features can actually help learners improve their production skills at the segmental level and not only at the suprasegmental level, as is claimed in Birdsong (2003), for example. In fact, a close examination of the mean evolution of each group clearly invalidates Hypothesis 4 #1, at least concerning read speech capacities of French learners. The pre-training to post-training evolution of the segmental group is stronger than that of the prosodic group. The former evinces a significant overall evolution of +23.5%, whereas the latter only has an evolution of +8%.

According to the mean evolutions worked out from Judge 1's scores, the gap between the two groups is very pronounced. While Group A has increased by 29%, Group B has decreased by 1.5%. This extreme case is completely at odds with our claims that a suprasegmental training has a better effect on L2 learners' production skills than a segmental training, and that the group should have higher scores after the training.

The evolution calculated from the mean scores of Judge 2 also invalidates Hypothesis 4 #1, even though the gap between Group A and Group B is here smaller. The increase by 27% of the segmental group is in keeping with that of Judge 1, and it is evidence of an advantage over the prosodic group and its 11.9% increase.

With Judge 3's scores, the gap is even smaller, and the evolutions of the two groups are very similar this time. The mean score of Group A has increased by 14.5%, and the score of Group B, by 13.8%. On the one hand, the difference is inferior to 1%, and it seems that the two groups have evolved in a similar way. On the other hand, the hypothesis is not completely confirmed according to Judge 3, and it is the segmental group that evolved the more after the trainings.

Evolutions of Group A vs. Group B for phrases and words (Hypothesis 4 #2)

As far as the productions of read phrases are concerned, we have hypothesized that Group B would evince a stronger evolution than Group A, mainly because Training B included oral practice at the level of the entire phrase. Yet, the opposite is actually found; the segmental group showed a greater evolution from pre-training to post-training production than the prosodic group. In Table 6 below, the evolutions of both groups according to the three judges'

mean scores are presented, following the schema *pre-training* → *post-training* = *rate of evolution* (whether increase + or decrease -, expressed in percentage):

	Evolution of Group A (%)	Evolution of Group B (%)
Judge 1	2.82 → 3.7 = +31.2%	3.54 → 3.52 = -0.56%
Judge 2	3.44 → 3.98 = +15.7%	3.66 → 4.22 = +15.3%
Judge 3	2.84 → 3.06 = +7.74%	2.72 → 3.28 = +20.6%
MEAN EVOLUTION	3.03 → 3.58 = +18.15%	3.3 → 3.67 = +11.2%

Table 6: Pre-training to post-training evolutions for phrases

For Judge 1, the better evolution of Group A is clear, and the gap between the two groups is large; Group A has increased by 31.2%, but Group B has decreased by 0.56%. This result is all the more unexpected as the evolution of Group A is very strong. On the contrary, the mean evolution of Group B is close to that of Group A if one follows Judge 2's scores. Although still higher, the evolution of +15.7% of the segmental group is almost on a par with the 15.3% increase of the prosodic group. As regards Judge 3, yet another pattern can be observed, since Hypothesis 4 #2 for phrases is here validated. The increase of Group B is greater than that of Group A, with +20.6% and only +7.74%, respectively.

Despite the latter result, the general result denies the hypothesis concerning phrases. The mean evolution of Group A, i.e. +18.15%, is above the mean evolution of Group B, which is only +11.2%.

The pre-training to post-training evolution for isolated words may lead to a twofold hypothesis. On the one hand, if prosodic features have more importance than segmentals, and Birdsong's (2003) idea proves to be true, then the prosodic group will have evolved more than the segmental group. This would imply that a suprasegmental training help learners with segmental production, as well. On the other hand, considering that a segmental training is based on phonemes and oral practice of individual sounds and words, it is just as conceivable that the mean score of Group A for words will have increased more than that of Group B.

As is shown in Table 7, we may conclude that the second hypothesis is true; the segmental group has a stronger pre- to post-training evolution than Group B.

	Evolution of Group A (%)	Evolution of Group B (%)
Judge 1	2.4 → 3.04 = +26.6%	3.16 → 3.08 = -2.53%
Judge 2	3.3 → 4.6 = +39.4%	3.92 → 4.26 = +8.67%
Judge 3	2.82 → 3.42 = +21.3%	3.2 → 3.46 = +8.12%
MEAN EVOLUTION	2.84 → 3.68 = +29.6%	3.42 → 3.6 = +5.26%

Table 7: Pre-training to post-training evolutions for words

Once again, Judge 1's scores and the calculation of the evolutions foreground a significant gap between the 26.6% increase of Group A and the 2.53% decrease of Group B. Even though

it is confirmed that the segmental group has evolved in word reading more than the other group, it is hardly comprehensible that Group B should have thus decreased. For Judge 2, both groups have increased in the word reading task, but the increase of Group A is much stronger than Group B, with +39.4% compared with +8.67%. Finally, the increase of Group A is slightly weaker with Judge 3, i.e. +21.3%, but it is still above Group B, with +8.12%.

On the whole, the evolution of word production of Group B is rather weak, as the mean score has changed from 3.42 to 3.6 (+5.26%). As could be expected, however, the segmental group showed significant improvement in word reading, going from a mean score of 2.84 to 3.68 (+29.6%).

4.3. Discussion of the results

4.3.1. Between-groups: Hypotheses 1 and 2

The major claim of this work was that the importance of prosody in the acquisition of English as a Foreign Language by French learners is as strong as, indeed stronger than, the importance of segmental features such as phonemes. By extension, our view was that intelligibility and the welfare of communication greatly depended on the realization – and thereby perception – of L2 suprasegmental features. In the scope of this experimental research, only read speech as produced by French EFL learners was tested, and future studies are still needed.

