The L2 acquisition of syllable structure and stress in Spanish.

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by

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Abstract

This thesis is a contribution to the field of second language (L2) acquisition of prosodic structure. The acquisition of prosodic structure has received considerably less attention than the acquisition at the segmental level and the research carried out in this area has largely focused on whether L2 learners can reset parameters in the foreign language. Most of the work done with parameter resetting in Lingusitics has largely looked at situations in which the L2 is in a subset-superset relation with respect to the native language of the learners.

This thesis is a contribution to the parameter resetting debate. It a cross-sectional study of the L2 acquisition of syllable structure and stress in Spanish and it attempts to unveil the mechanisms that are at play in a learning situation in which the L1 and the L2 have identical parameter settings and the L2 is in a subset relationship. Moreover, it also contributes to the less studied field of the acquisition of Spanish as a second language.

Fifty-nine subjects, grouped into four different levels of ability, were tested with an acceptability test of nonsense words and two production tasks. The acceptability judgement task aimed at tapping the real competence of syllable structure and stress. This type of methodology was adopted because an acceptability judgement test with nonsense words was the only way that competence about what is impossible could be obtained. The test results generally correlated with the results of production data, where these data were possible to obtain.

In the case of identity in the value of parameter settings for syllable structure, it will be shown that learners do not rely on their L1 value to make their judgements. Learners seem to start with a default value. This implies that the learning mechanism in L2 acquisition is the same as in L1. This allows learners to progressively sharpen their intuitions and end up setting the correct value for a parameter over time on the basis of positive evidence. As exposure is increased, judgements are closer to those given by the control group. In cases of impossible structures, learners are also able to identify that these structures are simply not possible. Transfer from L1 is only evident in the case of underlying representations or adjunctions, but not with parameters.

In the case of stress, learners seem to be producing structures that conform to a trochaic template. Since both Spanish and English have a trochaic pattern, it is impossible to determine whether they are transferring this from the L1 parameters or

whether the trochaic rhythm represents a universal default value. When extrametricality markings are identical to the learners' L1, these transfer from the very early stages, but learners are also able to learn some of the specific extrametrical markings in Spanish over time. The trochaic template also seems to be affecting the acquisition of syllable strucure, in particular those that relate to the Minimal Sonority Distance parameter and the representation of on-glides.

No part of this thesis has previously been submitted for a degree at the University of Durham or any other University.

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CHAPTER 1: Introduction

1.1. A learnability model for acquisition

This thesis is a study of second language (L2) acquisition of Spanish prosodic structure. More specifically, it is a study of syllable structure and stress. The L2 acquisition of phonology has attracted considerable attention in the field of Second Language Acquisition (SLA) research. This is probably due to the fact that even though post-puberty learners might manage to acquire other sub-systems of language, such as the syntactic component, phonology tends to pose quite a lot of problems for most learners. In fact, it is widely accepted that it is the norm, rather than the exception, that most L2 adult learners retain traces of first language (L1) accent in their speech even after prolonged periods of study and/or exposure to the language. However, as we know, this situation is usually reversed when we look at the L2 acquisition of phonology in children. The assumption in SLA is therefore that the older learners are, the more difficult it seems to be for them to speak a foreign language without interference from L1.

This observation can be a sign that the degree of mastery of an L2 is determined by age[1]. Researchers speak of a 'critical period' for the acquisition of language; e.g. Lenneberg (1967) proposed that the critical period coincides with lateralization and finishes at puberty. Since then, there have been other proposals. Krashen (1973) suggested that lateralization is complete by the age of 5, while Seliger (1978) suggested multiple critical periods that have edges at different times, coinciding with localization of language functions. By doing this, he provides a way to account for why certain aspects of the language may be acquired to different levels of proficiency by post-puberty learners. Regardless of the specific details of the time when the critical period seems to finish and the causes for this, the consensus seems to be that full acquisition of a second language post-puberty is rare, with cases such as the one studied by Obler (1989) being based on exceptional individuals. The likelihood is therefore that the majority of L2

[1] Factors other than age and L1 transfer have been suggested as possible causes of lack of complete acquisition. Among others, Krashen (1985) has suggested affective variables, Schumann (1975 social distance and Gardner and Lambert (1959) motivation.

learners end up with a phonology that is not exactly like the end state of a native speaker of that language, nor is it like the phonology of their L1. It is a phonology that is partly shaped by developmental processes, partly by transfer from L1 and partly by those areas of L2 phonology that the learner has managed to acquire. That is, it is an interlanguage (IL) phonology, to use the term coined by Selinker (1972).

The aim of research in IL phonology is therefore to determine to what extent a new phonological system can be acquired, which areas are more likely to be affected by transfer and why, what strategies the learner uses in order to overcome these problem areas and how these change over time. In other words, we are interested in finding out the developmental stages of acquisition and in explaining how these stages are shaped.

This thesis is a contribution to this line of research. Much of the work done in the L2 acquisition of phonology has focused on the segmental level, and relatively little attention has been paid to the suprasegmental aspects of phonology (syllable structure, stress, rhythm, intonation). Moreover, most investigations have focused on case studies and in which the difficulty for the L2 learner involved the acquisition of a more "complex" system than the one found in his/her L1. Little or no attention has been paid to what happens in situations where the two languages differ little. This was probably due to the great influence that the Contrastive Analysis (CA) approach (Lado, 1957) had on the field of SLA from its origins.[2]

This thesis is therefore an attempt to fill some of these gaps in the literature on L2 phonology. One of the major contributions is therefore to the less studied field of L2 acquisition of rhythmic structure. The original idea was to embark on the acquisition of rhythm, but since this would be too large a project even for a PhD thesis, the study has been restricted to areas of syllable structure and stress at the lexical level, the first step towards an understanding of the acquisition of rhythmic structure. In this cross-sectional study I explore the developmental stages that emerge over time and I do so focusing on Spanish, a language that has received little or no attention in the field of the L2 acquisition of phonology. Spanish is a language with a syllable structure and stress system that would appear to be 'simpler' than English, the L1 of the learners in the study. By setting the situation of acquisition in this direction (from a 'more complex' to a

[2] The CA hypothesis assumed that those areas in which the L1 and the L2 differed would be more difficult for the L2 learner. This view has been later rejected, as empirical studies showed that not all areas where there were differences posed the same degree of difficulty, and that difficulty did not only occur where there were differences.

'simpler' language), we gain further insight into the processes that are at play in L2 acquisition.

The second major contribution has to do precisely with the choice of the target language. While the acquisition of Spanish syntax has received more attention, especially in relation to the pro-drop parameter, little or no work has been done with respect to phonology. Even at the segmental level, when Spanish has been involved in an L2 acquisition study, it has mostly been as the first language of the learner (Flege 1987) but rarely as the L2. To my knowledge, this is the first comprehensive study that tackles the L2 acquisition of syllable structure and stress in Spanish.

A theory of language that cannot explain how natural languages are learnt by the human mind will not be able to give the kind of answers to the questions we have formulated above. The linguistic theory developed by Chomsky tried to explain not only what constitutes knowledge of language but also how this knowledge of language is acquired (Chomsky 1986). Because his theory provides the theoretical framework needed in SLA for it to develop, it has been largely adopted by psycholinguists in their research. The aim of this chapter is to make the theoretical model adopted in this thesis explicit. What follows is an explanation of this model and the implications for L2 acquisition.

1.2. Universal Grammar: principles and parameters

Chomsky's theory of language tries to address the question of what constitutes knowledge of a language and how languages can be acquired on the basis of observable data only. In connection with the second question ("the logical problem of language acquisition"), linguists have been puzzled by the speed with which children acquire their L1 with such poverty of the stimulus. Analysis of the input that L1 learners receive shows that the data they are exposed to and from which they are able to construct their own successive grammars is "impoverished". Given that this meagre input is the only thing they have access to, the assumption is that the human mind must have some built-in mechanism that helps the learner in the process of acquisition. This built-in mechanism is referred to as Universal Grammar (UG).

(1)

Input ⟶ [UG] ⟶ L1 grammar

UG is made up of a set of principles, which are common to all languages, and a set of parameters, which have language-specific values. Grammars of individual languages are therefore the result of the variation of the settings of the different parameters plus language-specific rules.

The crucial question for acquisition then is how these parameters are set in order to arrive at the different language-specific grammars. The initial state (S_0) of a child's grammar contains the general principles and the parameters set at their default or unmarked value, which is the most conservative value that can obtain. The steady state (S_s) or adult grammar, contains the principles and the parameters set at the correct value for that particular language. The process of acquisition is therefore seen as a succession of different states or grammars that move from S_0 to S_s as shown in (2) (Fikkert 1994).

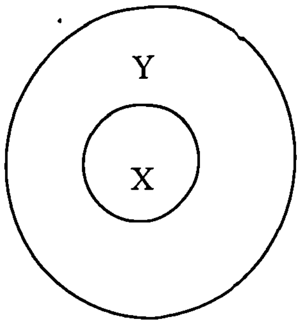
(2)

S_0------ S_1----- S_2---- S_3 .... S_s

In this developmental process, the different values of the parameters are progressively set on the basis of evidence from their input the so-called positive evidence. In other words, what is held to trigger a change in the value of a parameter is some specific observable data that the child can hear in the inputs s/he is receiving. One of the implications of this model is that the hypotheses that the child entertains are constrained by the values of the parameters. The child only needs to decide whether the setting of a parameter needs to be changed from the default setting (-) to a more marked value (+).

There is still one other learnability problem that needs to be addressed. In some cases, the values of the parameters may be mutually exclusive. For instance, the Head Parameter in syntax determines whether the head of a constituent is going to be to the right or to the left of a complement. The correct value can be set with the help of positive evidence and only one of the settings (left or right) is compatible with the input. In some cases, however, the settings may be in a subset/superset relationship. That is, we could have a parameter that generates a subset of cases X and another parameter Y that generates the cases in X plus some additional ones. This is captured in (3).

(3)



The learnability problem that arises in this situation is that the child could well hypothesize that the correct value of the parameter is that of Y. In this case, in order to notice that the correct value is X the child would need to have negative evidence available. The way that this problem is overcome is by invoking the Subset Principle (Berwick 1985, Wexler and Manzini 1987). The Subset Principle states that given two grammars X and Y in a subset relationship, where the grammar of Y generates the sentences in X and X is a proper subset of Y, and input that can be accommodated by both, the most restrictive grammar compatible with the input must be adopted. What the Subset Principle does in effect is force the learner to adopt the most conservative value, so that the 'wrong' generalization cannot be made. By doing this, we also ensure that there is no need to invoke negative evidence in L1 acquisition.

This view of learnability differs greatly from the Creative Construction Hypothesis (Dulay and Burt 1975), an earlier conception of the theory of acquisition in which the child was seen as a kind of 'little linguist' who was always engaged in a constant process of hypothesis making and testing. Under this earlier model, the child formulated hypotheses about the language, contrasted them with the data, rejected them if they did not produce the expected results and formulated new ones until the final state was arrived at. The weakness of this approach was that there was nothing in the theory that could constrain the number of possibilities that the child could consider in the process of hypothesis making. There is nothing, for instance, that could prevent the child from hypothesizing about things that are simply not possible in natural languages; we might see the creation of 'wild grammars'. Moreover, if the Creative Construction Hypothesis were the mechanism at play, in order to ensure L1 acquisition, the child would need to be told at some point that certain things did not exist. In other words, the model would require the existence of negative evidence. However, given that not all children get negative evidence and even in cases in which negative evidence feedback is provided to them, it does not appear to be used by children, and that wild grammars are simply not attested in the literature, it does not seem to be feasible to support this model as a good learning mechanism.

The lack of constraints on hypothesis formulation and the need to invoke negative evidence to explain acquisition led to the loss of psychological credibility for this view. The parametric model proposed by Chomsky that superseded it solves these problems by restricting the possibilities the child can entertain with the introduction of parameters and by allowing parameter settings to change with the exclusive help of positive evidence. This ensures the speed of the acquisition process, providing a solution for the logical problem of language acquisition and making it a credible learning mechanism for a theory of language acquisition. This will be the model adopted in this thesis[3].

[3] In recent years, some phonologists have favoured an Optimality theoretic (Prince and Smolensky 1993) approach instead of a parametric model. Under this account, UG is viewed as a set of principles and a set of constraints, instead of parameters. The way language-specific grammars differ depends on the way that the constraints are ranked and interact. One other important difference is that, unlike parameters, constraints are violable. I have decided to adopt a parametric model in this thesis. However, it is easy to see how constraint rankings involve different formulation of the unmarked value of a parameter and so any generalisations concerning parameter settings are possible under an optimality account as well.

1.3. Universal Grammar and Second Language Acquisition

The theory sketched above for L1 acquisition, could be, in principle, applied to L2 acquisition as well. The differences found in ultimate attainment in L1 and L2 acquisition, however, have led second language acquisition researchers to question firstly whether UG is available in L2 acquisition, and if it is, whether all the components are available or not.

On the issue of whether UG is available, there are three possible answers:

1-UG is not available in L2 acquisition

2-UG is available in L2 acquisition in the same way as it is available in L1 acquisition

3- UG is available to the L2 learner but via the L1.

Proponents of the first hypothesis (Clahsen and Muysken 1986, Schachter 1988) suggest that L2 acquisition is a radically different process to L1 acquisition. They argue that L2 acquisition is the result of the operation of general learning mechanisms which are not exclusive to language. The predictions that this hypothesis makes is that we should be able to find evidence in learners' errors of violations of the principles of UG.

The prediction implicit in the second position is that there is access to the principles and also the parameters of UG. This means that it would be possible to reset the parameters that have been set in L1 already. Very few researchers actually adopt the pure UG approach, as there are enough cases of lack of parameter re-setting in the SLA literature.

The third approach makes different predictions with regard to UG. It might be assumed that only those principles and parameters that are instantiated in the L1 will be available in the L2. This would be the pure transfer approach (Bley-Vroman 1989). The second possibility is that learners initially assume L1 values for L2, but since they have access to UG, they are able to reset the parameters.

For those proposals that assume that parameter resetting is possible, we have to account for the way that this is achieved. Recall that in L1 acquisition, the parametric model could explain how children could acquire a grammar on the base of positive evidence. In the case of L2 acquisition, a different situation arises. Some parameters may not be set at all in L1, but others are already set at a value. The possible scenarios that can emerge are as follows:

1- L1 and L2 parameter settings coincide
2- L1 is a subset of the L2
3- L1 is a superset of the L2

If the parameter settings in the two languages coincide, then we can assume that positive transfer will account for the acquisition. One question that still needs to be addressed, however, is whether the learner will indeed start from the default setting or whether the learner will start with the L1 setting.

If the L2 is a superset of the L1, then the same mechanism that is used in L1 acquisition could be employed in order to reset the parameter. The learner could start with the L1 setting and on encountering positive evidence that might challenge the setting chosen, will reconsider the situation and reset it to the superset value.

The real problem area to investigate is the third option. If the L1 is the superset, then two questions arise. Firstly, whether it is possible to revert to a more restrictive setting. And secondly, if it is possible, how it is done. White (1989) proposes that the subset principle does not operate in L2 acquisition and that L2 learners cannot revert to a more restrictive parameter setting than the one found in L1. This view implies that the only way L2 learners can prevent overgeneralizations is by making use of negative evidence. Since Schwartz (1993) suggests that L2 learners cannot make use of explicit negative evidence in acquisition, a situation in which the L2 is a subset of the L1 puts L2 learners at a disadvantage. The difference between the type of evidence that is needed to reset a parameter depending on the subset-superset relationships of the L1 and L2 and the effect that this has on ultimate attainment has led Young-Scholten (1994) to postulate the Assymetry Hypothesis. Young-Scholten hypothesises that lack of complete attainment in phonology could be due to the assymetry in the type of evidence needed to reset parameter. When only positive evidence is needed to reset a parameter, acquisition will ultimately take place but when explicit negative evidence is needed, acquisition will not take place.

The case in which the L1 is a superset of or identical to the L2 is precisely the one found in this thesis. Some of the controversies in the literature of SLA outlined in this section will be picked up again in later chapters. In the following chapter, I provide an introduction to rhythm and the syllable structure and stress in Spanish and English, laying down the theoretical background to understand the difficulties that English learners of Spanish face. Chapter 3 explains the methodology used in the present study. Chapter 4 is a review of the literature on the acquisition of syllable structure and stress in L1 and L2. Chapter 5 is a discussion of the results of this study and finally, in chapter 6 we summarise the findings.

CHAPTER 2: Prosodic structure: rhythm

2.1. Stress-timing and syllable-timing

Rhythm, according to one of the entries of the OED is a 'regularly recurring sequence of events'. In natural languages, we can also identify this periodic recurrence of events that speakers are able to recognise and anticipate in speech. Traditionally, two different types of languages have been distinguished depending on the type of recurrence they show in their spoken form: stress-timed languages, where stress intervals are isochronous or equal in duration, and syllable-timed languages, where syllables, not stresses, will tend to be repeated at more or less equal intervals of time. For simplicity, I will ignore a third type of language, the so-called mora-timed, an example of which is Japanese, where the isochronous unit will be neither stress intervals nor syllables, but moras, the constituent below the syllable in some versions of the prosodic hierarchy[1].

These definitions are obviously exclusive, and it follows that a particular language cannot belong to the two groups at the same time: if it is a stress-timed language, stresses will recur at equal intervals regardless of the number of syllables that intervene between them. In these languages, it has been observed that syllables and vowels will vary greatly in length: the more syllables that are allowed between stresses, the shorter these will be, and vice versa. In syllable-timed languages, however, syllables and vowels will tend to have a similar duration. Some languages typically identified as stress-timed are English, Arabic or Russian, and among the syllable-timed we find Romance languages, with the exception of Portuguese, and Yoruba, to mention but a few.

[1]Up to the word level, prosodic theory (McCarthy and Prince 1986) arranges constituents in a hierarchical structure as follows: prosodic word, foot, syllable and mora. Each constituent is made up of units from the level below: a prosodic word is made of feet, which in turn is made of syllables and in turn is made of moras.

The two terms stress- and syllable-timed were first coined by Pike (1953), but it is not a dichotomy that he himself had first observed. Before, A. Lloyd James (1940) had called the two rhythms 'morse-code' and 'machine-gun' respectively, but it was Pike's terms that were to be adopted by linguists (Abercrombie (1967), Catford (1988), A.C. Gimson (1980)).

The two languages that we will use in this thesis are representatives therefore of each of the two types of rhythm. The classification of languages based on the definition of rhythm we have presented here is a phonetic classification because it focuses on timing, the physical reality of production. One could argue that an investigation of L2 acquisition of rhythmic structure could be best explained by examining these differences observed at the phonetic level.

In the next section, we review the literature on stress-and syllable timing and we offer arguments against the analysis of rhythm from a purely phonetic perspective. We conclude that while there is evidence that all languages show a tendency towards stress alternation, syllables in syllable-timed languages cannot be said to be isochronous. In section 2.1.2 we argue that differences in rhythmic structure are the result of differences at the structural level, the level of phonological representation. We suggest that the areas of phonology that are involved in rhythm are syllable structure and stress. Having established this, we proceed to describe the background of syllable structure in Spanish and English in section 2.2. and of their stress system in section 2.3.

2.1.1.The physical reality of isochrony: The phonetic level

For the purposes of simplification, we defined syllable-timed and stress-timed rhythms as totally exclusive in the previous section. It is important to note at this stage, however, that isochrony, as defined by Pike (1953), is not to be understood in absolute terms. He is careful to state that stresses and syllables occur at 'more or less' (not identically) equal intervals. In other words, we are warned to expect variability in the range of measurements of inter-stress and syllable intervals.

This variability, however, should not be taken as evidence against the existence of these two different types of rhythmic structure. Allen (1975: 79) explains that humans have a tendency to act rhythmically. According to Allen, as individuals we have a preferred rate for performing a particular action with limits of 0.2 and 1.0 seconds between acts, and even when we are performing a rhythmic pattern at our preferred rate, there is a range of variability between 3-5% of the total length of the interval or between 7-11% if we are asked to perform at a different rate. Speech production involves complex motor commands, but studies discussed in Allen (1975) show that variability found in speech timing is similar to that of other types of motor behaviour (0.2-1.0 s.), such as finger tapping. Durational differences of inter-stress intervals tend to fall within this range in English (Lehiste 1977, O'Connor 1965). In the case of syllable-timed languages, Allen (1975) says measuring rate is more difficult, since inter-syllable intervals tend to be a lot shorter than inter-stress intervals. What has been observed, however, is that the timing of syllable length in syllable-timed languages tends to coincide with the bottom end of the range for preferred motor actions, and the rate of rhythmic grouping tends to fall in the middle and higher end of this range. In French, for instance, the average duration for the syllable is 0.2 s. whereas the rhythmic groups tended to fall in the range of 0.4 and 1.7 s.

One important point that Allen makes in his paper is the fact that despite the traditional division of languages into the two groups, there seems to be a tendency on both types of languages towards stress alternation. As an example, he mentions rules of stress alternation which shift stress to other syllables in the word, as in the English phrases 'He went ùpstáirs' and 'úpstàirs bédroòm' in the word *ùpstáirs*. The same phenomenon is present in German, another stress-timed language, and is known as 'Rhythmischernebenakzent', or even in Spanish with the alternations we find in accentual patterns of words such as 'Dimelo' (=Say it to me), which could have stress on the first or last syllable '**dí**melo/díme**lo**'.

Even if we agree there is variability, the psychological reality of Pike's dichotomy could potentially be verified. If there is any basis for this division, we should expect to find inter-stress-intervals clustering around certain values which would vary within a defined range in the case of stress-timed languages and the same situation in the case of syllable-timed languages with respect to syllable durations. Is this the case? Later attempts to try and substantiate this distinction at the phonetic level with acoustic measurements of inter-stress and inter-syllable intervals have proved fruitless, as we shall see shortly.

Let us start this examination by looking at a language which has been considered to be ‘stress-timed’. Portuguese, as mentioned above, is an exception among the Romance languages in its rhythmic organisation. Major’s (1981) analysis of Brazilian Portuguese shows that in normal speech, although longer words are longer in duration than shorter ones, the actual duration of individual syllables within the word is inversely proportional to the total number of syllables it contains. This provides support for considering Portuguese a stress-timed language. In casual speech he also found that inter-stress durations are not directly proportional to the number of syllables. In the example in (1a), we have a Portuguese sentence. The number of syllables in the second inter-stress interval is increased by one in (1b) and again by one in (1c). The dashes indicate the number of syllables contained and the accents above them indicate the position of the stress. The numbers are the counter of syllables per stress interval.

(1)

a. Esta é a melhor universidade do Brasil

’ ’ ’ ’
–– –– –– –––––– – – ––

5 5 4

(=This is the best Brazilian university)

b. Esta é uma gramde universidade do Brasil

’ ’ ’ ’
––––– –– –––––– – – ––

5 6 4

(=This is a great Brazilian university)

c. Esta é uma péssima universidade do Brasil

’ ’ ’ ’
––––– ––– –––––– – – ––

5 7 4

(=This is a terrible Brazilian university)

If Portuguese were a syllable-timed language, we would expect to find an increase in timing in the second interval only, as this was the interval where the syllables were added. However, this is not the case and Major found that the length of the first and third interval increased as the length of the second did too. That is, there seems to be a tendency towards equalising inter-stress intervals. Table 1 displays the length of the three different intervals in the three sentences, in milliseconds:

Table 1:

Sentences	First interval	Second interval	Third interval
1a	16	18	23
1b	39	42	48
1c	45	48	32

But Major found something else. As well as a lengthening of the first and third intervals when the duration of the second increased, the duration of the second interval was reduced by the use of syllable deletions. The transcriptions of sentence (1c) in citation style and fast speech are given in (2).

(2)

a- Citation style:

[ˈɛstamɛumaˈpɛsimauniversiˈdadʒinubɾaˈziʊ̯̃]

b- Fast speech:

[ˈɛsəməˈpɛzməveˈzanubɾaˈziʊ̯̃]

Note that in citation style, there should have been 5, 7 and 4 syllables in each interval. Instead, in fast speech, the result was the transcription in (2b), where the number of syllables has been reduced to an equal number of 3 for all three intervals.

In casual speech, rules of syllable deletion, monophthongization and raising of vowels in unstressed syllables are common and they all have the effect of contributing to the perception of the language as stress-timed. These processes operate more widely in casual style and less in formal style. Since language change normally operates diachronically in the direction of the forms found in casual, not formal, style, Major concludes that it seems as if Portuguese is perhaps at an intermediate stage between syllable and stress-timing and eventually, it might become truly stress-timed: citation style has few shortening processes and is reported to have 'a very Spanish sounding accent to it' (Major 1981:350), normal style favours post-tonic shortening and is the phase between the two types of rhythm, and casual style favours both pre and post-tonic shortening, which indicates a stress-timed rhythm according to Major.

Two things are worth noting about Major's study for our purposes: firstly, syllables are not the organising principle of rhythm but are produced in rhythmic groups; and secondly, these rhythmic groups do seem to display a tendency towards equal duration. The language achieves this by different processes such as syllable deletion, monophthongisation and vowel raising. It looks as if Portuguese is therefore displaying the features that characterise stress-timed languages.

While the reality of stress-timed rhythm has been less questioned, this has not been the case with regard to syllable-timed languages. In the 1980's, a series of articles appeared in which the classification of a language as syllable-timed was called into question. Wenk and Wioland (1982), for instance, deny the inclusion of French in this group. They argue that there is no such thing as syllable isochrony in French. In order to illustrate their point they consider the sentence in (3)[2]:

(3)

Il a sollicité ma collaboration, car Pierre aime toujours l'art.

I.la.so.lli.ci.té.ma.co.lla.bo.ra.tion.car.pie.rreaime.tou.jours.l'art

(=He requested my assistance because Pierre still loves art)

In (3), the first part of the sentence (Il a sollicité ma collaboration) contains twelve syllables and the second (car Pierre aime toujours l'art) only six, so we would naturally expect to find that the former would take double the amount of time if French is a syllable-timed language. Interestingly, the reading of 12 native speakers showed acoustically that not only was the timing not in a ratio of 2:1 (the mean for the first sequence was 162 cs. and for the second 148 cs.), but in the case of two speakers the six syllable sequence was measured as being in fact longer than the twelve syllable one. Wenk and Wioland then move on to ask what type of rhythm French has and try to compare it with English rhythm.

Fry (1958), cited in Hayes (1995), carried out some experimental tests in order to ascertain which of the three phonetic correlates of stress (loudness, pitch or duration) had the strongest effect on stress perception. He found that loudness had the least effect,

[2] I have illustrated syllable divisions in the second sentence.

followed by greater duration and finally pitch. Changes in pitch and duration, not loudness, are therefore the main perceptual cues for stress. Since pitch and durational changes may also be used in different languages for other phonological purposes (pitch for intonational changes, for instance, and duration as a phonemic vowel distinction) stress is phonetically realised on a language specific basis: some languages may focus on pitch as the most important correlate of stress (even if longer duration and higher intensity are present as well, pitch will be the main cue) and others may choose duration for the same purpose. This distinction is very important as it has other implications at the perceptual level.

Human perception works in such a way that a unit within a series which is distinguished from the others by higher intensity, will be perceived by listeners as the one leading the group, and when the unit is distinguished from the others by longer duration, it is perceived as final in the rhythmic group (Allen 1975:78). In English, the main acoustic correlate of stress is higher intensity. In French, however, higher intensity is not usually present as a correlate of stress. Instead, what we find is a longer ratio of difference in length between stressed and unstressed syllables. Perception of stress in French therefore depends on duration and in English on the intensity of the stressed syllable. The perceptual result is that English rhythm is perceived by groups that are headed by an initial stressed syllable and French by groups which are headed by a final stressed syllable. It is this fact that leads Wenk and Wioland to coin different terms to define these rhythms: French is called 'trailer-timed' and English 'leader-timed'. In both cases, however, we find that syllables are produced in rhythmic groups, and neither language has the syllable as the organising principle for rhythm. For this reason the authors deny the inclusion of French into the group of languages labelled as 'syllable-timed' by Pike. As in the Portuguese case examined before, we are in a situation in which stress is, once again, the organising principle.

Spanish is another language usually considered to be syllable-timed. In the literature review on this topic, however, we have two different positions, neither of which supports the inclusion of Spanish as a true syllable-timed language. Pointon (1980) reviewed the literature on Spanish rhythm and tried to make sense of four previous analyses of Spanish rhythm, namely Navarro Tomás (1922), Gili Gaya (1940), Delattre (1966) and Olsen (1972).

Navarro Tomás used three Spanish informants who were asked to read a poem, and his conclusion was that Spanish rhythm was based on feet, each beginning with a stressed syllable. Pointon does point out, however, that Navarro Tomás works with verse and this form is not representative of the language as a whole. Gili Gaya analysed a reading of a prose passage and his conclusion was that Spanish had a tendency to syllable-timing. However, he also says that this can be affected by the tempo used (rapid speech favours isochronicity) and that the greater the number of unstressed syllables between stresses, the more they are shortened. Delattre used spontaneous speech produced by native speakers, but there is a lack of information on the subjects: we are not told what variety of Spanish the subjects spoke (presumably Latin American given he is an American researcher) or even the number of informants used. His conclusion was that closed syllables were considerably longer than open ones except in unstressed non-final position. Olsen used only one Mexican informant and his results were very similar to Delattre's, and like him, he concluded that Spanish was syllable-timed.

In this article, however, Pointon reanalyses Gili Gaya's results using the same research procedure described by Olsen and Delattre (grouping the syllables according to the binary parameters ± stress and ± final). Gili Gaya's results are diametrically opposed to those found by Delattre: stressed syllables are 40% longer than unstressed ones, except in the case of final closed syllables, where stressed syllables are just marginally longer. One possibility for this apparent contradiction could be that different varieties of Spanish could yield very different results, another that we can only make very general statements about the duration of Spanish syllables. However, closer examination of Gaya's data reveals that there is a large number of CV syllables and fewer closed ones. Pointon analyses syllable length in terms of the type of consonant contained in the syllable and shows that length is determined by stress and the number and type of segments in the syllable. This would seem to go against a clear case of syllable-timing. However, when he analyses the inter-stress duration in Gili Gaya's data, he shows there is a large discrepancy of timing between stresses (the shortest rhythmic group lasts 21 cs and the longest 136.5 cs). Pointon tries to argue then for the position that Spanish is neither stress-timed (there is a large discrepancy in timing between stresses) nor syllable-timed (due to the different duration of syllables depending on their structure and position in the group). In his view, Spanish could either represent a third type of rhythm which he calls segment-timing where the number of segments and nature of the consonants in the syllable will determine its duration, or else that it represents a third type of rhythm, some kind of transitional rhythm of a language which is somewhere in a continuum with stress-timing at one end and syllable-timing at the other. Interestingly, this seems to be a similar conclusion to Major's (1981) with respect to Brazilian Portuguese, where he concluded that Portuguese was in some sort of transitional stage and in the process of moving towards stress-timing. The evidence for more equal timing between stresses was, however, stronger in the case of Portuguese.

It seems to me that all the results Pointon analyses in this study have several methodological flaws, such as lack of information on the origin and number of informants and the use of different elicitation techniques for data collection, and so the conclusions he arrives at should be taken with caution. He is trying to compare studies that are markedly different from each other in their methodology. Pointon's study is important, however, in that he casts some doubt about the classification of Spanish as a clear cut case of an example of syllable timing. It is also interesting that he points out that out of the four studies, the two carried out by the non-native speakers (Delattre and Olsen) come to the conclusion that Spanish is syllable-timed, while in the ones carried out by the native speakers (Navarro Tomás and Gili Gaya) the former says Spanish is stress-timed and the latter says it is syllable-timed but with some caveats on tempo. This might well indicate a perceptual bias on the part of the non-natives.

Borzone de Manrique and Signorini (1983), come closer to helping us understand the true nature of Spanish rhythm with a much more rigorous instrumental study and new data. The variety used was Argentine Spanish, there were four informants and the number of sentences analysed was 120. No examples of these sentences are given in the article, but we assume that due to the reading situation, they would be in careful style. Syllable duration was measured and interpreted with respect to syllable structure, preceding consonant, type of word (content/function), stress, position of syllable in the word, and position of word within the sentence. The study revealed that syllable length was determined by four different factors:

i) Length of vowel and consonant: Vowels were found to be longest in stressed prepausal position. The position in the word and stress does not seem to affect consonants. Instead, consonant duration depends on manner of articulation and rate of speaking. Voiced fricatives and the tap [ɾ] are the shortest consonants (43 and 10.2 ms. respectively), nasals and liquids have intermediate values (between 56 for [n] and 85 for [r]) and the longest are voiceless fricatives and plosives (98 ms. for plosives and 108 ms. for voiceless fricatives). With respect to place of articulation the general trend is that labials are longer than dentals and velars are the longest.

ii) Syllable structure: The more complex the structure, the longer syllables tend to be. CV, e.g. **'té'** (=tea), is by far the most frequent syllable type found in Spanish, and it is generally shorter than more complex structures such as CVC, e.g. **'vas'** (=you 2nd p. sg-go), CCV, e.g. 'Pue-**blo**' (=village), CVV, e.g. '**Pue**-blo' (=village), CVVC, e.g. '**pues**-to' (=position, job), since an increase in segments will bring about an increase in length. The ratio of stressed, pre-pausal open syllables to unstressed non-prepausal ones is 1:4, close to the ratio reported by Gili Gaya (1940), and in marked contrast with the reported 1:1 by Delattre (1966). In cases of complex syllable structures with equal numbers of segments (i.e. CCV, CVC, CVV), it seems as if the trend is for CCV to have shorter duration. Although Borzone de Manrique and Signorini do not provide an explanation for this, a reasonable answer could be that this is due to phonotactic constraints. In the previous section we saw how [ɾ] and [l] are two of the shortest segments in Spanish. Onset clusters in Spanish can only be occupied by a plosive or a fricative plus either [ɾ] or [l]. This would therefore explain why CCV tends to be shorter than the other two three-segment structures. In general, stress, prepausal position and manner of articulation of the onset consonant will be the factors that will affect syllable length. It must be noted, however, that the syllable structures discussed above are not an exhaustive inventory of all possible syllable types found in Spanish, because Borzone de Manrique and Signorini did not find enough tokens of the other possibilities in their data so information on this variable is not exhaustive.

iii) Function word/content word: The same syllable type will be inherently shorter in function words than in content words. For instance, in non-prepausal position, the average values for the main speaker were 157 ms. for stressed content words, 139 ms. for unstressed content words and 115 ms. for function words.

iv) Inter-stress intervals: These tended to cluster around similar values regardless of the number of syllables. We can find examples that are reminiscent of the Portuguese and French cases: the number of syllables that intervene makes no difference with respect to differential timing of inter-stress intervals. In (4) below some examples from Borzone de Manrique and Signorini (1983: 124) are included. As Lehiste (1977) showed, differences below 100 ms. are not perceptible, so we can safely group these values as similar intervals. The top row indicates duration of intervals in ms. and the bottom row indicates in brackets the number of syllables of each interval:

(4)

a.Two intervals 250-300 ms

(3) - (2) syllables

b. Three intervals 456-350-440 ms.

(4)- (2)- (3) syllables

c.Four intervals 310-400-410-350-380 ms

(3)- (4)- (4) - (2) - (4) syllables

There are also intervals that cannot be classified as similar intervals since the difference in duration is greater than 100 ms. Interestingly, in some cases, such as in (5a) below, they contain exactly the same number of syllables, and in other cases, like (5b), when there are three intervals, two are similar in duration and one differs:

(5)

a- Non-similar intervals (difference >100 ms), same number of syllables:

670-400 ms.

(3)- (3) syllables

400-520 ms

(4)-(4) syllables

260-430 ms.

(4)-(4) syllables.

b- Non-similar intervals: two similar, one non-similar

800-400-435 ms

(5)- (2)- (3) syllables

595-460-430 ms

(4)- (3) - (3) syllables

795-510-460 ms.

(6)- (2)- (3) syllables

Borzone de Manrique and Signorini note that in cases such as (5b), syntactic and semantic factors such as the presence of embedded constructions (e.g. the presence constructions in apposition between subject and verb: 'La casa, por ser fea, está en la colina' (=The house, because it is ugly, is on the hill)) or word prominence (e.g. the choice of emphatic stress in sentence such as 'Leo **muchas** poesías' (=I read a lot of poetry)) and change in attitude by the speaker (e.g. different speech rate in the two parts of sentences such as 'Dame el libro, por favor' (=Give me the book, please')) were in fact responsible for this lack of isochrony.

Borzone de Manrique, Signorini and Massone (1982), cited in Borzone de Manrique and Signorini (1983) found that other features typically associated with stress-timed languages could also be seen: unstressed syllables, as seen above, were not only shorter but they also contained reduced vowels (although unlike English vowel reduction, it was not in the direction of schwa, but towards the area of [a], the open central vowel in Spanish).

In short, there seems to be evidence that suggests that Spanish displays the same rhythmic features as stress-timed languages, with similar duration of inter-stress intervals, reduction of vowels in unstressed positions and syllable length depending on stress and position within the group. Borzone de Manrique and Signorini end their paper suggesting that perhaps the high presence of a CV syllable structure in Spanish and the particular way in which unstressed vowel reduction is carried out might make syllables more perceptible than in other languages and this could well be the reason why Spanish was perceived as syllable-timed.

One could argue against Borzone de Manrique and Signorini's findings by saying that their results are only relevant for the particular variety of Spanish used in their study.

However, another study on Chilean Spanish by Álvarez de Ruf (1978) cited in Roach (1982), arrives at the same conclusions, that this variety cannot be classified as syllable-timed either.

Having examined different studies that deal with syllable-timed and stress-timed languages, one can safely conclude that the Pike's distinction between the two types can no longer be maintained at a phonetic level. Even assuming variability, the phonetic analyses discussed above of the so-called syllable-timed languages seem to show that they display the same features as stress-timed languages, namely, a tendency towards isochronous inter-stress intervals.

If there is no substantiation at the acoustic level that we can talk about two different types of rhythm and therefore two different types of languages perhaps we should ask ourselves how it is that phoneticians in the past were led to distinguish two distinctive kinds of rhythmic structure in languages perceptually. As has been rightly hinted in several of the studies mentioned above, it is symptomatic that the initial perception of syllable-timed languages as isosyllabic has actually come from speakers of stress-timed languages and in this case it is not illogical to imagine that their perception would have been biased by their L1 (first language) linguistic experience. As Roach (1982) says, an untrained listener might well have wrongly identified the higher pitch on a syllable of a tone language as a stressed syllable since higher pitch is one of the acoustic correlates of stress. Likewise, speakers of a stress-timed language might wrongly impose their rhythmic pattern in other languages which might sound 'different' to the one they speak. Lehiste (1977) found that in English, listeners actually tended to hear intervals between stresses as more equal than they really were. This tendency to underestimate longer intervals and overestimate shorter ones has also been reported by Allen (1975). But even if that explains how the confusion might have arisen, it does not explain what it is in these languages that might have led to perceiving other languages as 'different'.