The first hypothesis that we put forward as regards the results of the experiment was that the French speakers who received a training on L2 prosodic features would be better evaluated by the native English speakers and expert than the group with segmental focus (Hypothesis 1). As a matter of fact, the hypothesis was not confirmed. The two groups turned out to have obtained very similar results: Group A has obtained a mean score of 3.63 out of 7, and Group B has obtained 3.64. The extreme closeness between these two scores is quite telling. As far as read speech capacities are concerned, a prosodic training does not necessarily help French learners improve their pronunciation and accent more than a segmental training does. Judging by the three listeners' scores of the post-training productions, intelligibility does not depend on segmentals only, nor does it depend on suprasegmentals only: (British speaker:) 3.37 *vs.* 3.3; (American speaker:) 4.29 *vs.* 4.24; (expert:) 3.24 *vs.* 3.37. Consequently, it seems that segments and prosody are of equal importance, and both aspects of English phonology should be taken into account in EFL pronunciation teaching.

While we hypothesized that Group A might be better at word reading after the segmental training, and Group B would be better at phrase reading after the prosodic training (Hypothesis 2), the analysis of the mean scores is not very conclusive. Yet, one can indeed observe a slight advantage of Group A in words (3.68 *vs.* 3.6), and a slight advantage of Group B in phrases (3.58 *vs.* 3.67), somehow confirming Hypothesis 2. However, the gaps between the two mean scores are so small – i.e. 0.08 for words and 0.09 for phrases – that it is wiser to conclude that the two groups are at the same level for both word reading and phrase reading.

Despite the unexpected results of the experiment, it is interesting to note the spontaneous reactions and perplexity of two of the three listener-judges during the rating task¹. Both Judge 2 (the American speaker) and Judge 3 (the expert in English phonology) pointed out that a wrong realization of some prosodic patterns prevented them from giving a better score to some of the productions. The perfect pronunciation of segments in these specific cases was not enough to get full score. Judge 2's comment concerned the bad rhythm of a sentence, despite the perfect realization of the phonemes. Judge 3's was about the stress pattern of a disyllabic word, and the rising intonation of an isolated word – the expert in English phonology remarked that a rising tone was not the default tone for such an isolated word, and a falling tone would have made the score higher. These comments made by two of the three listeners seem to highlight the importance of prosody in spoken English, even though the overall results of the experiment do not confirm that idea.

Our findings are at odds with the previous comparative experiments that investigated the effect of prosody with respect to that of segments. Both the experiments carried out by Derwing, Munro and Wiebe (1998) on the one hand, and Missaglia (1999) on the other, revealed that a prosody-centred training has a better effect on L2 learners' skills than a segment-based training, whatever the L1 of the subjects. This discrepancy between their findings and ours may be explained by the fact that our experiment only investigated read speech, and the number of French-speaking subjects and listener-judges was rather limited. Also, many other extra-linguistic factors played a role in the subjects' productions, such as their being tired or bored. More comparative experiments on the role of prosody are necessary, as the importance of the latter in intelligibility is still to be objectively proved. The conclusion of the between-groups design is only a first step to a closer examination of prosodic features in the production and perception of English as a Foreign Language by French speakers.

4.3.2. *Within-groups: Hypotheses 3 and 4*

The within-groups analysis of the pre- and post-training scores was supposed to show that both groups had better scores after their respective trainings than before the trainings (Hypothesis 3), even if this might have seemed to go without saying. Indeed Group A increased by 23.5%, and Group B increased by 8%, as was reported in the previous section. Hypothesis 3 was confirmed.

For the sake of a comparison between the importance of L2 prosody and L2 segments, the within-groups evolutions were compared with each other in order to determine whether the prosodic group evinced a stronger evolution than the segmental group (Hypothesis 4). If that was the case, then the importance of suprasegmental features vis-à-vis segmental features would be confirmed. Nevertheless, the results of the experiment bring evidence of the opposite conclusion. The global evolution of Group A, i.e. +23.5%, is far superior to the evolution of Group B, which is +8% only, thus giving more strength and efficiency on learners' skills to the segmental training. But apart from the possibility that a segment-based training is more efficient than a prosodic training, several explanations to this observation can be considered.

1 It must be borne in mind that the rating task was individual. The three raters never met to carry out the task, and they were not aware of the aim of the experiment, either.

First of all, given the intentional resemblance between our trainings and typical pronunciation lessons as given by an EFL teacher in France, it is possible that the French-speaking subjects regarded the trainings as serious lessons. As a consequence, French learners being more familiar with phonemes, the participants had more difficulty in understanding the training on prosodic features of English, which may have been something completely new to them. For that matter, we noticed that several subjects already mastered some basic elements of English phonemic contrasts before the trainings (e.g. the /i:/-/ɪ/ distinction, the realization of /ɔ:/), while none of them showed any knowledge of English prosodic features², including lexical stress, judging by their productions. If the suprasegmental training seemed harder to the French speakers who attended it, then it may have caused them difficulty in applying what was taught during the session, even though oral practice was done. As we have seen in the introduction and Chapter 1, the differences between the French and the English prosodic systems and rhythmic structures are so pronounced that a French EFL learner may not even realize that work on and practice of the L2 prosody are crucial.

Concerning Subject 7 of Group B whose mean score surprisingly decreased after the training (see 4.2.2.), it has been noticed that the cause for his thus decreasing is that he largely exaggerated lexical stress and nucleus realizations. Together with the observations from our own teaching experience during the prosodic trainings to five French speakers, it shows that the latter have real difficulties in understanding, and thereby learning and producing English rhythm and prosodic system. Obviously, a training that lasted a few hours could not make learners become experts in English prosody.

Finally, the strong differences of evolutions among the three judges of the experiments are sometimes noteworthy, as they may explain why the prosodic group globally evolved less than the segmental group. The most striking instance of discrepancy among the judges is the mean evolutions calculated from the scores of Judge 1 and Judge 3. According to the former, Group A increased by 29%, and Group B decreased by 1.5%. On the contrary, Judge 3's scores show that both groups have increased in a very similar way: +14.5% for Group A, and +13.8% for Group B. If one had to follow one result rather than the other, the conclusion would be completely different. According to Judge 1, a prosodic training does not help French EFL learners at all, whereas with Judge 3, both a prosodic training and a segmental training have similar effects on the learners' pronunciation skills. Now, one may wonder if the origin of the listener plays a role in this sharp contrast, just as Flege, Bohn and Jang (1997: 451) emphasized that listeners' judgements might not be a hundred percent reliable (*cf.* subsection 3.3.). The scores that were given by the British speaker often evince a decrease of the prosodic group members after the trainings, while the scores of the expert in English phonology does not. Even if one is tempted to conclude that segments are more important to British speakers' ears, the validity of this argument is not safe as only one British speaker did the rating task. In addition, that Judge 1 unconsciously focused on the learners' realizations of phonemes despite the instructions (Appendix D) is another possibility, just as a teacher and expert in phonology may unconsciously keep in mind the importance and realization of prosody.