Interestingly, as an explanation of how this might have happened almost all the studies above mention that it is probably due to the fact that the so-called syllable-timed languages have a simpler syllable structure (Spanish for example has a very high proportion of CV syllables) and the fact that vowel reduction in unstressed syllables tends to be more prominently marked (there is more reduction) in stress-timed languages, which obviously has the knock-on effect of highlighting and making the ones that are stressed more perceptually salient. In other words, the separation of languages on the basis of different stress-timed and syllable-timed rhythm is a purely perceptual phenomenon (Lehiste 1977, Puppel 1986) and it is only facts about the structure of the language that make them sound different, but there is nothing on the purely physical acoustic phonetic level that backs this dichotomy. To quote Allen's words, 'there appears to be no temporal structure imposed on the phrase after the phonological output, so that any rhythmic structures originate either in the speaker's grammar or the listener's perceptions' (Allen 1975). And if we are talking about differences at the structural level, then we leave the field of acoustic phonetics, the physical reality of production which deals only with temporal timing, to enter the world of phonology, which deals with the structure behind this realization. It is at the phonological level where we might be able to distinguish different rhythmic structures and establish a typological distinction among languages.

2.1.2 The structural reality of rhythm: the phonological level

The literature review in 2.1.1 pointed to the conclusion that at the acoustic level, there seemed to be no basis for the distinction between stress-timed and syllable-timed languages. When a closer analysis of the so-called 'stress-timed' and 'syllable-timed' languages was done, it was the group labelled 'syllable-timed' that failed to confirm the predictions that syllables in those languages were isochronous. Moreover, syllable-timed languages showed a tendency towards equal stress intervals, giving the impression that the only type of rhythm found was stress-timed. Dauer (1983) provides evidence in his paper that recurrence of equal interval stresses is a language universal (see also Allen 1975). To demonstrate this, he selected a passage of a modern play or novel in two stress-timed languages (English and conversational Thai) one syllable-timed language (Spanish) and two 'unclassified' languages (Italian and Greek). Native speakers of these languages recorded a passage from a modern novel or play in which a character speaks in normal everyday language.. The interstressed intervals of these recordings were subsequently measured and it was found that the variability of the timing of these intervals in all the languages examined was not statistically significant. He concluded that it was only perceptually that we hear two types of rhythm because languages belonging to the two types differ in structure in three main areas:

i) Syllable structure: in stress-timed languages we find a larger number of syllable structures allowed, and as a consequence, there is more variation in syllable length due to the addition of extra segments. There is also a tendency to have 'heavy' syllables stressed and lighter ones unstressed. In English, for instance, Dauer mentions that most CVCC, CCVC and CVCCC syllables are stressed, and among the two most common syllables in English, CVC and CV, it is the former that tends to be stressed and the latter unstressed. In French and Spanish, so-called syllable-timed languages, syllable length is not subject to so much variation and open syllables predominate, especially CV. In Spanish, in fact the most common syllable either stressed or unstressed is CV and among the least common, CCVC tends to be stressed and V unstressed. Table 2 shows the most frequent (above 5%) stressed and unstressed syllables in English and Spanish in the passages Dauer analysed:

Table 2 (taken from Dauer 1983):

ENGLISH		SPANISH	
STRESSED	UNSTRESSED	STRESSED	UNSTRESSED
CVC 35%	CV 38%	CV 53%	CV 61%
CV 28%	CVC 27%	CVC 24%	CVC 22%
CVCC 13%	VC 20%	CCVC 12%	V 7%
CCVC 6%	V 10%	CCV 9%	CCV 5%

Vowel quality also contributes to reinforce or even out the length of the syllable: in the English passage Dauer used to collect the data he found that if a CV syllable was unstressed, it contained a reduced or inherently shorter vowel, if stressed, then it contained a diphthong or a peripheral vowel. In Spanish CV represented the most frequent syllable type and when unstressed, it tended to have half-open or open vowels (90% of cases), which are inherently longer than closed vowels. If stressed, however, the distribution of vowels was more even. This means that the quality of the vowel contributes in English as a marker of differences between stressed and unstressed syllables, whereas in Spanish it seems to function in the opposite direction, obscuring the distinction.

ii) Reduction processes: vowel, consonant and syllable reductions. In stress-timed languages, there is greater degree of vowel reduction in unstressed syllables than in syllable-timed languages and only a restricted set of syllabic segments can occupy this position. For instance, English only allows schwa, /ə/, /ɪ/, /ʊ/ or a syllabic sonorant, as in important [im'pɔ:tənt],' button ['bʌtn̩] or 'input' ['ɪnpʊt]. Spanish can allow any of its five vowels in stressed and unstressed positions, as in 'mete' ['mete] (='(s)he puts in), 'polo' ['polo] (=Pole), 'pala' ['pala] (=spade), 'risible' [ri'siβle] (=laughable), 'sutura' [su'tuɾa] (=suture).

In Spanish, vowels in unstressed positions are reduced too, but this reduction is less perceptible as the unstressed vowel will just be phonetically realised slightly more centralised than its stressed counterpart. Despite this, there is no drastic change in the quality of the vowel undergoing reduction: it is a mere allophonic realisation of the same phoneme and at the phonological level we would still postulate the same underlying representation for the vowel, be it stressed or unstressed. Furthermore, in Spanish, as we saw above, the difference in length between stressed and unstressed syllables may be masked by other factors such as the inherently longer duration of the vowels that tend to occupy unstressed positions.

Dauer notes that when there is reduction in stress-timed languages, the unstressed syllable is never lost completely. He gives the English example 'I saw him', where it might maximally be reduced ['sɔm̩] but the syllabic nasal never loses its syllabicity, so we never get *['sɔm]. In contrast, in syllable-timed languages we find more instances of reduction processes that affect consonants or even whole syllables. For instance, in Spanish there are resyllabification rules across word boundaries that have the effect of reducing the total number of syllables in the utterance. When a word ends in a vowel and the following one starts with a vowel too, resyllabification takes place and the two adjacent syllables are syllabified as a single one, forming a diphthong or, in the case of identical vowels, a monophthong. This phenomenon is known as syneresis. This is exemplified in (6) and (7). In (6) we have a phrase where the first word, 'la',

(=the-fem.) ends in a vowel which is identical to the first segment of the next word 'alumna', (=student-fem.). (6a) shows the syllabification that we would expect if the words were pronounced in isolation. (6b) shows the result of the application of syneresis where the first two syllables have been syllabified as one. In (7) we have syneresis taking place twice: first between the first and the second word with non-identical segments, the result of which is a single syllable with a diphthong, and again between the third and the fourth word 'de' (=of), and 'este' (=this) with identical segments, as in (6). (7a) shows lexical syllabification and (7b) postlexical syllabification. Examples are my own.

(6)

La alumna más inteligente (=The most intelligent student-fem.)

a. **la.a.**lum.na.más.in.te.li.gen.te

b. **la**.lum.na.ma.sin.te.li.gen.te

(7)

La introducción de este libro ('The introduction to this book')

a. **la.in**.tro.duc.ción.**de.es**.te.li.bro

b. **lain**.tro.duc.ción.**des**.te.li.bro

The ease of articulation and greater speed achieved in stress-timed languages by vowel reduction seems to be done in languages like Spanish by consonant rather than vowel reduction. To illustrate this, Dauer cites the Spanish example 'pescado' (=fish). In the standard form, this word is pronounced [pes'kaðo], but in some accents it is pronounced [pɛ'kao]. Dauer argues that even this form is rhythmically nearer the original standard than [pə'skaðə], which would be the result of the application of English reduction rules.

Phenomena like the ones described above in syllable-timed languages (consonant and syllable reduction processes) have the effect of contributing to the creation of similar syllable structure (CV) which subjectively creates the impression of similar length. Dauer also makes the point that in syllable-timed languages these processes are conditioned by phonological environment rather than by stress. Yet again, we see that it is facts about structure, that is, phonology, not phonetics, that are at play. CV is the preferred syllable type in these languages and the differences between stressed and unstressed syllables would be minimised due to the effect of vowel quality and distribution of vowels in unstressed positions.

iii) Stress: Dauer says that most stress-timed languages have lexical free stress (although Spanish and Italian also do) and stress is marked by prominent changes in pitch, loudness, length and quality. Syllable-timed languages, by contrast, have no lexical free stress (French) and stress is likely to be realised by changes in pitch contour[3].

Based on the analysis of the texts used, Dauer also comes to the conclusion that the potential number of syllables between stresses in a normal text tends to be higher in syllable-timed languages: Spanish allows up to 7 but the most usual range is between 2 and 6 , while the maximum found in English was 5 and the range was between 2 and 4. He based these figures on the texts he used, and he is quick to add that it would be hard but not impossible to find counterexamples to these.

As mentioned before, stressed syllables are longer than unstressed ones (in English they are 1.5 times longer, in Spanish 1.1 times). Stress-timed languages like English also allow more freedom of movement for stress (e.g. after**nóon** vs. **á**fternoon **téa**) or even insertion of extra stresses to break up long interstress intervals (e.g. 'I'll **fó**llow him to **Cón**stantin**ó**ple if **né**cessary), whereas in Spanish it is a lot more constrained, with only one fixed syllable being the possible candidate for stress per word (but cf. Allen 1975).

Two main conclusions are reached in his paper. Firstly, that the terms stress- and syllable timed rhythm, if maintained, have nothing to do with timing but with the structure (or in other words the phonology) of the language. Secondly, that the division is artificial in that languages do not fall into one type or the other in a black and white fashion. Quite the contrary. Dauer suggests that we should define the rhythm of a

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[3]Dauer mentions Japanese as an example of syllable-timed languages. However, Japanese is considered to be an example of a third type of rhythm, mora-timing.

language according to how important the role of.stress is in that language, especially in relation to the areas mentioned above. Some languages, like English, very clearly display the features associated with stress-timing. Other languages, however, are a lot more controversial. As well as some of the cases discussed under 2.1.1, Dauer considers Czech, which has been labelled both stress-timed and syllable-timed, and Finnish, which does not fit into either pattern. He suggests perhaps languages should be better categorised according to where these fall in a continuum depending on how important a role stress and the other structural features mentioned above play in the language. So he proposes a continuum like the one in (8) where languages would fill in a position in the spectrum depending on how close they are in their behaviour to a total stress-based system.

(8)

Stress-based

Japanese French Spanish Greek Portuguese English

Summing up, on the basis of the literature examined, we can conclude that the distinction between stress-timed and syllable-timed rhythm is untenable on an acoustic phonetic level. Secondly, it looks as if all languages base rhythm on alternation of stressed and unstressed syllables. This creates different patterns of alternation, from which typologies of languages could be drawn. These patterns are part of the structure of the language and are therefore part of the phonological component. Thirdly, the phonological areas that are involved in this are syllable structure, stress assignment rules/constraints and processes of (vowel) reduction. Ideally, differences in these areas should be expressed in terms of parameters, since it would be the mechanism that would allow us to describe language and explain language development and change in a constrained way. What follows is a detailed description of syllable structure and stress assignment of two languages (English and Spanish) which will be used in the L2 acquisition study.

2.2. The syllable in phonological theory: segmental and moraic theories of syllabic structure

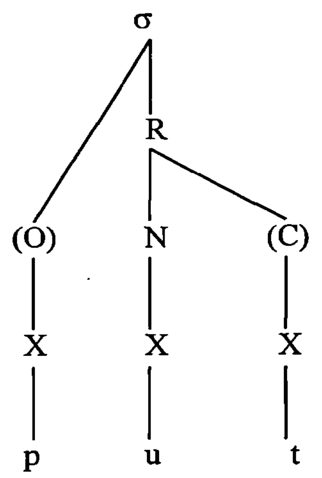
In the first account of generative phonology, Chomsky and Halle (1968), the syllable was not given the status of a constituent. Further investigations, however, have shown that it is necessary to make reference to the syllable in order to explain certain phonological phenomena. The syllable is held to be a unit of linguistic organisation because it is the domain of some phonological rules, it is the unit that receives stress and it is also the place where we can specify the phonotactic restrictions on a language. Among others, Selkirk (1982), Nespor and Vogel (1986) and Itô (1986), have recognised the syllable as unit of phonological representation.

Where the positions held by various linguists seem to differ most is with respect to the internal structure of the syllable. Several different organisations have been proposed in the literature, but we can restrict the positions taken on this to basically two: segmental and moraic theories of the prosodic tier. I will proceed to describe these two briefly in this section, bearing in mind that the descriptions will be short given that this is not the main purpose of this thesis.

The basic assumption of the segmental theory is that each segment is associated to an X-tier[4] which in turn is linked to the subsyllabic constituents. A syllable comprises a binary branching structure with an onset (O) and a rhyme (R), which in turn contains a nucleus (N) and a coda (C) as seen in (9).

[4] Other versions of the theory McCarthy (1979), Clements and Keyser (1983) have suggested C and V slots instead of X slots. C slots dominate [+cons] and V slots [-cons] segments.

(9) Segmental theory:



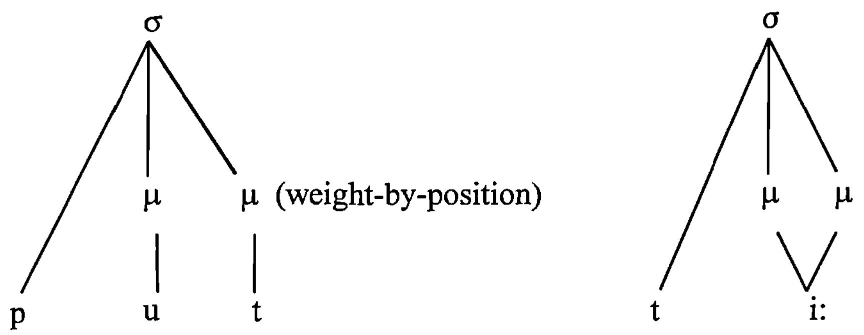
This is the structure proposed by Fudge (1969) and Selkirk (1982), among others[5]. The nucleus is the only obligatory constituent and both the onset and the coda could be absent. Grammars of individual languages determine the possibilities in terms of the number of branches in the different sub-domains. Weight is interpreted by assuming that a branching rhyme contributes to the weight of the syllable.

The second position is the moraic approach. Some proponents of this theory are Hayes (1989) and Zec (1995). Moras are the next subsyllabic constituent in the prosodic hierarchy and are meant to capture the concept of weight: light syllables contain one mora and heavy syllables contain two. Syllables can consist minimally of one mora and maximally two (Zec 1995). Moras are assigned to segments within a syllable by looking at their sonority and their position: short vowels are assigned one, long vowels two, and any consonant that follows the vowel can be assigned one mora if the language is quantity sensitive (QS) by the weight-by-position rule (Hayes 1989). Any pre-vocalic consonant is linked to the syllable node directly since onsets do not generally play a role in stress assignment[6]. The structure is seen in (10).

[5] As we shall see in the following section on Spanish syllable structure, the rhyme is by no means a constituent recognised by all researchers. Other 'flat'structures recognise the onset, nucleus and codas as constituents but no other intermediate node mediating between the root node and these (Noske 1993). Both in English and in Spanish there is evidence that we will need reference to a rhyme constituent, as will be explained below.

[6]Generally speaking we could generalise that languages do not seem to require reference to onsets for stress placement. However, in Davis (1988) it is convincingly shown that for stress shift and destressing rules reference to onsets may be required in Western Aranda and Pirahã. Minimally then, onset-sensitivity is needed for these rules in these languages.

(10) Moraic theory



Both the segmental and the moraic approaches can actually account for the concept of weight. The biggest difference is in the onset constituent. While the segmental approach recognises the onset as a constituent, the moraic approach does not. As Fikkert (1994) points out, when children acquire their first language there are a number of cases in which reference to the onset is necessary. In the process of acquiring complex onsets, children typically produce two adjacent segments which differ maximally in sonority (plosive + glide). It would be difficult to imagine how we could explain this in a non-ad-hoc way without making reference to the onset as a unit. There is also evidence from slips-of-the-tongue phenomena that the onsets function as a unit too. For these reasons, I will adopt a segmental rather than a moraic approach in this thesis.

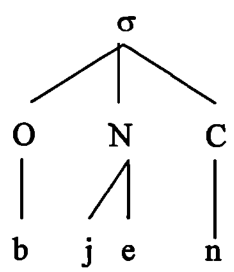
2.2.1.- Syllable structure in Spanish

2.2.1.1. Maximal syllable length and arguments for the existence of a rhyme node in Spanish

The most extensive treatment on syllable structure in Spanish is Harris (1983). Harris adopts a sub-syllabic binary branching structure which divides syllables into onsets and rhymes, which in turn can be internally divided into nucleus and coda, as in (9) above. Harris argues against Saporta and Contreras (1962), who support a ternary flat structure and no recognition of the rhyme as a constituent. A representation of the word 'bien' (=well) following Saporta and Contreras (1962) is given in (11).

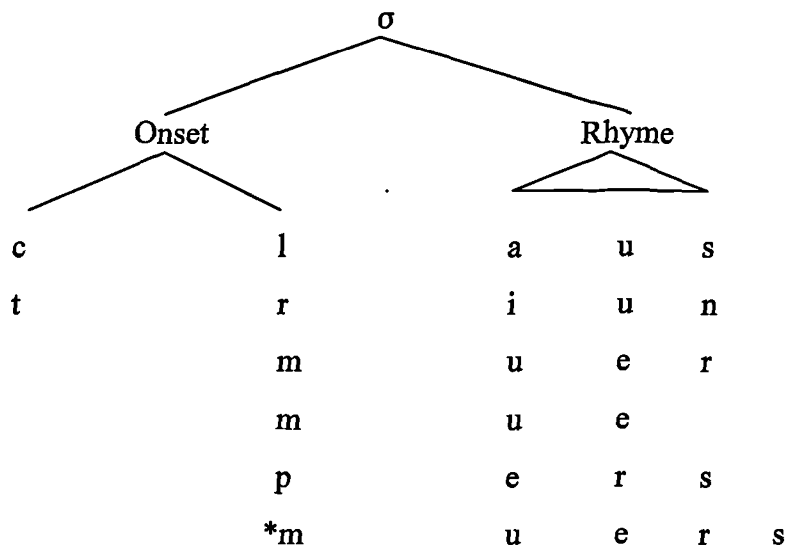
(11)

Saporta and Contreras structure:



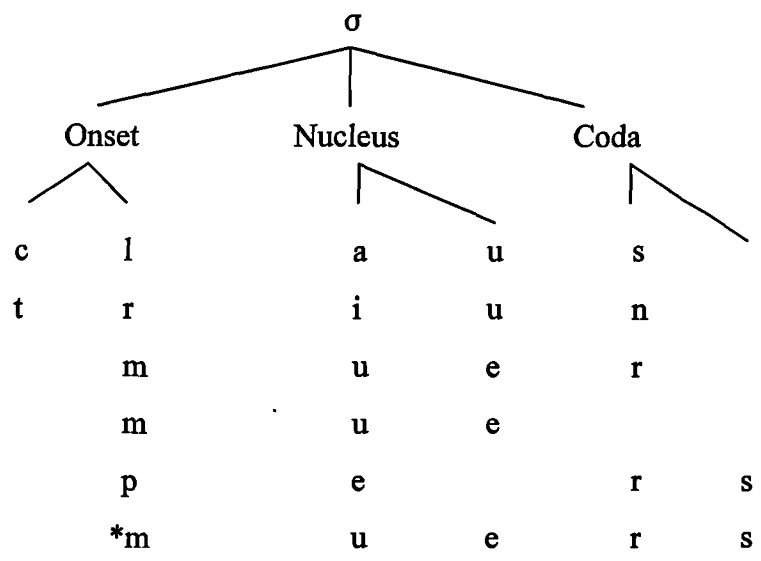
Harris provides two different motivations for his hierarchical analysis. The first one has to do with explanatory adequacy. If we assume rhyme constituency in Spanish, we can offer a generalisation about the maximal number of segments that a syllable may contain. The maximal number of segments allowed in a Spanish syllable is five; however, not all possible combinations of segments are allowed. While 'claus-tro' (=cloister) and 'triun-fo' (=success) are well-formed words in Spanish, a hypothetical 'muers-to' is not. Given that 'muer-to' (=dead) , 'mue-ca' (=grimace) and 'pers-pi-caz' (=shrewd) are possible words in Spanish, the argument for its ill-formedness must rest on syllable structure considerations and not on constraints on phonotactics. Following this analysis, and disregarding the actual structure inside the rhyme, the representation of the first syllable of the words '**claustro**', '**triunfo**', '**muerto**', '**mueca**', '**perspicaz**' and * '**muersto**' is shown in (12).

(12)



The alternative of this analysis, the flat structure proposed by Saporta and Contreras, would generate the following structure in (13):

(13)



Note that if we assume a flat structure, structurally there is nothing that prevents the generation of the ill-formed syllable **'muers'** and the stipulation we would need to filter out syllables such as this one would be cumbersome. In fact, it would have to stipulate that syllables can contain a maximum of five segments 'if the initial string of consonants contains two segments, but a maximum length of four segments if there is only one initial consonant and a maximum of three if there is no consonant' (Harris 1983:10). By assuming a rhyme, however, and adding a constraint such as 'rhymes are maximally three segments long' (Harris 1983:10), we can provide an explanation for the ill-formedness of 'muersto'.

The second argument in favour of the rhyme has to do with stress. In Spanish, non-verb words can only carry antepenultimate stress if the penult and final syllables are CV. That is, 'te-lé-fo-no' (=telephone) is a possible stress pattern but not the hypothetical '*te-lé-fos-ro' or '*te-lé-fol-po', '*te-lé-foi-ro'. The ungrammaticality cannot be put down to the overall length of the syllable, since we can find three-segment penultimate syllables such as 'te-lé-gra-fo' (=telegraph). If we assume a rhyme, the generalisation is that antepenultimate stress is impossible if the penult contains a branching rhyme. Without the rhyme, again, we have to resort to a more ad-hoc rule to prevent the generation of these examples.

2.2.1.2. Minimal word and syllable length

Although Harris does not go into this, a brief word is necessary about the minimal syllable length in Spanish. The minimal syllable must contain at least one element in the rhyme and this element must be the nucleus, as it is the only obligatory constituent. This requirement also coincides with the minimal word, as there are plenty of examples in Spanish of words that minimally contain one element in the rhyme: e.g. 'té' (=tea) 'dé' (=(you) give imper) and 'ha' (=(he) has-aux).

2.2.1.3. Onsets

Onsets are optional constituents in Spanish. Any Spanish consonant can occupy the onset position and onsets are maximally binary branching. The range of consonant combinations is limited to obstruent followed by a liquid (either /l/ or /r/); that is, there is a requirement that clusters contain consonants which are not adjacent on the sonority scale. The range of possible onset combinations and accidental gaps (marked with dashes) in Spanish is exemplified in (14).

(14)

/pl-/	**pla**.to	['pla.to]	(=plate)	/pr-/	**pri**.mo	['pɾi.mo]	(=cousin)
/tl-/	a.**tle**.ta	[a.'tle.ta]	(=athlete)	/tr-/	**tres**	['tɾes]	(=three)
/kl-/	**cla**.vo	['kla.βo]	(=nail)	/kr-/	**cruel**	['kɾwel]	(=cruel)
/bl-/	**blan**.co	['blaŋ.ko]	(=white)	/br-/	**brazo**	['bɾa.θo]	(=arm)
/dl-/	__			/dr-/	**drama**	['dɾa.ma]	(=drama)
/gl-/	**glo**.bo	['glo.βo]	(=baloon)	/gr-/	**gris**	['gɾis]	(=grey)
/fl-/	**fla**.co	['fla.ko]	(=thin)	/fr-/	**frío**	['fɾi.o]	(=cold)
/θl-/	__			/θr-/	__		
/sl-/	__			/sr-/	__		
/xl-/	__			/xr-/	__		

This description is taken from Harris (1983), and he states these restrictions in terms of rules. Needless to say, they could also be construed in terms of parameters. This will be done in section 2.2.3.

2.2.1.4. Spanish rhymes

Spanish rhymes are also maximally binary branching. Harris (1983) specifies the following rules for the creation of rhymes:

-Rule 1: The rhyme must always be occupied by at least one segment specified as [+syllabic, -consonantal]. An optional constituent can be attached to the right, specified as [-syllabic].

This rule would yield the following possible well-formed structures in the language:

(15)

V	**a**.la	['a.la]	(= wing)
VG	**au**.la	['au̯.la]	(=classroom)
VL	**al**.ta	['al.ta]	(= tall)
VN	**an**.cla	['aŋ.kla]	(=anchor)
VO	**ad**.mirar	[að.mi'ɾaɾ]	(= admire)

-Rule 2: A segment marked as *[-consonantal] can be adjoined to the maximally* binary branching structure allowed above.

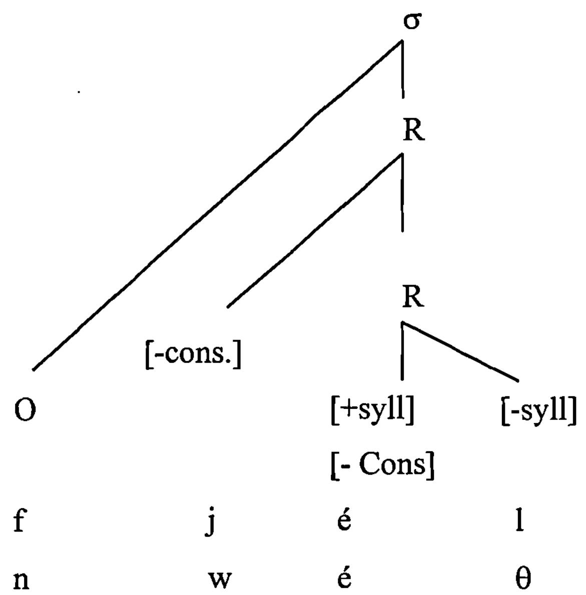
This would yield the following syllable types:

(16)

GV	**hue**.vo	['we.βo]	(=egg)
GVG	**buei**	['bwei̯]	(= ox)
GVL	**piel**	['pjel]	(= skin)
GVN	**bien**	['bjen]	(= well)
GVO	**diag**.no.sis	[djaɣ.'no.sis]	(= diagnosis)

There is no need to specify to which side we need to adjoin it since an attachment to the right would produce structures that would violate the sonority hierarchy (i.e. *VLG, *VNG, *VOG). The structure is captured in (17) with the examples 'fiel' ['fjel] (=loyal), and 'nuez' ['nweθ] (=nut)[7]:

(17)



In addition to theses structures, Harris also considers the special status of the phoneme /s/ in Spanish. Spanish allows an extrametrical segment, /s/, which is incorporated to the right of the prosodic structure by the principle of Stray Adjunction. This *only* applies to derivational stems word finally. The presence of extrametricality would therefore account for why we find the otherwise impossible four-segment rhyme structures GVGs in verbal inflections in some Spanish dialects as in 'limpiais' (=you-pl. clean).

In addition to the extrametricality behaviour, /s/ can also be found following any well-formed rhymes not exceeding more than two segments. The resulting possible existing structures would be: VGs, VLs, VNs, VOs, Vs and GVs, as exemplified in (18)[8].

[7] Note that this structure contains a sub-branching of the rhyme. This would give the nucleus and the coda the status of a constituent, but this status cannot be justified in Spanish as it is not a structure that functions as a unit in any phonological processes or rules. This question will be addressed again in 2.2.1.5.

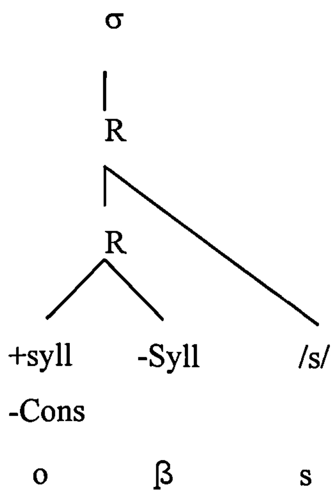
[8] Note that even though binary onsets are allowed, the /s/ needs to be syllabified in the coda of the preceding syllable because only obstruents + liquids can be complex onsets in Spanish.

(18)

VGs	**ais**.la.do	[ai̯z.'la.ðo]	(= isolated)
VLs	**pers**.pi.caz	[pers.pi'kaθ]	(=shrewd)
VNs	**ins**.pi.ra.ción	[ins.pira.'θjon]	(= inspiration)
Vos	**obs**.truc.ción	[oβs.truk'θjon]	(= obstruction)
Vs	**is**.la	['iz.la]	(= island)
GVs	**fies**.ta	['fjes.ta]	(= party)

In this case the /s/ appears inside the stems and therefore cannot be extrametrical, but it can be incorporated into the syllable structure by Rule 3 (Harris 1983): Adjoin the segment /s/ to the right of an existing rhyme. This structure is exemplified in (19) with the word '**Obs**táculo' [oβs.'ta.ku.lo] (=obstacle)

(19)



These rules generate all the productive syllable types in Spanish. All structures are possible both in final and medial position. There are, however, two cases that need some comment. The first is the case of GVG, which appears word finally 'buey' ['bwei̯] (=ox) and medially mainly in proper names, Cuau-tla, Guale-guai-chu. Harris comments that native speakers make 'weak and vacillating comments about the well-formedness of GVG' (Harris 1983: 16). The second case concerns the structures VGN and VGO. Although these structures appear in some Spanish words, Harris treats these cases as fossilised forms and claims they do not represent productive processes. Supporting evidence for this comes from the fact that they are restricted to a very limited number of words: VGN appears only in 3 words in medial position ('veinte' ['bei̯n.te](=twenty), 'treinta' ['tɾei̯n.ta] (=thirty) and 'aunque' ['au̯ŋ.ke] (=although)), and VGO appears in one word only, 'auxilio', [auɣ.'si.ljo] (=help). He also says that native speakers' judgements of nonsense words of these types are not clear.

Finally, Harris proposes a filter disallowing the co-occurrence of high [-consonantal] elements in the rhyme that agree in backness to prevent cases such as *ii, *ii, *uu, *uu, as well as e-epenthesis, the use of erasure convention to delete unattached or stranded elements that would not be realised phonetically, and resyllabification.

The vowel /e/ is the underspecified vowel in Spanish and it is attached to a syllablic consonant that would otherwise be left unattached. The word 'esfera' (=sphere), is analysed by Harris (1983) with an underlying representation /sfera/. Since the initial /s/ cannot be syllabified with the following consonant in the onset, e-epenthesis needs to apply.

The erasure convention applies in the case of consonants that cannot be syllabified in the coda nor in the onset, as in 'escultor' [es.kul.'toɾ] (=sculptor). The underlying representation of this word is /sculptor/ in this earlier conception of the theory. The cluster /lpt/ cannot be syllabified in the coda (only one consonant is allowed in coda position in Spanish, as we saw earlier) not in the onset (even though a complex onset is possible, we could not have two obstruents in this position). So the /p/ does not surface because it is deleted by the erasure convention, which says that 'segments not incorporated into syllable structure at the end of a derivation are erased' (Harris 1983:35).

The rule of resyllabification proposed has the effect of syllabifying final word consonants in the onset of word initial vowels. This rule is shown below in (20):

(20) Resyllabification rule:

[+Cons] -->[+cons] /_______#V
| |
R   O

2.2.1.5. The case of the on-glides: further developments in the theory

Harris (1983), as we saw in (17), analyses words which contain GVC rhymes with another node below the first rhyme projection. What is unusual about the way that he subdivides the rhyme is that he leaves the on-glide detached from the nucleus. The representation of the on-glide has always been problematic in Spanish, as the on-glide can, on the one hand, behave as a real onset if there is no consonant occupying this position, or as part of the rhyme if the onset is occupied[9]. Harris (1983) ignores this dual status in his analysis and at the same time creates the added problem of the appearance of an intermediate node made up of the nucleus and the coda consonant.

Subsequent to this, two different analyses have been proposed to explain Spanish syllable structure. One of them has been proposed by Harris himself. Harris (1989) uses the sonority-based algorithm proposed in Dell and Elmedlaoui (1986) to explain syllabification in Berber[10] to argue that syllable structure in Spanish could be generated as a result of two main rules: the rule of core syllabification (21) and the rule of adjunction (22).

(21). Rule 1: Core syllabification:

σ
/|
(Y) Z → (Y) Z Where Z = most sonorous segment.

[9] A real rhyme would be a case like 'ciego' ['θje.ɣo] (=blind), in which the glide contributes to weight. However, /j/ in onset position becomes an obstruent consonant, as in 'iodo' ['ʒo.ðo](=iodate) .
[10] The Imdlawn Tashlhiyt dialect of Berber has puzzled phonologists for some time due to the unusual way in which syllable structure is formed. In this language, any segment (from vowels to obstruents) can occupy the nucleus of a syllable.

(22) Rule 2: Adjunction

$[[Z]_N]_{N'}\ W \rightarrow [[Z]_N\ W]_{N'}$

By the rule of core syllabification CV syllables are created. The most sonorous segment is identified and the less sonorous element to the left is syllabified. This rule applies until all potential nuclei are syllabified. The adjunction rule applies after core syllabification to generate coda positions.

The core syllabification rule makes use of the Sonority Hierarchy to identify the potential nuclei in a given language. The Sonority Hierarchy, given in (23), captures the relative sonority of phonological segments. Obstruents are the least sonorous segments while vowels are the most sonorous.

(23) Sonority Hierarchy

Obstruents- Nasals-Liquids-Glides-Vowels

The Sonority Hierarchy is used together with the Sonority Sequencing Principle (SSP) (Kiparsky 1981, Clements 1990) to define what can constitute a syllable. The SSP specifies that segments on either side of the nucleus have to be organised in such a way that they decrease in sonority as they move away from the nucleus.

Spanish only allows vocoids to be the nucleus of a syllable, which Harris considers to be the universal unmarked value. Initially then, all vowels would be identified as potential nuclei and core syllabifications would be created. Words with clear CV syllables such as 'peluca' [pe.'lu.ka] (=wig) would identify the most sonorous elements (vowels) and syllabify their respective onsets.

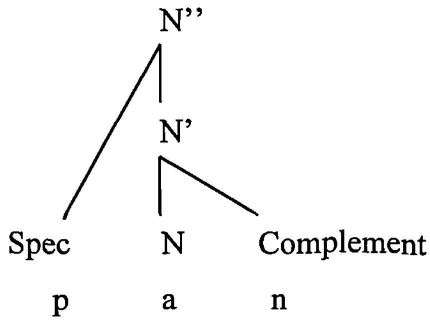
This analysis becomes problematic, however, when we consider cases with glides, such as 'au.to' ['aw.to](=car). The high back vowel is not a nucleus in this case but an off-glide. If we assume this algorithm for core syllabification, all vowels (including the /u/ in the first syllable) would be identified as potential nuclei and could be potentially syllabified as trisyllabic instead of bisyllabic. In order to prevent this, Harris stipulates an underlying specification of glides as [-syll] and high vowels as [+syll].

This different specification allows the grammar to syllabify post-vocalic glides within the rhyme by the rule of adjunction in cases like 'au.to' ['aw.to], and to syllabify consonantized glides on onset position in cases like 'io.do' ['ʒo.ðo], given that the glide would be specified as [-syllabic] and therefore could never be wrongly syllabified as an independent syllable.

However, this explanation falls short of explaining some other cases, such as the representation of the on-glide in a diphthong after an onset. It is well known that GV structures in the antepenultimate or ultimate syllable (see section 2.3.1.2. on stress) block stress assignment in the antepenultimate syllable in Spanish: 'a.duá.na' (=customs) is a possible stress pattern, *á.dua.na is not; 'ca.rí.cia' (=caress) is possible, *cá.ri.cia is not. It follows from this that prevocalic glides contribute to weight and therefore must be represented in the nucleus. If glides are always represented as [-syllabic], they would never be able to appear in a nuclear position and therefore they would not be able to contribute to weight.

Hualde (1991) presents a solution to this problem. He adopts Levin's (1985) theory of syllabification, which treats the syllable as an X-bar projection of a category N (nucleus), with rhymes being the sister node and complement of the nucleus, and onsets occupying the specifier position. We have exemplified this structure with the word 'pan' [ˈpan] (=bread) in (24).

(24)



Hualde suggests the following rules of syllabification regarding onsets and nucleus:

Node projection: Mark vowels as syllable-heads, i.e., create N nodes and project N' and N'' nodes.

Complex nucleus: Adjoin a prevocalic glide under the N node.

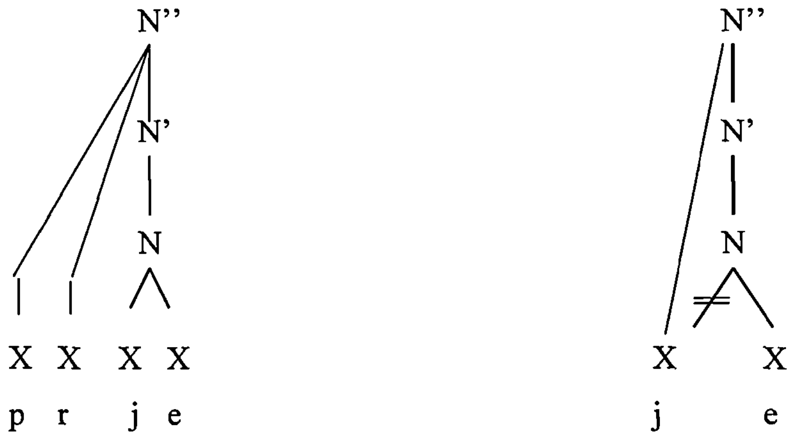
CV rule: Adjoin a consonant to the left of the nucleus under the N'' node.

Complex onset: Adjoin a second consonant under N'' if the result is a permissible cluster in Spanish. The same specifications as in Harris (1983) apply; namely, that the sequence must obey the Sonority Hierarchy and that only the cluster OL is allowed, with some accidental gaps.

These rules generate the following structures with prevocalic glides: (25a) represents the case of a glide in a diphthong; (25b) represents the case of a syllable initial glide which occupies an onset position:

(25)

a. **prie**.to   b. **ye**.gua



ʒ (after consonantization)

(25a) follows the rules above: first the nucleus is identified, then the complex nucleus rule applies followed by the CV rule and complex onset rule. In (25b), the glide is originally generated in the same position as in the previous example. However, no consonant is available preceding it to be adjoined in onset position by the CV rule, and the glide is therefore delinked and attached to onset position by a process of consonantization.