Since our results do not support the claim that suprasegmentals make learners' read productions better than segmentals do, the existence of a link between the good production

2 Except for the rising tone on questions, also present in the French prosodic system.

of L2 suprasegmental features and the improvement at the segmental level is also challenged. In Birdsong's (2003) experiment on the production of French by English learners, the findings are similar to ours. The issue of finding out whether native-like production of suprasegmental features could predict native-like production of segmentals was raised. The results did not confirm the author's hypothesis, and the French productions by the English speakers did not bring evidence of the link between L2 prosody and segments. As was pointed out by the author, though, more research is needed, and the claim is maintained that prosody has more weight in communication than segments. Still, considering the similarity between Birdsong's and our own results, it seems that the two phonological aspects of an L2 are at least of equal importance in pronunciation to native speakers' ears, even though Birdsong's experiment focused on productions of French, and ours did not investigate spontaneous production.

CHAPTER 5. CONCLUSION AND PERSPECTIVES FOR FURTHER RESEARCH

5.1. Conclusion

Throughout this work, the main objective has been to enhance the role of prosody in L2 phonology acquisition, and its contribution to intelligibility. In the theoretical section (Chapter 1), we saw that, interestingly enough, French teachers of English as a Foreign Language tend to focus on phonemes when it comes to pronunciation teaching, thereby overlooking prosodic features in spite of the great differences between the French system and the English system. For that matter, when one talks about the pronunciation of a foreign language, what immediately comes to one's mind is L2 phonemes and their differences with those of the L1. Yet, as was seen in Chapter 2, the importance of prosody in both first language and second/foreign language acquisition is acknowledged by many researchers, and sometimes teachers even (Burgess & Spencer, 2000), and it is hardly understandable that learners should not be aware – or made aware – of this aspect of the English phonological system. French speakers thus do not realize that prosody is essential to communication, since its function is not the same in their mother tongue and in the target language. Our hypothesis has been that the suprasegmental features of English actually contribute to speech intelligibility and foreign-accentedness more than segmental features do, contrary to what non-native speakers usually believe.

The pilot experiment that we conducted on the production of English by French EFL learners and the whole protocol that we developed, described in Chapter 3, were initially designed to allow future comparative experiments on the acquisition of English segments and suprasegments by French learners, both at the perception and the production levels. The results given in Chapter 4, however, do not support the hypothesis that a prosody-based training has more impact on French learners' production skills, according to the judgements of native speakers and experts. The between-groups analysis of the post-training scores has revealed that both a segmental training and suprasegmental training equally help the learner improve his/her pronunciation, at least as far as read production is concerned. The within-groups design has shown that a prosodic training does not help learners improve more than a segmental training. Notwithstanding, one may challenge the very significance and conclusiveness of the results. The shortness of the trainings, as well as many other external factors, possibly prevented the French speakers from assimilating the training on L2 prosody and its oral practice properly. Moreover, the twenty stimuli that were used cannot account for a whole L2 phonological system, nor can they evince every segmental and prosodic problem and difference with the source language. While it is necessary to improve teaching methods and materials, experiments on L2 acquisition also need improving, developing, and expanding. This pilot experiment is a first step towards more elaborate experiments.

In order to examine carefully and objectively the contribution of prosody to intelligibility and foreign-accentedness with respect to that of segments, and to address the issue of the link between prosodic accuracy and segmental accuracy as put forward by Birdsong (2003), the ideal method would be to compare French EFL learners' productions of perfect prosody on the one hand, with perfect productions of segments only, on the other. However, this utopian design would be of no avail or interest. Discovering the importance of prosody in L2 phonology acquisition is supposed to contribute to the field of EFL teaching and didactics,

and actual French learners of English, be they in primary school, secondary school, or at university, all have different levels and capacities of understanding a lesson. It would consequently be pointless to train some French subjects to produce accurate L2 prosody and ignore segments altogether, and conversely to train other subjects to produce perfect L2 phonemes and phones only; the findings would never be comparable and applicable to real situations. Our experiment has served to underline that teaching English prosody to speakers of such a syllable-timed language as French turns out to be a hard task, even if much oral practice is done, and future experiments with similar trainings should take that into consideration.

As is pointed out in Busà (2008: 118): “Because, in speech, segmentals and suprasegmentals overlap and contribute to each other in many important ways, in pronunciation classes they should be taught together rather than separately”. The teaching and learning of the pronunciation of a foreign language equally depends on segments and suprasegments, despite the central claim of this work. The mean scores that were obtained by the two groups in our experiment seem to be in keeping with that, as the segmental group and the suprasegmental group proved to be at the same level after their respective trainings. Nonetheless, future experiments should provide more evidence of the roles of prosody and segments in communication.

Unavoidable extra-linguistic factors constitute limitations to any experimental study. As far as this study is concerned, one can mention the subjects' and the listeners' personal timetable constraints, and the restricted durations of the trainings, which prevented the subjects from having enough time to practise and assimilate the training correctly. As a conclusion, more research should be done in the field of L2 acquisition of suprasegments and segments by French EFL learners, so that future findings can be broadened and applied to the field of teaching and didactics.

5.2. Future work

The creation of this pilot experiment now serves as a basis for future comparative studies on the acquisition of English segments and suprasegments by French learners. Given the limitations of this study, more elaborate experiments investigating the role of prosody in intelligibility, foreign-accentedness, and communication in general, are required.

As was reminded several times throughout this work, our focus was production, and more specifically read production capacities of French EFL learners. That is why the results of the experiment cannot – must not – be generalized to other capacities such as perception and spontaneous speech, and the link between prosodic accuracy and overall pronunciation is still to be analyzed more closely. In order to bring strong evidence of the importance of suprasegmental features vis-à-vis segmental features, future research must test read speech and spontaneous speech capacities as well as perceptual capacities of French learners before and after longer trainings – prosody-based or segment-based. The examination of all these capacities separately and then together will lead to a safer conclusion as to the importance of suprasegmental features in L2 acquisition in general. More particularly, testing spontaneous speech capacities after either a prosodic training or a segmental training will be relevant, because it is only in natural, extemporaneous conversation that the importance of the

prosodic structure of a language appears (*cf.* the experiment conducted by Derwing, Munro & Wiebe, 1998). As regards perception, hypotheses are open as to whether or not a prosodic training helps French learners improve their perceptual skills more than a segmental training does. A future experiment should indeed resort to a pre-training evaluation and a post-training evaluation of French subjects' capacities to perceive and understand English, both in a between-groups design and a within-groups design. Besides, subjects' overall capacities should also be checked in the long term, i.e. some time after the post-training tests, so as to gauge the efficiency of prosodic instructions on French speakers and possible subsequent application to EFL class situations.

The number of participants in such a comparative study of L2 segments and prosody is significant. Even though ten French speakers and three listeners were used for this pilot experiment, more subjects and judges should be involved in the future. Concerning production, having a control group of native English speakers do the recordings could be interesting; they would act as distractors among all the productions, and it would be possible to see if raters actually give them the highest scores. The reliability of the subjective evaluations would be tested, as well. Similarly, a control group of French EFL learners receiving no training at all could increase the validity of the experiment and prove the efficiency of the trainings. Furthermore, whether subjective evaluations – i.e. listeners' judgements – are done by ten or twenty native speakers, they should be completed by objective evaluations of the productions through fine acoustic analyses via professional software such as *Praat*.

The link between the findings of comparative experiments on the one hand and the field of EFL teaching in France on the other, could be strengthened if the students of a whole form were used as subjects. If feasible, testing the effect of a prosodic training on students who are at the same academic level – e.g. a whole form of students in last year of general secondary education (*Terminale*) – would be most appropriate to investigate the acquisition of English prosody by typical French EFL learners. Accordingly, the division of a form into three groups – control, segmental, and prosodic – would be better for subsequent applications of the findings to the domain of didactics, all the more as a typical form consists of students with various personal capacities of acquiring a language. The two trainings could take place over several sessions, similarly to Derwing, Munro and Wiebe's (1998) experiment, so that the constraints of the durations of the trainings would not come up, and the resemblance with a typical pronunciation lesson in an actual EFL class situation would be kept.

Thus, the pilot experiment that we have carried out opens the way to many other possibilities to analyze the contributions of L2 segmentals and suprasegmentals to intelligibility, foreign-accentedness, and the welfare of communication. Despite the pioneering results of this study, the role and importance of suprasegmentals in the acquisition of English phonology are not lessened, and they still need to be investigated in the future.

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APPENDIX A: QUESTIONNAIRE OF SELECTION

1. Nom :
2. Prénom :
3. Âge :
4. Pays de résidence :
5. Nationalité :
6. Langue maternelle :
7. Quelles études faites-vous ?
8. À quel âge avez-vous commencé l'anglais ?
9. Quelle est votre moyenne d'anglais (sur 20) approximative en milieu scolaire ?
10. Pensez-vous avoir un accent anglais britannique, américain, ou autre ? Si vous ne savez pas, précisez-le.
11. Sur une échelle de 0 à 10, comment évalueriez-vous votre prononciation de l'anglais ?
12. Avez-vous déjà fait de la phonétique anglaise ? Si oui, qu'avez-vous étudié (alphabet phonétique, règles d'accentuation des mots, ...) ?
13. Avez-vous déjà séjourné pendant plus de deux semaines dans un pays anglophone (Angleterre, Irlande, États-Unis, ...) ? Si oui, où et combien de temps ?
14. Regardez-vous et/ou écoutez-vous souvent de l'anglais (films, radio, ...) ? Si oui, à quelle fréquence (par exemple, une fois par semaine) ?
15. Quelles sont vos disponibilités (jours, heures) ?

APPENDIX B: FRENCH-SPEAKING SUBJECTS

	Sex	Age	Course of study	Length of study of English (school context exclusively)
Group A: Segmental focus				
Subject 01	Female	18	Psychology	8 years
Subject 02	Male	21	Japanese	11 years
Subject 03	Male	18	Secondary school	8 years
Subject 04	Female	22	Certificate in primary education	13 years
Subject 05	Female	20	Business Management	10 years
Group B: Suprasegmental focus				
Subject 06	Female	23	Access certificate	13 years
Subject 07	Male	20	Business management	10 years
Subject 08	Male	22	Steel construction studies	12 years
Subject 09	Female	20	Business management	10 years
Subject 10	Female	18	Business management	9 years

APPENDIX C: STIMULI

The tables below present the stimuli that were used in the experiment, i.e. the words and the sentences, as well as details about each of them. The following abbreviations are used: N° = number of the item; W = word; P = phrase; # Syll. = number of syllables that the item consists of; V/C = vowel and/or consonant problem; freq. = frequency of the word in the spoken part of the British National Corpus.