Hualde's analysis is superior to both Harris (1983) and (1989) since it is able to capture why glides contribute to weight (cf. (17) above, where the glide is not part of the nucleus) and at the same time is able to describe the consonantal behaviour of glides. This will be the analysis that will be assumed for Spanish structure[11].

[11] For an optimality account of syllable structure and stress in Spanish, see Morales-Front (1994).

Hualde adds further rules for the syllabification of coda segments:

Coda rule: adjoin a segment to the right of the nucleus under N'

Complex coda: adjoin a consonant to the right of a glide under N'

/s/ adjunction: Adjoin /s/ under N'. In order to account for the usual disappearance of the obstruent in this position, a subsequent rule would delete the first consonant in the sequence CsC . i.e. 'Obstáculo' [o(β)s.'ta.ku.lo] (=obstacle).

All the rules would be ordered as follows:

Node Projection

Complex Nucleus

Consonantization (movement of non-initial glides to the onset)

CV rule

Complex onset

Coda rule

Complex coda

/s/ adjunction

The rules in Hualde (1991) also explore the domains of syllabification and resyllabification, and this represents a further improvement in the theory. He shows convincingly that a rule of resyllabification such as the one in (20) proposed in Harris (1983) is redundant if we allow the rules of syllabification stated above to occur in domains smaller than the word (i.e. to allow prefixes and compound words to have two domains of syllabification) and the CV rule to apply postlexically. If we do this, we can explain why we get different syllabification effects in monomorphemic words such as [su.blime] (syllabified as 'su.bli.me'), and bimorphemic words such as [[sub][lunar]] (syllabified 'sub.lu.nar') and [[sub][alterno]] (syllabified as 'su.bal.ter.no'): the application of the CV rule post-lexically but not of the Complex onset would yield the correct outputs. This is exemplified in (26):

(26)

	[sublime]	[[sub][alterno]]	[[sub][lunar]]
Syllabification	[su.bli.me]	[[sub] [al.ter.no]]	[[sub][lu.nar]]
Prefixation	(n.a.)	[sub.al.ter.no]	[sub.lu.nar]
CV rule	(n.a.)	[su.bal.ter.no]	(n.a.)
Other rules	[su.βlí.me]	[su.βal.tér.no]	[suβ.lu.nár]

The rules of syllabification have applied in the three words in a first pass at the morphemic level. This is what has allowed the [b] in 'sublime' to be syllabified in the onset, while in subalterno'and in 'sublunar', we are dealing with bimorphemic words. By allowing the CV rule to apply once more at the postlexical level, the [b] can attach to the onset of the following syllable in 'subalterno', but not in 'sublunar' because the onset is already occupied by another consonant. Since it is the CV rule and not the complex onset rule that can apply postlexically, we get two different outcomes in the last two cases.

Having analysed syllable structure in Spanish in detail, we now proceed to describe English syllable structure.

2.2.2.- English syllable structure

2.2.2.1. Maximal syllable length and arguments for the existence of a rhyme node in English

Giegerich (1992) examines the different possibilities of well-formed syllables in English by looking at the following examples:

(27)

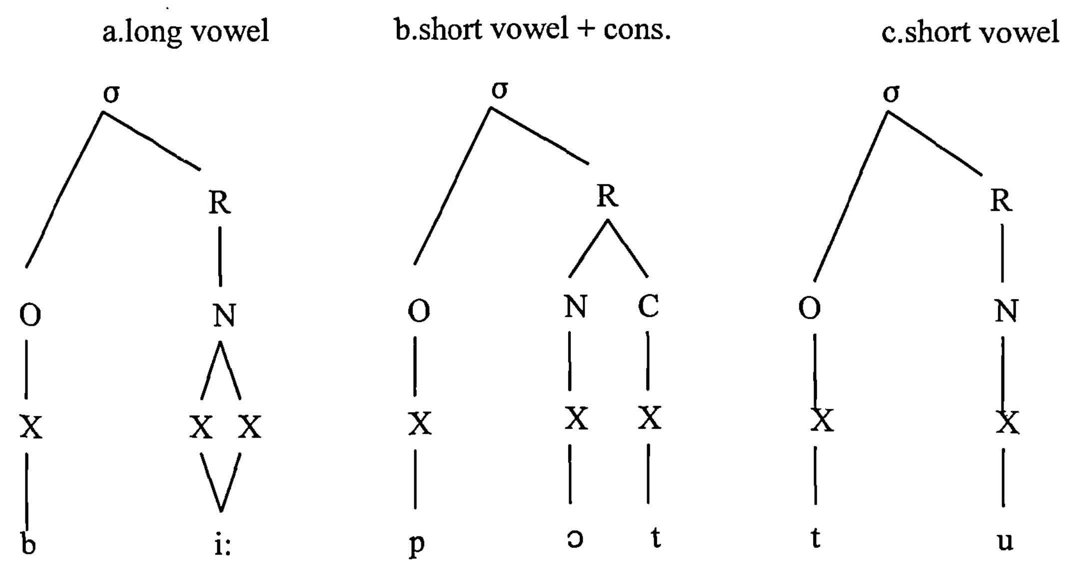
a. free b. sit c.seal d.clamp e.*/klaimp/ f. find

An examination of the different types of monosyllabic words above leads to the generalization that the maximal length of the syllable in English is limited to three positions in the rhyme. The example in (27a) contains two positions (given that long vowels are represented occupying two X positions in the nucleus), the example in (27b) has two positions too (one in the nucleus for the short vowel, and one in the coda for the consonant); the example in (27c) contains three positions (two in the nucleus for the long vowel and one for the consonant in the coda); the example in (27d) contains three positions, one in the nucleus and two in the coda for the two consonants; the example in (27e) contains four positions, two in the nucleus (one for each of the segments of the diphthong) and two in the coda (one for each coda consonant) and the example in (27f) contains four positions, two for the nucleus and two for the coda. Note, however, that while the example in (27f) is well-formed, the one in (27e) is not. The reason for this apparent anomaly will be explained below in section (2.2.2.4.2.) and it clearly has to do with phonotactic restrictions on coda segments. Leaving the example in (27f) aside for a while, it is quite clear that the generalisation we could make is that the overall maximal syllabic length in English is limited to three X slots in the rhyme. If we did not have a rhyme node, the generalisation, as in the case of Spanish, would be harder to capture. Since the X slots could be distributed either in the nucleus or in the coda (we could have a long vowel or a diphthong plus a consonant, or else a single vowel and two consonants) the generalisation would be harder to capture if we did not have a rhyme node. It is therefore important that the rhyme position be maintained in English if we wish to capture generalisations about syllable length.

2.2.2.2. Minimal word and syllabic length

English has two different minimal word requirements depending on whether the word is a lexical word or not. Stressed lexical words have a minimal requirement of two X positions in the rhyme (Giegerich 1992). That means either a long vowel or a diphthong or a short vowel plus a consonant. However, if the word is unaccented it can contain just a short vowel. Both types are represented in (28) with the lexical words 'bee' and 'pot' and with the unstressed word 'to':

(28)



2.2.2.3. Onsets

As in Spanish, onsets are optional constituents in English. Any consonant segment (except ʒ and ŋ) can occupy the onset position and onsets are maximally binary branching. Any combination of consonants must obey the Sonority Sequencing Principle (SSP) (Kiparsky 1981, Clements 1990). So all segments on either side of the nucleus must be organised in such a way that they decrease in sonority as they move away from the nucleus.

This does not mean that English allows any combination of sounds that obey the Sonority Hierarchy. English imposes a Minimal Sonority Distance (MSD) which disallows clusters whose segments are immediately adjacent in the sonority scale. Given all the above, the only possible resulting combinations are given in (29):

(29)

Onsetless syllable:

V a.pple

Simple onset:

OV boot

NV ne.ver

LV loop

GV when

Complex onset:

OGV twin

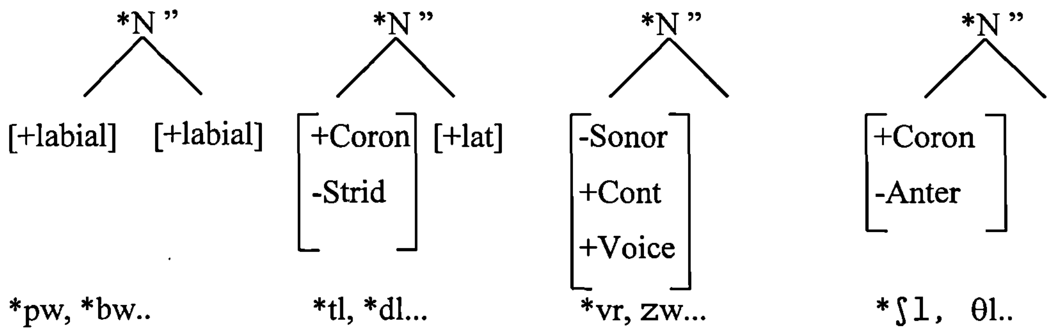
OLV bring

NGV new

Among the complex onsets, we have some distributional gaps, since we lack some clusters. Any obstruent can be combined with a glide but we find no examples of [pw], [bw], [fw], [ð w], [ð j], [zw], [ʒw] [vw] and [ʃj], [zj] [ʒj]. Any obstruent can be combined with a liquid but there are no clusters that start with [tl], [dl], [vl], [vr], [ðl], [zl], [ʒl] and [θl] (Giegerich 1992).

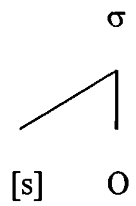
Clements and Keyser (1983) explain these gaps by using the following filters:

(30)



It is well known that English can also contain two-consonant clusters that start with /s/: [sm], [sn], [sp], [st] and [sk]. These combinations violate both the SSP and the Minimal sonority distance. One way to account for these structures is to postulate a special status for [s], so that this segment can be adjoined to the left of an otherwise well-formed onset by adjunction (Kenstowicz 1994):

(31)



Strong support for this analysis comes from the fact that the only possible 3-segment clusters on onsets in English are restricted to combinations of [s] plus a possible two segment cluster that obeys the SSP and MSD: [spj], [stj], [skj], [spr], [str], [skr], [spl], [skl]. The absence of [sp, st] plus [w] is simply an accidental gap in the language.

2.2.2.4. Rhymes

2.2.2.4.1. Nucleus

UNSTRESSED SYLLABLES:

The only obligatory constituent of the rhyme is the nucleus, always occupied by a segment specified as [+sonor] (Mohanan 1986). This allows syllabic /n/ and /l/ as well as vowels to occupy the nucleus of an unstressed syllable.

STRESSED SYLLABLES:

The specification of the first X in the nucleus is [-consonantal]. Lets us recall (section 2.2.2.2) that in the case of stressed syllables these must be heavy, so this needs to be followed by either another X in the nucleus, specified as [+sonor] in the case of diphthongs, or by a consonant in the coda.

2.2.2.4.2. Codas

Any consonant can be attached to the right of the nucleus, in coda position. If the nucleus is occupied by a lax vowel and the syllable is stressed, this attachment is obligatory in order to satisfy the minimal length requirement. This rule yields the following syllable types:

(32)

VL pal

VN pan

VO pat

As English rhymes can contain a maximum of three segments, there may be a further attachment of a second consonant. This cluster of consonants must comply with the SSP. Possible consonant cluster combinations in the rhyme in English are:

(33)

LN elm

LO health, help

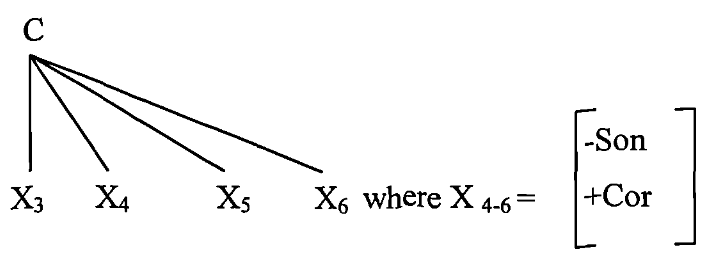
NO seventh, thank.

Note that in the rhyme, adjacent members in the Sonority Hierarchy can appear in the same syllable (LN). The only requirement that we need is that the consonants must decrease in sonority as we approach the margin.

Apparent violations of these generalisations are permissible syllable structures that contain either more than three X positions in the rhyme, e.g. 'sixths', and/or apparent violations to the SSP or MSD e.g. 'width', 'lapse', 'pact', 'earl' (in rhotic dialects).

What all these examples have in common is that all the consonants violate the SSP are coronal obstruents [t, d, s, z, θ]. Coronal consonants seem to be the unmarked consonants in English and the ones used in inflectional morphology. Several proposals have been made to account for their exceptional behaviour. Giegerich (1992) explains these cases by a template that involves the addition of up to three coronal consonants to the right of an otherwise well-formed coda. These segments are marked 4 to 6 below:

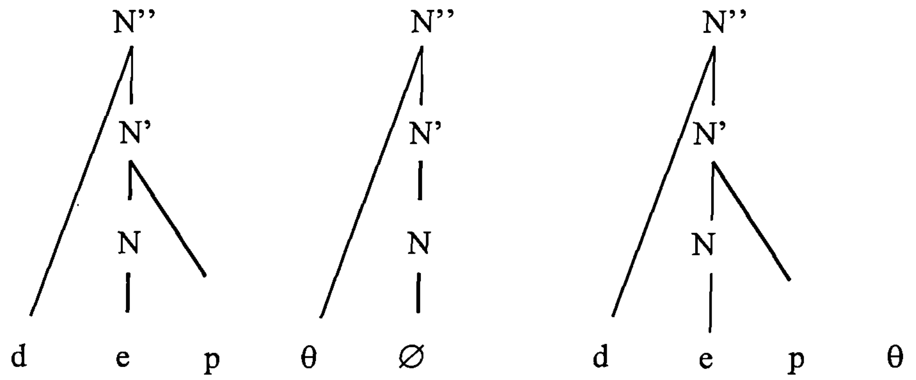
(34)



Kenstowicz (1994) discusses other proposals in his book. Halle and Vergnaud (1980) suggest housing these coronal consonants in an appendix that would be directly attached to the root level (σ) of the syllable while Booij and Rubach (1984) suggest a direct attachment to higher constituents like the prosodic word. Another way to deal with them is by licensing them with an Edge Constraint, following Itô (1986), as shown in (35b), or to treat these consonants as onsets of a syllable with an empty nucleus or null vowel (Kaye 1990, Burzio 1988), as shown in (35a).

(35)

a. Onsets of an empty nucleus b. Prosodic licensing



2.2.2.5. The case of the on-glides

Throughout the preceding discussion, I have deliberately ignored on-glides, as they deserve special consideration. So far, I have been assuming that on-glides in English are part of the onset. However, close inspection of the empirical data might reveal other facts. Let's recall that onset clusters in English must contain segments that are not adjacent to each other in the Sonority Hierarchy. However, we can find the following onset clusters which contain a [j] on-glide:

(36)

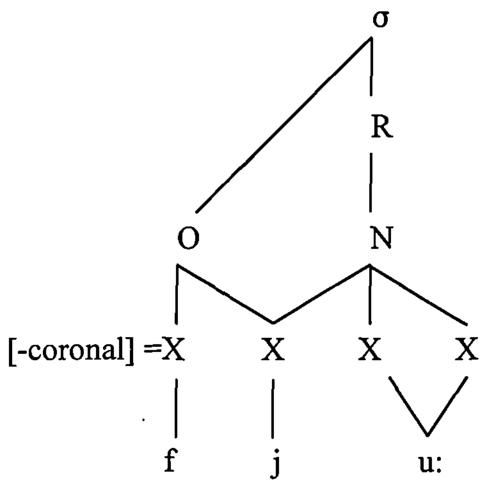
Oj pew, few, view, queue

Nj new, mule

Lj lewd, lieu

While [j] can appear before any vowel in onset-initial position, if it appears in a cluster it can only be followed by a [u:]. Notice also that the last case, **Lj**, is also a violation of the MSD. Given that the Consonant + j cluster has a close relationship with the nucleus, Giegerich (1992) analyses /j/ as doubly linked; on the one hand, it must be linked to the nucleus because it forms a phonological unit with /u:/; on the other, it must also be linked to the onset as we never get instances of a maximal onset followed by a /ju:/ (*splju, *flju). In addition, in General American (GA) English, a further specification is that /j/ cannot appear after a coronal consonant. This prevents the generation of clusters /tj, dj, nj, lj, sj, zj/, possible in most British English dialects. The representation is exemplified in (37):

(37)



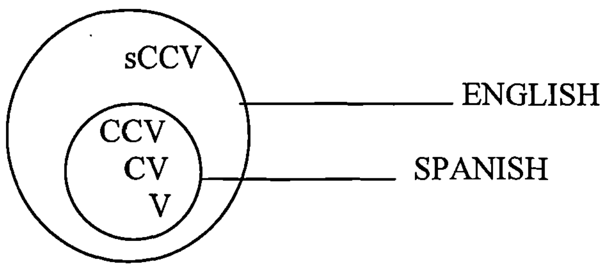
The asymmetry of /j/ and /w/ on-glides in American English is also noted by Davis and Hammond (1995). Under their approach, the /j/ is analysed as part of the nucleus whereas the /w/ is always part of the onset. The arguments for this distinction are similar to those mentioned above. Note that while /j/ can only pattern with /u:/, /w/ can appear next to any vowel with the exception of /u/, which can be explained by homorganicity. Davis and Hammond, however, do not mention that the /j/ is linked to the onset. They specifically argue against a rule of /j/ insertion and they only specify that the /j/ is co-moraic with the vowel in the nucleus.

2.2.3. Summary of English and Spanish syllable structures and implications for L2 acquisition

In this section, I will attempt to summarise the similarities and differences between Spanish and English and I will translate the previous description into parameter settings.

ONSETS:

(38)



With respect to onsets, we see that English allows all the possible onset clusters that Spanish does and some more. More specifically, English allows an extrametrical element /s/, that is adjoined to the left of an otherwise well-formed onset. The MSD that may exist between consonants in the cluster is set at the same value, as they both require combinations of segments which are not adjacent to each other on the Sonority Scale. Both languages have accidental gaps but these differ. There are some gaps in English which do not exist in Spanish. In particular, three unattested clusters in English are fairly frequent in Spanish: [pw] as in 'puedo' (=I can), [bw] as in 'bueno' (=good), and [fw] as in 'fuera' (=outside).

This description can be expressed in terms of parameter settings. Fikkert (1994:108) has suggested the following three settings for the onset parameter:

(39)

ONSET PARAMETER:

a. Number of onsets is equal to 1	On =1
b. Number of onsets is equal to or smaller than 1	On ≤ 1
c. Number of onsets is equal to or smaller than 2	On ≤ 2

where **c** ⇒ **b** ⇒ **a** and ⇒ means 'implies'.

The default parameter setting would be **a** and on the basis of positive evidence (the existence of onsetless syllables), it can be switched to **b**. The implication of these settings is that the parameter can only be switched to **c** after it has been switched to **b**. This would explain why in child language acquisition we see the emergence of onsetless syllables before the appearance of consonant clusters in the onset. Both English and Spanish would have the same setting, **c**.

In addition to this, Fikkert suggests an extrasyllabicity parameter:

(40)

EXTRASYLLABICITY PARAMETER:

Can consonants at the left edge which violate the Sonority Sequencing Principle be extrasyllabic?

Yes/No

The underlined setting is the default one, and this would also be the case for Spanish, as there is no evidence in the language would enable us to set it otherwise. English, on the other hand, has the setting **Yes,** and this allows the generation of clusters starting with /s/.

Fikkert does not go into how the parameter involving Minimal Sonority Distance should be formulated for onsets. One possible formulation could be:

(41)

MINIMAL SONORITY DISTANCE PARAMETER:

The minimal distance requirement in the sonority scale between two members belonging to the same constituent is

One/Adjacent

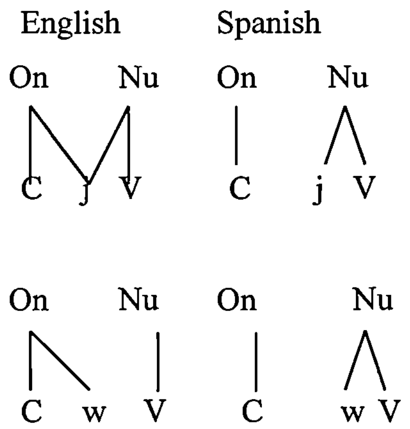
Note that there is no possibility of setting a third parameter option to zero since this would allow the creation of homorganic consonants. Spanish and English would have the default value of one.

The greatest difference with respect to these onsets lies in the representation of on-glides. English (or at least American English, which is the variety relevant to this study) represents /j/ glides as doubly linked, both to the nucleus and to the onset, whereas /w/ is part of the onset. Spanish, on the other hand, always represents on-glides which are preceded by a consonant as part of the nucleus, and initial on-glides in the onset. This is shown in (42):

(42)

Consonant + Glide combination:

	English	Spanish
CjV	j doubly linked	j in nucleus
CwV	w in onset	w in nucleus



Note that this difference cannot be captured in figure (38) as it has nothing to do with the structures allowed but with the way that the on-glide is represented underlyingly. In principle, the structures allowed in both languages are the same, but the way the filters and the underlying representations work generate two different sets of initial clusters in both languages.

Using positive transfer, English learners of L2 Spanish will be able to generate most of the onsets in Spanish. The learners, however, will have to realise that there are a number of other differences:

i) sCCV are not possible in Spanish. Only CCV onsets are allowed. The absence of these structures (indirect negative evidence) will have to trigger the setting of this parameter to the default value.

ii) Some CCV clusters allowed by the MSD (such as /bw/, /pw/) are not found in English. Positive evidence is available to trigger the production of these structures in Spanish.

iii) The underlying representation of the glide needs to change from English, otherwise incorrect conclusions for what constitutes a heavy syllable in Spanish will result.

The learner will need to find clues in the language that tell him/her that all on-glides are in the nucleus and not in the rhyme. One clue could actually come from syllable structure. Spanish, like English, imposes a restriction of minimal sonority distance in consonant clusters in onsets to the effect that clusters with segments that are adjacent in the Sonority Hierarchy are disallowed (recall section 2.2.2.3.). Given that the cluster LGV in Spanish is widely attested (in words such as 'luego' (=then, afterwards); 'rueda' (=wheel); 'llueve' (=it rains); 'marioneta' (=puppet)) and that it appears in combination with all possible liquids found in Spanish ([l], [r], [λ] and [ɾ]) as these examples show, the L2 learner will have to analyse these strings of sounds and create a representation.

S/he might entertain two different hypotheses: either that these are a violation of the MSD, a violation of a principle in UG, and therefore highly unlikely, or that this responds to a different analysis of glides underlyingly. Further clues come from stress assignment rules, as we shall see in section 2.3.1.2., when we review stress patterns, so ample positive evidence is available to the learner in the input that should allow him/her to arrive at the representation.

When confronted with this problem of a different template, if the learner transfers the English representation, it is expected that s/he will use a remedial strategy to bring the structure LGV into conformity with the English structure. Once the learner represents the G correctly in the nucleus, LGV will be correctly generated. In this evolution, developmental sequences are expected.

RHYMES. Maximal and minimal length

In both languages, the maximal number of segments in the rhyme is three. However, this apparent identical behaviour should be taken with caution. The crucial case here is again the behaviour of the on-glide. If the L2 learner of Spanish analyses the on-glide in the onset, in fact the maximal number allowed in Spanish is two (one for the vowel in the nucleus and one for the glide or consonant that may follow it in the coda). If the L2 learner syllabifies the glide appropriately, then the maximal number coincides. The crucial examples to revealing which representation applies may be words such as the hypothetical 'pueim-bo': if learners accept this as a possible word in the language, the only possible interpretation is that the [w] is in the onset, [ei] in the nucleus and [m] in the coda. The maximal number of segments is satisfied and it would conform to the rules of

English but not to those of Spanish, where the [we] has to be in the nucleus, the [i] in the coda, achieving thus the maximal number of three allowed segments.

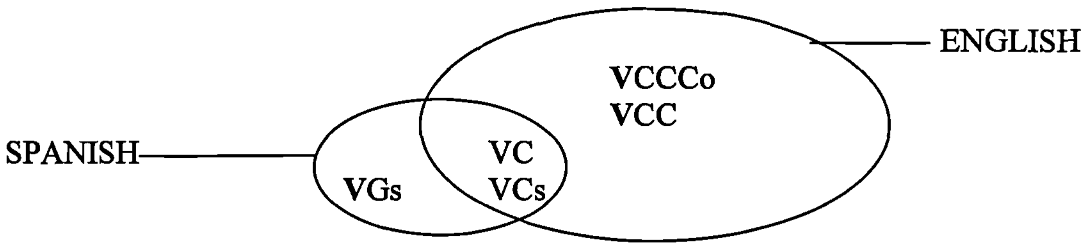
With respect to minimal length, we saw that English and Spanish coincide in the requirements for unstressed words or syllables, as the minimum needed is at least one segment in the nucleus. For the minimal word or the stressed syllable, English requires at least two segments, either a long vowel or a diphthong in the nucleus, or a short vowel in the nucleus and a consonant in the coda. Spanish, on the other hand, only requires one segment in the nucleus for the minimal word. If L2 learners transfer the minimal word requirement in English, they will need to create an additional slot in the nucleus to satisfy the requirement. One other possibility is that they do not transfer the English setting and that they start from the most restrictive setting, the one found in Spanish.

CODAS:

Both Spanish and English have the same setting for the coda parameter, since they only allow a maximum of two positions. However Spanish imposes a restriction on the type of segments that can occupy these positions. It allows one consonant or a glide followed by an /s/. English, on the other hand, allows any two consonants as long as they are not segments from the same class on the sonority scale. In addition, English allows a maximum of three other coronal consonants at the right edge of a well-formed syllable (shown in figure 43 as VCCCo).

Note that we have put the structure VGs in Spanish outside because the G in this structure is actually part of the coda in Spanish, not part of the nucleus.

(43)



Only VC + VCs are in a subset relation in the coda.

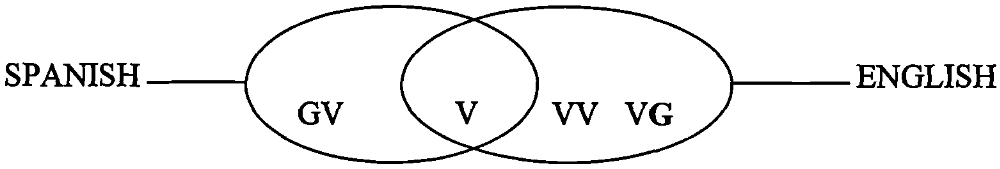
Learners could rely on their L1 setting and produce these structures successfully. Since the structures contained in the superset but not in the subset are never realised in the L2, the setting of the coda parameter could remain as in L1. This would imply that their

L1 grammar could potentially generate VCC + VCCCo structures too. The only way to test whether this is the case is by creating experimental conditions that will tap their competence.

NUCLEUS:

An important difference exists here between the two languages. Both languages allow binary branching, but in English, the nucleus can be occupied by either a long vowel or a falling diphthong. Spanish, by contrast, does not have long vowels, so the binary branching can only involve a rising diphthong. The differences are represented graphically in (44).

(44)



If the learner is transferring from his/her L1 to represent the nucleus, we could expect some instances of long vowels or a possible representation of off-glides in the nucleus.

Taken together, we can explain the differences in the rhyme using parameter settings. Fikkert (1994) suggests the following parameters for the rhyme:

(45)

BRANCHING RHYME PARAMETER:

Rhymes can branch into a nucleus and a coda

[No, Yes]

(46)

BRANCHING NUCLEUS PARAMETER:

The nucleus can be branching

[No, Yes]

(47)

EXTRARHYMAL PARAMETER:

A (final) bipositional rhyme can be followed by an extra consonant

[No, Yes]

The underlined settings are the unmarked value. Both English and Spanish have all these parameters set to YES. I would also add the following parameters:

(48)

MAXIMAL RHYME PARAMETER

a. The maximal number of rhyme positions is =1

b. The maximal number of rhyme positions is ≤2

c. The maximal number of rhyme positions is ≤3

where c⇒b⇒a and ⇒means 'implies

The English and Spanish settings would be **c**.

(49)

MINIMAL WORD REQUIREMENT;

a. The minimal number of rhyme positions for a minimal word is =1

b. The minimal number of rhyme positions for a minimal word is =2

The English setting would be **b** and the Spanish setting would be **a**. Setting **a** would be the unmarked value, since the canonical syllable is CV.

As in the case of onsets, most of the actual parameter settings in English and Spanish coincide. There are, however, some differences, and the English learner of L2 Spanish would have to notice that certain specifications and underlying representation of segments differ. The difficulties encountered are :

i) The specification for the members that can occupy a nucleus position: in Spanish, it can be GV, in English VV or VG. I have already discussed in the section on the nucleus above the type of evidence that the learner will need in order to arrive at these representations.

ii) The type of elements that can occupy a coda position: Gs and Cs in Spanish and any two consonants that do not coincide in sonority in English. The English learner is going to have to restrict the possibilities of segments in these positions and will have to notice that something is absent in the language.

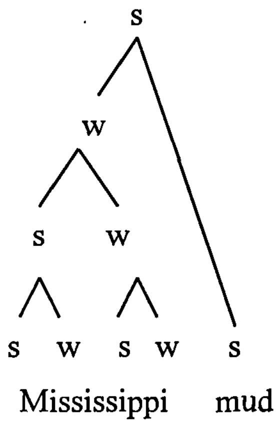
Having examined the syllable structure of Spanish and English, we now turn to an examination of the stress systems in both languages.

2.3. Stress in phonological theory

In the first generative treatment of phonology, Chomsky and Halle (1968) dealt with stress in the same fashion as any other distinctive feature. It soon became apparent that stress was in fact a different type of feature and that generalisations about stress assignment could not be captured with the simple use of a binary feature. It became quite clear that sometimes it was necessary to distinguish more than two levels of stress (accented versus unaccented) as some languages, like English, show at least two other levels: primary and secondary. Moreover, stress, unlike all the other features, has no unambiguous phonetic correlate. At the level of production, it was first assumed that if a breath pulse was present, a stressed syllable would occur; however, many stressed syllables, as it was later proved in the work of Ladefoged (1967), are produced without a breath pulse. Secondly, at the level of perception, it appeared to be the case, as Fry (1955,1958) showed, that duration and pitch are the main perceptual cues for stress, and to a lesser extend, loudness. And yet, all these are employed in phonology for other main purposes: duration is the main cue for vowel length, pitch changes mark tone and are also the phonetic basis of intonation.

These are some of the arguments that were put forward to argue against the treatment of stress as a binary feature. The alternative to SPE was Metrical Theory, originally conceived by Liberman (1975) and Liberman and Prince (1977). Under this approach, stress was seen as the linguistic manifestation of rhythmic structure. Rhythmic structure has a hierarchical organisation: sequences of beats have different levels of strength and, as we saw in section 2.1.1., are evenly spaced out at certain intervals, so that we get a linear succession of peaks and troughs. This earlier conception of Metrical theory proposed the formalism of the tree structure in order to capture this rhythmic hierarchy, as can be seen below in an example taken from Hayes (1995).

(50) Metrical tree



Stressed nodes in the tree were labelled 's' and unstressed 'w'. Grids were then read off the tree in order to obtain rhythmic interpretation, with this version of Metrical theory containing both a tree and an extraphonological grid representation. Subsequent debate centred around the status of the grid in phonology. Selkirk (1984) later argued that grids could not be extraphonological, because certain language particular rules need to make reference to the grid and so she proposed a pure grid theory. Halle and Vergnaud (1987) later incorporated the notion of bracketed grids. In bracketed grids, both prominence relations and constituent structure are captured. The difference between a pure grid and a bracketed grid representation is captured in (51).

(51)

	a. Bracketed grids			b. Pure grids	
Level 3			x		x
Level 2	(x		x)	x	x
Level 1	(x	x)	(x)	x x	x
Level 0	(x x)	(x x)	(x)	x x x x	x
	Mississippi mud			Mississippi mud	

Under the bracketed grid approach, metrical structure is represented in an autosegmental plane separate from the segmental plane. Stress-bearing constituents (which can be syllables or smaller subsyllabic constituents) are identified on level 0 and organised into constituents (feet). The heads of these constituents are projected onto line 1, and one of these heads is identified as the head of the word in line 2. The heads on line

1 represent secondary stresses. The way in which languages of the world form constituents in lines 0 and 1 varies parametrically.

Some of the parameters suggested by Halle and Vergnaud (1987) were adopted by Dresher and Kaye (1990) in their computational model of metrical phonology. This model adheres to tree representation and has the advantage of providing a model for the development of learning theories of stress. In fact it has been adopted in various L1 (Fikkert 1994) and L2 acquisition studies (Archibald 1993, 1994; Pater 1993) as the theoretical basis for exploration of parameter (re)setting because a model that expresses typological differences in terms of parameters will be compatible with the logical problem of language acquisition (see Chapter 1).

Subsequent to this, the most important development in Metrical Theory has come from Idsardi (1992). Idsardi also bases his theory on the work by Halle and Vergnaud (1987) but suggests some important changes. The first one is the introduction of the Edge Marking Parameter (EMP), which replaces the extrametricality and unbounded foot construction parameters. This parameter will be seen in operation in the following section on Spanish stress, but the basic idea is that instead of the old convention of marking the last syllable or segment as extrametrical, the word or morpheme is morphologically marked for the appearance of a particular boundary. The second difference lies in the treatment of heavy syllables: instead of having heavy syllables project another grid mark onto level 1, the convention followed by Idsardi is to project a bracket before a grid mark on level 0. As a knock-on effect, the old rules of conflation that combined two grid marks are done away with. This will also be seen in operation in the following section.

Given that these parameters are a development of the previous metrical theories and that they have been used in the most recent account of Spanish, this will be the theory I will use to examine and compare the stress systems of the languages considered in this thesis. Recall that because it is also able to express variation in terms of parameters, it has the advantage, like the Dresher and Kaye's model, of being adequate for an acquisition theory.

2.3.1 Spanish stress

Harris (1983) was the first attempt to characterise stress assignment rules within a metrical tree theory. Although the descriptive generalisations arrived at in that account still hold, the theoretical explanation of the data has been revised in subsequent papers (1992, 1995) incorporating the new convention of bracketed grids and refining some basic and important issues. The description that follows is mainly based on Harris (1995), which follows mainly Halle and Vergnaud (1987) and also incorporates new developments in Idsardi (1992).

2.3.1.1 Domain of Spanish word stress

The domain of application for Spanish word stress is the M(orphological) word and not the P(honosyntactic) word. This is the same view as in Harris (1983) and (1992)[12]. M-words are stem plus sufixes and P-words are M-words plus clitics. Clitics can add a fixed number of syllables (typically a maximum of three) to either end of an M-word and never trigger stress shift, whereas suffixes do trigger stress movement. Taking Harris' examples (1995:868), the difference is exemplified below in (52). Stressed syllables, which do not necessarily coincide with morphological boundaries, are represented in bold.

[12] Other proposals (Otero 1986, Roca 1988) had suggested the domain of the 'derivational stem' for stress in Spanish. Harris (1992) argues against this idea using two arguments: firstly, that the concept of 'derivational stem' is not defined in UG, just in terms particular to Spanish morphology, and secondly, that given that some words contain a derivational stem and others do not, words without a derivational stem would be beyond the scope of the theory for the purpose of stress assignment. In (1995), however, he admits that some generalizations about stress assignment need to make reference to the stem. More specifically he refers to words with a final syllable which contains VC. This context blocks antepenultimate stress in Spanish but this final rhyme must be the rhyme of the stem, not the word, as shown by the well-formed examples 'análisis' ('-is' is the inflectional suffix) and 'solicitábamos' (=we-solicited), where '-mos' is a plural verb inflection.

(52)

P-words (M-words +clitics) :

Pre**pa**re	(=prepare (imper.))
Pre**pá**reme	(=prepare me)
Pre**pá**remelo	(=prepare it for me)
Pre**pá**resemelo	(=let it be prepared for me)

M-words (Stem + suffixes):

Par+o	(=stop)
Par+**ad**+o	(=stopped)
Par+a+**dor**	(=stopping place)
Par+a+dor+**cit**+o	(=stopping place (diminutive))

2.3.1.2. The Window Condition

Word stress in Spanish always falls within a particular 'window' at the right edge of the word: it can only appear on one of the last three syllables. The unmarked or 'canonical' stress is penultimate stress. The marked version, triggered by both stems and certain affixes, is on the antepenult, and final stress in vowel-final words is restricted to two verbal paradigms (preterite and future) and mostly borrowed nouns. In table 3 I have exemplified this with different classes of words. Stressed syllables have been marked in bold and English glosses appear in brackets.

Table 3

	NOUN	ADJ.	ADV.	VERB
Penult stress: (canonical)	**me**sa (=table)	ba**ra**to (=cheap)	**le**jos (=far)	**can**ta (=s/he sings)
Antepenult stress: (marked)	**mé**dico (=doctor)	**cá**lido (=warm)	**rá**pido (=quickly)	lla**má**ramos (=we should call)
Final stress (vowel-final):	me**nú** (=menu)		a**llí** (=there)	can**tó** (=s/he sang)

This prosodic restriction may shrink by one window or two, however, depending on the segmental structure of the rhyme of the last two syllables. This creates the following configurations:

Two-syllable window: (examples taken from Harris 1995)

If the penultimate syllable is heavy, either GV, VC or VG, or if the final syllable is GV or VC, stress falls on the penult. Glosses of the examples in table 4 are given in brackets:

Table 4: Two-Syllable Window

PENULT GV	PENULT VG	PENULT VC	FINAL GV	FINAL VC (MARKED)	FINAL VC (MARKED)
No.rie.ga (=Noriega)	Ja.**mai**.ca, (=Jamaica)	a.**lar**.ma (=alarm)	ca.**ri**.cia (=caress)	ca.**ni**.bal (=cannibal)	**tú**.nel (=tunnel)

In the case of final VC syllables we may in fact get two different patterns: penult stress is the marked setting and final stress is the unmarked setting. Thus, we may get '**tú**nel' (=tunnel) as the marked setting and 'to**nel'** (=barrel) as the unmarked setting.

One-syllable window:

If the final rhyme is VG, stress must fall on the final syllable:

con.**voy** (=convoy)

As we saw earlier, a restricted number of verbal morphemes and some borrowed nouns may also restrict stress to the final syllable:

Table 5: One-Syllable Window And Marked Words:

Final VG	Morphologically marked words
con.**voy** (=convoy)	me.**nú**, can.**té** (=menu), (=I sang)

2.3.1.3. Quantity Sensitivity

The behaviour of the placement of stress under the conditions stated above would be good evidence to suggest that all glides and consonants contribute to syllabic weight. However, if they do, they behave in an unsystematic way. For instance, why should VG in the final rhyme trigger final stress but VC penult stress? Harris (1995) takes this as evidence to show that stress is assigned in Spanish in some classes of words in a 'quantity insensitive' (QI) mode –that is, with reference to syllables rather than syllabic weight. In particular, he says that verbs have a quantity insensitive application of stress and that all the other words have a quantity sensitive (QS) application[13].