WORDS

N°	Word	# Syll.	V/C	Type of difficulty	Freq. in spoken BNC (per million words)
W01	“full”	1	V/C	lax vowel /ʊ/; dark <ɫ> [ɫ]	208.55
W02	“saw”	1	V	tense vowel /ɔ:/	210.76
W03	“play”	1	V/C	diphthong /eɪ/; devoiced clear <ɫ>	255.91
W04	“run”	1	V/C	lax vowel /ʌ/; phoneme [ɹ]	221.04
W05	“dear”	1	V/C	tense vowel /ɪə/ and rhoticity	225.08
W06	“sit”	1	V	lax vowel /ɪ/	229.21
W07	“party”	2	V/C	tense vowel /ɑ:/; aspirated /p/	205.86
W08	“thinking”	2	C/C	dental fricative /θ/; phoneme /ŋ/	210.09
W09	“either”	2	V/C	lax vowel /aɪ/ or /i:/; phoneme /ð/	235.26
W10	“hello”	2	V/C	diphthong /əʊ/; phoneme /h/	219.7

PHRASES

N°	Phrase	# Syll.	Prosodic difficulty
P01	“Would you like some Christmas pudding?”	8	reduced forms; nucleus on “pud-”
P02	“I think he lives in London now.”	8	nucleus on “Lon-”; stress-timing
P03	“You should tell him she was asleep.”	8	stress-timing; reduced forms (overall tempo)
P04	“I’m afraid they hate each other.”	8	reduced forms; nucleus on “hate”
P05	“I have got an exam tomorrow.”	9	reduced forms; nucleus on “-xam”
P06	“What an interesting lecture that was!”	9	lexical stress in “interesting”; nucleus on “lec-”
P07	“I forgot to bring my books with me.”	9	stress-timing; nucleus on “books”
P08	“I’d like to speak to the manager.”	9	lexical stress in “manager”; nucleus on “man-”
P09	“She must have been waiting for the bus.”	9	reduced forms (overall tempo); only 3 stresses
P10	“He is leaving for Paris today.”	9	reduced forms; nucleus on “Pa-”

TRANSCRIPTIONS

The transcriptions of the words are narrow and include major diacritic markings such as allophonic variations, and stress marks (ˈ). The transcriptions of the phrases are broad, with

stress marks (primary stress ˈ, and secondary stress ˌ) and underlining to show the nuclear accent. The prosodic patterns, especially tonicity, correspond to the default/unmarked ones.

W01. [ˈfʊt]

W02. [ˈsɔ:]

W03. [ˈpɪeɪ]

W04. [ˈʌn]

W05. [ˈdɪə]

W06. [ˈsɪt]

W07. [ˈpʰɑ:ti]

W08. [ˈθɪŋkɪŋ]

W09. [ˈaɪðə]

W10. [heˈləʊ]

P01. wəd ju ˈlaɪk səm ˌkrɪsməs ˈpʊdɪŋ

P02. aɪ ˈθɪŋk ɪ ˈlɪvz ɪn ˈʌndŋ ˈnaʊ

P03. ju ʃəd ˈtel ɪm ʃɪ wəz əˈsli:p

P04. aɪm əˈfreɪd ðeɪ ˈheɪt ˌi:tʃ ˈʌðə

P05. aɪv ˈgɒt ən ɪgˈzæm təˈmɒrəʊ

P06. ˈwɒt ən ˈɪntrəstɪŋ ˈlektʃə ˈðæt ˌwɒz

P07. aɪ fəˈgɒt tə ˈbrɪŋ maɪ ˈbʊks wɪð mi

P08. aɪd ˈlaɪk tə ˈspi:k tə ðə ˈmæɪnɪdʒə

P09. ʃɪ ˈmʌst əv bɪn ˈweɪtɪŋ fə ðə ˈbʌs

P10. hɪz ˈli:vɪŋ fə ˈpæɪs təˈdeɪ

APPENDIX D: INSTRUCTIONS FOR THE RATING TASK

French speakers recorded English words and sentences. All you have to do is: listen to the sound file; score the recording on a 7-point scale (roughly: 1 = terrible/unintelligible/very strong foreign accent; 2 = very bad; 3 = bad; 4 = so-so; 5 = good; 6 = very good; 7 = native-like/no foreign accent).

You have no particular point to pay specific attention to; just rate the *global* English quality (is it intelligible, is it understandable, is it strongly foreign-accented, ...?).

This is the list of the twenty words and sentences that the French speakers recorded:

“full”

“play”

“saw”

“run”

“dear”

“sit”

“party”

“thinking”

“either”

“hello”

“Would you like some Christmas pudding?”

“I think he lives in London now.”

“You should tell him she was asleep.”

“I’m afraid they hate each other.”

“I have got an exam tomorrow.”

“What an interesting lecture that was!”

“I forgot to bring my books with me.”

“I’d like to speak to the manager.”

“She must have been waiting for the bus.”

“He is leaving for Paris today.”

Nothing else was given to them, so if you think you hear another word correctly pronounced, it is in fact one of the words above, but not correctly pronounced.

For example, if you hear “so” or “seat”, you may assume that the real words were “saw” and “sit”, therefore the pronunciation is not so good.

APPENDIX E: SCORES

These are the scores (out of 7) that were given to each recording by the three listener-judges. The first table gives the scores of the productions before the trainings, and the second table shows the scores after the trainings. The following abbreviations and symbols are used: S00 = Subject n°00; W00 = Word n°00; P00 = Phrase n°00; → = mean score.

RATINGS OF THE PRE-TRAINING RECORDINGS

	Judge 1	Judge 2	Judge 3	Mean		Judge 1	Judge 2	Judge 3	Mean
Group A: Segmental				2.94	Group B: Suprasegmental				3.37
S01-W01	2	2	5	3	S06-W01	2	2	1	1.67
S01-W02	3	1	1	1.67	S06-W02	2	1	1	1.33
S01-W03	3	6	6	5	S06-W03	2	1	4	2.33
S01-W04	1	6	5	4	S06-W04	6	2	1	3
S01-W05	1	1	1	1	S06-W05	2	6	4	4
S01-W06	5	5	6	5.33	S06-W06	3	1	5	3
S01-W07	3	5	3	3.67	S06-W07	3	3	4	3.33
S01-W08	2	1	1	1.33	S06-W08	6	7	4	5.67
S01-W09	1	1	1	1	S06-W09	1	1	1	1
S01-W10	7	7	5	6.33	S06-W10	6	6	5	5.67
→ S01-Words	2.8	3.5	3.4	3.23	→ S06-Words	3.3	3	3	3.1
S01-P01	3	3	3	3	S06-P01	5	3	4	4
S01-P02	2	3	3	2.67	S06-P02	2	2	1	1.67
S01-P03	3	2	4	3	S06-P03	3	2	2	2.33
S01-P04	2	2	1	1.67	S06-P04	5	3	2	3.33
S01-P05	5	5	4	4.67	S06-P05	3	5	3	3.67
S01-P06	2	3	2	2.33	S06-P06	3	3	4	3.33
S01-P07	3	3	2	2.67	S06-P07	6	5	3	4.67
S01-P08	3	3	4	3.33	S06-P08	5	5	4	4.67
S01-P09	2	5	3	3.33	S06-P09	5	5	2	4
S01-P10	3	3	4	3.33	S06-P10	5	2	4	3.67
→ S01-Phrases	2.8	3.2	3	3	→ S06-Phrases	4.2	3.5	2.9	3.53
→ S01-W + P	2.8	3.35	3.2	3.12	→ S06-W + P	3.75	3.25	2.95	3.32

S02-W01	1	1	1	1	S07-W01	3	7	4	4.67
S02-W02	1	6	4	3.67	S07-W02	1	1	1	1
S02-W03	1	6	1	2.67	S07-W03	7	7	6	6.67
S02-W04	1	2	1	1.33	S07-W04	1	6	5	4
S02-W05	2	5	4	3.67	S07-W05	5	7	3	5
S02-W06	1	6	7	4.67	S07-W06	6	7	7	6.67
S02-W07	1	5	4	3.33	S07-W07	6	6	4	5.33
S02-W08	6	7	3	5.33	S07-W08	2	5	1	2.67
S02-W09	2	1	1	1.33	S07-W09	6	5	4	5
S02-W10	3	6	4	4.33	S07-W10	5	5	5	5
→ S02-Words	1.9	4.5	3	3.13	→ S07-Words	4.2	5.6	4	4.6
S02-P01	5	3	4	4	S07-P01	6	6	5	5.67
S02-P02	5	3	4	4	S07-P02	6	6	3	5
S02-P03	2	3	2	2.33	S07-P03	6	6	3	5
S02-P04	3	3	2	2.67	S07-P04	3	5	3	3.67
S02-P05	3	5	3	3.67	S07-P05	3	6	3	4
S02-P06	2	5	3	3.33	S07-P06	2	5	3	3.33
S02-P07	5	5	4	4.67	S07-P07	5	6	4	5
S02-P08	2	6	3	3.67	S07-P08	6	6	4	5.33
S02-P09	3	3	2	2.67	S07-P09	6	6	4	5.33
S02-P10	5	5	5	5	S07-P10	6	5	4	5
→ S02-Phrases	3.5	4.1	3.2	3.6	→ S07-Phrases	4.9	5.7	3.6	4.73
→ S02-W + P	2.7	4.3	3.1	3.37	→ S07-W + P	4.55	5.65	3.8	4.67
S03-W01	2	2	2	2	S08-W01	2	3	4	3
S03-W02	1	1	1	1	S08-W02	1	1	1	1
S03-W03	1	5	5	3.67	S08-W03	3	6	6	5
S03-W04	1	1	1	1	S08-W04	2	6	4	4
S03-W05	1	2	1	1.33	S08-W05	1	5	4	3.33
S03-W06	2	2	4	2.67	S08-W06	1	1	1	1
S03-W07	2	3	1	2	S08-W07	2	5	3	3.33
S03-W08	2	1	1	1.33	S08-W08	2	3	1	2
S03-W09	1	1	2	1.33	S08-W09	2	1	1	1.33
S03-W10	2	2	2	2	S08-W10	6	5	4	5
→ S03-Words	1.5	2	2	1.83	→ S08-Words	2.2	3.6	2.9	2.9
S03-P01	2	2	3	2.33	S08-P01	2	3	3	2.67
S03-P02	2	2	2	2	S08-P02	2	3	2	2.33
S03-P03	2	3	2	2.33	S08-P03	1	2	1	1.33
S03-P04	1	2	2	1.67	S08-P04	2	1	1	1.33
S03-P05	2	2	3	2.33	S08-P05	3	5	3	3.67
S03-P06	1	2	2	1.67	S08-P06	3	3	2	2.67
S03-P07	2	3	2	2.33	S08-P07	5	5	4	4.67
S03-P08	2	3	2	2.33	S08-P08	5	6	3	4.67
S03-P09	2	2	1	1.67	S08-P09	3	3	3	3
S03-P10	2	3	1	2	S08-P10	3	5	4	4
→ S03-Phrases	1.8	2.4	2	2.07	→ S08-Phrases	2.9	3.6	2.6	3.03
→ S03-W + P	1.65	2.2	2	1.95	→ S08-W + P	2.55	3.6	2.75	2.97