2.3.1.4. Parameter settings for stress in Spanish

What follows is just a listing of the different parameters, stipulating in bold the settings for Spanish. An explanation will follow with exemplification taken from Harris. Examples for non-verbs are shown in table 7 and for verbs in table 8.

(53)

PROJECTION PARAMETER (PP):

a- Project a grid • for each **syllable head** in verbs

b- Project a grid • for each **nuclear X** elsewhere.

(54)

BOUNDARY PARAMETER (BP):

Project a left boundary **'('** for **σ[....X_NX...]** in non-verbs

These two parameters capture the difference between the quantity insensitive operation of stress in verbs and the quantity sensitive operation in other classes of words.

[13] The issue of quantity sensitivity is alsocontroversial in the literature on Spanish stress: Roca (1988) argued that stress in Spanish operates in a quantity insensitive fashion citing as examples accentuation patterns of certain (foreign) proper names. Harris (1992) argues against Roca and suggests an analysis where both verbs and other classes of words are derived through the operation of the same rules, one of which is quantity sensitivity.

(55)

EDGE MARKING PARAMETER (EMP):

Particular morphemes may trigger specific boundaries:

a)-Place a **Left** boundary '(' to the **Left** of the **Left**most • **(LLL)** for class $\mathcal{R}$ morphemes[14].

b)-Place a **Right** boundary ')' to the **Right** of the **Right**most • **(RRR)** for class $\mathcal{L}$ morphemes[15].

The general setting for words which are not morphologically specified is:

c)-Place a **Right** boundary ')' to the **Right** of the **Right**most • **(RRR)**.

In addition, we also have the following filter that blocks the operation of this parameter in final position:

FILTER:

*(• #

(56)

ITERATIVE CONSTITUENT CONSTRUCTION PARAMETER (ICCP):

Insert a boundary every two grid marks '•' starting from the **R** (Right to left iteration).

(57)

Delete unpaired boundaries '('.

This rule is the equivalent of the old conflation rule in Halle and Vergnaud (1987) and Halle, Harris and Vergnaud (1991).

(58)

HEAD PARAMETER (HP):

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14 $\mathcal{R}$ is mnemonic for 'rightward displacement' of accent. This is meant to account for vowel-final stressed verbs (in the preterite and future, as in 'canté' (=I sang), 'cantaré' (=I will sing) and for the same cases in nouns (i.e. **menú** (=menu)).

15 $\mathcal{L}$ is mnemonic for 'leftward displacement' of accent. Morphemes identified as class $\mathcal{L}$ are the imperfect '-ba' and subjunctive '-e' in some dialects in verbs. For QS words, the labelling of $\mathcal{L}$ is responsible for antepenultimate stress and the cases of penult stress when there is GV in the final rhyme (i.e. car**i**cia), final stress when it has VG in the final rhyme (i.e. conv**oy**), and final stress in final-consonant words (i.e. par**ed**).

Project the **leftmost** • of each foot on line n onto line n+1 (**L**).

Table 6: Application of parameters in Quantity Sensitive words (nouns, adverbs, adjectives)[16].

	Canonical	3-Syllable Window	Final VC marked	Final VC unmarked	Final GV	Penult GV	Penult VC/ VG	1-Syll. Window	V-final stress
	ven.ta.na (=window)	mé.di.co (=doctor)	tú.nel (=tunnel)	to.nél (=barrel)	Ca.rí.cia (=caress)	a.duá.na (=customs)	a.lár.ma (=alarm) Ja.mai.ca	con.vóy (=convoy)	me.nú (=menu)
53b	• • •	• • •	• • •	• • •	• • ••	• •• •	• • •	(• • • •	• •
54	(• • •	———	———	———	———	———	• (• •	• • • •	———
55a	———	———	———	———	———	———	———	———	• (•
55b	———	• •) •	• •) •	———	• • •) •	———	———	(• • •)•	———
55c	(• • •)	———	———	• • •)	———	• •• •)	• (• •)	———	• (•)
56	(• (• •)	(• •) •	(• •) •	• (• •)	• (• •) •	(• •(• •)	———	(•(• •) •	———
57	• (• •)	———	———	———	———	• • (• •)	———	•(• •) •	———
58	• (• •) •	(• •) • •	(• •) • •	• (• •) •	• (• •) • •	• • (• •) •	• (• •) •	•(• •) • •	• (•) •

'Ventana' represents the canonical word stress pattern with stress on the penult. Each nuclear X (vowel) gets a grid mark by (53b) and since it is a non-verb, we project a bracket to the left of the heavy syllable (54). For the edge marking parameter (55), we use the general setting of projecting a right bracket to the rightmost grid mark. Finally we apply the ICCP (56) to form a binary foot using right-to-left iteration, delete unpaired brackets (57) and create a head projecting the leftmost grid in the foot created.

'Médico' is the example for words that represent the three-syllable window. We do not project a left bracket by (54) since none of the syllables are heavy. Notice that these words are morphologically marked for leftward displacement of stress, so instead of (55c), we apply (55b). The ICCP (56) creates a foot and the head parameter (58) creates a left-headed foot and places the stress in the correct place.

An identical derivation is also found in cases of final VC syllables that place stress on the first syllable. The correct representation for 'túnel' is [tú.ne.l]$_{l}$V, where the 'l' in the last syllable is really an onset with an empty nucleus, not a coda. Recall that this is the marked setting. Note that in the case of 'tonél', the unmarked setting, the correct

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[16] Numbers refer to the parameters, filters or rules listed above.

representation also contains a final consonant which is the onset of an empty nucleus [to.**ne.l**]V. The difference between the two words is that in 'túnel' the word is morphologically specified for rightward displacement of stress and uses (55b) to create the right boundary while words like 'tonel' just follow the canonical stress assignment using (55c). The ICCP (56) finally constructs a foot with different consequences in both cases. The Head Parameter (58) then produces a left-headed foot.

When the word contains GV, as in 'aduana', or 'caricia', one grid mark is projected for each vocoid by the Projection Parameter (53b). Since 'caricia' is marked for left displacement ([ca.**ri**.ci]$_{\acute{}}$a) and 'aduana' is not, the right boundary applies according to (55b) in 'caricia' and according to (55c) in 'aduana'. The ICP creates binary feet, unpaired brackets are deleted by (57) and finally the left heads of feet are created.

The derivation of 'alarma' follows the canonical pattern. It is identical to the one in 'ventana' except for the fact that the right boundary is placed before the second grid mark in this case because the heavy syllable is now placed in this position. This is also the derivation we find in cases of a penult VG, as in 'Jamaica'. The post-nuclear glide is in the coda and therefore it does not project a grid mark and follows the same steps as 'alarma'.

Finally, we need to account for the behaviour of final VG syllables. Harris argues that these words are also marked for left displacement and that the final G is part of a complex empty nucleus. The representation of convoy is therefore [con.vó.y]$_{\acute{}}$V. The left stress displacement marking forces the projection of a right boundary by (55b) and then the ICCP (56), deletion of unpaired brackets (57) and the Head Parameter (58) yields the correct stress pattern.

The case of 'menú' is one of rightward displacement of stress. This forces the setting of a left boundary before the final nucleus by (55a) and the application of ICCP and head projection will do the rest.

A chart exemplifying how these parameters apply in the case of placement of stress in verbs is shown below. The only difference with respect to the previous examples is that here we have a quantity insensitive (QI) application of stress, so grid marks are projected according to (53a) for syllables and not for syllabic nuclei. This is particularly noticeable in the second example. Given that my study does not examine the application of stress in verbs, I have not added any explanations to the examples.

Table 7: Derivations that illustrate the parameters above in verbs[17]:

Rule/parameter	a.pláu.de	lím.pia	a.plau.dí.mos	so.li.ci.tá.ba.mos	co.mí.	co.mí.mos
53a	• • •	• •	• • • •	••• •• •	• •	• • •
55a	______	______	• • (• •	______	•(•	• (• •
55b	______	______	______	••• ••) •	______	______
55c	• • •)	• •)	• • (• •)	••• ••)•)	• (•)	• (• •)
56	• (• •)	(• •)	(• • (• •)	•(•• (••) •)	______	______
57	______	______	• • (• •)	••• (••) •	______	______
58	• (• •) •	(• •) •	• • (• •) •	••• (••) • •	• (•) •	• (• •) •

2.3.2. English stress

Having reviewed the stress system of Spanish, we now turn to the system in the native language of the L2 learners. English stress has been the subject of great controversy in the generative phonology literature. After the failure to account for stress in a linear mode with a binary feature in SPE, Metrical Theory was seen as the solution to account for the problems faced and different analyses were proposed (Hayes 1985, Halle and Vergnaud 1987). Some differences in the analyses proposed have to do with the particular version of Metrical Theory adopted (bracketed grids or trees -see discussion in section 2.3) but leaving aside these issues, the generalisations on English stress can be summarised as follows.

2.3.2.1. Quantity Sensitivity

English is a quantity-sensitive language, which means that heavy syllables attract stress. This can be illustrated with the SPE examples 'Canada ' and 'agenda': in '**Ca**nada', stress falls on the antepenult because there is no branching rhyme in any of the syllables; in 'a**gen**da', stress is attracted to the heavy syllable. However, quantity sensitivity is not the only aspect that needs to be considered in stress assignment.

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[17] Recall that certain verbal morphemes might trigger right or leftward displacement of stress. The glosses and morphological information (where appropriate) for the words used are as follows:
aplaude (=he claps), limpia (=he cleans), aplaudimos [a.plau.d][í]$_{V}$.[mos] (=we clapped), solicitábamos [so.li.ci.t][á.ba]$_{V}$.[mos] (=we solicited-imperfect), comí [co.m][í]$_{V}$ (=I ate) and 'comimos'[co.m][í][mos]$_{V}$ (=we ate)

2.3.2.2. Extrametricality

After examination of the most common stress patterns in English, Hayes (1981) and Halle and Vergnaud (1987) concluded that stress tended to fall on different syllable positions depending on the category of word. Whereas nouns tend to attract stress to the penult (if heavy) or to the antepenult (if the penult is light), unsuffixed adjectives and verbs normally display final stress. This is exemplified below in table 8:

Table 8: English stress

NOUNS		VERBS	ADJECTIVES
Penult light	Penult heavy		
camera	a**gen**da	dis**play**	ab**surd**
cinema	di**plo**ma	di**gest**	di**vine**
discipline	po**ta**to	Ins**pire**	se**cure**

The way we can account for this distribution is by making use of the concept of extrametricality; in the case of nouns and in words that contain certain suffixes (for instance, -al: 'personal', 'anecdotal') there is a final extrametrical syllable that is not 'seen' by stress rules, and in the case of unsuffixed adjectives and verbs, there is a final extrametrical segment.

This explains the different stress patterns found in oppositions like '**so**lid vs. Ab**surd**'; and 'de**ter**mine vs. A**chieve**'. In the former, the final consonant is extrametrical and therefore does not count for weight. We are left with a light syllable which does not attract stress. In 'absurd' and 'achieve', even though the final consonant is extrametrical too, the final syllable continues to be heavy as it contains a long vowel, and therefore attracts stress. This different stress pattern is connected to syllable weight and extrametricality: if the final syllable is superheavy[18], stress is attracted to it and we get final stress; otherwise, we get penultimate stress.

[18] A syllable is defined as superheavy if it contains more than two segments in the coda

2.3.2.3. Stress Assignment Rules

Given these facts, Halle and Vergnaud (1987) suggest the following rules and order of application for English:

(59)

Extrametricality.

• → . / ______] line 0 in nouns and certain suffixes, provided • dominates a rime with a short vowel (non-branching nucleus)

(60)

Accent Rule:

Assign a line 1 asterisk to a syllable with a branching rhyme with the proviso that the word-final consonant is not counted in the determination of rime branchingness in the case of the final syllable of underived verbs and adjectives.

(61)

Main stress rule: Binary Constituent Construction.

Line 0 parameter settings are [+HT, +BND, left, right to left]

Construct constituent boundaries on line 0

Locate the heads of line 0 constituents on line 1.

The application of this rule is non-cyclic.

This rule creates constituents on line 0. These constituents are left head terminal [+HT], bound [+BND] or binary, and the directionality of foot construction is right to left (after extrametricality). These left heads are then represented on line 1.

(62)

Unbounded Constituent Construction on line 1 and Stress Conflation:

Line 1 parameter settings are [+HT, -BND, right]

Construct constituent boundaries on line 1

Locate the heads of the line 1 constituents on line 2.

Conflate lines 1 and 2.

These rules create line 1 constituents which are unbounded (i.e. non-binary) which have right heads situated on line 2. The effect of conflation is to collapse lines so that any stress-bearing units that have no head on an upper line are deleted and only one level of stress (main stress) remains.

(63)

Rhythm rule:

In a constituent C composed of a single word, retract the right boundary of C to a position immediately before the head of C, provided that the head of C is located on the last syllable of C and that it is preceded by a stressed syllable.

This rule is the one responsible for stress shift in well known examples such as 'thírteèn bóoks' or in simple words that are lexically marked for the application of this rule (i.e. noun-verb pairs like súspèct vs. sùspéct).

Although these rules generate a fair amount of well-formed stress patterns in English, they are by no means the only ones. In addition to the above, Halle and Vergnaud (1987) suggest rules of stress enhancement, y-syllabification, shortening over a stress well, stress deletion and reduction. There is also a lengthy discussion about suffixes that trigger stress and another important section on stress in phrases, compounds and word-sequence phonology. Since this study does not involve compound or word-sequence phonology and no word with suffixes that will trigger stress was included in the data collection, there is no need to go further into a description of these other areas.

The application of the main rules and parameters is exemplified below in (64):

(64)

Line 2	• . .	. • .	. •	• .	. . . . • .
Line 1	(• . .)	(. • .)	(. •)	(• .)	(• . • . • .)
Line 0	(• •) .	• (•) .	• (•)	(• •)	(• •)(• •)(•) .
	Canada	agenda	robust	solid	onomatopeia

All stress-bearing units get a grid mark on line 0 except the last syllable of the nouns by application of the extrametricality rule. From the accent rule, the heavy syllables in ‘agenda’ and ‘robust’ get a projection on line 1. Note that in ‘solid’, even though there is a heavy syllable, no grid mark is projected, because the last consonant in adjectives does not count. It does count in the word ‘robust’ because the other coda consonant still renders this syllable heavy. The application of the main stress rule creates bounded feet on line 0, with an application of the parameters right to left. The left heads are projected to line 1 creating unbounded feet. Finally, the head of line 1, the rightmost grid mark, is projected on line 2 and this creates the main stress.

2.3.2.4. Parameter settings for stress in English

For ease of comparability with the Spanish description, I will now ‘translate’ the rules of Halle and Vergnaud (1987) into the conventions used in Idsardi (1992) and used in the description of Spanish stress found in section 2.3.14. As well as providing an account using the same algorithm, it has the advantage of describing facts in terms of parametric variation and of reducing the operation of language-specific rules.

(65)

PROJECTION PARAMETER

Project • for each syllable head

(66)

BOUNDARY PARAMETER

Project a (for σ [....X_NX .....]

(67)

EDGE MARKING PARAMETER

Particular morphemes may trigger the following boundaries:

a) Place a **left** boundary ‘(‘ to the left of the Leftmost • (LLL) for class $\mathcal{R}$ morphemes.

b) Place a **Right** boundary ‘)‘ to the **Right** of the **Right**most • (**RRR**) for class $\mathcal{L}$ morphemes.

This edge marking parameter will operate in the same cases as extrametricality. In nouns, therefore, the final syllable will fall outside the right boundary. In adjectives and verbs, the only way to ensure that the last consonant is extrametrical is to postulate that adjectives and verbs also have an extrametrical syllable with an empty nucleus and the onset would be the final consonant. The underlying representation of 'robust'and 'solid' would be [ro.bus.t]ℒV and [so.li.d]ℒV. The same would happen with verbs: 'achieve' would be [a.chie.v]ℒV.

c) Place a **Right** boundary ')' to the **Right** of the **Right**most • (**RRR**). This is the general rule for words not morphologically specified.

(68)

ITERATIVE CONSTITUENT STRUCTURE PARAMETER

Insert a boundary every two •s starting from the Right (Right to left iteration)

(69)

HEAD PARAMETER

Project the leftmost • of each foot on line n onto line n+1 (L)

The operation of these parameters is seen below in table 9 with the same examples that we used under the Halle and Vergnaud formalism. We have also added some verbs, which follow the same pattern as the adjectives of the same type.

Table 9: Examples of derivations of verbs, adjectives and nouns following Idsardi's parameters.

	Noun Antepenult stress	Noun Penult stress	Noun Penult stress (longer word)	Adj. Final stress	Adj. Penult stress	Verb. Final stress	Verb Penult stress
	Canada	agenda	onomatopeia	robust [ro.bus.t]ℒV	solid [so.li.d]ℒV	achieve [a.chie.v]ℒV	determine [de.ter.mi.n]ℒV
65	•• •	•••	••••••	• • •	• • •	• • •	• • • •
66	•• •	•(••	••••(••	• (• •	• • •	• (• •	• (• • •
67a	———	———	———	———	———	———	———
67b	••) •	•(•)•	••••(•)•	• (•) •	• •) •	• (•) •	• (• •) •
67c	———	———	———	———	———	———	———
68	(••) •	•(•)•	(••(••(•)•	• (•) •	(• •) •	• (•) •	• (• •) •
69	(••) • •	•(•)• •	(••(••(•)• •	• (•) • •	(• •) • •	• (•) • •	• (• •) • •

2.3.3. Summary of Spanish and English stress parameter settings. Implications for L2 acquisition.

Looking at the above accounts, we can note that English and Spanish have certain similarities with regard to stress assignment parameter settings: both languages create bounded feet with left heads (ICCP and HP). Assuming positive transfer, English learners of Spanish would not have to reset any parameters for the correct production of stress.

Where the two languages differ radically is in their treatment of what is a stress-bearing unit and extrametricality. Both languages are QS but Spanish is QI for verbs and QS for all other words. English is QS for ALL classes of words. In Spanish, therefore, the projection parameter has a dual setting (the stress bearing unit can be either the syllable or any nuclear X) while in English it can only be one (the syllable head). The boundary parameter only applies in Spanish to non-verbs, and in English to all categories of words. English learners of Spanish will have to realise this difference. Two predictions could be made about the way they can go about changing their settings:

i) To transfer the English settings for the projection boundary parameters for all classes of words.

This is the prediction that the Contrastive Analysis would make. It is empirically testable whether learners can eventually manage to reset the parameter to the QI value in the case of verbs, and achieve a dual setting, or whether they will overgeneralise the parameter settings in nouns to apply to all classes of words, never resetting it to the unmarked value. Stress assignment in verbs will not be dealt with in this thesis, but this can be explored further in future research.

ii) To revert to the unmarked value in UG until they start getting positive evidence to the contrary.

I assume the unmarked or default value is QI for all words because unmarked settings in a given language have those that can only be reset in the light of positive evidence. For resetting QI to QS we have the cues of weight, and this setting can be changed once learners have encountered enough data in the language that make them re-evaluate their hypothesis and change its value. These cues could be found in all classes of words, across the board, or restricted to a particular group of words (nouns, adverbs and adjectives, as in Spanish).

If we assume that the unmarked setting is QS, however, in order to reset it to QI the cues learners would need to find in the language would not be based on the existence of a cue but rather on the **absence** of one. These cues, based on noticing an absence rather than a presence, are not so robust as those that make use of positive evidence.

If learners revert to a QI application of stress, this would be evident in the data we have collected and could be proof that it is possible to revert to a more unmarked setting than the one found in L1.

The second difference between the two languages lies in extrametricality. The operation of the edge marking parameter has the same effect as the extrametricality rules proposed in Harris (1992) for Spanish and Halle and Vergnaud (1987) for English. The choice of what constitutes an extrametrical unit is language specific and different in both languages. These extrametrical elements are therefore lexically marked and so the correct acquisition of extrametricality depends on the correct marking of certain morphemes in the lexicon. Since this is not dependent on a parameter setting, it makes it very difficult to predict what the learner will do. Assuming transfer, all we can predict is that in initial stages they will have a marking of extrametricality as in English (final syllable for nouns, adjectives and verbs, with the assumption that there is a syllable with an empty vowel in the case of verbs and adjectives). This may be subject to modifications and developmental sequences later on as learners realise what morphemes in Spanish will trigger the application of the right settings for the Edge Marking Parameter (EMP).

The wrong application of extrametricality and QS in Spanish, can, therefore, not only place the accent in an impossible configuration within the three or two-syllable window, but also place it outside this syllable window (say, on the fourth syllable, as in the English '**ínterestìng**ly'). It will be cases like this that we will examine empirically.

In this section, I have provided a general description of Spanish and English main stress rules and I have identified the areas of divergence in the two languages, namely the behaviour with respect to extrametricality and QS. In order to identify the elements that can affect QS, a correct parsing of syllable structure is of paramount importance, especially in relation to the representation of the glides, since it will affect the representation of weight of the word. In addition, the application of the of Edge Marking Parameter settings, which are lexically marked, will be of great importance.

A summary of the parameter settings in both languages appears in table 10.

Table 10: Stress parameter settings

Lang.	Projection	Boundary	Edge marking	Iccp	Delete	Head
Spanish	• syllable heads in verbs • nuclear X's elsewhere	(for σ [...X_NX...]	a-LLL for R morph b-RRR for L morph. c-RRR	R to L	unpaired	L
English	• syllable heads	(for σ [...X_NX...]	a-LLL for R morph b-RRR for L morph. c-RRR	R to L	unpaired	L

Having examined the differences between the syllable structure and stress systems of Spanish and English and considered the implications that these will have in the case of English learners of L2 Spanish, we now turn to describe the methodology used in this study. This will be done in the following chapter.

Chapter 3: Methodology

In chapter 2 we outlined the difficulties that English learners of L2 Spanish will face in trying to produce Spanish syllable structure and stress. In this chapter, I will discuss issues related to research methodology. In section 3.1. we discuss subject selection and and in section 3.2. we deal with data collection design.

3.1. Subject selection

The domain of the study determines the type of data needed, and this, in turn, affects the research design. A study of linguistic development could involve collection of cross-sectional or longitudinal data. Collection of longitudinal data is possible when subjects who fulfill the requirements needed to control certain variables are available to the researcher. One of these variables[1] was no knowledge of other languages. In British academic institutions, multilingual exposure is the norm rather than the exception, and even more so in the case of Spanish, as it is practically impossible to find learners who are 'real' second language learners. Most British students start learning a language, typically French, and after one or two years of study they take up Spanish or German. Even in those rare cases in which learners start learning Spanish, it is very common for them to start learning a third language soon.

Another factor for consideration was the time constraint: if a developmental study is to be comprehensive, a considerable amount of time is needed to collect data that covers from early to advanced stages of acquisition. Although the definition of 'advanced' is open to different interpretations, and even more if we try to define it in terms of the learner's phonological acquisition, we could say that a span of five or six years might be the minimum we should be considering in an instructed situation. Given all these

[1] A full explanation and discussion of all these variables will be offered in section 3.1.2 below.

limitations, cross-sectional data was chosen as a feasible alternative to conduct this research and was the methodology adopted.

For part of the data collection, the study included a test group, who will be the subject of the IL investigation, and a control group of native speakers of Spanish who has been used to test the reliability of one of the tests.

3.1.1. The non-native group

The non-native group was made up of 49 students of Spanish from the University of Wisconsin-Madison (USA). The data from these learners were collected in March 1996 at this University. Students taking language courses during the second semester in the Spanish department in Madison were given a questionnaire in class which they were asked to fill in. A copy has been included in appendix A. This questionnaire aimed at obtaining information about their native language and foreign language experience and to determine their availability to participate in the study. About 400 questionnaires were distributed to students at different levels and only those who complied with the requirements of the variables being controlled for and claimed to be available to take the tests were contacted for the recordings. These variables were :

1- **Native language**: **English.** The great majority of subjects spoke mid-western varieties of American English.

2- **Initial exposure: post-puberty.** At the time of testing, the youngest learner was 17 and the oldest 35. The median age was 20 and the mean 20.6.

3- **No knowledge of other second languages.** No learner who reported knowledge of other languages was included in the present study. This was based on the assumption that familiarisation with other foreign languages could interfere with the results. Young-Scholten (1997) reports final word stress in the speech of English learners of Polish who had been studying French for three years and this is precisely the type of effect we wanted to avoid.

Given that the purpose of this study is to find out whether there are developmental sequences in the IL phonology of learners, the length of exposure to Spanish varied a great deal, ranging from 2 months to 11 years.

It is important to note that although the questionnaire included questions on the language courses they were taking at university and a self-report of their level of Spanish, the factor taken into consideration for classification into the different groups was solely their length of exposure to Spanish. Since learners of Spanish at Madison were given placement tests on arrival at the University if they reported some knowledge of the language and were placed at the right level accordingly, one could argue that they could have been divided into groups according to the language course they were attending. However, since the focus of this study was on phonology and the placement test they were given was written, it was felt that neither the self-report nor the placement would be good predictors of their phonological level. In the absence of any other independent measure to place learners in different groups that would reflect their phonological development, it was felt that length of exposure to the language (be it in formal or naturalistic settings) was the only indicator that could be used to place them in homogeneous groups. As phonetic or phonological training was only reported by a few students in their native language, it can be assumed that the only way the phonology of most of the test subjects could evolve would be as the result of greater exposure to the spoken language, and so factors like phonetic or phonological instruction were not considered.

It has to be noted that in placing learners into these groups another consideration was whether they had spent time abroad and whether they had had exposure to native input, both inside and outside classes. With the exception of the advanced group, nobody reported extended periods abroad in a Spanish-speaking country. Most of them reported no periods abroad, and those who did, tended to report short stays ranging from a couple of days to a week on holiday once or twice. The advanced group did contain five learners who reported a year or longer period in a Spanish-speaking country. This was therefore taken into consideration and so although two subjects in this group had only had 3.2 and 5 years exposure to Spanish -a length that would have supported inclusion in the intermediate, not the advanced group- these learners had spent a year and a year and a half respectively in a Spanish speaking-country. Therefore it was felt that their inclusion in the advanced group was justified by the fact that the amount of exposure to the FL during this time would have been a lot greater than the corresponding amount of instruction in the United States.

Other factors similar to the ones just mentioned, such as exposure to native input outside class, or native teachers were also considered in an attempt to have as homogenous groups as possible. However, no significant exposure to Spanish outside class in informal settings (friends, TV, radio..) was reported and the majority of the teachers they had had was also non-native. The longer their length of exposure or study of the language, however, the higher the possibility was that they had had native teachers.

After all these considerations, learners were thus placed in the following groups:

Group 1 (Begl): 13 absolute beginners. The range of exposure was between 2 months and 9 months of Spanish. All these learners had started learning the language at University and were enrolled in the first or second semester of Spanish. Their average age was 20.3 and the medium 21. This group will be referred to as Beg1.

Group 2 (Beg2): 13 advanced beginners. The range of exposure was between 2 years 2 months and 3 years 2 months. Their mean age was 19.3 and the medium 19. All these learners were either in the first or second semester of Spanish at university but had all started learning the language in high school. This group will be referred to as Beg2.

Group 3 (Int): 12 intermediate students. The range of exposure was between 4 years and 4 years 6 months of Spanish. Their mean age was 18.4 and the medium 18. These learners were in third year classes at university and had all started learning the language in high school. This group will be referred to as Int.

Group 4 (Adv): 11 advanced students. The range was between 3 years and 11 years 6 months of Spanish. The mean was 7 years 2 months and the medium 7. Their mean age was 19.2 and their medium 20. These learners were in third or fourth year advanced language courses at university and the ones with the lowest length of exposure in formal settings had also spend a year or more in a Spanish-speaking country (see above). This group will be referred to as Adv.

3.1.2. The control group

In addition to the four non-native groups, we also had a control group of native speakers, which will be referred to as **group 5** or **NS.** This group was also given a very brief questionnaire prior to the administration of one of the tests (a copy of which has been included in appendix B) in order to find out some background information regarding their knowledge of other languages. All these students were secondary school Spanish students from Sama, Asturias, Northwestern Spain, and their data were collected in June 1997. Their average age was 17.6 and the median was 17.5 Given that everybody in Spain is required to learn at least one foreign language in their teens, it was impossible to find native speakers of Spanish of a similar age to the non-native group and who knew no foreign languages. However, all the ones included in this study had studied English for an average of 7.8 years at school and 7 had also studied French for 3 years, although one of them was bilingual in French and Spanish (her father was French).

3.2. Data collection design

Once the decision to use cross-sectional data was made, the next step was to decide how to collect the data. Learners were asked to perform three different tasks: an acceptability judgement test, a reconstruction task and a reading task. Each of these will now be described in detail.

3.2.1. The Acceptability Judgement test

This test aimed at tapping the competence of non-native speakers. One could argue that their competence could be inferred from looking at their production data, especially since we are examining phonological development and it is almost impossible to use avoidance as a strategy to get round aspects of the language that have not been acquired. However, there is a specific case where this competence could not be inferred just by looking at their production data, and this is the case of syllable structure.

In the sections on syllable structure in Chapter 2 we discussed how English generally contains a more complex syllable structure than Spanish. In some cases, this is the result of a different parameter setting (the Extrasyllabicity Parameter that creates sCCV onsets); others it is the result of a different underlying representation (VCC codas are the result of the specification that the two positions in the coda can only be occupied by [+cons] segments while in Spanish, glides can also occupy this position). We also saw that the correct representation of the on-glide in the nucleus instead of in the onset is necessary in Spanish if the stress system is to be learnt correctly. Spanish is a quantity sensitive system and therefore the on-glide contributes to weight. A correct representation of syllable structure must therefore be arrived at before stress is handled correctly.

If we only look at the production data of English learners of Spanish to determine what their IL grammar looks like, we are immediately faced with problems. Since more complex structures, such as sCCV, are never present in Spanish, we have no way of figuring out whether the parameter settings that generate them are still available in their IL grammar but are never used or whether the learner starts building the L2 grammar without transfer from the L1 settings. More importantly for our purposes, the English learner of Spanish will have to change the underlying representation of the on-glide in order to learn the stress system of Spanish correctly. In a word such as 'cien' ['θjen] (=hundred), the English learner could well be parsing that word with the glide in the onset and produce it correctly, since this combination of fricative and glide does not violate the MSD and the maximum number of rhyme elements would be 2, consistent with both English and Spanish maximal rhyme structure. One of the crucial ways in which we could figure out whether the learner has acquired a correct representation of the glide is with hypothetical words such as 'pweimbo': if the on-glide is analysed in the onset, and the learner accepts this word as a possible word then it would mean that the rhyme contains 3 moras ('-eim'), something which is possible in English but not Spanish.

Looking at production data of real Spanish words would not give us the information we are after, and so it was thought the only way we could get round these problems was by using an acceptability judgement test of nonsense words. The use of nonsense words was preferred over the use of real words because it was only with impossible word structures that we could test what the competence of the learner was in cases such as the ones described above. Furthermore, in the case of possible structures, correct responses in a test with real words could be due to familiarisation and memorisation of individual items rather than the result of a true internalised rule/parameter/constraint. By using nonsense words we could therefore make sure that correct answers were not the result of a learnt pattern or lexicalization. This type of nonsense-word methodology has been used before by other researchers in phonology (Pater 1992, Nouveau 1994) and also in morphology (Berko 1958) in different formats.

In total, there were 145 tokens representing well-formed and ill-formed syllable structure and stress patterns. There were five words in each of the 14 syllable structure and 15 stress categories[2]. Words were created by the researcher, randomised and recorded twice, preceded by a number and followed by a silence during which they were asked to rate the words according to a 1 to 5 scale, where 1 meant 'certainly possible' and 5 'certainly impossible'. Subjects were considered to be semi-blind to the purpose of the study. They were told that the test would try to establish whether they could identify what could constitute a possible Spanish word but were not told exactly what the researcher was after (i.e. stress assignment and syllable structure). They were also given a couple of examples to judge prior to the administration of the test, to train them in the use of the marking scale they were about to use. Each learner was given a marking sheet (Appendix C) where they had to write a score for each of the words they heard. Words were presented to them aurally in a language lab to ensure optimal sound quality. Non-natives took the test in March 1997 and the control group in June 1997. The whole test lasted around 25 minutes. A list of all the words used is given in appendix D.

[2] Words were carefully designed so that they did not include endings that might attract stress (e.g. no word ended in '-ción' as this suffix attracts final stress.)

These words were a subset of a larger group of data of 226 words which were pilot tested in June 1996. In the pilot test words were presented in alphabetical order in oral or written format, and the learners were asked to give a rating for the acceptability of these words using the same 1 to 5 scale. The whole test took 1 hour and was administered in a language lab at the University of Durham (UK) to 29 students of Spanish who had a knowledge of at least one more language (typically French). Most learners also knew a fourth language (German or Italian). It was also administered to a group of 6 native speakers of Spanish in Sama, Asturias, Spain and two native speakers from Madrid. Some students found it difficult to give judgements to nonsense words and so tended to ask things like 'How can I tell whether it is correct or not when it is a made up word?'. They were asked in this case to consider things like 'If I saw/heard this word in a passage/conversation, would I think this could be a new word in Spanish that I simply have never come across or would I think it sounds 'foreign'?' 'Could this be a possible new name for a new product they are trying to release? If so, would this choice be pronounceable for a native speaker?'.

Several methodological flaws prevented the use of all the words in the pilot test. The excessive amount of testing time put a heavy strain on the learners and so it was felt that the overall number of words had to be reduced. Four categories of words (two in syllable structure and two in stress) were omitted from the design and two (in stress) were doubled. Results were nevertheless computed and those to which the control group gave the best scores were kept for the final test. For the categories that had not been piloted, a new list of words was created.

3.2.1.1.Tabulation of the data

Each word created for this test was given a unique ID number which coincided with the randomised order in which it was presented to the learner and was then put into a database. The database also contained the following information fields:

1- TYPE: This referred to whether the word was being investigated for stress (coded ST) or syllable structure (coded SY) patterns.

2- TARGET: Codes were used here to refer to the specific syllable structure or stress pattern examined. I will list the categories considered, but a full explanation of the details in each category will be provided in section 5.1. when we deal with the results. For syllable structure the categories examined were:

1M: This coded words which contained a single mora.
2M: Monosyllabic bimoraic words
CCCV: Triconsonantal onsets where the first C was not [s].
sCCV: Triconsonantal onsets where the first consonant was [s].
CCV: Biconsonantal onsets
GV(C): Rhymes with GV or GVC structures
GVGC: GV nuclei followed by GC codas
VCC: syllables with codas which contained two consonants.
VCCC: Syllables with codas which contained three consonants in the coda which were not possible in English nor in Spanish.
VCCCo: The last C in the coda is [+ coronal]
VCs: Bimoraic codas where the last consonant is an [s].
VGs: Bimoraic codas with Gs structures
VGC: Bimoraic codas with GC structures and where the C is not a [s].

For stress assignement rules, the categories examined were the following:

One-syllable window:

FINAL GV syllable: Stress was placed on the final syllable.

Two-syllable window:

FINAL VC syllable. Stress was placed beyond the two-syllable window condition
FINAL VC-m syllable. Marked stress pattern. Stress on penult.
FINAL VC-u syllable. Unmarked stress pattern. Stress on final.
FINAL VG. Five words were acceptable (stress was on penult) and five unacceptable (stress beyond penult).
PENULT VG syllables. Five words were acceptable (stress was on penult) and five unacceptable (stress beyond penult).
PENULT VC syllables. Five words were acceptable (stress was on penult) and five unacceptable (stress beyond penult).
PENULT GV syllables. Five words were acceptable (stress was on penult) and five unacceptable (stress beyond penult).

Three-syllable window.

WIN: Five words were acceptable (stress was on antepenult) and five unacceptable (stress beyond antepenult).

3- GRAMMATICALITY: This field specified whether the word was grammatical or ungrammatical according to stress or syllable structure rules.

The database created also contained information on the learners. Each learner was given an ID code and assigned to a group based on the criteria specified in section 3.1.1. The database contained the information about age, years of exposure, and knowledge of other languages that was collected with the questionnaires. Finally, the scores given by the learners and native speakers were put into the database.

3.2.2. The reconstruction and reading tasks

Production data in L2 phonological research has traditionally been collected by means of reading of lists of words or sentences (Archibald 1994, among others). There is some evidence, however, that points to the fact that production in a second language will differ depending on whether the word has been presented orally or written to the learner (Young-Scholten 1997). Evidence that reading ability might influence the pronunciation of an otherwise acquired word also comes from research on L1 reading ability by Lee (1987). He found that reading ability of 6, 7 and 8-year old Mexican children deteriorated the longer the word was and that certain syllable structures (interestingly the ones with on-glides) were much harder for these learners than other simpler syllable structures. Given this evidence, it was decided that the use of reading should be avoided or at least complemented by other data collection methods which might better reflect the performance of the non-native speaker. The way in which spontaneous production could occur while at the same time maintaining some control over what was being said, was by setting a reconstruction test (Larsen-Freeman and Long 1992). This technique has also been called 'story retelling' and 'paraphrase recall'.

In this version of the technique, each learner[3] met the researcher in a room individually and was played a story on tape. The story contained certain key words that represented specific syllable or stress patterns that were the target of the test and would be the ones used to analyse their production. The story was played on tape and the researcher also had a series of pictures that illustrated the events of the story. These pictures were used as illustrations of the narration and the researcher pointed at the relevant one when details contained in the story were mentioned. This also facilitated comprehension of the story for the beginners groups. The story was played a second time and the same procedure was repeated. Subjects were then asked to retell the story again in their own words. At this stage, learners used the pictures to help them recall events. If they forgot some detail of the story where key words would be missing the researcher asked questions

[3] This test was not taken by the control group.

to prompt them to use the words they were avoiding or could not remember. In cases where the learners knew very little Spanish, the whole story had to be told by means of questions and answers as the learners had very few linguistic resources to allow them to tell the story all by themselves. In very few extreme cases, they could produce so little that they were simply asked to describe what they saw in the pictures.

After this recording, subjects were then given the text that has been used to make the recording and were asked to read it aloud. A copy of this text has been included in appendix E. This last recording was done in order to ensure that everybody, be it beginner or advanced, would provide at least some evidence of production data. The production sessions were recorded in a quiet room with cassette audio tapes using a Sony cassette tape deck Model CFS-1030 and lasted about 35 minutes.

3.2.3. Transcriptions

After the recordings of the production data (both the spontaneous and the reading tasks), only the words that reflected the syllable structure or stress patterns we were interested in were transcribed. These categories represented those areas where Spanish and English differed most: namely, the syllabification of on-glides after consonants and the production of nomomoraic and monosyllabic words. For syllable structure, the following categories of words were transcribed

1- CGV words: 'In**vier**no' (=winter), '**Suer**te' (=luck)
2- LGV words: 'Ca**lien**te' (=hot), '**Rue**da' (=wheel)
3- CCGV words: '**Grie**go' (=Greek), '**True**nos' (=thunder)
4- 1 Mora: **'Té'** (=tea), **'va'** (=(s)he-goes)

For stress assignment, the categories analysed reflected the position of stress, as exemplified below.

1-ANTEPENULT: 'rápido' (=quickly) 'médicos' (=doctors)
2- PENULT:
  2.1.- VC final: '**Hués**ped' (=guest), '**ár**bol' (=tree)
  2.2.- GV penult: 'Fami**lia**res' (=relatives), 'cu**bier**to' (=overcast)

2.3.- VG penult: '**Vein**te' (=twenty), '**Lui**sa' (=name)

2.4.- VC penult.: 'Bu**fan**da' (=scarf)', 'de**lan**te' (=in front)

2.5.- GV final: 'V**arias**' (=various), 'despa**cio**' (=slow)

3- FINAL:

3.1.-VC final: '**terror**' (=terror), 'ciu**dad**' (=city)

3.2.- V final: 'cana**pé**' (=sandwich), 'ca**fé**' (=coffee), Para**guay**

The transcriptions were broad transcriptions where the main focus was on syllable divisions and stress placement.

The inclusion of both acceptability judgements and production data allowed us to get as complete a picture as possible with respect to syllable structure and stress patterns. Where production data could not give us enough insight into the competence and the underlying mechanisms involved, a new technique for data collection was devised. In addition, great care was put in selecting as many subjects as possible and also in the criteria chosen to classify them into the different groups. This ensured that other variables did not affect the results and aimed at achieving reliability.

In this Chapter we have described the research design and data collection in detail. Before we proceed to discuss our data, we will provide an introduction to the research carried out in the field of first and second language acquisition of rhythmic structure. This will be done in Chapter 4. In Chapter 5 we will discuss our results.

Chapter 4: The acquisition of syllable structure and stress

In chapter 3, we described the methodology followed to collect the data. In this chapter, and before we discuss the data from the cross-sectional study, we will present an overview of previous studies on the acquisition of syllable structure and stress both as a first (L1) and as a second (L2) language. The chapter will be organised as follows: section 4.1 will present the literature on L1 acquisition. Section 4.1.1. will deal with rhythmic perception by infants and section 4.1.2. will deal with rhythmic production by infants. Section 4.2 will present findings on the L2 acquisition of rhythm. Section 4.2.1. will examine adult perceptual abilites, section 4.2.2. will examine studies on the L2 acquisition of syllable structure. Finally section 4.2.3. will look at previous studies on the L2 acquisition of stress.

4.1. The L1 acquisition of rhythmic structure

Previous studies on early L1 phonological development have largely concentrated on the examination of phonological processes and strategies that children use to reproduce adult target structures, the shape of early words and the development of segmental inventories. Ingram (1976) has studied in detail the phonological processes that children use to reduce the complexity of adult targets and he has identified syllable structure processes (final consonant deletion, unstressed syllable deletion, cluster reduction), reduplication (either of syllable or of segmental material) and substitution processes (stopping, fronting, devoicing).

With respect to syllable structure, it is well documented in the literature that the first syllable type that children produce responds to a CV structure (Jacobson 1968), then children usually move on to produce reduplicated babbling of the type CVCV or develop more complex syllable structures, such as CVC.

Although research in these areas continues to flourish, it has only been relatively recently that work on prosody has been extensively produced. This can be explained as a result of the development of phonological theory into non-linear models which paid more attention to underlying representations and levels of structure (Clements and Keyser 1983, Nespor and Vogel 1986, Halle and Vergnaud 1987). Once hierarchical representations of structure above and below the syllable and the melodic level were identified, prosodic research that focused on how children acquire these structures started to be produced. The aim of this section is to investigate the findings in this area. But before we start with the analysis of production, we will present the findings from the literature on speech perception.

4.1.1. Rhythmic perception by infants

Speech recognition in L1 acquisition has been an area that has merited a fair amount of attention in the last decade, and quite understandably so. This interest has been shown not only by phonologists, but also by syntacticians, as the latter have had to solve the problem of how it is that infants are able to identify words or syntactic structures from what must sound like continuous and unintelligible speech. Identification of lexical and syntactic categories must be the first step children have to perform before they start looking for syntactic patterns. Linguists have hypothesised therefore that children must make use of some aspect of phonology, since the acoustic signal is all the child has access to, to identify these categories. According to this view, it is prosodic phonology that helps the child identify the linguistically relevant units that will be used to create syntactic structures. This has become known as 'Prosodic bootstrapping' (Gleitman and Wanner 1982). What is important for our purposes is to find out infants' perceptual abilities with regard to prosodic constituents, the evolution of these abilities and how the strategies they use might or might not differ from those used by adults.

A considerable body of experimental research has been produced trying to identify what prosodic constituents infants are sensitive to. At the clausal level, Hirsh-Pasek, Kemler Nelson, Jusczyk, Wright Cassidy, Druss and Kennedy (1987) found that infants between 6 and 10 months old are sensitive to clausal units in speech. Their experiment involved the insertion of artificial pauses at clause boundaries and within-clause locations in child-directed speech. Children preferred to listen to passages in which the pause coincided with clausal boundaries than to those passages where it did not. However, it looks as if subclausal units are more difficult to identify, and so nine-month olds but not six-month olds are sensitive to phrases (Jusczyck, Hirsh-Pasek, Kemler, Nelson, Kennedy, Woodward and Piwoz, 1992). Gerken, Jusczyck and Mandel (1994) confirms these findings and add that when the boundaries of syntactic and prosodic phrases do not coincide, children seem to be sensitive to prosodic, not syntactic phrases. Taken together, this implies that children use a top-down approach in speech recognition, as they seem to be working from larger to smaller constituents.

Below the phrase, the level of interest for our study, further research has been carried out in order to investigate the type of prosodic cues that infants use for word recognition. By the end of the first year of their lives, children must have made use of some sort of accurate word recognition strategy to allow them to identify words and meaning, as it is around this time that the first word emerges in the speech of children cross-linguistically. Allophonic cues, phonotactics and stress alternations are considered in Myers, Juscyck, Kemler Nelson, Charles-Luce, Woodward and Hirsh-Pasek (1996) as possible candidates for signalling word boundaries but they conclude that none of them can be used reliably as single cues to the exclusion of the rest. Given that children identify phrases later than clauses, it seems logical to assume that words are identified even later, and that some type of top-down process, working from larger to smaller units, is at play. This is indeed partly the finding of the experimental evidence presented in their paper. Eleven-month-old English-learning infants showed a preference for listening to readings where pauses coincided with word boundaries over readings where pauses were inserted between syllables within the word. Four-and-a-half-month olds and nine-month olds, however, did not show sensitivity to word boundaries. The question that remains, however, is what type of cues children use to segment these words.

One possibility to explain this, is that children are relying on prosodic information. The same experiment was run again with eleven-month olds exposing them to low-pass filtered versions of the stimuli presented in the earlier experiment. Low-pass filtering has the effect of leaving prosodic information and removing phonotactic, allophonic and phonetic cues. There was no significant difference between the two. It seems to be clear, then, that prosodic information was being used to segment words. In adult perceptual literature, it has been observed (Cutler and Norris 1988) that English speakers use stressed syllables to locate word boundaries in speech. In order to test whether these children were relying on the same cues, the same experiment was run again with WS and SW words inserting pauses before and after the words and between the words. The prediction was that if they followed a metrical segmentation strategy, they would notice the interruptions of SW more readily than interruptions to WS, as the boundary would leave a weak syllable right after the pause. However, children consistently listened longer to uninterrupted words than to uninterrupted words, regardless of the rhythmic pattern. Myers et al (1996) conclude therefore that by 11 months, children are able to identify words in speech and that their perceptual abilities operate top-down, detecting larger units first and smaller units later.

It would follow, then, that ability to discriminate syllables might take place **after** eleven months. This is clearly not correct, as research has demonstrated that ability to distinguish syllables might be present at birth. For instance, Bertoncini, Floccia, Nazzi and Mehler (1995) have shown that neonates are already sensitive to the rhythmic unit of their ambient language. Three-day-old French infants were tested with bisyllabic and trisyllabic Japanese words and later on with bisyllabic Japanese bimoraic and trimoraic words. The results indicate that as early as that newborns discriminate bisyllabic from trisyllabic words, but they do not distinguish between bisyllabic words which differ with respect to the number of moras they contain. Taken together, these results indicate that children (or at least French children) are sensitive to syllables almost from birth, while they fail to use the mora as a speech processing unit. In their paper, they favour a view that suggests that the syllable is a universal unit of perception initially and that it is only later that infants develop perceptual abilities that will match the rhythmic properties of the ambient language (i.e. children who are exposed to mora-timed languages they will develop perceptual abilities for recognition of moras). They also discuss the possibility that these results just demonstrate a language specific perceptual bias: these French children use the syllable as a speech processing unit because they are exposed to a syllable-timed language, but maybe Japanese babies will demonstrate a bias towards moras since they are exposed to a mora-timed language. The lack of empirical evidence from similar studies done with infants learning mora-timed language does not allow them to distinguish between the two, but they claim that irrespective of the language they hear, syllables are particularly salient units in the initial stages of speech processing.

Myers at al. (1996) also mention that previous research has shown that infants can be sensitive to monosyllabic and also to bisyllabic SW words earlier, at seven-and-a-half. How can the view that speech perception is a top-down phenomenon be reconciled with the idea that syllables (smaller units than words) are recognised much earlier and also with this other research? They argue that initially, children may make a first pass at segmenting words by using a trochaic pattern. This will not be enough to locate word boundaries, as many English words do not have initial stress, and so this is where non-prosodic (phonotactic, allophonic) information comes in to help correct segmentation. What seems to be clear is that word segmentation is a much more complex task than previously thought, and that the children seem to be using not only multiple sources of cues, both prosodic and non-prosodic, to aid them in the task, but also different strategies, both bottom-up and top-down.

The suggestion that prosodic information, and in particular a trochaic bias, might play an important role in speech segmentation, is not really new. In adult perception, Cutler and Norris (1988) have shown that English speakers may employ a Metrical Segmentation Strategy for speech segmentation and in L1 production, Allen and Hawkins (1980) had proposed a trochaic bias for early words, or at least in the case of English learning infants. In L1 perception, Jusczyck, Cutler and Redanz (1993) found that nine-month English infants preferred listening to trochaic rather than iambic words, while this bias was not present at six months. This preference at nine months but not at six months has also been corroborated by Morgan (1996) with novel word trochaics, and by Echols, Crowhurst and Childers (1997), also using novel words.

Turk, Jusczyck and Gerken (1995) investigated the matter further and tested whether this preference to the SW pattern had to do with a preference for heavy syllables rather than for the stress alternation by testing SW patterns with a heavy and a light syllable with nonsense words initially. Their results show that English learning infants have a preference for SW over WS both for nonsense words and real words, and that the preference for SW was evident when the strong syllable was light too. This seems to point to the suggestion that syllable weight does not play a role in determining preference for the trochaic pattern. However, there was a lack of a significant difference over the preference of SW over WS when the strong syllable was heavy. This is interpreted therefore as a preference for both strong syllables and a trochaic pattern on the part of English learning infants.

Unfortunately, as we can see, most of the work on L1 speech perception has been done with English, a language with a trochaic rhythmic pattern. It order to test whether this preference for SW structures is a universal or a language specific development, a replication of these experiments with languages with a non-trochaic pattern is needed. Two important findings, however, can be concluded from these studies. Firstly, that prosodic information, in particular rhythmic information, is used by children as young as 7 months to help them in their word segmentation, at least at a first pass, and that other non-prosodic information is needed to help them identify words later on starting at 11 months. And secondly, that the strategies they are using for speech segmentation are both top-down, as they perceive larger units before they perceive smaller units, but also bottom-up, as linguistic units like the syllable are already present at birth and preference for a particular type of rhythm is already present at nine months. Given these findings, what remains to be investigated is how production abilities reflect the perceptual abilities found. This is considered in the next section.

4.1.2. Rhythmic production of children's early words

Children's early productions have consistently been shown to correspond to monosyllabic CV structures cross-linguistically. Later developmental stages typically start incorporating a reduplicated CVCV structure and more complex monosyllabic structures, if present in the ambient language. Clearly these data show that there are constraints operating on the output of children's early words with the result that truncation is a general strategy used cross-linguistically. Examination of truncated syllables has revealed that these are not random and that they usually represent unstressed syllables in multisyllabic words (Gerken 1994, Wijnen, Krikhaar and den Os 1994) and function words (Demuth 1994), also typically unstressed. A word like 'eraser' is reported in Demuth (1995) as ['raisə] and Gennari and Demuth (1997) report the deletion of the article in the Spanish phrase 'a la casa' (=to the house), pronounced [a.'ka.sa].

Prosodic phonology has been invoked to account for these early productions, and a large body of research has concentrated on this area of L1 acquisition. The literature on this has concentrated mainly on two issues: firstly, whether there is a specific bias towards a particular foot type (trochaic or iambic) in production, and secondly, whether stress is learned lexically or involves rules.

The second of these two issues is perhaps the least controversial. Since Chomsky and Halle (1968), stress has been shown to be rule-governed. Since then, other phonological accounts have dealt with stress assignment rules extensively and research into this has given rise to accounts such as that of metrical phonology. A computational model has also been proposed by Dresher and Kaye (1990).

Although the logical assumption is that stress should be learnt by rule rather than lexically, as it would be more economical, there is still the possibility that children may learn stress on an individual word basis: all the words they hear will be pronounced with correct stress, and so they could just fix the position of stress on individual words and produce these accordingly. Hochberg (1988b) made two predictions in order to test these competing hypotheses: firstly, if children learn stress by rule, regular stress patterns would be easier to produce than irregular or prohibited stress, and secondly, if errors are produced with irregular and prohibited forms, these should be systematic and tend towards regularization.

Hochberg used real and nonsense words in order to test these hypothesis and used 50 three to six-year-old Spanish learning children as test subjects. The task with real words was a naming task and children had to name objects from a picture book for the benefit of a bird puppet who wanted to learn Spanish. The task with novel words was an imitation task: children were given the bird and were told they had to make the bird speak. The investigator said some real words initially and the children had to make the bird say these words. After this training, the investigator used the nonsense words and children imitated them. Given that acceptability judgements with nonsense words will be used in my L2 acquisition study, I will take some time to explain the procedure she followed when devising novel words. She took care not to include certain endings which are associated with stress patterns that are morphologically conditioned (i.e. she did not end consonant-final words with '-ar', '-er' or '-ir', as these are infinitival endings and attract stress). The categories she used are shown in (1) marking all the stress patterns tested in each word:

(1)

1- V-final bisyllabic, trisyllabic and quadrisyllabic words:

CV.CV	ga.gá	gá.ga		
CV.CV.CV	bo.cha.cá	bo.chá.ca	bó.cha.ca	
CV.CV.CV.CV	ca.ta.pa.ná	ca.ta.pá.na	ca.tá.pa.na	cá.ta.pa.na

2- V-final trisyllabic words with closed penult :

CV.CVC.CV	so.sen.gá	so.sén.ga	só.sen.ga

3- C-final bisyllabic and trisyllabic words:

CV.CVC	gui.fór	guí.for
CV.CV.CVC	ca.ba.dón	ca.bá.don

The stress patterns shown above yield regular or unmarked, irregular or marked and impossible stress types in Spanish (see section 2.3.1.2. on Spanish stress).

Two criticisms spring to mind regarding this design. It is unfortunate that she did not test all possible existing syllable types in Spanish. She did not test any diphthongal syllables (VG or GV), which, as we saw in the section on stress, also constrain the position of stress in Spanish, restricting it to a two or one-syllable window. The second criticism concerns the testing of these words, as not all subjects were tested on all of these forms. She claims that in order to 'avoid frustration for younger children and boredom for older children, the three-year-olds and eleven four-year olds were not asked to imitate the four-syllable words, while the remaining eleven four-year-olds and five-year-olds were not asked to imitate the to-syllable words' (Hochberg 1988b:692). This is clearly bad methodological practice, as she is assuming that past a certain age, children would have acquired certain structures but not others without having empirical developmental evidence to proof that this is the case. Her data will therefore only show us a fragmented picture of the real developmental progression.

Her results do, however, support the predictions she made to a certain extent: errors rates in unmarked stress patterns were 22%, while for marked stress it was 43% and for prohibited 56% and their errors tended towards a regularization. For spontaneous speech, the same tendency was observed, although less robustly, as in the case of irregulars, the tendency towards regularisation was not statistically more significant than the tendency towards irregularization in regulars. Hochberg explains this by saying that although they found irregulars more difficult, familiarity with these words made them pronounce them correctly, which was not the case with novel words. This is taken as evidence that children had not only acquired the regular patterns but also the exceptions. However, while it is likely that the test with nonsense words taps the underlying competence in a better way than the test with spontaneous productions, if she argues that this is the case, then she would have to postulate that in the case of marked patterns, the spontaneous responses must be interpreted as a sign that these stress patterns must have been learnt lexically and not as a result of an internalised rule.

Moreover, her data do not uniformly support the prediction that marked stress patterns are more difficult to imitate than prohibited ones. In (2) we show the syllable types that did not conform to this hierarchy of difficulty:[1]

[1]Stressed syllables appear in bold type

(2)

1- Marked V-final stress. CV.CV.CV.**CV**, ca.ta.pa.ná and CV.CVC.**CV** so.sen.gá were as difficult to imitate as prohibited antepenult **CV**.CV.CV.CV cá.ta.pa.na and penult **CV**.CVC.CV só.sen.ga.
2- With trisyllabic and quadrisyllabic CV words, (CV.CV.CV bo.cha.ca and CV.CV.CV.CV ca.ta.pa.na), penultimate stress was easier than final stress.

Regarding development, Hochberg says that rule learning had already been accomplished by the age of 3. The finding that acquisition of stress rules takes place around that age is well attested in the literature (Fikkert 1994, Nouveau 1994 for Dutch). Furthermore, Hochberg says that from 3 to 5 years there was simply a progression in the sensitivity and mastery of irregulars.

Even though Hochberg cannot account for prohibited and marked stress in a good manner, she does prove her point, however, that stress is not learnt lexically but by rule in the case of penult stress.

With respect to the other claim, that the trochaic bias is present in early production, Allen and Hawkins (1980) suggested that English-learning infants showed a bias towards a (possibly universal) trochaic pattern. They found that children tended to delete initial unstressed syllables as well as weak syllables next to another weak syllable, and explain this by suggesting that there is a trochaic bias in production that would force them to produce SW syllables. In an experimental perceptual pilot they tested 3 to 6 year-olds, with three pairs of 'wug-like' creatures with names that conformed to either W S, S W, WW S or S W W accentual patterns. Children were trained to discriminate S W and W S patterns with the phrases 'hót-dòg' and 'hòt dóg'. They then showed them the toys and asked them to identify the pairs and then produce the names. In their test, they did not find a bias in discrimination, though, so they are cautious to restrict their hypothesis for trochaic bias to production, and at least for English, which happens to be a trochaic language.

Using experimental evidence, Gerken (1994) also supports the idea of the existence of a SW metrical template that English children use in their early productions and argues against the suggestion that these productions reflect a universal perceptual bias (it had been suggested that this could be the result of a preference to ignore perceptually less salient unstressed initial syllables or to listen to final syllables). Additional research into acquisition of stress in other trochaic languages has shown that children do seem to show an initial SW starting point. Wijnen, Krikhaar and den Os et al. (1994), found in their analysis of spontaneous data of Dutch that SW formed the majority of the body of early productions. When the target was SWW, there was a loss of one of the weak syllables, not necessarily the first, and in WS and WWS words there was usually a loss of the initial syllable. This confirms Allen and Hawkins' predictions, but given that Dutch also contains a majority of trochaic words, they cannot determine whether this production bias is a language universal or whether it simply reflects the generalizations of the language being learnt. Fikkert (1994) also reports an initial SW stage in acquisition of Dutch stress and says that this cannot be defended as a universal bias until research from other iambic languages is carried out.

The trochaic bias as a universal default setting has been contested in the literature, though, with data from another trochaic language, Spanish. Hochberg (1988a) claims that stress is learnt unbiased towards any particular stress type. Her data come from a longitudinal study of four children learning Spanish and includes spontaneous as well as imitation data of nonsense words. Her claim is that if we are to admit there is a universal trochaic bias, children would be less likely to give correct stress to iambic words than to trochaic words. For spontaneous data, Hochberg found that only one child was better at producing trochaic patterns. Fikkert (1994) argues that Hochberg's findings are not significantly different to those of Allen and Hawkins, and yet her conclusions are different. Fikkert's criticism is that the total number of trochaic words was far greater than iambic ones in both studies and that Hochberg's results did not include monosyllabic renderings of polysyllabic adult forms. Recall that one of the main arguments of Allen and Hawkins for the Trochaic Bias was that in WS targets, the initial syllable was deleted to accommodate a trochaic pattern. Fikkert also says that although Hochberg argues against the trochaic bias by showing developmental data for SW words and showing that correct productions increased over time, she did not discuss the development of WS words, which, presumably, should also have shown a progression in acquisition.

Hochberg's data are clearly inconclusive and her claims about the neutral bias should be taken with caution until we have definite proof against the trochaic bias. A more recent and far more interesting suggestion about the constraints on early phonological production is that of Demuth (1995). In her paper, she argues that neither the perceptual nor the production models can account for these truncated forms, and instead, she proposes that children's early words conform to linguistically well-formed minimal prosodic words. She claims the perceptual bias falls short of explaining why some segmental material of the truncated syllables is sometimes incorporated into the syllable structure that is preserved, and as for the production trochaic bias, she quotes studies from acquisition of K'iche' Maya, an iambic language, where WS targets are usually produced by children as S forms, as shown in (3).

(3)

Adult K'iche'	Child
W S	S
jolom 'head'	***lom***.

If children are guided by a trochaic bias in their production, she argues, then their forms should be like the Dutch monosyllabic forms quoted by Wijnen et al (1994) where the child epenthesises to create a trochaic foot, as shown in (4).

(4)

Dutch target	Child
S	S W
melk 'milk'	['mɛlək]

A phonological word, according to the Prosodic Hierarchy (Nespor and Vogel 1986), is minimally made up of a foot, which, following Hayes (1995), is binary in nature. Feet, as shown in (5), can be made of two syllables, or of one syllable made of two moras, which would result in monosyllabic bimoraic feet.

(5) Possible foot types:

a.Iambic and trochaic b.Iambic c.Iambic and trochaic

In K'ich'e, the CVC forms produced by the child would correspond to foot type 'a', while satisfying the minimal word constraint. In Dutch and English, the minimal word corresponds to bisyllabic feet. Her claims about the course of acquisition are that both universal and language specific constraints shape the form of early words in children's productions. She identifies the following stages in (6):

(6)

STAGE 1; UG provides a default trochaic syllabic foot.

STAGE 2; Stress sensitivity: iambic or trochaic feet are created.

STAGE 3; Weight sensitivity. Reorganisation of syllables included in feet.

In initial stages, the foot coincides with the minimal and maximal word, but as prosodic awareness develops they will start showing an upper limit for the phonological words, which will be language specific.

In Demuth (1995) and Demuth and Fee (1995), the same idea is developed further and by using this account, they are able to explain inter- and intra-speaker variability in the shape of early words. The development of prosodic structure in Dutch and English goes through the following stages in (7):

(7)

STAGE 1 : sub-minimal word. CV syllable without contrastive vowel length (i.e. 1 mora)

STAGE 2: Minimal word. Bimoraic structures of the type (C)VCV, (C)VC, CVV.

STAGE 3: Complex feet. Starting with the trochaic foot in Stage 2, two feet are created and eventually one single primary stress per word is realised.

STAGE 4: Phonological words. Extrametrical syllables are allowed.

Given that bimoraic feet can be represented by different syllabifications, as above, this accounts for the inter- and intra- speaker variability in the early stages. This coincides with the one- and two-word stage. The minimal word is the unmarked prosodic word structure, the 'holding place' for learning more about syllable structure and stress assignment in quantity sensitive languages. Their claim is that stages 3 and 4 may not hold cross-linguistically, while the minimal word stage does, as it functions as a constrained learning space for further language- specific analysis, specifically areas concerning syllable structure and syllable weight.

This hypothesis is clearly superior to the other two entertained (i.e. the perceptual and trochaic bias) as not only does it account for the same data but it also accounts for variability and provides an empirical testable model for L1 acquisition. This proposal also has implications for the learning model assumed, as it implies that the child does not have full access to the linguistic structure provided by the prosodic hierarchy or that the access is there but the child does not exploit it. Demuth (1995) takes the latter view on this and proposes an optimality model where parse constraints will gradually start being ranked higher in the hierarchy.

It looks more and more feasible, therefore, that it is a combination of prosodic factors, and not exclusively a trochaic bias, that explains the shape of early words. This is also a logical conclusion, as the development of the metrical system depends largely on development and realisation that more complex syllable structures are present in the language, in particular in the learning of languages that are quantity sensitive. In child language acquisition, the development of stress goes hand-in-hand with the development of syllable structure and recent analyses of prosodic structure have studied it in this light (Fikkert 1994 and Nouveau 1994 for Dutch). No good developmental account exits to my knowledge on the early acquisition of Spanish stress and syllable structure. As we have noted earlier earlier on, Hochberg's youngest subjects were three years old, and by that time, it is assumed that children have already acquired the basic regularities of Spanish stress. We do have, however, some accounts of the development of syllable structure.

Following a parametric model of acquisition, and making use of the Subset Principle (Berwick 1985, Wexler and Manzini 1987), Carreira (1991) has tried to explain how acquisition of syllable structure in Spanish develops over time with the exclusive use of positive evidence. She claims that the different stages in the acquisition of syllable structure could be expressed in terms of an implicational hierarchy, which involve a subset-superset relationship. Initially, children start with CV syllables only (Stage 1, below). The presence of CVC syllables would imply the presence of CV. Within this, not all CVC syllables would be as easy to produce. The first consonants that appear in coda positions would be nasals (Stages 2,3,4). The next type of consonants that would appear would be sonorants and then all the other consonants would be produced. Acquisition of CVC precedes acquisition of complex onsets, CCV, and segments appear in coda position before they appear in complex onsets. She also makes the connection that as well as showing a system which would be in a subset-superset relationship, which makes acquisition possible with exposure to positive evidence only, these systems are also attested in the phonology of natural languages: in Maori, only CV syllables are allowed, Japanese would correspond to CVN(asal) syllables, Italian to CVS(onorant) and Spanish would be CVC. The stages Carreira identifies appear in (8)[2].

(8)

STAGE 1: CV syllables (age 1;9)

ratón [ra.'ton] (=mouse) → ['tu.to]

tres ['tres] (=three) → ['te]

[2] Transcriptions for the adult form are mine. Other varieties of Spanish pronounce the word 'hacer' as [a.'ser].

STAGES 2,3,4: CV and CVN syllables (age 1;11-2;1)

tren ['tɾen] (=train) → ['ten]

tres ['tɾes] (=three) → ['te]

STAGES 5,6: CV and CVC syllables, no CCV (age 2;4-2;6)

pastel [pas.'tel] (=cake) → [pʔd.'tɛl]

hacer [a.'θeɾ] (=to do) → [ʰas.'sɛhɾ]

STAGE 7: development of CCV.

She mentions that [s,r,l] are acquired in syllable-final position and in non-branching onsets before appearing in branching onsets, so the absence of obstruent + r/l in stages 5,6 cannot be due to phonetic problems, as they already show the segment in other positions. This developmental stage is also noted by Lleó and Printz (1996) in their analysis of deletion of segments in onset clusters in German and Spanish. Their data offer support in favour of an acquisitional hierarchy CV>CVC>CVCC>CCVCC.

Several comments should be made about Carreira's study. Although she uses the Subset Principle to explain acquisition of this particular group of syllable structures, she does not provide a full developmental account of the acquisition of all possible syllable types in Spanish. She simply takes a neat group of syllables that can be explained by the Subset Principle and applies this accordingly, yielding the correct result. However, she does not consider anything beyond CCV syllables or, more interestingly, the nucleus. Codas in Spanish can be occupied by a glide too, and these are absent from her analysis. Do these come before or after CVC? If we are to go by her data, they seem to come first, as she cites the example ['tai] from ['tɾen], 'train', as an example of a CV word in Stage 1. But we are not told whether this means that the CVG stage precedes the CVC stage or whether it is simply the case that at this stage, the length distinction or bipositional structure in the nucleus is not correctly applied and we get both CV and CVG. Another interesting structure for our study is CGV syllables, which are also not considered. In addition, in Stage 1 she does not seem to make any distinction between CV and CVCV structures. Under Demuth's analysis, this would represent two different stages, corresponding to the submininal and the minimal word stage respectively.

Using the same data, Morales-Front (1998) analyses the development of the same type of syllable structures. Instead of a parametric model, however, he uses an Optimality approach, but he fails to go beyond these structures analysed by Carreira. We therefore lack a good developmental account of how syllable structure proceeds in Spanish L1 acquisition.

More detailed accounts of development of syllable structure come from studies in other languages which have with similar structures to the ones found in Spanish. Fikkert and Freitas (1997) talk about the acquisition of Portuguese and Dutch syllable structure. Portuguese has a closer syllable structure to Spanish than Dutch. It allows a simple (CV) and branching nucleus (CVG) and it also contains CVC syllables, where the coda consonant has to be a liquid or a [ʃ]. It also allows CVGC structures, but the coda consonant also has to be [ʃ]. This description is summarised in (9).

(9) Possible syllable types in Portuguese:

CV [ˈpa.tu] (=duck)

CVG [ˈlɐj.tɨ] (=milk)

CVC [ˈpor.ku] (=pig)

[ˈpaɫ.ku] (=stage)

[ˈfraʃ.ku] (=jar)

CVGC [ˈfawʃ.tu] (=luxury)

They identify the following stages in the acquisition of Dutch and Portuguese:

Stage 1: CV syllables. Both CV and CVG syllables appear, but the underlying representation is a non-branching nucleus.

Stage 2: Branching rhyme: CVC syllables, coda C is a fricative. Liquids appear syllabified in the onset of the next syllable or are sometimes substituted by a glide.

Stage 3: Branching nucleus: CVO/L syllables.

Stage 4: Extra-rhymal parameter: CVGC syllables.

These data go against the findings in Carreira that the acquisition of the coda consonant is in a Subset-Superset relationship universally. In Dutch, where the full set of consonants is possible in coda position, Fikkert and Freitas say that fricatives appear before sonorants. Given these developmental stages in different languages, it could well be that the particular acquisition of segments in coda position is language-specific, and the language universal would be that CV are produced before CVC and these in turn precede CVGC. As we can see, at this stage we only have a fragmented picture of how syllable structure acquisition proceeds in the early stages. More studies are needed in this area to gain a full understanding of acquisition of phonology. In the next section, I will summarise the conclusions that can be made about L1 phonological acquisition.

4.1.3. The L1 acquisition of rhythmic structure: conclusions

From these studies, several conclusions can be made about the nature of child first language acquisition. As we saw, the difficulties that children face are very different from the ones that adults will be confronted with later on when they try to learn a second language.

Firstly, we saw how children have to make use of cues in the acoustic signal to identify words and syntactic categories which would help them start analysing the input they hear. This is both a bottom-up and an up-down process. Adults learning an L2 in a formal setting may approach this is a totally different way. Formal instruction implies literacy and exposure to the written word from the very beginning. I assume that this fact will predispose learners to use different segmentation strategies for word recognition. In fact my own view is that L2 learners do not make use of the same segmentation strategies as in L1 or at least in initial stages, as exposure to the written form will make them store the representation of the word in a different way, most probably lexically, instead of guided by any prosodic principles as is the case in L1 acquisition.[3] Reading effects are also found in L1 production. Lee (1987) studies the hierarchy of syllabic difficulty in reading with L1 learners of Spanish. He found that the difficulty of reading syllable types depended on the length of the syllable and the presence of a glide (more specifically the on-glide) in the syllabic nucleus. His subjects were 33 Mexican children of first, second and third grade and involved reading of nonsense words which represented eight different syllable types in Spanish. He found that CGVC was the hardest for all the years, the typical error being splitting it into two syllables (i.e. CV-VC)[4]. In the case of the children, we cannot say that these errors are the result of lack of acquisition of the CGV syllable, as by that age they would have acquired it. Clearly, it is something to do with difficulty of syllable type in reading ability. It therefore looks as if when performing a reading task, children may also make use of different strategies for word recognition[5].

The other conclusion we can draw from these L1 studies is that children seem to be following a pattern of development in accordance with some universal principles. The minimal prosodic word proposed by Demuth (1995) seems to account for the development of early phonology in languages that have different rhythmic structures. The superiority of that account versus the ones where a perceptual and trochaic prosodic bias has already been discussed. This initial minimal prosodic word will gradually expand to accommodate the prosodic characteristics of the language children are learning, and different developmental patterns will emerge depending on this. Syllable structure and stress assignment will evolve hand-in-hand, as findings about syllable structure will have repercussions in the development of stress systems (whether a language is quantity sensitive or not). For Dutch, these interactions have been fully explained in Fikkert

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[3] Anecdotal evidence from teaching can be used as an example: a typical scenario in a foreign language class is that learners tend to find reading much easier than listening, at least in initial stages. Teachers normally have to devote teaching time to develop listening strategies. The phonetic cues that normally throw students have to do with resyllabification, weakening or assimilation processes that are not normally in operation when words are said in isolation (and presumably stored lexically by the learner). When learners cannot understand continuous speech, often it is because they are trying to listen to individual words instead of letting themselves be guided by the prosodic cues that help children segment speech in acquisition. Besides, as we shall see later on in section 4.2.1 , they may also be making use of the segmentation strategies in their L1 to help them understand, and if the L1 and the L2 use different strategies, that can explain the frustration and failure in comprehension that L2 learners experience in listening to fluent speech.

[4] Interestingly, this is exactly the same type of mistake that we will find later on with L2 learners

[5] One of the possible interpretations that I make of his results is in reading, the scanning goes from left to right, while Spanish syllabification (Lleó and Prinz 1996) operates from right to left. If your reading ability is developing, you may treat each vowel segment you see as a nucleus, and then create CV.VC syllables instead of CGV.

(1994), following a parametric model of acquisition. For Spanish, unfortunately, no complete developmental account exists to this date, and all we have is a fragmentary view of how certain aspects of stress (Hochberg 1987) and syllable structure (Carreira 1991, Morales-Front 1998) proceed.

4.2. The L2 acquisition of rhythmic structure

Having reviewed the literature on L1 acquisition, we will now present the findings in the literature of the acquisition of rhythmic structure as a second language. Mirroring the structure followed in the review of L1 acquisition, I will start with a discussion of the mechanisms that adults use in perception, and then I will proceed to an examination of the studies on the L2 acquisition of stress and syllable structure.

4.2.1. Adult speech perception

We saw in section 4.1.1. that children use prosodic cues in order to carry out word segmentation, and this process is probably aided also by other non-prosodic information. This provides the frame in which the child can work out the phonological representations of the words in the input. The child is, however, in the process of learning the language, and so it would not be very far-fetched to assume that the mechanism for word segmentation is not exactly the same as the one that adults use when they are listening to L1 speech, as adults have already developed a complete phonological system. Several studies have addressed the issue of what cues native speakers use in their L1, using a variety of languages. As we shall see, all of them suggest that adults use language-specific units for speech segmentation.

Cutler, Mehler, Norris and Seguí (1986) suggest two different sublexical candidates as possible units in speech segmentation: the phoneme and the syllable. The phoneme has the advantage of being the smallest perceptual unit in speech, but it faces the problem of segmentation, as the acoustic cues that signal a particular phoneme may be distributed over neighbouring sounds, which makes recognition difficult. The syllable as a unit has had greater support in the literature on perception, as it was found that listeners were faster at monitoring syllables than phonemic units. Mehler, Dommergues, and

Frauenfelder (1981) had demonstrated that listeners were faster at monitoring a sequence in speech when it corresponded to a syllable in speech than when the segments were spread over two syllables For French speakers who had to monitor 'pal-' sequences, they were faster when 'pal-' was syllabified in the speech they heard as belonging to a single syllable -as in *pal.mier-* than when it belonged to two -as in *pa.lace*. This was evidence that listeners were using syllabification as a processing and segmentation unit. In a follow-up to this study, Cutler et al. (1986) went further and tried to explore whether all listeners, regardless of their L1, used the syllable as segmentation unit. They argued that it could be the case that languages like French may be more likely to give clear signals to the listener about where syllable boundaries lie, as syllable boundaries are unambiguous. However, listeners of stress-timed languages, typically containing heavy syllables and ambisyllabic consonants, may give less clear cues to the listeners and these may not rely so heavily on the syllable as a segmentation unit. The same experiment carried out with the French subjects was replicated exposing English subjects to English, French and nonsense word stimuli, and French subjects to English and French stimuli. They concluded that native French speakers relied on the syllable regardless of whether they were listening to French or English input, while English speakers did not use the syllable with any of the three stimuli. They concluded that syllabification is therefore used as a speech recognition strategy by speakers of languages with clear syllabification boundaries. They hypothesise that attention to syllabification is only one of the possible strategies used by listeners, but that during language acquisition they adapt their perceptual routines so that they can exploit the structure of the language they listen to.

Cutler and Norris (1988) carried out further experimental work in English and found that in this language, speech recognition is a process that involves a type of segmentation triggered by the appearance of a strong syllable. This seems to mirror the trochaic bias we examined in L1 perceptual abilities. It appears then that the mechanism for speech perception may be language-specific and conditioned by the phonological structure of the language heard. So-called syllable-timed languages may be using the syllable, so-called stress-timed languages use strong syllables, and so we would expect that mora-timed languages would use the mora as a segmentation strategy. This is indeed the finding of Otake, Hatano, Cutler and Mehler (1993). The response time of Japanese subjects was measured with CVNVCV and CVNCV words (like 'kanona' and 'kanko') where the nasal was always segmented in the preceding syllable and constituted an extra mora. CV targets were as easy to detect by Japanese speakers in CVCVCV words as in CVNCV words, which is the prediction that we would expect from the mora hypothesis, as CV is a mora in both types of words. When presented the same stimulus in an auditory form only, Japanese speakers reacted in the same way. English learners, on the other hand, did not display mora sensitivity to this stimulus while French speakers responded to CV more accurately than to CVN, lending support to their syllabic segmentation strategy.