S04-W01	2	2	4	2.67	S09-W01	2	2	4	2.67
S04-W02	6	1	1	2.67	S09-W02	3	5	3	3.67
S04-W03	3	5	6	4.67	S09-W03	2	5	6	4.33
S04-W04	3	6	1	3.33	S09-W04	1	6	1	2.67
S04-W05	1	3	4	2.67	S09-W05	3	6	5	4.67
S04-W06	6	3	6	5	S09-W06	5	7	5	5.67
S04-W07	3	3	3	3	S09-W07	2	3	4	3
S04-W08	5	5	3	4.33	S09-W08	3	2	1	2
S04-W09	2	1	1	1.33	S09-W09	3	1	1	1.67
S04-W10	5	5	5	5	S09-W10	6	5	4	5
→ S04-Words	3.6	3.4	3.4	3.47	→ S09-Words	3	4.2	3.4	3.53
S04-P01	6	5	5	5.33	S09-P01	6	3	4	4.33
S04-P02	3	3	4	3.33	S09-P02	2	3	2	2.33
S04-P03	3	5	4	4	S09-P03	2	3	2	2.33
S04-P04	3	3	2	2.67	S09-P04	2	2	2	2
S04-P05	5	5	3	4.33	S09-P05	3	3	4	3.33
S04-P06	3	3	2	2.67	S09-P06	2	2	1	1.67
S04-P07	3	3	3	3	S09-P07	3	3	3	3
S04-P08	3	6	4	4.33	S09-P08	3	3	2	2.67
S04-P09	2	5	2	3	S09-P09	3	5	3	3.67
S04-P10	5	5	5	5	S09-P10	3	3	3	3
→ S04-Phrases	3.6	4.3	3.4	3.77	→ S09-Phrases	2.9	3	2.6	2.83
→ S04-W + P	3.6	3.85	3.4	3.62	→ S09-W + P	2.95	3.6	3	3.18
S05-W01	2	6	4	4	S10-W01	2	3	3	2.67
S05-W02	1	1	1	1	S10-W02	1	3	1	1.67
S05-W03	3	6	6	5	S10-W03	5	5	6	5.33
S05-W04	1	1	1	1	S10-W04	3	5	5	4.33
S05-W05	1	5	1	2.33	S10-W05	3	5	1	3
S05-W06	1	1	1	1	S10-W06	2	1	1	1.33
S05-W07	3	3	3	3	S10-W07	3	3	5	3.67
S05-W08	2	1	1	1.33	S10-W08	5	1	1	2.33
S05-W09	2	2	2	2	S10-W09	1	1	1	1
S05-W10	6	5	3	4.67	S10-W10	6	5	3	4.67
→ S05-Words	2.2	3.1	2.3	2.53	→ S10-Words	3.1	3.2	2.7	3
S05-P01	3	5	4	4	S10-P01	3	3	2	2.67
S05-P02	1	2	2	1.67	S10-P02	2	2	1	1.67
S05-P03	2	2	2	2	S10-P03	3	2	2	2.33
S05-P04	2	3	2	2.33	S10-P04	2	3	1	2
S05-P05	2	3	2	2.33	S10-P05	3	3	1	2.33
S05-P06	2	3	2	2.33	S10-P06	2	2	1	1.67
S05-P07	3	5	3	3.67	S10-P07	5	3	3	3.67
S05-P08	3	3	4	3.33	S10-P08	3	2	2	2.33
S05-P09	3	3	2	2.67	S10-P09	3	3	4	3.33
S05-P10	3	3	3	3	S10-P10	2	2	2	2
→ S05-Phrases	2.4	3.2	2.6	2.73	→ S10-Phrases	2.8	2.5	1.9	2.4
→ S05-W + P	2.3	3.15	2.45	2.63	→ S10-W + P	2.95	2.85	2.3	2.7

RATINGS OF THE POST-TRAINING RECORDINGS

	Judge 1	Judge 2	Judge 3	Mean		Judge 1	Judge 2	Judge 3	Mean
Group A: Segmental				3.63	Group B: Suprasegmental				3.64
S01-W01	1	5	1	2.33	S06-W01	2	2	5	3
S01-W02	1	1	1	1	S06-W02	2	2	1	1.67
S01-W03	5	7	4	5.33	S06-W03	5	7	7	6.33
S01-W04	1	5	3	3	S06-W04	2	5	1	2.67
S01-W05	1	1	1	1	S06-W05	3	6	4	4.33
S01-W06	6	7	6	6.33	S06-W06	3	3	5	3.67
S01-W07	5	5	4	4.67	S06-W07	5	7	4	5.33
S01-W08	2	5	1	2.67	S06-W08	7	7	4	6
S01-W09	2	1	2	1.67	S06-W09	1	1	1	1
S01-W10	7	6	5	6	S06-W10	7	7	5	6.33
→ S01-Words	3.1	4.3	2.8	3.4	→ S06-Words	3.7	4.7	3.7	4.03
S01-P01	5	3	4	4	S06-P01	6	5	4	5
S01-P02	5	5	4	4.67	S06-P02	2	2	2	2
S01-P03	3	3	4	3.33	S06-P03	3	2	3	2.67
S01-P04	2	3	2	2.33	S06-P04	3	2	2	2.33
S01-P05	5	5	3	4.33	S06-P05	2	3	3	2.67
S01-P06	5	4	2	3.67	S06-P06	3	5	3	3.67
S01-P07	2	3	2	2.33	S06-P07	3	3	4	3.33
S01-P08	3	5	3	3.67	S06-P08	3	3	4	3.33
S01-P09	5	3	2	3.33	S06-P09	5	3	4	4
S01-P10	5	6	4	5	S06-P10	6	3	5	4.67
→ S01-Phrases	4	4	3	3.67	→ S06-Phrases	3.6	3.1	3.4	3.37
→ S01-W + P	3.55	4.15	2.9	3.53	→ S06-W + P	3.65	3.9	3.55	3.7
S02-W01	2	7	5	4.67	S07-W01	2	7	5	4.67
S02-W02	2	6	1	3	S07-W02	1	2	1	1.33
S02-W03	2	6	6	4.67	S07-W03	2	6	5	4.33
S02-W04	1	2	6	3	S07-W04	2	6	4	4
S02-W05	3	6	5	4.67	S07-W05	1	1	1	1
S02-W06	3	7	6	5.33	S07-W06	3	1	5	3
S02-W07	5	3	4	4	S07-W07	3	6	4	4.33
S02-W08	7	5	4	5.33	S07-W08	7	5	4	5.33
S02-W09	5	7	5	5.67	S07-W09	5	6	4	5
S02-W10	2	6	5	4.33	S07-W10	6	6	4	5.33
→ S02-Words	3.2	5.5	4.7	4.47	→ S07-Words	3.2	4.6	3.7	3.83
S02-P01	6	5	4	5	S07-P01	3	5	5	4.33
S02-P02	3	5	1	3	S07-P02	3	4	4	3.67
S02-P03	3	3	3	3	S07-P03	2	3	2	2.33
S02-P04	6	5	6	5.67	S07-P04	5	5	4	4.67
S02-P05	1	5	1	2.33	S07-P05	5	6	4	5
S02-P06	5	6	3	4.67	S07-P06	3	6	3	4
S02-P07	6	6	5	5.67	S07-P07	3	5	4	4
S02-P08	5	6	3	4.67	S07-P08	5	6	4	5
S02-P09	3	3	1	2.33	S07-P09	3	6	3	4
S02-P10	5	5	4	4.67	S07-P10	1	5	2	2.67
→ S02-Phrases	4.3	4.9	3.1	4.1	→ S07-Phrases	3.3	5.1	3.5	3.97
→ S02-W + P	3.75	5.2	3.9	4.28	→ S07-W + P	3.25	4.85	3.6	3.9