Cutler and Otake (1994) explored the issue further and found that sensitivity to moras was found in Japanese speakers even with structures other than the CV structure used in the previous experiment. Once again, sensitivity with these targets was absent with English learners. As found in the French studies, it was also observed that where the structure of the input allows it, Japanese speakers impose a mora segmentation strategy when listening to English words. English listeners display a detection disadvantage for recognition of medial vowels in their native language, and this disadvantage was also apparent in Japanese. Cutler and Otake mention that these findings have important implications for second language acquisition, as they seem to suggest that listeners develop language specific processing routines which are not easily changeable and may be retained even when processing a language which may require a totally different strategy. They then cite a study by Cutler, Mehler, Norris and Seguí (1992), where highly proficient French-English bilinguals were tested on their rhythmic segmentation. It was found that bilinguals commanded only one strategy; either one based on syllabic segmentation or the one characteristic of English speakers. They claim that the segmentation procedure that infants adopt when they are exposed to their first language in order to help them locate words in the speech signal is only established once and that whatever strategy is adopted is carried over into adulthood. These learners were performing at native levels in all aspects of production and comprehension in both languages. However, even though they only had a single procedure for segmentation at their disposal, there was an important difference when compared with the performance of monolingual speakers who had been exposed to foreign input. Bilinguals were not applying the segmentation strategy they had to the language which was not appropriate (so even though syllabic segmentation was the only strategy at their disposal, it was not applied when listening to English materials). Therefore it looks as if experience with the other language had showed them that the segmentation strategy they were using was inappropriate and inhibited this mechanism as it interfered with word recognition in this language. They argued that the reason that this was not happening with monolinguals in previous experiments was because there was no recognition process that could interfere to show them it was inappropriate as they did not know the language they were exposed to.

Bradley, Sánchez-Casas and García Albea (1993) had already found similar results with Spanish-English bilinguals and Spanish and English monolinguals. The same results as in the Cutler et al. (1986) study were obtained as Spanish listeners were faster responding to Spanish materials that corresponded to a syllable than to those that did not. English subjects, however, were not using the syllable, neither with English nor with Spanish stimuli. English subjects performed faster with CVC sequences regardless of whether this was monosyllabic or it spread over two syllables. Contrary to the previous findings, though, bilingual Spanish speakers did not seem to be using the syllabic routine when they listened to English materials even though the task conditions were similar to those used in the Spanish experiment and would have yielded a syllabic effect.

This therefore points to the fact that with enough exposure to a second language, the initial segmentation strategy used in the learner's L1 can at least be inhibited. Cutler and Otake rightly point out that what remains to be investigated is the amount of exposure needed in a second language in order to abandon a routine specific to one's native language.

It appears that in order to achieve native-like proficiency in a second language it may be necessary to suspend the segmentation routines that we learnt in our first language. I also assume that since perception precedes production, only once this is done will learners be able to start producing target-like utterances and respecting the rhythm of the language they are learning. Further research is needed on the development of perceptual abilities of L2 learners that could give us a clue as to when L1-based abilities will be disengaged.

4.2.2. The L2 acquisition of syllable structure

In the literature on the L2 acquisition of syllable structure, two recurrent lines of investigation can be identified. The first one concerns the phonological processes that affect and alter L2 syllable structures in the interlanguage of learners. Typically, these processes can be reduced to two, namely epenthesis and consonant deletion. The second issue has to do with markedness and whether it is possible to acquire more marked syllable structures when the L1 contains a more restricted (or less marked) set of possibilities. Markedness considerations and the Subset Principle are at the core of this second line of research.

Let us take each of these in turn, starting with markedness and the Subset Principle (see Chapter 1). Most of the research into syllable structure has focused on the acquisition of more complex syllable structures. Syllable structure represents a good case for testing the subset principle, as syllable structures in languages of the world can be described in terms of implicational hierarchies. That means that if more complex syllable structures exist, this implies the existence of simpler ones. The simplest syllable structure that exists is the canonical and universal CV. This universal CV syllable has been taken to be the least marked as the existence of more complex syllables such as CVC or CCV implies the existence of CV.

With the exception of Akita (1996), I know of no study of L2 acquisition of phonology that has tried to test the situation in which the L1 is in superset relation with regard to the L2. The majority of work on syllable structure has tried to determine whether parameters can be reset to a superset value and also whether learners can make use of positive evidence to reset them. One of these studies is Broselow and Finer (1991). In their paper, they argue that Korean and Japanese learners of English arrive at a parameter setting between the L1 and the L2 values with respect to the Minimal Sonority Distance Parameter. Learners were tested on stop+j and stop+r clusters and they found that learners could produce Cj and /pr/ clusters with roughly the same level of correct productions. Since neither of the two languages has /pr/ clusters, but they have Cj, this is interpreted as evidence that they are resetting the parameter, and that this is neither that of the L1 nor of the L2 but an intermediate value.

Their results, however, are rightly questioned in Eckman and Iverson (1993). Broselow and Finer's argumentation hinges on the false assumption that the on-glide is part of the onset in these languages, when in fact it can be proved to be part of the nucleus. This is precisely the situation that we shall see in the case of Spanish in our study too. Methodologically, Eckman and Iverson also note that Broselow and Finer's results are combined for all subjects rather than specifying individual scores. Eckman and Iverson present their own spontaneous data to argue that typological markedness is a much better predictor then the MSD for the IL patterns of syllable structure observed. It might be argued that the MSD parameter determines markedness relations too, but the difference between the two approaches is that in the analysis that Eckman and Iverson present, not only are they able to explain the results in Broselow and Finer and their own data, but also why obstruent-glide onsets are more marked than obstruent liquid onsets.

Eckman and Iverson are thus able to provide a superior account to Broselow and Finer's. My own view is that the MSD parameter could be used all the same to explain their data, as long as it is used in conjunction with a correct underlying representation of the glide. That is, Broselow and Finer's parameter could work if there is a specification that the Sonority Hierarchy must stop at the point in which we cease to have an onset. In the case of Korean and Japanese (and Spanish), this point is liquids, as the glide is part of the nucleus, and in languages like English just before the vowels.

Broselow and Park (1995) make an interesting contribution to the parameter setting debate in L2 with the claim that IL grammars contain a stage in which the setting of the L1 is operative for analysis of the target language forms, and the setting of L2 is operative in the production of these forms. This is what they call 'split parameter setting'. They base their claim on an analysis of epenthesis in the English of Korean speakers. In the IL of these learners, epenthesis seems to occur after a syllable with long vowel, while it is absent after a syllable containing a short vowel. This is shown in (10).

(10)

Long vowel:	Short vowel
beat ['bitʰɨ]	bit [bit]
peak ['pʰikʰɨ]	tip [tʰip]

Broselow and Park explain these productions by postulating a 'mora conservation' strategy whereby Korean learners notice there is a length distinction in English between long and short vowels, but the absence of this distinction in their L1 prevents them from realising it in terms of difference in length. Therefore they choose to preserve this distinction producing vowels of equal length, but adding an extra mora (by means of epenthesis) after the syllable which contains the long vowel.

Although this is an interesting proposal, they leave several things unanswered. On the one hand, I find that their data are not sufficiently justified, as they do not provide background information on how they collected the data or evidence that this behaviour is indeed robust. For instance, we are not even given figures that show what percentage of productions goes in this direction and what percentage doesn't. Secondly, and more importantly, if the analysis they present is correct, the next question is how learners manage to make the perceptual and the production parameter meet on the same value over time, or whether indeed it ever does.

This last paper touches also on the second area of research into syllable structure in L2 acquisition, that of which strategy the learner adopts when s/he has difficulty resetting a parameter or acquiring a structure which is more complex than in the L1. In the case of the syllable, two processes have been identified: deletion and epenthesis. It has been observed in the literature that one of the differences between the L1 and L2 acquisition of syllable structure is the overwhelming preference that children show in favour of deletion over epenthesis processes (Weinberger 1987). The literature on L2 acquisition, however, reports both types of phenomena in L2 IL phonologies. Tarone (1987) asks whether this is due to the influence of transfer or whether it can be attributed to the application of universal CV syllable structures. In order to test these two competing hypotheses, she tested six speakers of three different languages (Cantonese, Portuguese and Korean) with English words. Tarone's findings revealed that the strategy employed by each learner depended on the language background, with Korean and Cantonese favouring deletion and Portuguese favouring epenthesis. In the case of non-final consonant clusters, however, there was a general tendency to delete rather than to epenthesise. She also found that the overall majority of errors could be attributed to language transfer, but the rest could be accounted for by appealing to a preference to modify the syllable structure in favour of a CV universal syllable. Tarone's findings highlight the shortcomings of the Contrastive Analysis Hypothesis (Lado 1957). As is well known, a strict comparison between two language systems and identification of areas of difference in order to predict possible sources of error fails to predict all the possible errors that a learner makes. Eckman's (1987) Markedness Differential Hypothesis (MDH) provides a step forward in the identification of areas that will be difficult for the learner. The MDH uses markedness relations in order to predict difficulty in second language acquisition.

Broselow (1987) also sides with Tarone in her paper on 'non-obvious' transfer in which she claims that transfer is very obvious in syllable structure modifications. Using two different dialects of Arabic (Iraqi and Egyptian), she explains the different positions of the epenthetic vowels in the production of Arabic learners of English by referring to the positions where epenthesis would occur in the dialects of their native language. An apparent variation in the epenthetic results found in the English of these learners is thus attributed to the influence of their L1.

Relating to epenthesis too, another area that has been investigated is the nature of the vowel that appears when epenthesis takes place. Weinberger (1988) examined differential substitutions and the quality of the vowel in epenthetic constructions and found that the epenthetic vowel chosen by the learner is the underspecified vowel in the L1 of the learner. Thus, for Arabic learners it will be /i/, for Spanish /e/ and for Mandarin /ə/.

As we can see, the problems related to deletion and epenthesis have puzzled researchers for some time, and although quite a lot of the research points to the fact that in all these processes an influence from the L1 is evident, we are still short of finding a total answer to the problem of why certain languages would be favouring one process over the other. Further research will need to be done in this area in order to find the solution to the problem.

Having reviewed the literature on L1 and L2 acquisition of syllable structure, we now turn to the review of the studies of the L2 acquisition of stress.

4.1.3. The L2 acquisition of stress

The acquisition of stress in a second language is an area that has only recently been studied in some detail, and to my knowledge, only three researchers have embarked on this task: Archibald (1993a, 1993b, 1995), Mairs (1989) and Pater (1993, 1997). They studied the acquisition of English stress but the L1 of the learners differed; Archibald worked with Polish, Hungarian and Spanish, Mairs with Spanish, and Pater with French. Another common denominator is that both Pater and Archibald use a parametric model for stress assignment, in particular Dresher and Kaye (1990), and investigate the question of whether L2 learners are able to reset parameters in a second language. Archibald (1995) concludes that learners are able to reset some metrical parameters and that their interlanguage phonologies obey UG principles, L1 parameter settings (transfer) and L2 parameter settings (from resetting). Pater (1997) presents evidence from French learners that suggests that they are missetting a parameter, adopting a value which is incorrect both in their L1 and in their L2. In any case, his study also supports the idea that parameters can be reset, even if it is at an incorrect value. Mairs (1989) did not adopt a parametric model, but found that all the errors that Spanish speakers made in English could be generated by the rules of the L2 target language stress system and explained them as a result of transfer of the syllable structure of the L1.

Given that Spanish and English are the languages that will be used in this dissertation and that a common methodology has been used with the other two languages he investigated, I will restrict the discussion of Archibald's work to the study of L1 Spanish learners (1993a, 1993b, 1995). Metrical parameter settings for English and Spanish (drawn from Dresher and Kaye 1990) are exemplified in (11).

(11)	ENGLISH	SPANISH
P1. The word is strong on the	right	right
P2. Feet are	binary	binary
P3. Feet are built from the	right	right
P4. Feet are strong on the	left	left
P5. Feet are Quantity Sensitive (QS)	yes	yes
P6. Feet are QS to the	rime	rime
P8A. There is an extrametrical syllable	yes	yes
P8 It is extrametrical on the	right	right

Although the actual metrical parameter settings are identical in both languages, the stress systems are not identical, as both languages differ with respect to which morphemes are considered to be extrametrical. Strictly speaking, therefore, in the case of Spanish, learners only have to concern themselves with the acquisition of particular stress rules, not parameter resetting. Spanish, as we saw in Chapter 2, prohibits the appearance of stress beyond the last three syllables of the word and this restriction may shrink to the last or last but one syllable depending on whether the last two syllables are heavy or light. This produces a hierarchy of markedness. Archibald predicts that those stress patterns in English which would be marked according to Spanish rules would be more difficult to acquire than those which are unmarked. He established 7 different categories of 50 words and tested these with 7 Spanish learners, asking them to read these words in isolation and then to do a perception test with the same words. Taken together, learners were better at the perceptual task (18% errors) than at production (27% errors). However, three out of the four subjects were better at production than at perception. Most of the errors were the result of the wrong extrametrical marking, and he concludes that there is no evidence that the interlanguage of these learners reverts to the default setting of [-extrametrical] for the extrametricality parameter. Learners are also aware of the internal structure of words and know that the derivational domain is the right domain for extrametricality.

Pater's work (1993, 1997) also takes up the issue of parameter resetting with a different methodological approach to the one used by Archibald. Drawing on Archibald's study, Pater says that although it is possible that parameter resetting is the explanation for the proficiency of Archibald's subjects, nothing in principle rules out the possibility that learners may have just learnt stress lexically, especially as the English stress system is full of exceptions. He also notes that quite a lot of studies on L1 acquisition of stress (Allen and Hawkins 1980, Nouveau 1994, Hochberg 1988 a & b) have used nonsense words in order to test whether there is a learning of rules, parameters or constraints (depending on the methodological framework adopted). Pater's work is innovative and interesting methodologically because by adopting a nonsense word methodology, he is able not only to test whether learning occurs (not just lexical learning of stress), but also once this is confirmed whether we can talk about parameter resetting. He also questions the value of carrying out perceptual tests as Archibald's absolute beginners were getting high scores at the perceptual task and all his conclusions about acquisition are based on their production, not their perception. Given these considerations, he abandons perceptual tasks and only carried out production tests with nonsense words. Learners were requested to read these words and then sentences containing the word. The group was quite large, 57 subjects who were French learners in a summer inmersion programme in Ontario. They were given a selection of 16 nonce words with a variety of syllable weight combinations to test whether these learners had acquired quantity sensitivity. Subjects were an average of 20 years old and had started learning English at an average age of 11.8.

French and English differ quite a lot with respect to their metrical parameters, as can be seen in (12), where we state the parameter settings of English, French and the learners' Interlanguage.

(12)

	ENGLISH	FRENCH	INTERLANGUAGE
P1: Extrametricality	on	off	off
P1A: Edge	right	n/a	n/a
P2: Foot size	binary	unbounded	binary
P3: Foot headedness	left	right	left
P4: Quantity sensitivity	on	off	on
P4A: Coda weight	on	n/a	on
P5: Direction of foot construction	r > l	n/a	l > r
P6: Word headedness	right	right	left

The parameters are the same as those adopted by Archibald, but Pater gives them different terms as he adopts a bracketed metrical grid instead of the labelled trees Archibald uses to represent prosodic structure. A close look at the settings in the IL shows that French learners are able to reset two of these parameters, foot size and headedness. Looking at the L1 acquisition data from Fikkert (1994) and Hochberg (1988 a & b), he says that these seem to be parameters that are set very early on in L1 acquisition, and so these findings correlate well with the L1 data. There are also other parameters that are set at the L1 learners' settings, and others that are set at the L2 setting, but more interestingly, two of these parameters are set neither at the L1 nor at the L2 setting.

Pater's study is interesting because, as he points out in his conclusion, not only does it show that it is possible to misset a parameter as well as reset it (with the implications this has for a parametric theory of language learning, where it is assumed that once a parameter is set, it cannot be reset) but also because it shows that the view that IL grammars start with L1 settings and gradually get closer to the L2 settings, may be incorrect. Pater points out that there are other language peculiarities of the second language system which may lead the learner to make incorrect hypotheses. For instance, even though English has word headedness on the right, there are many words which surface with stress on the left.

Pater (1993) also suggests that the nonce word methodology is appropriate to use in future research and that the use of aural presentation rather than written presentation may be preferrable. As we saw in Chapter 3, the design of one of the tests used for the data collection for this thesis, partly draws on the methodology used in his study.

With the exception of Mairs (1989), all the studies carried out on acquisition of stress have adopted a parametric model, and none of them have undertaken the study of the Spanish stress system. As we saw, different scenarios have emerged in the studies we have seen: in some cases, metrical parameters are transferred, in others it seems to be possible to reset them completely and in others learners arrive at intermediate values. The results of this thesis will add something to the research in this area of L2 acquisition of phonology. After this discussion on the findings reported in this Chapter on L1 and L2 acquisition of rhythmic structure, we now proceed to discuss our data. This will be done in the following chapter.

Chapter 5: The L2 acquisition of syllable structure and stress in Spanish

In this Chapter, we will discuss the results of our study on the acquisition of syllable structure and stress in Spanish. The Chapter will be organised as follows. Section 5.1. deals with the acquisition of syllable structure in Spanish. In section 5.1.1. we discuss the results of the acceptability judgement test and in section 5.1.2. the results of the production data. Section 5.2. deals with the acquisition of stress. Section 5.2.1. presents the results of the acceptability test and section 5.2.2. discusses the results in production. Finally, in section 5.3. we offer some conclusions.

5.1. The L2 acquisition of syllable structure in Spanish

5.1.1. The acceptability judgement test

In section 3.2.1.1. we provided a list of all the categories of words tested in the acceptability test. Recall that the emphasis for this particular test was put on those areas that were not present in the system of the L2 of the learners. This section is organised as follows. Section 5.1.1.1. deals with tests related to the minimal word, section 5.1.1.2. tests that tested onset clusters, section 5.1.1.3 deals with codas and section 5.1.1.4. deals with the nucleus.

5.1.1.1. Minimal Word

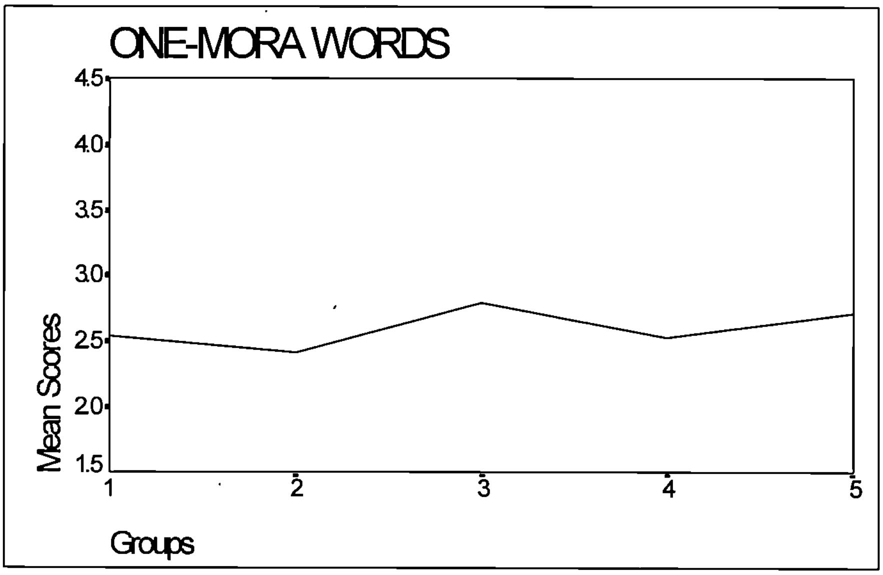
The minimal word in Spanish is a monomoraic, monosyllabic word, while in English it is a bimoraic monosyllabic word. Five nonsense words were created that conformed to the minimal requirement in Spanish, and five other nonsense words satisfied the minimal requirement in English. Some real Spanish word examples of one-mora words are 'sí' (=yes), 'da' (=he-gives), té (=tea) and some nonce examples are **'to'**, '**sa**'. Real examples of two-mora words are 'sol' (=sun), 'pan' (=bread) and 'ver' (=to see) and some nonce examples were '**dun**', '**jas**'[1].

Table 1 shows the mean scores by group for both types of words. In brackets, we find the Standard Deviation (S.D.). Figure 1 shows the results for one-mora and Figure 2 for two-mora words.

Table 1: One- and two-mora words

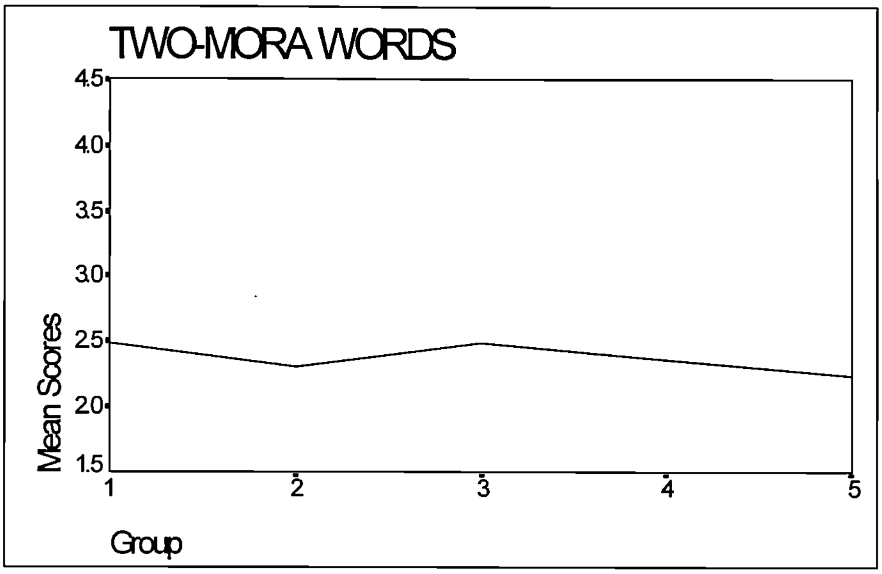
GROUP	ONE-MORA	TWO-MORA
1 (BEG 1)	2.54 (0.56)	2.49 (0.76)
2 (BEG 2)	2.43 (0.81)	2.31 (0.66)
3 (INT)	2.80 (0.84)	2.48 (0.55)
4 (ADV)	2.53 (0.88)	2.36 (0.88)
5 (NS)	2.72 (0.73)	2.24 (0.52)

Figure 1



[1] The convention I will follow will be that stressed syllables will be marked in bold.

Figure 2



The ANOVA test carried out in these two categories of words did not yield any statistically significant results. For one-mora words, the results were $F(4,54)=0.49$; $p>0.50$, and for two-mora words $F(4,54)=0.29$; $p>0.50$. Since the minimal word in Spanish has a more restricted setting than in English, the results seem to indicate that the learners can indeed reset the parameter and revert to a more conservative setting, and this can be done from the very early stages in acquisition. It remains to be seem whether the ability to perceive this difference is coupled with the ability to produce the monomoraic monosyllabic words in Spanish. What seems to be evident, in any case, is that at the level of representation, these learners do not seem to be making use of their L1 setting but are reverting to a default setting which is more restricted than the one used in their L1.

5.1.1.2. Onsets

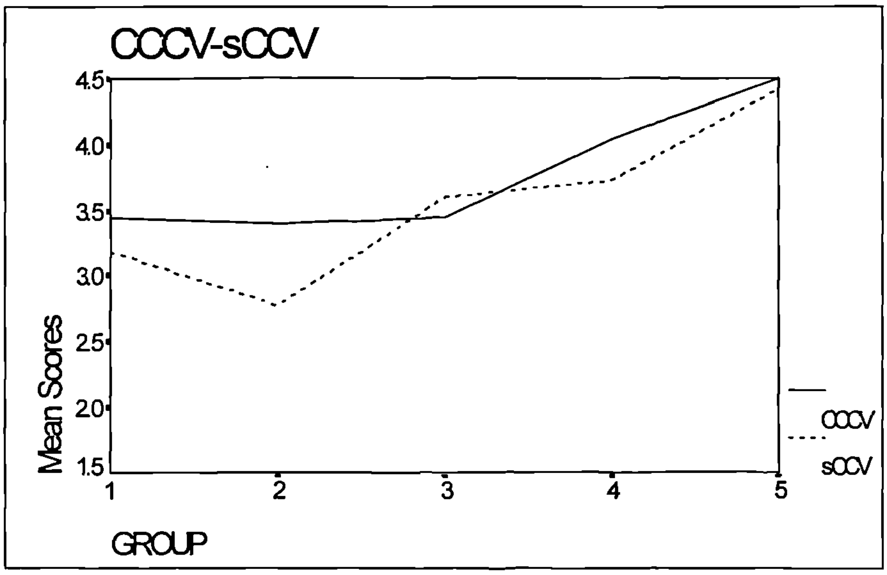
a) CCCV and sCCV

In Spanish, the maximum number of consonants in the onset is two (CCV). Five words with CCCV onsets which complied with the principle of the sonority hierarchy but did not correspond to grammatical clusters either in English or in Spanish were created. Some examples are '**fnl**espo' or '**pfn**emo'. In addition to this, five other words which contained possible three-consonant clusters in English (sCCV) were created. The purpose of including these words is to see whether the influence of the L1 would have any effect in the judgement of three consonant clusters. Some examples of the words used are 'sclacato' or 'strupeto'. Table 2 and Figure 3 show the mean scores for groups. In the table, the S.D. appears in brackets.

Table 2: CCCV and sCCV

GROUP	CCCV	sCCV
1 (BEG 1)	3.45 (0.44)	3.18 (0.69)
2 (BEG 2)	3.40 (0.72)	2.77 (0.72)
3 (INT)	3.45 (0.42)	3.60 (0.89)
4 (ADV)	4.04 (0.64)	3.72 (0.95)
5 (NS)	4.50 (0.36)	4.42 (0.48)

Figure 3



We find significant differences in the mean scores of the two categories of words, CCCV and sCCV, ($F(1,54)=4.4$; $p<0.05$) and also in the mean scores of the group variable ($F(4.54)=11.81$; $p<0.001$). There is no interaction effect ($F(4,54)=1.52$; $p>0.10$). This means that there is evidence that the two classes of words are distinguished by the subjects as two separate categories, and that the mean rating of the all the word types is statistically significant depending on the group variable. However, there is no evidence that the distinction of the word types CCCV and sCCV is affected by the group variable; all groups are making this distinction.

We can explore the differences in the ratings within each word type, however, in order to explore the main effect found. CCCV and sCCV were analysed using a one-way analysis of variance and statistical differences were found among groups. In both cases, the first three groups (Beg1, Beg 2 and Int) behave significantly different from the advanced and this one in turn behaves significantly differently from the control group (1, 2, 3/ 4/ 5[2]). The first 3 groups seem to be at one stage and the advanced in another which is close to but not identical to that of the natives. If they make this distinction across groups for both categories of words this must mean that they are not transferring their L1 setting but that over time, they are sharpening their awareness about what is impossible in the L2. This means that the mechanism they are using must involve UG and this applies to both CCCV and sCCV.

b) CCV grammatical and ungrammatical

A binary branching onset is the maximal onset that Spanish allows. Five words were created containing a CCV syllable which could be a possible cluster in Spanish. These clusters do not only satisfy the maximal onset requirement but they also comply with the Minimal Sonority Distance (MSD) requirement in Spanish. Some examples of the words used are '**gr**oco' or '**dr**umas'. These are also possible CCV clusters in English.

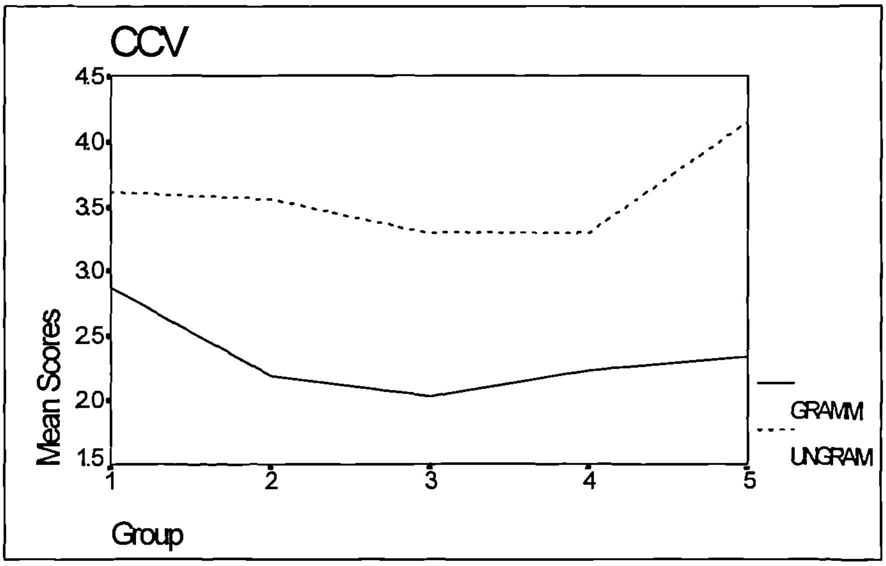
Five other words contained a CCV cluster that violated the Minimal Sonority Distance (MSD) requirement in Spanish and English (it contains consonants which are adjacent to each other in the Sonority Hierarchy). Some examples are '**fn**epo' and 'nriseta'. Results for mean scores appear in Table 3 and Figure 4 below.

[2] The slash represents the cut-off point where there is a significantly different result.

Table 3: CCV grammatical and ungrammatical

GROUP	CCV	CCV (U)
1 (AB)	2.88 (0.87)	3.62 (0.56)
2 (B)	2.18 (0.53)	3.56 (0.57)
3 (I)	2.03 (0.36)	3.29 (0.59)
4 (A)	2.24 (0.65)	3.29 (0.76)
5 (N)	2.34 (0.57)	4.15 (0.61)

Figure 4



In these categories of words, there is a main effect for grammaticality ($F(1,54)=179.09$, $p<0.001$) and also a main effect for group ($F(4,54)=3.33$, $p<0.05$) as well as an interaction effect ($F(4,54)=3.5$, $p<0.05$).

If we look at the graph, we see that the group that is clearer about the difference in grammaticality is the control group. If we remove the native group and we run the analysis again, we continue to get a main effect for group ($F(4,54)=3.08$, $p <0.05$) and a main effect for grammaticality ($F(1,54)=115.41$, $p<0.001$) but the interaction disappears ($F(4,54)=1.9$, $p>0.10$). This clearly signals then that the group that is causing the interaction is the control group. The control group is therefore significantly better at distinguishing grammatical CCV and ungrammatical CCV than non-natives. This is a surprising finding, since these clusters coincided in grammaticality status with the English setting for the MSD. This might indicate that transfer does not play a big role -even in cases where the setting is identical in both languages.

In order to find out whether there are significant differences in the treatment of each of the categories, we need to look at them in isolation using a one-way analysis of variance. In the case of grammatical CCV we find that the group that is behaving significantly different from the others in the Beg1 group and in the case of the ungrammatical CCV the group that is behaving significantly different is the control group. So what is happening is that the beginners group is initially worse at figuring out what is possible, whereas the rest are behaving similarly to the control group. The evolution is therefore 1/ 2, 3, 4, 5 , where the slash represents a significantly different result. In the case of ungrammatical CCV clusters, however, the control group behaves significantly better than all the others and the evolution is 1, 2, 3, 4/ 5. That is, it looks as if non-natives initially realise what is possible first and then it takes them longer to realise what is not possible, and that their intuitions about ill-formedness are never as sharp as those of native speakers. This behaviour would be explained by the fact that in order to figure out what is possible, they have access to positive evidence, and for the ungrammatical they would have to make use of indirect negative evidence, which only prolonged exposure to the L2 can give them.

5.1.1.3 Codas

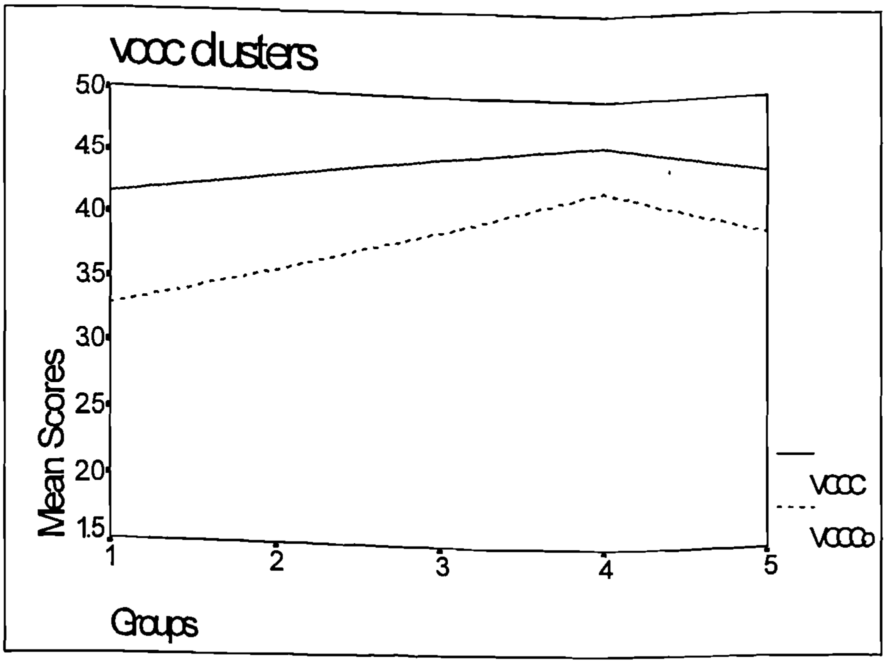
a) VCCC and VCCCo

Three consonant clusters in the coda are ill-formed in Spanish. Five words were created containing VCCC words that were impossible structures both in English and in Spanish. Examples of words in this category are 'frige**rmf**' or 'fese**rarnk**'. Five other words with this structure were possible structures in English (as the consonants were coronal consonants) but not in Spanish. Some examples used were 'ca**bornt**', 'de**palnd**'. These will be referred to as VCCCo. Results of mean scores by group appear in Table 4 and the graphical representation of the scores in Figure 5.

Table 4: VCCC clusters

GROUP	VCCC	VCCCo
1 (BEG 1)	4.15 (0.72)	3.28 (0.78)
2 (BEG 2)	4.34 (0.54)	3.60 (0.85)
3 (INT)	4.53 (0.39)	3.97 (0.58)
4 (ADV)	4.65 (0.42)	4.31 (0.51)
5 (NS)	4.44 (0.40)	3.96 (0.56)

Figure 5



The analysis of these data yields a main effect for group (F(4,54)=3.74; p<0.01) and for category of words (F(1,54)=57.27; p<0.001) but no interaction effect (F(4,54)=1.432; p>0.10). This means that the groups can distinguish the two categories but the differences in the judgements are not affected by the group variable. Analysis of each category with a one-way analysis of variance does not yield any statistically significant results in the case of VCCC structures. So all subjects are behaving as if they belonged to the same group. In the case of VCCCo, the advanced group is behaving significantly different to the others. With increased exposure, then, advanced learners can outperform the judgement of the native speakers. Since the natives, however, are performing similarly to all other non-natives, we cannot conclude that L1 is having any special influence in their IL. Since VCCC structures are impossible in English, they could be using either transfer or UG in order to arrive at these judgements. In the case of VCCCo, found in English, given that even the first group of beginners is behaving similarly to the native group it would seem logical to posit that transfer is not playing a role and that the learners are reverting to a default unmarked setting. Learners will not accept these structures until they encounter positive evidence in Spanish that they exist. Since this is not available, they rate VCCCo structures as unacceptable.

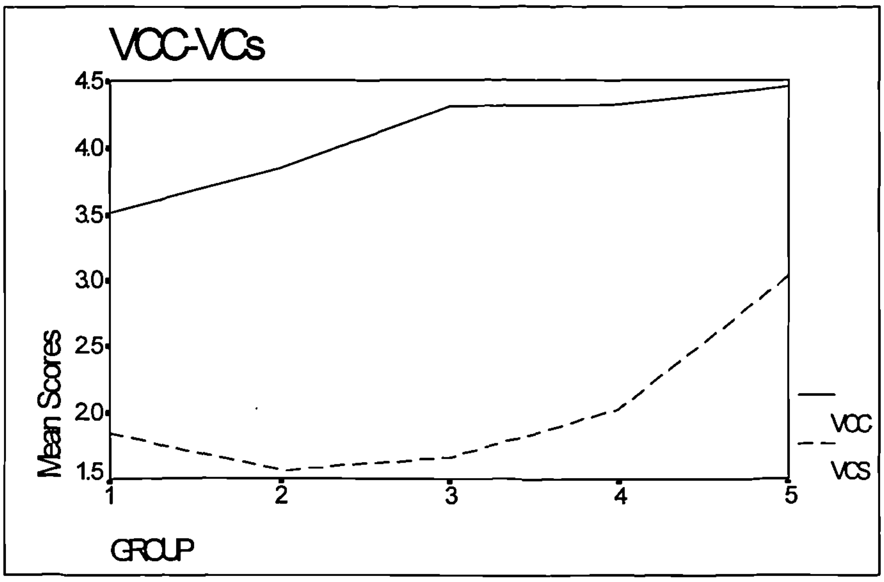
b) VCC and VCs.

Two-consonant clusters in the coda are ungrammatical in Spanish, unless the second consonant is /s/. Ten VCC words were created to test their acceptability: five that did not contain /s/ as the last segment (henceforth VCC) and five others with /s/ (henceforth VCs). VCC clusters complied with the principle of the Sonority Hierarchy. Some examples of these words were 'porse**berd**', 'sa**polm**'. VCs words contained this cluster in word medial position (recall this is the only position where it would be possible in Spanish). Some examples are 'inspa**ra**ta' and 'ins**te**re'. Two VCs words ('perspa**ta**na' and 'abs**pu**mo') were rated ungrammatical by 7 out of 10 subjects in the control group, so they were removed from the study as this probably meant there was some error in test design. The results of VCC words correspond to five words and those of VCs words correspond to three words. Mean scores are shown on Table 5 and Figure 6.

Table 5: VCC and VCs

GROUP	VCC	VCs
1 (BEG. 1)	3.51 (0.64)	1.84 (0.59)
2 (BEG. 2)	3.85 (0.57)	1.56 (0.57)
3 (INT)	4.32 (0.43)	1.67 (0.51)
4 (ADV)	4.33 (0.38)	2.03 (0.86)
5 (NS)	4.46 (0.44)	3.03 (0.76)

Figure 6



Significant differences were found between the scores of the two categories of words (VCC and VCs), (F(1,54)=375.74; p<0.001) and also in the mean scores of the group variable (F(4,54)=11.53; p<0.001). There is also a group by word-type interaction (F(4,54)=4.34; p<0.01). The interaction only disappears when both groups 1 (Beg1) and 5 (NS) are removed. We then get a main effect for group (F(2,33)=4.43; p<0.05) and for coda type (F(1,33)=304.27; p<0.001) but no interaction effect (F(2,33)=0.76; p<0.50)

One observation that needs to be made about the results of VCs is that the behaviour of the control group is somewhat puzzling. Considering the fact that these words are possible in Spanish, it is surprising to see a mean score so high (3.03) produced by native speakers. This is also reflected in the fact that no less than seven subjects rated the two words that had to be removed as impossible. Notice that the mean score of the VCC clusters produced by native speakers is a lot higher and that with this category of words the control group has no difficulty in predicting their unacceptability. One possible explanation for this different behaviour may have to do with the fact that native speakers are reacting to the special status of /s/ in phonological structure. The correct representation of the /s/ is by adjunction and therefore this segment is not present in the underlying representation in the same way as a real coda consonant would be. The control group may be hesitant as to whether the /s/ is analysed by adjunction or as a coda. Given that this was a test with nonsense words, the acceptability of these items was not so easy to determine. In the absence of previous exposure to these words, some may be assuming it is a coda, in which case they would rate them as unacceptable, while others may be assuming that the /s/ is an adjunction, therefore rating it as acceptable, hence the mean score close to three that we get. Closer examination of the data actually reveals exactly this behaviour: of all mean scores computed, 13 judgements were 1 or 2 (acceptable) 7 were 5 (don't know) and 12 were 4 or 5 (unacceptable).

Non-natives, however, accept VCs clusters and clearly distinguish them from VCC clusters. Once again, we see that the realisation of what syllabic patterns are impossible (VCC) in a given language is something that learners can master from a very early stage, even in cases where the structure is permitted in the L1 but not in the L2. It is interesting to note too that the non-natives realise that VCs is indeed a possible structure. The existence of VCs words in Spanish is what triggers the distinction. Note, however, that they differ with respect to the control group in the mean ratings given to these items (much lower than the ones found among natives). This may well signal a different underlying representation of the /s/. While native speakers may be aware that this may be attached as a coda or by adjunction, non-natives may be using their L1 representation and may be accepting VCs codas because the /s/ is a coronal consonant. This might be what gives different mean scores in the two cases. If this is the case, it remains to be explained why certain aspects of phonology are transferred from L1 (the underlying representation of the /s/) while others (the unacceptability of VCC and VCCC structures) are acquired without any influence of the L1.

Another aspect that needs some comment is the fact that the absolute beginners group (Beg 1) is clearly behaving in a different way from the other non-native groups. That is, the difference between the mean scores of VCC and VCs is significant. This is because the mean rating of the ungrammatical types is lower than in the case of other groups. A recurrent pattern that is emerging is that with increased exposure to the language, learners' awareness about unacceptability increases too.

The last commentary concerns the differences found among groups in the treatment of VCC syllables. Even though they all distinguish VCC from VCs syllables, it is evident that not all groups are equally sharp about intuitions on ill-formedness. A one-way analysis of variance of the VCC clusters allows us to see that there are significant differences among groups, which seem to correspond to three different stages; on the one hand, the two groups of beginners, and on the other the intermediate and the advanced group. The latter are also significantly different from the natives and so the development would be 1, 2 /3, 4/ 5. So even though they have an awareness of the difference between VCC and VCs, they are not as good as natives at ascertaining that VCC is impossible. In the case of VCs structures, the one-way analysis of variance gives us significant differences between the native group and the other non-natives. This is caused by the unusually high rating given by the natives to these classes of words. This behaviour has been already commented on above.

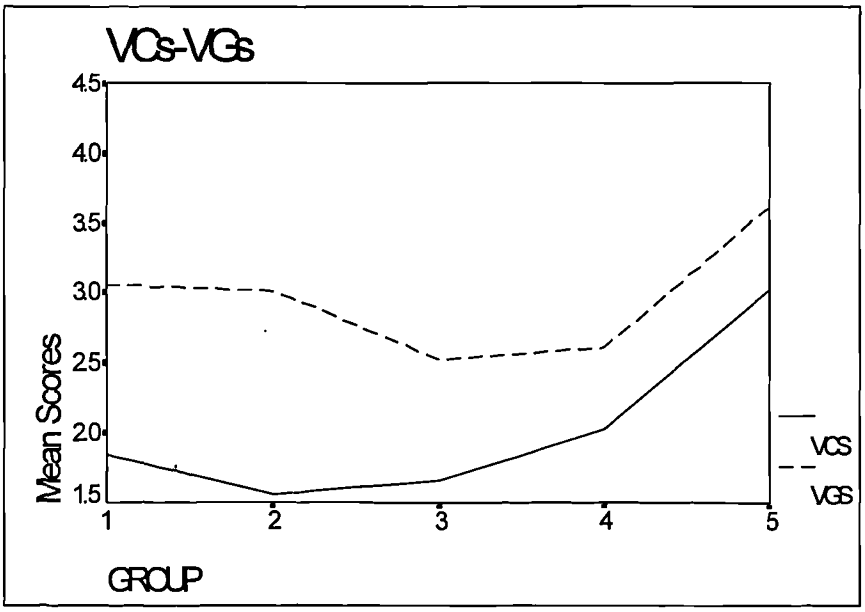
c) VCs and VGs.

Since we now know that /s/ is treated by non-natives in a different way from any other coda consonant, we might be able to find out what happens with the underlying representation of VC and VG codas by comparing VGs and VCs structures. Five words were created with a VGs structure and the same VCs words were used to make comparisons. Some examples of VGs words are 'aus**me**ca' or '**pei**sdo'. Results are shown in Table 6 and Figure 7.

Table 6: VCs and VGs

GROUP	VCs	VGs
1 (BEG. 1)	1.84 (0.59)	3.06 (0.58)
2 (BEG. 2)	1.56 (0.57)	3.01 (0.62)
3 (INT)	1.67 (0.51)	2.53 (0.60)
4 (ADV)	2.03 (0.86)	2.62 (0.67)
5 (NS)	3.03 (0.76)	3.62 (0.65)

Figure 7



The comparison of the mean scores of structures which contain an /s/ gives us an interesting picture. If we look at the graph we see that prior to the intermediate level, learners give higher ratings to words that contain /s/ after a consonant and a lower rating if it follows a glide. Comparison of mean scores of the two word types (VGs and VCs) gives us significant results precisely at this point: we get a main effect for group ($F(4,54)=7.95$; $p<0.001$), for word type ($F(1,54)=118.21$; $p<0.001$) and also a group by word type interaction ($F(4,54)=3.99$; $p<0.01$)) but if we remove groups 4 and 5 this interaction disappears ($F(2,35)=1.93$; $p<0.25$)).

Recall that the /s/ is syllabified by adjunction in Spanish. Let us recall too that in English, the off-glide is syllabified in the nucleus while in Spanish it is part of the coda. We clearly get different judgements for VGs and VCs up to the intermediate level, and the advanced learners are behaving in a way that signals that they are close to the native parameter setting. The explanation for this different behaviour must rest in the way that the two structures (VG and VC) are represented. If the /s/ is treated by the non-natives as having the special status it has in English (recall that coronal consonants appear in the coda but can violate the maximal number of syllable weight), the mean scores of VCs structures should be low, as we saw that they were aware that two coda consonants were impossible in Spanish. This is exactly what we find.

In the case of VGs structures, the mean rating is higher, and interestingly, close to three, clearly signalling uncertainty about their acceptability. This uncertainty is not resolved until a much later stage (advanced) when they are able to give lower ratings and realise that there is no difference between VCs and VGs. Note that despite the fact that the scores of the intermediate group are not significantly different from those of the two groups of beginners, we already start getting a lower rating. However, these results just tell us that they are unsure about its status at the beginning, and that later on they accept it in a way that is not significantly different from the native group, but it does not tell us how they are analysing the glide. We have no way of knowing whether the G is in the nucleus or in the coda in their IL. Recall they could transfer the English setting and put it in the nucleus or adopt a native representation put it in the coda. In order for us to know where it is represented, we need to compare the mean scores of VCC structures and VGC structures.

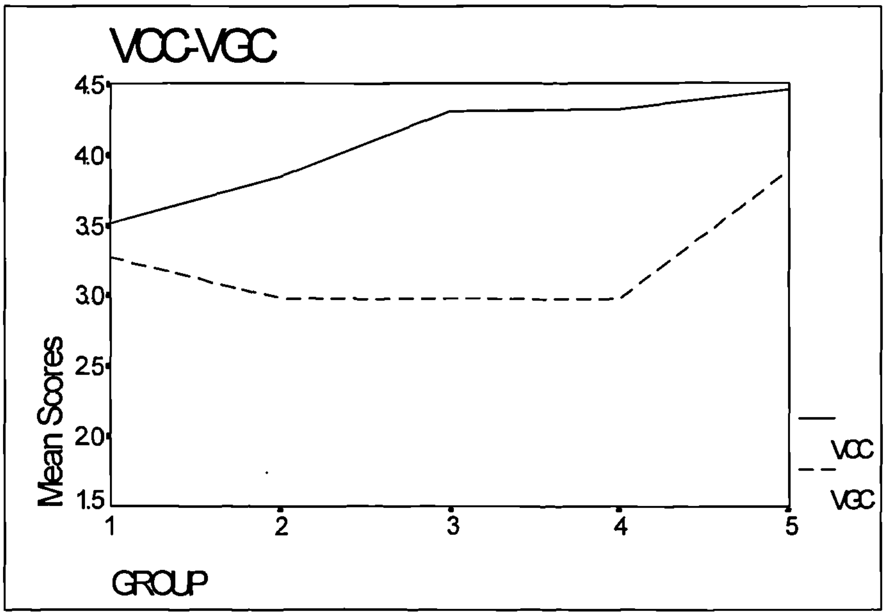
d) VGC and VCC

Both structures are ill-formed in Spanish, as the off-glide occupies the coda and the maximal number of coda elements in Spanish is one, unless the second consonant is an /s/, which was not the case in the words that belonged to these categories. Five other words were created that contained VGC structures and were compared with the VCC types described above. Some VGC examples are '**tauf**to' or '**ca**l**oun**ta'. One of the words (**caum**bo) was considered to be well-formed by eight control subjects so it was removed from the study. The results therefore correspond to five VCC words and four VGC words and are shown on Table 7 and Figure 8.

Table 7:VCC and VGC

GROUP	VCC	VGC
1 (BEG. 1)	3.51 (0.64)	3.27 (0.72)
2 (BEG. 2)	3.85 (0.57)	2.98 (0.49)
3 (INT)	4.32 (0.43)	2.98 (0.47)
4 (ADV)	4.33 (0.38)	2.98 (1)
5 (NS)	4.46 (0.44)	3.87 (0.72)

Figure 8



Analysis of the data gives us a main effect for word type (VGC versus VCC) ($F(1,54)=77.23$; $p<0.001$) and for group ($F(4,54)=4.81$; $p<0.01$) as well as a interaction ($F(4,54)=4.81$; $p<0.01$), which means that the subjects clearly identified these two word types as belonging to two separate categories. However, this difference in the distinction is affected by the group variable. We therefore need to find out which group(s) is causing the interaction. Removal of group 1 (Beg 1) gives us an interaction that is close to the level of significance ($F(3,42)=2.4$; $p>0.05$). The p score is in fact 0.08, which falls within the range of >0.05 and <0.10, so we are justified in exploring the data further. Removal of both groups 1 (Beg 1) and 5 (NS) finally makes this interaction effect disappear ($F(2,33)=1.45$; $p=0.25$).

We are then justified in distinguishing three main stages: one that would involve absolute beginners where the nature of the scores gives us a lot of indeterminacy. The difference in the rating of VGC versus VCC by the first beginners group is significantly different from the other non-natives. They are unsure about the status of VG, given the mean scores around 3. Note that if they were using transfer, the mean rating should have been much lower, since VG would be in the nucleus and C in the coda, so the maximal number of segments in the rhyme would be satisfied. A second stage would involve the advanced beginners, the intermediate and the advanced learners. These subjects are clearly separating VG from VC structures. They are clear that VCC structures are unacceptable, but they are not able to distinguish that the glide in VGC is in coda position and therefore is as unacceptable as VCC. Note that we cannot go from this evidence to suggest that the glide is therefore represented in the nucleus as in English. All we know is that it is not considered to be like VCC structures where the second segment is indeed in the coda. The fact that the mean rating of VGC structures for the advanced beginners, intermediate and advanced learners is around 3 might signal that the mechanism that is driving this representation is not transfer but involves UG. They are unsure about the representation but they certainly do not revert to the one in L1, otherwise they would not be making the distinction between this cluster and VCC.

This representation is unstable for a long time and understandably so since the type of data that might trigger one representation or the other is practically impossible to find in Spanish. In theory, if the glide were in the nucleus, we could still make the generalisations about stress regarding the two-syllable window (recall that the appearance of a heavy syllable in penult position restricts the appearance of stress in Spanish to the last two syllables, but the heavy syllable is also triggered by a branching nucleus like GV, not only by a coda position –see Chapter 2). The only evidence that could signal that the glide is in the coda in Spanish comes from the interaction of the maximal syllable length rule and the fact that only one coda position is allowed. If the off-glide is in the nucleus, then we would still be allowed to fill in the coda position with another consonant without violating the maximal syllable length rule. This would create VGC structures. In other words, the evidence that the learners need to represent the glide correctly is negative evidence, the absence of such structures from Spanish.

It is interesting, though, that the fact that VCCC and CCCV structures are impossible in Spanish was picked up at a very early stage while the realisation of the ill-formedness of VGC takes much longer. The reason for this may have to do precisely with the position that it occupies in the middle of the syllable. Coda conditions need to be (and seem to be in this case) specified and realised first before the nucleus is figured out. This finding is interesting because there is a parallel here between the way that L1 learners go about producing complex syllables and the way that these L2 learners develop a representation of L2 syllables. Demuth (1995) claims that in the development of prosodic structure, children display the following stages:

Stage 1; Core Syllables:		CV
Stage 2; Minimal words:	Stage 2a	(C)VCV Epenthesis (σ>σσ)
	Stage 2b	(C)VC Bimoraic feet (σ>σ)
	Stage 2c	CVV
	Stage2b,c	CVC-CVtense

In other words, after the monosyllabic monomoraic stage, the child first produces bimoraic bisyllabic words, then bimoraic monosyllabic words of the type (C)VC, that is, bimoraic by virtue of the coda and lastly, bimoraic feet which include the distinction of tense vowels and presumably diphthongs. In other words, the development of coda consonants precedes the development of a complex nucleus. This is exactly the same development that we are witnessing in the case of English L2 learners of Spanish.

5.1.1.4. Nucleus

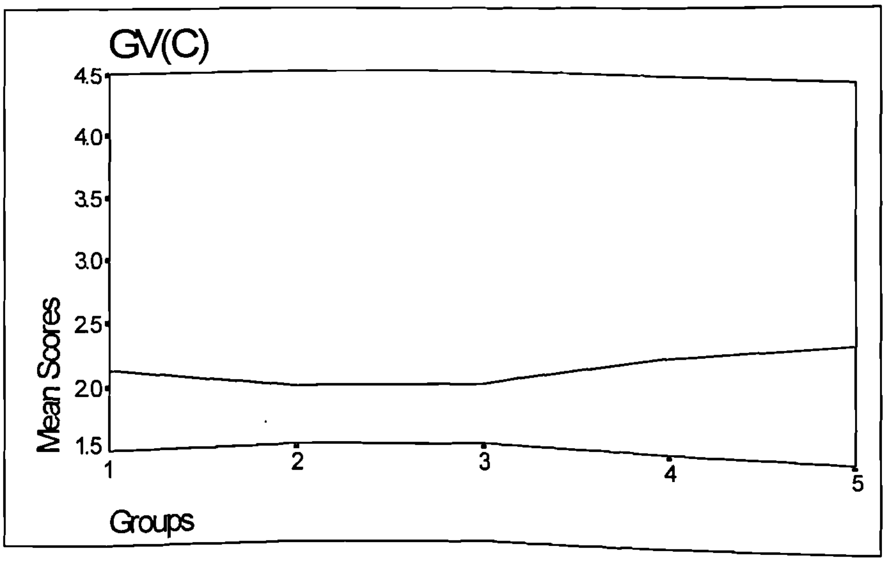
a) CGV(C)

Recall that the nucleus in Spanish can be maximally binary branching. Given that Spanish does not have long vowels, it can only be occupied by the diphthong GV. A group of two CGV words (i.e. '**llue**co') or CGVC words (i.e. '**rias**to', '**rulien**to') was created to test subjects. These learners could rate these words as acceptable if they used transfer, since the number of coda positions would be satisfied (if the glide is analysed in the onset, we could be left with a maximum of two other segments in the rhyme). However, they would also have to accept the appearance of the glide after a liquid, clearly violating the MSD for English. Results of means scores for these words and a graphical representation are given below in Table 8 and Figure 9:

Table 8 CGV(C)

GROUP	CGV(C)
1 (BEG. 1)	2.14 (0.44)
2 (BEG. 2)	1.95 (0.63)
3 (INT)	1.97 (0.62)
4 (ADV)	2.27 (0.62)
5 (NS)	2.48 (0.89)

Figure 9



Analysis of the data with a one-way analysis of variance does not yield statistically significant results in the mean scores across groups. This means that we have to assume that all subjects are behaving as if they belonged to the same group. Even if learners use transfer they are also realising that the LGV combination is a possible structure. It could also be the case that learners are accepting these structures because they are hearing not one syllable in LGV but two, that is, that they are hearing LV.V. The only way to find out the reason behind these judgements would be to ask the subjects to say the number of syllables they can hear, something that was not done in the present study but could be done in future research.

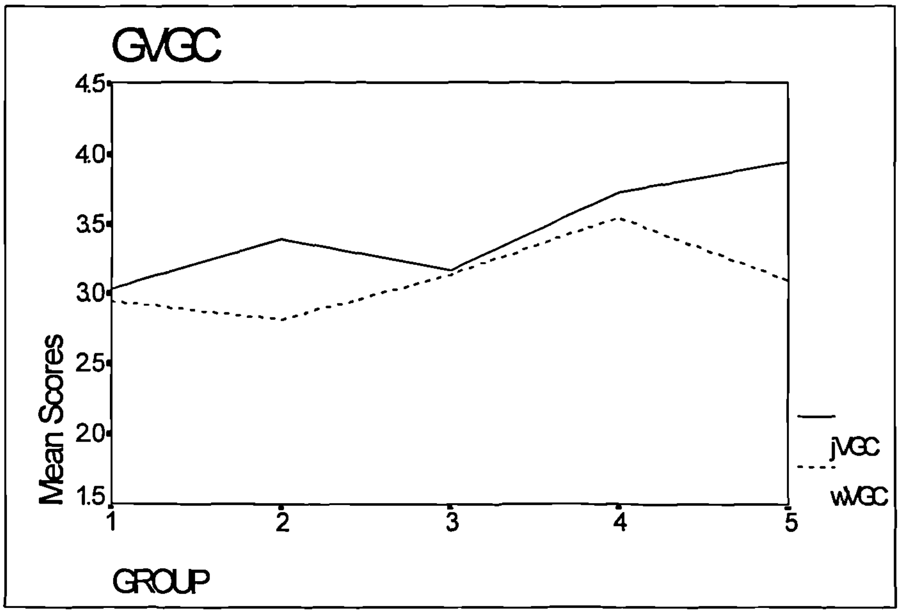
b) GVGC

This group of words was created to test the representation of the on-glide. Recall that if the on-glide is analysed in the onset, learners might accept this structure, as it nevertheless complies with the maximal number of rhyme positions in Spanish. Five words were created with this structure, two where the on-glide is /j/ and three where the on-glide is /w/. Some examples of the words used were 'cha**pieur**mo' and '**cuain**co'. Mean scores for the groups are given in Table 9 and Figure 10.

Table 9:GVGC

GROUP	JVGC	WVGC
1 (BEG. 1)	3.04 (0.85)	2.95 (0.54)
2 (BEG. 2)	3.38 (0.82)	2.82 (0.88)
3 (INT)	3.17 (0.68)	3.14 (0.48)
4 (ADV)	3.73 (1)	3.55 (1.01)
5 (NS)	3.95 (0.60)	3.10 (1.13)

Figure 10



The analysis of the words does not give us a main effect for the group variable (F(4,54)=2.01; p=0.10 but it does yield a main effect for category (whether it is wVGC or jVGC) (F(4,54)=1,54)=7.88; p<0.010). There is no interaction effect (F(4,54)=1.58; p>0.10). So we have to assume that there are no developmental sequences in the acquisition of the correct representation of the on-glide. We have to assume that learners do not use transfer but from an early age manage to figure out that the on-glide appears in the nucleus in Spanish. The type of evidence that exists in the language to help them arrive at this correct representation is more robust: recall that GV nuclei attract stress and also that the appearance of LGV combinations in Spanish should make them reassess their L1 representation if they analysed it in the onset (as it would violate the MSD). Not only is there a large number of these words in Spanish but recall that they did not have trouble identifying this structure either (see previous section on GV(C) words). At this point, and without the results from the other tests, we have to assume that either this representation changes before the stage at which these data were collected (the mean exposure to Spanish of group 1 was 7 months) or else learners start with a default analysis of the glide which turns out to be the correct one for Spanish. The other possibility, as we suggested above, is that they accept them because they can hear two syllables (CV + VC) instead of one. In the light of the present data, it is impossible to determine the real cause.

5.1.1.5. Summary of Findings

Here in Table 10 is a summary of the syllable structures discussed:

Table 10

	Findings	Possible explanation
ONE-MORA WORDS	No significant differences	Revert to default Minimal word setting
TWO-MORA WORDS	No significant differences	Transfer
CCCV/sCCV	No interaction	
CCCV	Stages: 1,2,3/4/5	Default Branching Onset Parameter
SCCV	Stages: 1,2,3/4/5	Default Branching Onset Parameter
CCV gram-CCV ungr.	Natives significantly better	Default Branching Onset Parameter
CCVgram.	Stages: 1/ 2, 3, 4, 5	Default value
CCV-Ungram	Stages: 1, 2, 3, 4/ 5	Default value
VCCC-VCCCo	No interaction	
VCCC	No stages	Transfer/Default coda setting
VCCCo	Stages: 1,2, 3, 5/ 4	Default coda setting
VCC-VCs	Interaction for 1, 5	
VCC	Stages: 1, 2/ 3, 4/ 5	Default coda setting
VCs	Stages: 1, 2, 3, 4 /5	Transfer of representation of /s/
GV:	No significant differences	Correct representation or perceptual error
LGV:	No significant differences	Correct representation or perceptual error

/s/ is represented as in English throughout stages

VG: The representation of G is not transferred but it is not like in L1 either.

Codas are acquired before the nucleus is acquired

5.1.2. Results of production data

5.1.2.1. Transcriptions and coding of the data

Before I comment on the results, I should explain how the data were transcribed and coded. Recall that the story that was used as the basis for the production data was constructed around the selection of certain words that conformed to the syllable structure or stress patterns we were interested in examining. Therefore only these words were transcribed. I have divided the results according to the task they had to perform. Recall that after listening to the story twice, they had to retell it in their own words. The pronunciation of the words used in this task was classified as spontaneous production. In some cases, subjects could not recall a word and they either asked for the word in Spanish or were told the word and were asked to repeat it. These data are coded imitation productions. The second task was a reading task: they were given the written text of the same story and they were asked to read it aloud. These data were coded reading.

When the transcriptions were subsequently analysed to code productions according to the different patterns they produced, segmental accuracy was not crucial. Let me clarify what I mean by this with an example. For instance, when looking at production of the minimal word in Spanish (a stressed monomoraic and monosyllabic word), if the subject was producing CV and the quality of the vowel was not exactly native-like, the production was accepted as correct as long as the vowel was not long or centralized. What mattered for our purposes was whether the structure CV was produced in a stressed position, not whether the word was produced totally native-like. The same goes for consonant segments. It could be the case that some consonants were not produced target-like (e.g. the plosive had some aspiration or the quality of /r/ was English-like), but if the structure CV was achieved, the rendition was accepted as correct. The same goes for all the other categories of words examined.

Another explanation is needed for the different number of instances of the same word category. The number of total productions obviously depends on the type of task the test subjects were performing. The most homogeneous data in terms of numbers was produced in the reading task, as they could not improvise or avoid the words. However, even in this task one can observe differences in the total number of tokens across groups. This is partly due to the fact that there are different numbers of subjects in each group (11 for the advanced group, 12 for the intermediate and 13 for the two groups of beginners), and partly because some data had to be treated as void. This was the case when the word produced had very little resemblance to the original. Thus although differences in segmental production were ignored, if the subject produced words which not only contained different numbers of syllables but also different segmental structure from the original, those words were removed. In addition, if words were repeated, both productions were included. Finally, in a very small number of cases, the recording was not good enough to allow us to transcribe it.

Where the situation differs is in the imitation and production data. Imitation data are the most fragmentary, as the inclusion of this category depends on the difficulty of the words (note that the amount of imitation data increases in the beginners groups). In the case of production data, when I realised that they had avoided the production of some of the word types I was interested in, I prompted them with questions to elicit the words. Sometimes, however, they continued to avoid them by using circumlocutions or synonyms, other times they simply did not recall or know these words in Spanish, so the only solution was to tell them the words and ask them to repeat. The cost of doing this is, of course, that we lose spontaneous data and only get a fragmentary glimpse of imitation data. Moreover, note that the tokens in both spontaneous and imitation data do not necessarily come from the same number of subjects. In some cases, only half or less then half of the subjects produced the words in the spontaneous data. This is particularly true of categories that contained a very small number of words or where the word chosen was only mentioned once in the story. Despite these limitations, I think it is important to examine the different type of data as they provide a glimpse of the possible different strategies that learners may be employing depending on the task. For example, since reading is an acquired skill, different from linguistic ability, the strategies they used in reading might be different, especially when we compare beginners and advanced students.

Based on the description of syllable structure in Spanish and English in Chapter 2, the focus of the production tasks was those areas where the two languages differ. The reason behind this decision was the assumption that learners would not have any trouble producing structures identical to those in their L1. For instance, there doesn't seem to be much point in testing the production of CCV structures of the type 'tropezar' (=trip over) since the MSD parameter setting is the same in both languages[3].

Therefore the main focus for the production data relating to syllable structure was on three main areas:

-Minimal word length.

-Representation of the on-glide and interaction with the MSD parameter.

-MSD in CCGV structures.

Each of these areas will be commented on in detail in the following sections.

5.1.2.2. Minimal word length: one or two moras?

The story contained four words that contained one mora and four others that contained two moras. The one-mora words we included were 'té' (=tea), 'no'(=no), 'sé' (=I-know), 'va' (=he-goes). The two-mora words were 'sol'(=sun), 'más' (=more), 'luz' (=light) and 'muy' (=very). Some of these words were repeated more than once in the story, so in total, there should have been 23 cases of one-mora words and 16 of two-mora words in the reading task. Results for one-mora words are shown in Table 11 and for two-mora words in Table 12. There was only 1 token in the imitation data for one-mora words by the Beg1 group, and it was correctly produced as CV. Given the small amount of imitation data, this table has not been included[4].

[3] Anecdotal evidence from teaching English L2 learners of Spanish supports this approach. While it is true that the correct representation of /r/ in Spanish is difficult to achieve for English speakers, learners generally produce CCV structures with /r/ correctly, even in the early stages. Errors produced are typically the result of segmental production. In terms of syllabic *structure*, these clusters are generally produced correctly (i.e., we get an obstruent and a liquid in onset position). The same goes for other areas where there is identity; there does not seem to be any point in testing CV structures, or even CVC structures.

[4] Tables should be read as follows: The total number of productions for each group is given in brackets under the name of the group. The total number of raw scores for each production type is given in brackets in the corresponding cell. The proportion that this number represents is given above in decimal numbers.

Table 11: One-mora words: 'té, no, sé, va'.

	Reading task				Spontaneous			
GROUP: (Total N)	BEG1 (299)	BEG2 (299)	INT (276)	ADV (253)	BEG1 (31)	BEG2 (26)	INT (35)	ADV (19)
Correct: CV	0.996 (298)	1 (299)	0.99 (273)	0.996 (253)	0.9 (28)	1 (26)	0.66 (23)	0.95 (18)
CVi/w	(0)	(0)	0.01 (3)	(0)	0.1 (3)	(0)	0.31 (11)	0.05 (1)
CV:	0.003 (1)	(0)	(0)	0.003 (1)	(0)	(0)	0.03 (1)	(0)

Table 12: Two-mora words: 'sol, más, luz, muy'.

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (208)	BEG2 (208)	INT (192)	ADV (176)	BEG1 (6)	BEG2 (11)	INT (23)	ADV (20)
Correct: CVG/C	1 (208)	1 (208)	1 (192)	1 (176)	1 (6)	0.82 (9)	0.85 (20)	1 (20)
CV+Ce	(0)	(0)	(0)	(0)	(0)	0.09 (1)	0.1 (2)	(0)
CVC+e	(0)	(0)	(0)	(0)	(0)	0.09 (1)	(0)	(0)
CV:	(0)	(0)	(0)	(0)	(0)	(0)	0.05 (1)	(0)

	Imitation			
GROUP (Total N)	BEG1 (6)	BEG2 (3)	INT (0)	ADV (0)
Correct: CVG/C	1 (6)	0.66 (2)	(0)	(0)
CV+Ce	(0)	0.33 (1)	(0)	(0)

As we can see, both in one- and in two-mora words the subjects are producing almost perfect productions in the reading task. In the case of one-mora words there are a few more errors, but the correct productions are all around 99% so these errors can be considered negligible. There is more variation in the spontaneous productions. As well as seeing fewer target-like productions than in the reading task, we also observe that the intermediate group is behaving considerably below the average with one-mora words. If we compare their behaviour with the results of the acceptability judgement task, we observe only a slightly higher mean score for this task. Therefore there seems to be some correlation between the higher mean scores in the acceptability judgement task and the production data we see here. Given that all the other groups behave similarly, the behaviour of the intermediate group cannot be the result of a developmental pattern and another explanation must be sought. Examination of the cases where the diphthong occurred shows that 9 out of the 11 cases of diphthongisation involved the word 'no', which was pronounced /nɔu/. The remaining two involve diphthongisation of /e/ into /eɪ/. The pronunciations of 'no' are therefore clear copies of pronunciation of a cognate word and should really be discarded (interestingly, the three instances of diphthongisation found among the Beg 1 group also involve this word).

It is important, however, to look at the cases of /e/ diphthongisation. Despite the fact that the errors represent a very small proportion of all errors, I think they merit an explanation, which is linked to a more general explanation about the speed with which the minimal word parameter seems to be reset. It is strange that even absolute beginners display such a quick resetting of this parameter when this involves reverting to a more restrictive setting than the one found in their L1[5].

Moulton (1990:123) mentions that the pronunciation of /ɛ/ (as in 'pet') and /eɪ/ (as in 'pay') in Standard American English 'varies between monophthongal and diphthongal'. Although I have found no other references about the vowel quality of the mid-western dialects (the variety that most of the subjects in the study spoke), in the light of this finding, I question that the apparent acquisition that we seem to be witnessing here, both at the level of representation and production, is a true case of parameter resetting. I would like to suggest that it is likely that this is a case of L1 transfer. Data collection from British English speakers can shed some light on this issue, the subject of further research.

Let us now look at the case of two-mora words. The repair strategy learners tended to use in spontaneous or imitation data with one-mora words involves the creation of a heavy nucleus (either by diphthongisation or by vowel lengthening) while in the case of two-mora words the preferred strategy is the creation of a bimoraic bisyllabic word. What is interesting about this is that the vowel they are employing to create these extra syllables is the correct underspecified vowel in Spanish /e/, not the English /i/ and that even the Beg 2 learners are aware of what the underspecified vowel is in Spanish. Harris (1995) suggests that the correct representation of final-consonant words in Spanish is with an empty vowel. If this vowel surfaces, as in the case of plural formation, this vowel is

[5] While it is true that there is a large number of positive evidence in Spanish, which should help them reset it, the results found here clearly contrast with the behaviour I was used to in my contact with British students of Spanish. In the case of British students, diphthongisations of minimal words and final open syllables are frequently heard even at advanced levels. This is obviously anectodal data but this observation

the underspecified /e/. If learners are aware that all final consonants have this representation, then they should also have a head start in stress assignment, as they will be aware that there is an extra stress-bearing unit at the end of the word. This will be discussed again when we look at stress in section 5.2.2.2.

5.1.2.3. Representation of the on-glide and interaction with the MSD parameter

As well an acceptability judgement test to gain an insight into the representation of the on-glide in the IL phonology of the subjects in this study, some production data of GV structures was collected. Specifically, the interesting contexts were the production of these complex nuclei with an onset. Onsetless contexts were considered to be less interesting since learners could produce such syllables using transfer from their L1. What really mattered was whether they could produce these with simple and complex onsets. Only by looking at their realization in these contexts can see whether they mastered these structures, since it is only in these contexts that there might be a conflict between the representation of the on-glide and their MSD parameter setting.

The contexts chosen for this test were Obstruent+GV (OGV) and Liquid+GV (LGV).

5.1.2.3.1. Obstruent + GV

The simple onset chosen for the test words with this structure was an obstruent. In this context, learners could produce the structure correctly even if the on-glide was transferred from English and was not represented in the nucleus, because there would not be a conflict with the MSD setting. Within this category of words four different sub-classes were distinguished, depending on the syllable and word structure configurations that could obtain[6]:

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led me to inquire whether this apparent speed in acquisition might be linked to the dialectal phonology of their segmental inventories.

[6] Stressed syllables have been marked in bold. Note that on all the words stress fell on the target syllable structure being tested.

<u>CGV+ σ</u>: Two words, '**pue**blo' (=village) and '**bue**no' (=good) represented this category. The on-glide was /w/ in both words. Results appear in Table 13.

Table 13: CGV+σ. Words: 'pueblo, buena'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (77)	BEG2 (79)	INT (61)	ADV (67)	BEG1 (2)	BEG2 (4)	INT (28)	ADV (15)
CGV+σ	0.74 (57)	0.78 (62)	0.84 (51)	0.99 (66)	1.00 (2)	1.00 (4)	0.86 (24)	1.00 (15)
CV+V+σ	0.26 (20)	0.19 (15)	0.16 (10)	0.01 (1)	(0)	(0)	0.14 (4)	(0)
CCV2+σ	(0)	0.02 (2)	(0)	(0)	(0)	(0)	(0)	(0)

As we can see, the subjects are producing a target-like structure in a great majority of cases. Performance improves as the level increases, but even the Beg1 group is producing correct structures for around 75% of the cases. English does not contain /pw-/ and /bw-/ structures but very early on these learners start producing these clusters in Spanish. In the acceptability judgement test, learners also behaved similarly to natives when they had to identify whether CGV structures were possible. However the test words of the type CGV contained liquids as onsets and the combinations /bw-/ or /pw-/ were not tested. These results would seem to indicate that even the filter that prevents these structures in English is not operating and that almost from the start learners realise that Spanish is different from English. The effect of transfer is more noticeable at the beginning levels, but even there learners are performing at high levels of accuracy.

Note also that the preferred repair structure in the case of errors is CV+VC. This means that learners prefer segment preservation over deletion. Learners are clearly perceiving the two vowel elements and even when they do not produce the glide, the two vowel positions are preserved. Another interesting finding is that the results of the spontaneous task are similar to those from the reading task.

<u>CGVC+σ</u> : This is the syllable that contains the on-glide and had the maximal number of rhyme positions allowed in Spanish. Four words, '**Cuen**ca' (=Proper name), '**guan**tes' (=gloves), '**puer**ta' (=door) and '**suer**te' (=luck), contained /w/ as the on-glide, and two, '**fies**ta' (=party) and '**sies**ta'(=nap), contained /j/. Results for /j/ appear in Table 14a and for /w/ in 14b.

Table 14a: CGVC+σ. Words: 'Cuenca, guantes, puerta, suerte'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (43)	BEG2 (52)	INT (46)	ADV (44)	BEG1 (4)	BEG2 (7)	INT (14)	ADV (16)
CGVC+σ	0.39 (17)	0.42 (22)	0.41 (19)	0.73 (32)	(0)	0.14 (1)	0.29 (4)	0.44 (7)
CGV +σ	0.02 (1)	0.06 (3)	0.02 (1)	0.04 (2)	0.25 (1)	(0)	(0)	(0)
CV+VC	0.53 (23)	0.52 (27)	0.56 (26)	0.23 (10)	0.50 (2)	0.43 (3)	0.64 (9)	0.56 (9)
Other[7]:	0.05 (2)	(0)	(0)	(0)	0.25 (1)	0.43 (3)	0.07 (1)	(0)

	Imitation			
GROUP (Total N)	BEG1 (15)	BEG2 (10)	INT (1)	ADV (4)
CGVC+σ	0.27 (4)	(0)	(0)	0.50 (2)
CV+VC	0.67 (10)	(8)	1.00 (1)	0.50 (2)
Other:	0.06 (1)	(0)	(0)	(0)

Table 14b: CGVC+σ. Words: 'fiesta, siesta'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (113)	BEG2 (117)	INT (108)	ADV (98)	BEG1 (61)	BEG2 (47)	INT (71)	ADV (49)
CGVC+σ	0.14 (16)	0.14 (17)	0.14 (15)	0.29 (28)	0.21 (13)	0.21 (10)	0.21 (15)	0.55 (27)
CV+V	0.85 (96)	0.85 (100)	0.86 (93)	0.71 (70)	0.79 (48)	0.79 (37)	0.79 (56)	0.45 (22)
CV_2C+σ	0.01 (1)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (2)	BEG2 (3)	INT (0)	ADV (0)
CV+V	1.00 (2)	1.00 (3)	(0)	(0)

The picture we are witnessing here is different from what we had seen with CGV structures. The addition of a coda element to CGV brings about a drop in performance. For the words with the /w/, all groups, with the exception of the advanced group show a chance level (50-50) preference for CV+VC and CGVC structures in the reading task.

[7] Structures covered by the 'Other' category include CøVC+σ, øGVC+σ and øV+VC. Note that one of the things structures have in common is the avoidance of the adjacency of the consonant onset with the glide. One way to achieve this is by deleting the onset, another way is by deleting the glide.