S03-W01	2	5	2	3	S08-W01	2	3	1	2
S03-W02	1	3	1	1.67	S08-W02	3	1	1	1.67
S03-W03	3	5	5	4.33	S08-W03	1	6	4	3.67
S03-W04	1	6	5	4	S08-W04	2	5	1	2.67
S03-W05	1	1	1	1	S08-W05	2	5	4	3.67
S03-W06	3	6	6	5	S08-W06	1	1	1	1
S03-W07	2	2	4	2.67	S08-W07	2	3	4	3
S03-W08	5	5	5	5	S08-W08	2	1	1	1.33
S03-W09	3	7	5	5	S08-W09	1	1	1	1
S03-W10	5	7	4	5.33	S08-W10	7	7	5	6.33
→ S03-Words	2.6	4.7	3.8	3.7	→ S08-Words	2.3	3.3	2.3	2.63
S03-P01	3	3	2	2.67	S08-P01	3	5	3	3.67
S03-P02	2	2	2	2	S08-P02	2	3	4	3
S03-P03	2	3	3	2.67	S08-P03	6	3	3	4
S03-P04	2	3	3	2.67	S08-P04	2	2	1	1.67
S03-P05	3	3	3	3	S08-P05	3	5	4	4
S03-P06	2	3	2	2.33	S08-P06	2	3	2	2.33
S03-P07	3	3	3	3	S08-P07	3	3	4	3.33
S03-P08	3	3	3	3	S08-P08	3	5	3	3.67
S03-P09	2	3	2	2.33	S08-P09	3	2	3	2.67
S03-P10	3	3	4	3.33	S08-P10	3	5	3	3.67
→ S03-Phrases	2.5	2.9	2.7	2.7	→ S08-Phrases	3	3.6	3	3.2
→ S03-W + P	2.55	3.8	3.25	3.2	→ S08-W + P	2.65	3.45	2.65	2.92
S04-W01	1	2	1	1.33	S09-W01	1	2	2	1.67
S04-W02	1	1	1	1	S09-W02	2	5	1	2.67
S04-W03	6	7	5	6	S09-W03	3	5	5	4.33
S04-W04	5	7	4	5.33	S09-W04	3	6	5	4.67
S04-W05	3	1	1	1.67	S09-W05	2	6	7	5
S04-W06	2	3	1	2	S09-W06	5	6	4	5
S04-W07	3	3	4	3.33	S09-W07	5	3	5	4.33
S04-W08	5	6	1	4	S09-W08	5	5	1	3.67
S04-W09	2	4	1	2.33	S09-W09	1	1	1	1
S04-W10	6	6	5	5.67	S09-W10	5	3	4	4
→ S04-Words	3.4	4	2.4	3.27	→ S09-Words	3.2	4.2	3.5	3.63
S04-P01	6	6	4	5.33	S09-P01	5	3	4	4
S04-P02	3	5	3	3.67	S09-P02	2	5	4	3.67
S04-P03	5	5	4	4.67	S09-P03	3	6	3	4
S04-P04	3	3	3	3	S09-P04	2	3	1	2
S04-P05	3	3	3	3	S09-P05	6	7	6	6.33
S04-P06	3	5	2	3.33	S09-P06	3	5	3	3.67
S04-P07	5	5	4	4.67	S09-P07	5	5	3	4.33
S04-P08	3	3	3	3	S09-P08	3	3	4	3.33
S04-P09	5	3	4	4	S09-P09	3	6	4	4.33
S04-P10	5	3	3	3.67	S09-P10	5	5	4	4.67
→ S04-Phrases	4.1	4.1	3.3	3.83	→ S09-Phrases	3.7	4.8	3.6	4.03
→ S04-W + P	3.75	4.05	2.85	3.55	→ S09-W + P	3.45	4.5	3.55	3.83

S05-W01	3	6	1	3.33	S10-W01	1	2	5	2.67
S05-W02	3	7	1	3.67	S10-W02	2	3	1	2
S05-W03	5	5	5	5	S10-W03	5	5	6	5.33
S05-W04	1	2	1	1.33	S10-W04	3	6	5	4.67
S05-W05	1	3	2	2	S10-W05	2	5	4	3.67
S05-W06	1	7	5	4.33	S10-W06	3	7	5	5
S05-W07	2	3	6	3.67	S10-W07	2	5	5	4
S05-W08	2	2	3	2.33	S10-W08	3	5	4	4
S05-W09	5	5	5	5	S10-W09	2	1	2	1.67
S05-W10	6	5	5	5.33	S10-W10	7	6	4	5.67
→ S05-Words	2.9	4.5	3.4	3.6	→ S10-Words	3	4.5	4.1	3.87
S05-P01	6	5	4	5	S10-P01	3	3	2	2.67
S05-P02	3	3	3	3	S10-P02	3	3	1	2.33
S05-P03	3	5	4	4	S10-P03	2	2	3	2.33
S05-P04	3	3	2	2.67	S10-P04	5	5	1	3.67
S05-P05	3	3	2	2.67	S10-P05	6	5	4	5
S05-P06	2	3	3	2.67	S10-P06	5	5	4	4.67
S05-P07	6	5	4	5	S10-P07	5	5	3	4.33
S05-P08	5	5	4	4.67	S10-P08	3	5	3	3.67
S05-P09	2	3	3	2.67	S10-P09	3	6	4	4.33
S05-P10	3	5	3	3.67	S10-P10	5	6	4	5
→ S05-Phrases	3.6	4	3.2	3.6	→ S10-Phrases	4	4.5	2.9	3.8
→ S05-W + P	3.25	4.25	3.3	3.6	→ S10-W + P	3.5	4.5	3.5	3.83