The advanced group is much better at producing target-like structures. However, this picture changes in the spontaneous and imitation tasks, where their performance is similar to that found in the other groups.

In the case of /j/ we see a different pattern of behaviour. Subjects prefer CV+VC structures over the target forms and this is the same for the reading and the spontaneous productions. There are two possible explanations for this different behaviour. One could be that the different nature of the glide causes different performace difficulties. The other could be the nature of the words themselves: the words that contain the /j/ are words that have been borrowed into English from Spanish. What the learners could be showing in the reading task is a greater influence from the way that these words have been adapted into English phonology. If we look at the results of the spontaneous task and we compare them, we see similarities between the two groups of words. The advanced group is undecided between CV+VC and CGVC, with about 50% performance in both, while the others clearly prefer CV+VC over CGVC. The fact that this is true of the imitation task as well is evidence in support of this hypothesis. Certainly, the influence of L1 reading will be greater in cases of cognates or borrowing and this is shown here with the comparison of these two types of words.

One last point that needs to be addressed is why there is a mismatch between the results from the acceptability judgement test and the production tasks. Recall that learners had correctly identified which GV structures were and were not possible in Spanish and it seemed to be the case that they had also realised that the on-glide had to occupy a nucleus position. The inability to produce the syllable structure here must mean either that the acceptability judgement test is not powerful enough to tap their competence or that the errors have to do with performance limitations.

In favour of the strength of the acceptability test, one could argue that other aspects of syllable structure, such as the minimal word length, have been correctly mirrored in performance. Of course there could have been errors in test design for words containing GV in the acceptability judgement test that were not present in the case of the minimal word. If this were the case, then the control group would not have been able to judge the acceptability of the words presented accurately. Recall also that those words that were rejected by half of the control subjects or more were also removed from the study.

But there is another possibility that might lend support to the view that the results of the acceptability judgement test could be misleading. The test design can be correct and the test items can be working well for the control group but we could obtain misleading information about the non-natives if these subjects correctly judge the acceptability of GV structures not because they accept GV structures, but because they are not perceiving GV but two syllables (V+V), exactly the performance strategy they are using here. The only way to test this would have been to ask them during the task how many syllables they perceived.

In the absence of such information, one can only speculate about what really happened. Evidence that might shed some light on this has to do with the way that most learners tended to imitate the words they did not know. Often, they would start by repeating the word after me once, normally without being asked to. In the case of structures with the on-glide, they would often repeat it at least once again after the initial imitation. One would think that the reason for this was to improve their initial pronunciation, i.e. they realised that their pronunciation had not been accurate (GV). However, most of the time the imitations were identical to their first production (normally V+V). This could be taken as an indication that what they were experiencing was difficulty with the production of the structure, but not necessarily that the correct syllable structure had not been noticed. Likewise, it could be argued that the repetition was just an exercise to enable them to remember the new word they had heard. There is no way of knowing which of the two possibilities is correct.

What these results show, in any case, is the necessity of carrying out perceptual and other types of tests (e.g. judgement tasks) in phonology to make sure that we do not take performance limitations as competence errors or that the production we see is indeed the result of their IL competence.

σ+CGVC+σ Another syllable was added to the previous structure in order to test whether the repair strategy differed from the other types of words. Three words that contained a /j/ as the on-glide represented this category: '**invierno**' (=winter), '**cubierto**' (=overcast). Results appear in Table 15.

Table 15: σ+CGVC+σ. Words: 'invierno, cubierto'

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (34)	BEG2 (24)	INT (22)	ADV (20)	BEG1 (5)	BEG2 (4)	INT (5)	ADV (5)
σ+CGVC+σ	(0)	0.13 (3)	0.09 (2)	0.50 (10)	(0)	(0)	(0)	0.60 (3)
σ+CV+VC+σ	0.85 (29)	0.79 (19)	0.91 (20)	0.45 (9)	1.00 (5)	1.00 (4)	1.00 (5)	0.40 (2)
σC+GVC+σ	(0)	0.04 (1)	(0)	(0)	(0)	(0)	(0)	(0)
σ+ CV_2C+σ	0.12 (4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
σ+ CV_1C+σ	0.03 (1)	0.04 (1)	(0)	0.05 (1)	(0)	(0)	(0)	(0)

Once again, we see similar results to the ones found in the spontaneous production of words like 'fiesta'. The advanced group gets 50% or slightly more of correct forms while all the other groups overwhelmingly prefer CV+VC structures. Note that the other difference is that now that word length is increased, we begin to see more cases of vowel or glide deletion among the beginners groups. This might have to do with memory constraints, as parsing of longer structures for reading may lead to more segment deletions.

σ+CGVC : A syllable precedes the CGVC structure. Only one word, '**adiós**' (=good-bye), containing /j/ as the on-glide, represented this structure. Results appear in Table 16.

Table 16. σ+CGVC. Word: 'adiós'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (13)	BEG2 (14)	INT (13)	ADV (11)	BEG1 (0)	BEG2 (0)	INT (1)	ADV (0)
σ+CGVC	0.31 (4)	0.29 (4)	0.31 (4)	0.54 (6)	(0)	(0)	(0)	(0)
σ+CV+VC	0.61 (8)	0.36 (5)	0.61 (8)	0.36 (4)	(0)	(0)	(0)	(0)
σC+V+VC	0.08 (1)	0.29 (4)	0.08 (1)	0.09 (1)	(0)	(0)	1.00 (1)	(0)
σC+GVC	(0)	0.06 (1)	(0)	(0)	(0)	(0)	(0)	(0)

A similar pattern in emerging here: the advanced group produces target forms in slightly more than 50% of the situations, but the other groups are way behind this mean. Although the preferred structure is still one that favours segment preservation over deletion, note that there is a clear tendency in the Beg2 group to syllabify the onset of the stressed syllable in the coda of the preceding syllable. This is the first case where the preceding syllable does not have codas and so it provides the right context for this to happen.

5.1.2.3.2. Liquid + GV

The same diphthong GV was tested with a liquid as the onset. This syllable appeared in the following contexts:

LGV+σ : One word, '**liebre**' (=hare), contained /j/ as the on-glide and two others, 'rueda' (=wheel) and 'luego'(=then), contained /w/. Results for /j/ appear in Table 17a and for /w/ in Table 17b.

Table 17a. LGV_{+} σ Word: 'liebre'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (9)	BEG2 (11)	INT (11)	ADV (11)	BEG1 (3)	BEG2 (6)	INT (3)	ADV (9)
CGV	(0)	0.09 (1)	0.09 (1)	0.09 (1)	(0)	(0)	(0)	(0)
CV+V	0.44 (4)	0.81 (9)	0.91 (10)	0.73 (8)	1.00 (3)	1.00 (6)	1.00 (3)	0.89 (8)
CV_1	0.56 (5)	(0)	(0)	0.18 (2)	(0)	(0)	(0)	0.11 (1)

	Imitation			
GROUP (Total N)	BEG1 (17)	BEG2 (9)	INT (8)	ADV (5)
CGV	0.12 (2)	(0)	0.25 (2)	0.60 (3)
CV+V	0.76 (13)	1.00 (9)	0.50 (4)	0.40 (2)
CV_1	0.12 (2)	(0)	0.25 (2)	(0)

This is another case of mismatch between the results of the acceptability and the production test. Although learners had accepted LGV structures in the acceptability test, they clearly have not performed as expected. The reading and spontaneous data yield similar scores and we cannot say that any particular group is performing better than the other. Where we see some differences is in the imitation task, with better imitations the more advanced the group is. It is also worth pointing out that while the structure CV+VC is also the preferred repair strategy here, we begin to see a higher use of deletion than in similar structures of the same type (CGV+σ) where the onset was not a liquid. No large differences in performance can be found in the comparison of results with the groups of words that contained /w/ instead of /j/. The only outstanding difference is in the imitation task, where the advanced group performs better with /j/ than with /w/.

Table 17b. $LGV_+ \sigma$ Word: 'rueda, luego'

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (24)	BEG2 (28)	INT (25)	ADV (21)	BEG1 (2)	BEG2 (1)	INT (10)	ADV (10)
LGV+σ	0.04 (1)	(0)	0.04 (1)	0.19 (4)	(0)	(0)	(0)	0.10 (1)
CV+V	0.83 (20)	1.00 (28)	0.96 (24)	0.81 (17)	1.00 (2)	(0)	0.80 (8)	0.90 (9)
CV_2	0.12 (3)	(0)	(0)	(0)	(0)	1.00 (1)	0.20 (2)	(0)

	Imitation			
GROUP (Total N)	BEG1 (13)	BEG2 (9)	INT (1)	ADV (5)
LGV+σ	(0)	(0)	(0)	0.20 (1)
CV+V	1.00 (13)	1.00 (9)	1.00 (1)	0.80 (4)

(σ)+σ+LGV : Two words, 'historia' (=history) and 'varias' (=various) represented this structure. Two others, 'Mario' and 'Gloria', which also belonged to this category, were treated separately since they are proper names that also exist in English and have been incorporated into English phonology. Note, however, that the other two words are cognates too. Results appear in Tables 18a and 18b respectively.

Table 18a. (σ)+σ+LGV. Words: 'historia, varias'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (21)	BEG2 (25)	INT (22)	ADV (22)	BEG1 (0)	BEG2 (3)	INT (2)	ADV (3)
(σ)+σ+LGV	0.14 (3)	0.40 (10)	0.64 (14)	0.82 (18)	(0)	0.67 (2)	1.00 (2)	0.67 (2)
(σ)+σL+V+V	0.14 (3)	0.16 (4)	0.09 (2)	0.04 (1)	(0)	(0)	(0)	(0)
(σ)+σL+GV	0.48 (10)	0.40 (10)	0.23 (5)	0.14 (3)	(0)	(0)	(0)	0.33 (1)
(σ)+σ+LV+V	0.24 (5)	0.04 (1)	0.04 (1)	(0)	(0)	0.33 (1)	(0)	(0)

Table 18b. σ+LGV. Words: 'Mario, Gloria'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (65)	BEG2 (62)	INT (59)	ADV (55)	BEG1 (26)	BEG2 (33)	INT (14)	ADV (27)
σ+LGV	0.18 (12)	0.53 (33)	0.52 (31)	0.84 (46)	0.08 (2)	0.67 (22)	0.64 (9)	0.70 (19)
σL+V+V	0.25 (16)	0.18 (11)	0.17 (10)	0.09 (5)	0.42 (11)	0.03 (1)	0.07 (1)	0.22 (6)
σL+GV	0.48 (31)	0.29 (18)	0.29 (17)	0.07 (4)	0.42 (11)	0.30 (10)	0.29 (4)	0.08 (2)
σ+LV+V	0.09 (6)	(0)	0.02 (1)	(0)	0.08 (2)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (1)	BEG2 (2)	INT (3)	ADV (0)
σ+LGV	1.00 (1)	(0)	0.33 (1)	(0)
σL+GV	(0)	1.00 (2)	0.66 (2)	(0)

The results of these words are rather different from the ones seen in the previous word types. In this case, there does not seem to be much difference between the results of the two classes of words (borrowing/cognate). Subjects are much better at producing the target form LGV and we also note that the preferred repair strategy is not σ+σ+LV+V, as we had seen in previous examples, but σ+σL+GV. Note that the attachment of the lateral to the preceding coda is again possible because the previous syllable is open. It is important to point out too that this preference for the attachment of onsets to preceding codas is also more extensive in the beginners groups, and that when this preference is given up by learners we begin to see a larger number of correct structures produced. However, this high number of correct responses should be taken with caution. The ease with which they produced these structures might be due to the influence of the L1. There are many words in English with the Latinate suffix '-rious'/-ɪəs/ (notorious, various, serious....) and if the English suffix is pronounced a bit fast, these two syllables might easily turn into a diphthong. Recall that these results do not take vowel quality into consideration but there was a fair amount of cases in which words included under CGV were produced with a schwa instead of a full vowel. Although cognates and loan words can give us an insight into how a particular foreign structure is syllabified into another phonology (and by extension, how L2 learners of that language might produce these structures when using pure transfer) they are not ideal test items for observing what is really going on with respect to the rest of structures of this type found in the language. A better picture might emerge if we look at other examples of this type.

<u>σ+LGV+σ</u> :. Two words, 'caliente' (=hot) and 'pariente' (=relative) belonged to this category. Results appear in Table 19.

Table 19. σ+LGV+σ. Words: 'pariente, caliente'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (57)	BEG2 (72)	INT (60)	ADV (57)	BEG1 (39)	BEG2 (37)	INT (46)	ADV (34)
σ+LGV+σ	0.02 (1)	0.17 (12)	0.18 (11)	0.32 (18)	0.03 (1)	0.03 (1)	0.06 (3)	0.29 (10)
σ+LV+VC+σ	0.12 (7)	0.22 (16)	0.48 (29)	0.39 (22)	0.23 (9)	0.32 (12)	0.35 (16)	0.41 (14)
σL+V+VC+σ	0.61 (35)	0.47 (34)	0.18 (11)	0.24 (14)	0.61 (24)	0.35 (13)	0.39 (18)	0.21 (7)
σL+GVC+σ	0.09 (5)	0.07 (5)	0.08 (5)	0.05 (3)	0.05 (2)	0.19 (7)	0.07 (3)	0.09 (3)
Other[8]:	0.16 (9)	0.07 (5)	0.06 (4)	(0)	0.08 (3)	0.11 (4)	0.13 (6)	(0)

	Imitation			
GROUP (Total N)	BEG1 (5)	BEG2 (3)	INT (0)	ADV (0)
σ+LGV+σ	(0)	0.33 (1)	(0)	(0)
σ+LV+VC+σ	0.40 (2)	(0)	(0)	(0)
σL+V+VC+σ	0.60 (3)	0.33 (1)	(0)	(0)
σL+GVC+σ	(0)	0.33 (1)	(0)	(0)

[8] Structures under this heading include σL+V_2C+σ and σ+LV_2C+σ.

A different picture is found in non-cognate/borrowed words. We find a preference for σL+V+VC+σ structures as the repair strategy again among the beginners groups, which is then given up by the intermediate and advanced groups in favour of σ+LV+VC+σ. This tendency is also found in the imitation task but the number of correct performances is very low, even among the advanced students. No large differences are found between the spontaneous and the reading task.

σ+σ+LGV+σ: One word, 'familiares' (=relatives), represented this structure. Results appear in Table 20.

Table 20. σ+σ+LGV+σ. Word: 'familiares'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (9)	BEG2 (13)	INT (12)	ADV (11)	BEG1 (0)	BEG2 (1)	INT (0)	ADV (0)
σ+σ+LGV+σ	0.11 (1)	0.15 (2)	0.08 (1)	0.36 (4)	(0)	(0)	(0)	(0)
σ+σL+GV+σ	0.67 (6)	0.85 (11)	0.83 (10)	0.45 (5)	(0)	1.00 (1)	(0)	(0)
σ+σL+V+V+σ	0.22 (2)	(0)	0.08 (1)	0.18 (2)	(0)	(0)	(0)	(0)

The results found here are similar to the ones in the previous words in terms of overall performance of the correct structure. What is different is that the repair strategy used across levels involves the creation of a coda in the preceding syllable. I cannot find any good explanation for this behaviour.

5.1.2.3. Minimal sonority distance parameter in CCGV structures

Productions of GV nuclei were also tested with a binary branching onset, to further test the operation of the MSD. The following structures were selected for this test:

-CCGV+σ: Two words, '**true**nos'(=thunder) and '**grue**so' (=thick), contained a /w/ as the on-glide, and one, '**grie**go' (=Greek), contained a /j/. Results are shown in Tables 21a and 21b respectively.

Once again we see that there are no significant differences between the results of the different types of glide, confirming the same tendency we observed in the previously discussed production data and also in the acceptability judgement tests. There is a very small number of correct responses and once again the strategy used involves splitting the syllable into two, creating CCV+V. Results are therefore similar to those found in LGV+σ /'liebre'/, and the appearance of a complex onset does not have a great influence on performance.

One point worth commenting on is that there seems to be a slightly higher use of deletion with these words. The number of the total number of cases is, however, too small to allow us to make any strong claims.

Table 21a. CCGV+σ Words: 'truenos, grueso'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (20)	BEG2 (25)	INT (24)	ADV (20)	BEG1 (1)	BEG2 (0)	INT (8)	ADV (9)
CCGV+σ	0.05 (1)	0.12 (3)	0.12 (3)	0.15 (3)	(0)	(0)	0.12 (1)	(0)
CCV+V	0.90 (18)	0.80 (20)	0.79 (19)	0.75 (15)	(0)	(0)	0.63 (5)	1.00 (9)
CCV_2	(0)	0.04 (1)	0.08 (2)	0.05 (1)	(0)	(0)	0.25 (2)	(0)
CCV_1	0.05 (1)	0.04 (1)	(0)	0.05 (1)	1.00 (1)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (18)	BEG2 (19)	INT (9)	ADV (7)
CCGV+σ	0.11 (2)	0.05 (1)	(0)	0.14 (1)
CCV+V	0.50 (9)	0.95 (18)	1.00 (9)	0.86 (6)
CCV_2	0.39 (7)	(0)	(0)	(0)

Table 21b. CCGV+σ Word: 'griego'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (12)	BEG2 (12)	INT (12)	ADV (11)	BEG1 (0)	BEG2 (1)	INT (6)	ADV (10)
CCGV+σ	(0)	0.08 (1)	0.08 (1)	(0)	(0)	(0)	(0)	0.10 (1)
CCV+V	0.50 (6)	0.83 (10)	0.83 (10)	1.00 (11)		1.00 (1)	0.67 (4)	0.70 (7)
CCV2	0.33 (4)	0.08 (1)	0.08 (1)	(0)	(0)	(0)	0.33 (2)	0.20 (2)
CCV1	0.17 (2)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (16)	BEG2 (10)	INT (3)	ADV (1)
CCGV+σ	0.06 (1)	(0)	(0)	(0)
CCV+V	0.75 (12)	0.90 (9)	1.00 (3)	1.00 (1)
CCV2	0.06 (1)	(0)	(0)	(0)
CCV1	0.12 (2)	0.10 (1)	(0)	(0)

-σ+CCGVC. Only one word, 'Ga**briel**' (=proper name), represented this structure. This word represents the maximal syllable length that can be found in Spanish, as both the onset and the rhyme are maximally occupied.

Table 22. σ+CCGVC. Word: 'Gabriel'.

	Reading task				Spontaneous Production			
GROUP (Total N)	BEG1 (76)	BEG2 (86)	INT (81)	ADV (83)	BEG1 (70)	BEG2 (94)	INT (65)	ADV (41)
σ+CCGVL	(0)	0.02 (2)	0.10 (8)	0.24 (20)	(0)	(0)	0.03 (2)	0.22 (9)
σ+CCV+VL	0.05 (4)	0.24 (21)	0.47 (38)	0.41 (34)	0.10 (7)	0.18 (17)	0.35 (23)	0.71 (29)
σC+CV+VL	0.85 (65)	0.70 (60)	0.35 (28)	0.34 (28)	0.84 (59)	0.72 (68)	0.51 (33)	0.07 (3)
Other[9]:	0.09 (7)	0.03 (3)	0.08 (7)	0.01 (1)	0.06 (4)	0.09 (9)	0.11 (7)	(0)

[9] Other structures in this category include σC+CGVC, σ+C_1øV+VC, øC_2GVC, C_1øGVC, σC+V+VL, σ+CCV2L and σC+CV2L.

Like 'Mario', this word also exists in English, and so the results found here may not necessarily be the same as those found for other Spanish words. There is a slightly better performance by the advanced group and we also observe that the preferred repair strategy by the intermediate and advanced groups is similar the one we found for 'griego': σ+CCV+VL. The beginners opt for the attachment of the first consonant onset to the preceding coda, which is a tendency we have been observing in previous cases. In the spontaneous data, the intermediate group also prefers this coda formation.

5.1.2.5. Summary of findings

Several conclusions regarding syllable structure can be reached after this analysis.

Minimal Word Parameter:

We saw that learners are performing at levels that would support the view that the parameter has been acquired. However, we saw how there was some doubt that the speedy acquisition was a real case of parameter resetting as it could also be the result of transfer from the L1.

Onsets:

With regard to the filter that prevents the appearance of /pw/ and /bw/ in English, it appears that this filter is soon deactivated or is never in operation, since this cluster has the highest percentage of correct performances from the early levels on.

With respect to the MSD parameter, we saw that there are some trends for the different clusters that involve on-glides:

- LGV: the performance of all the groups is very poor. No group outperforms the other. This coincides with the behaviour found in CCGV.
- LGVC: the advanced group outperforms the others, but despite this, the number of correct productions is only around 30%.
- CCGVC: the advanced group produces around 20% of correct responses. The only test word was a cognate.

The preferred repair strategy is involves segment preservation and splitting of the diphthong into two different syllables: CV+V(C). This might be a reflection of the learners' representation or might reflect performance problems. In the absence of other perceptual data, and until we analyse the stress results, there is no way of determining what the real cause is. The mismatch between the performance results and the results of the acceptability judgement test in all cases of LGVC does not allow us to determine what is happening either.

With respect to the production of on-glides there is no real difference in the pronunciation of structures that contain jV vs. wV.

Codas:

We saw that the learners seem to retreat to a more conservative setting for the coda parameter. This was evident in the case of VCC structures and even more so in the case of VCCC.

There is also a tendency for the beginner groups (and occasionally intermediates) to attach the onset consonant to the coda of the preceding syllable if this is open.

The representation of /s/ does not seem to be the same as for non-natives as for natives, and it looks as if they could be transferring the representation from the L1.

Finally, an effect for reading is found in cases of cognate words and borrowings, but for the rest of the words, the results are similar.

Having examined the acquisition of syllable structure, we now turn to the discussion of the results of our data for stress in section 5.2. In section 5.2.1. we will look at the results of the acceptability judgement test and in section 5.2.2. the results of the production data.

5.2. The L2 acquisition of stress in Spanish

5.2.1. The acceptability judgement test

In Chapter 3, the different categories used to classify the different nonsense words created were listed. What follows is an discusion of the results for each of these categories. Each category has been analysed using a MANOVA procedure (two-way analysis of variance with repeated measures on one factor, the within-subject variable).

5.2.1.1.The one-syllable window: final VG words

Recall that the one-syllable window specifies that when the final syllable is heavy and contains a VG structure, stress can only fall on the last syllable of the word. Five words complied with this pattern and were categorised 'grammatical'. Five others displayed stress on the penult or antepenult, clearly violating the condition, and were thus categorised ‘ungrammatical’. Examples of real words and nonsense words are given below in (1). Stressed syllables will be marked in bold.

(1)

Structures: σ σ σ (Gram) *σ σ σ (Ungram)

Structures:	σ σ σ (Gram)	*σ σ σ (Ungram)
	|	|
	VG	VG
	curu**pay**	**pa**nasay
	liga**ray**	**da**voy

Real words: Para**guay**, con**voy**, jer**sey**

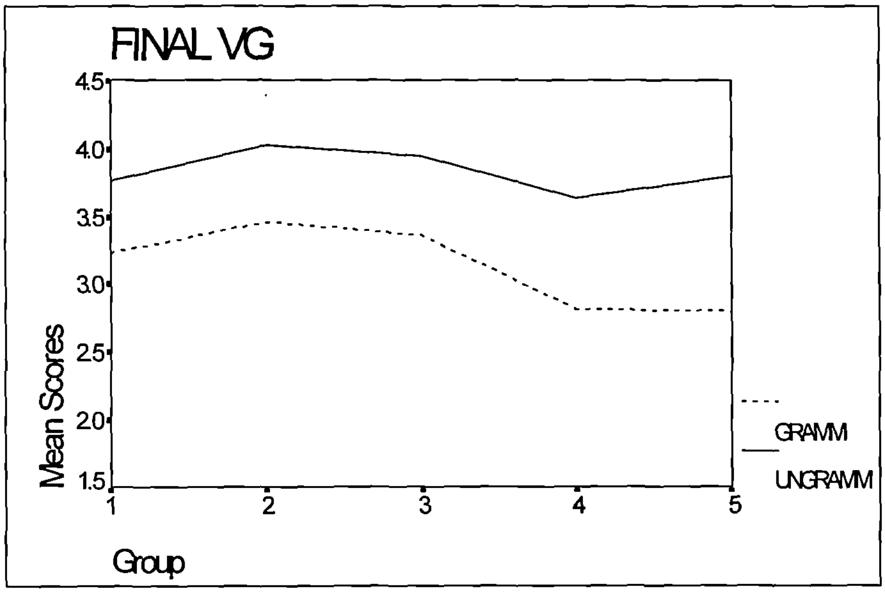
Inspection of the data, however, revealed that two words in each of the two subgroups (grammatical and ungrammatical) must have had some error in test design. Two ungrammatical words (‘A**na**nay’ and ‘Co**la**tey’) were rated as grammatical by six and five subjects of the control group respectively. Likewise, two others in the grammatical group (‘Curu**pay**’ and ‘Bon**coy**’) were rated as ungrammatical by seven and six native speakers, respectively. Given that this represents over 50% error by native speakers, these words were removed from the data. The results shown here therefore reflect only the remaining three words in each category.

Table 23 shows the mean scores for each group of subjects. The Standard Deviation for these scores appears in brackets. Figure 11 shows in a graphical way the mean scores for these groups. Recall that group 1 corresponds to the absolute beginners (Beg1), group 2 to beginners (Beg2), group 3 to intermediate (Int), group 4 to advanced (Adv) and group 5 to the native (NS) control group.

Table 23

GROUP	Grammatical	Ungrammatical
1 (Beg1)	3.23 (0.78)	3.77 (0.67)
2 (Beg2)	3.46 (0.55)	4.03 (0.63)
3 (Int)	3.36 (0.86)	3.94 (0.75)
4 (Adv)	2.82 (1.12)	3.64 (0.86)
5 (NS)	2.80 (0.61)	3.80 (0.94)

Figure 11



The statistical analysis yields significant differences (F(1, 54)= 45.43; p< 0.001) in the mean scores of the grammatical and ungrammatical tokens. This means that we can reject the null hypothesis that the tokens come from the same category. Subjects therefore behave significantly differently when we compare their performances in the grammatical and the ungrammatical categories.

The next step now is to find out whether there are also significant differences between the behaviour of the different groups in their scores for these words. We therefore need to compare the behaviour within subjects, and it turns out that we do not find statistically significant results (F (4, 54)= 1.22; p> 0.25). This means that subjects distinguish both grammatical and ungrammatical regardless of their level of Spanish. If we look at Figure 11, however, we note that the control group speakers make a sharper distinction between the grammatical and ungrammatical tokens: the difference between the ratings is 1. Among the non-natives, the advanced group displays a difference in the mean scores of 0.83, while the other three groups show a difference of around 0.5. This indicates a tendency in the direction of the results of the control group.

The grammaticality by group interaction does not show any significant different results (F (4, 54)= 0.71; p> 0.50). This means that the differences between the grammatical and ungrammatical scores are distinguished across the different groups and there is no evidence that the differences found between types are affected by the level variable

5.2.1.2. The two-syllable window

Recall that the two-window condition specifies that when the penult or final syllable contains certain structures, stress falls on the penult. Each of the structures that triggers stress in this position will be analysed below.

-PENULT VG.

If the penult syllable is heavy and contains a VG structure, stress can only fall on the last syllable of the word. Five words complied with this pattern and were categorised 'grammatical'. Five others displayed stress on the penult or antepenult, clearly violating the condition, and were thus categorised 'ungrammatical'. Some examples of real words and nonsense words are given below in (2).

(2)

Structures:	σ σ σ (Gram)	*σ σ σ (Ungram)
	|	|
	VG	VG
	Do**roi**te	**Ta**leito
	Ge**nei**ca	**Cio**teina
Real words:	Ja**mai**ca, a**cei**te	

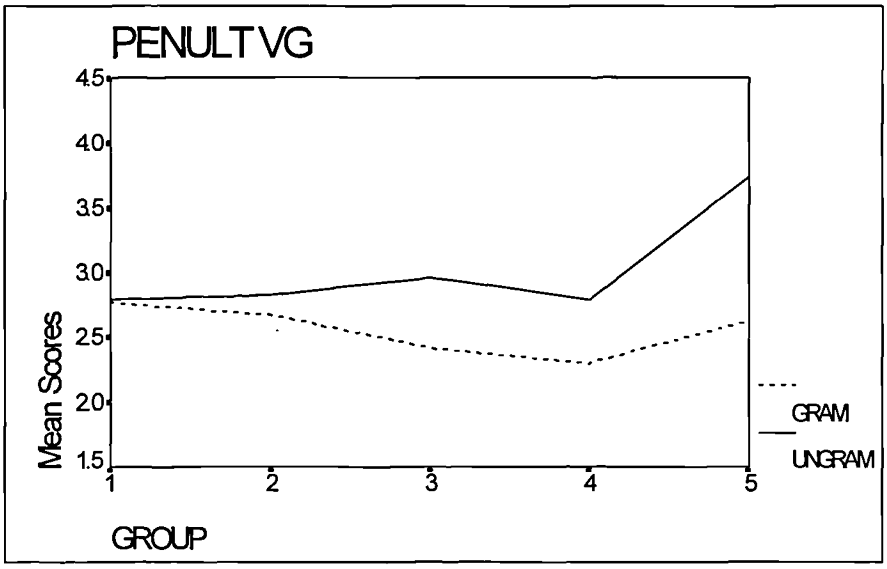
As in the previous case, examination of the data revealed that there was one word (Sio**tei**ma) from the grammaticality group that had to be removed, as it was rated as ungrammatical by no less than 8 native subjects. Therefore results in Table 24 and Figure

12 shown here come from 5 words in the ungrammatical group and 4 words of the grammatical group.

Table 24

GROUP	Grammatical	Ungrammatical
1 (Beg1)	2.77 (0.54)	2.80 (0.49)
2 (Beg2)	2.67 (0.56)	2.83 (0.71)
3 (Int)	2.42 (0.66)	2.97 (0.72)
4 (Adv)	2.29 (1.05)	2.80 (0.88)
5 (NS)	2.62 (0.95)	3.74 (0.69)

Figure 12



The statistical analysis gives us significant differences (F (1, 54)= 16.45; p< 0.001) in the mean scores of the grammatical and ungrammatical tokens. This means that we can reject the null hypothesis that the tokens come from the same class. Subjects behave significantly differently when we compare their performance on the grammatical and the ungrammatical tokens.

As regards the behaviour displayed by subjects depending on the level they belong to, we do not find statistically significant results (F (4, 54)= 1.70; p> 0.10), i.e. subjects display a similar behaviour in their judgement of tokens. If we look at Figure 12, however, we note that the control group is clearly behaving in a very different fashion when compared to the absolute beginners and even the advanced beginners group. This behaviour is picked up when we run the statistics for the grammaticality by group interaction, where we find results close to the levels of statistical significance ($F (4, 54)= 2.52; p> 0.05$). The p value is 0.52, so even though we cannot talk about a significant result, we can say there is a trend, since the p score is higher than 0.05 and lower than 0.10. This needs to be explored further, as it hints that the differences found between the grammatical and ungrammatical types can be affected by the group variable.

If we remove the Beg1 group, we get non-significant results in the group by grammaticality interaction ($F(3,42)=2.17; p>0.10$) as $p=0.11$, and this becomes even less significant if we remove groups 1 and 2 ($F(2,30)=1.62; p>0.10$) as $p=0.20$. If we remove group 5 only, the results are non-significant ($F(3,45)=1.02; p>0.25$). It therefore looks as if there is a clear difference in the behaviour of the control group with respect to the others. Their removal yields much clearer non-significant results then the removal of the beginners groups. Examination of the graph reveals, however, that not all the non-natives behave the same way. The two groups of beginners seem to be at an earlier stage in development. Therefore, we could be justified in saying that there is a statistically different behaviour between the control group and the non-natives. Within the non-natives, there seems to be an improvement in the judgement produced over time. Thus, absolute beginners and advanced beginners behave in a similar way and it is not until the intermediate stage that we can see how the differences between the grammatical and ungrammatical stress types start diverging, although this pattern is not statistically significant.

-PENULT GV.

If the penult syllable is heavy and contains a GV structure, stress can only fall on the penult. Five words complied with this pattern and were categorised 'grammatical'. Five others displayed stress on the antepenult, clearly violating the condition, and were thus categorised 'ungrammatical'. Some examples of real words and nonsense words are given below in (3).

(3)

Structures: σ σ σ́ (Gram) *σ σ σ (Ungram)

GV	GV
peliama	**cluntiola**

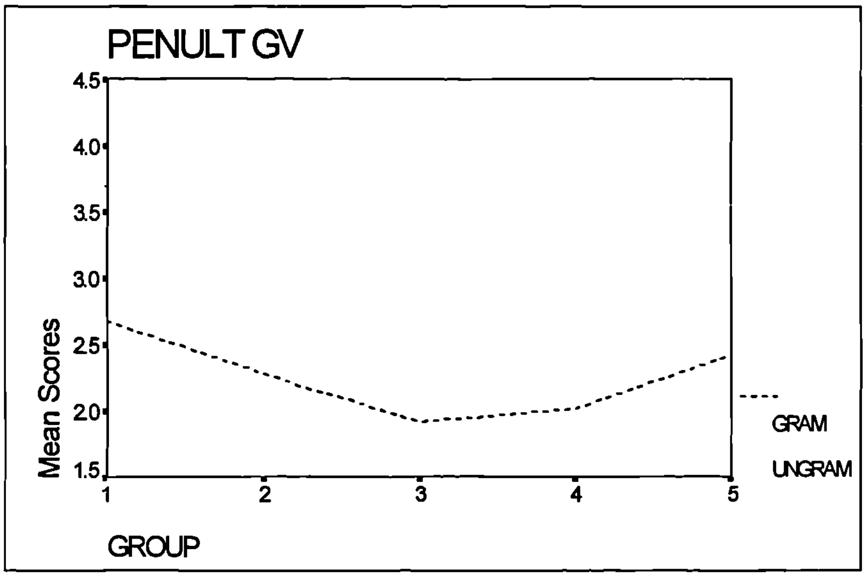
Real words: **cielo, pañuelo.**

Five control group subjects out of 10 treated one ungrammatical word (**'Periaso'**) as grammatical, so it was removed from the analysis. The results shown in Table 25 and Figure 13 correspond therefore to 5 words of the grammatical and 4 of the ungrammatical group.

Table 25

GROUP	Grammatical	Ungrammatical
1 (BEG1)	2.68 (0.62)	3.52 (0.62)
2 (Beg2)	2.28 (0.61)	3.71 (0.52)
3 (Int)	1.92 (0.51)	3.81 (0.67)
4 (Adv)	2.02 (0.63)	3.43 (0.88)
5 (NS)	2.42 (0.82)	3.55 (1.08)

Figure 13



The statistical analysis gives us significant differences (F (1, 54)= 115.59; p< 0.001) in the mean scores of the grammatical and ungrammatical tokens. This means that we can reject the null hypothesis that the tokens come from the same category.

Again, as regards the behaviour displayed by subjects depending on the group they belong to, we do not find statistically significant results (F (4, 54)= 0.91; p > 0.25).

The statistics for the grammaticality by group interaction yield results that are once again *close* to the levels of statistical significance (F (4, 54)= 2.07; p>0.050). The p value is 0.098, which is between 0.05 and 0.10.

The removal of Beg1 yields the following results: non-significant differences for group (F(3,42)=0.63; p>0.50), significant differences for grammaticality status (F(1,42)=102.27; p<0.001) and non-significant differences for the group-by-grammaticality interaction (F(3,42)=1.17; p>0.25). This means that we could claim that the absolute beginners are behaving in a different fashion compared to the other non-natives and the control group and that their behaviour represents a developmental stage.

-PENULT VC.

If the penult syllable is heavy and contains a VC structure, stress can only fall on the penult. Five words complied with this pattern and were categorised 'grammatical'. Five others displayed stress on the penult or antepenult, clearly violating the condition, and were thus categorised 'ungrammatical'. Some examples of real words and nonsense words are given below in (4).

(4)

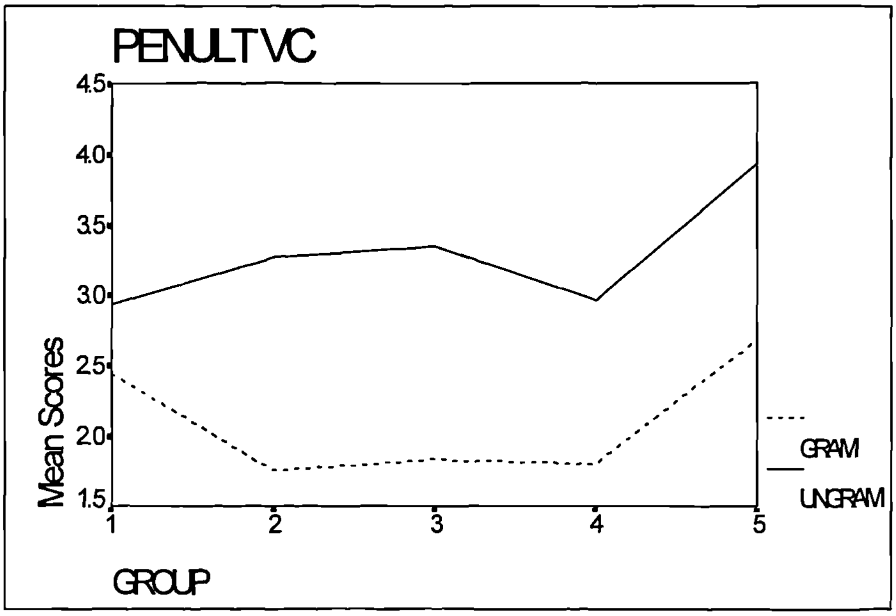
Structure:	σ σ σ (Gram)	*σ σ σ (Ungram)
	|	|
	VC	VC
	Dalcanta	**Isterta**
	Aconte	**Dalcospa**
Real words:	**Alberto, perla, pronto.**	

Table 26 and Figure 14 show the results of the mean scores by group.

Table 26

GROUP	Grammatical	Ungrammatical
1 (BEG1)	2.45 (0.52)	2.94 (0.67)
2 (Beg2)	1.75 (0.60)	3.28 (0.74)
3 (Int)	1.83 (0.70)	3.35 (0.54)
4 (Adv)	1.80 (0.61)	2.96 (0.87)
5 (NS)	2.68 (0.92)	3.94 (0.70)

Figure 14



The statistical analysis gives us significant differences (F (1, 54)= 128.14; p< 0.001) in the mean scores of the grammatical and ungrammatical tokens. This means that we can reject the null hypothesis that the tokens come from the same category.

However, for this set of words we also find statistically significant results in the mean scores for the different groups (F(4, 54)= 4.27; p< 0.01) and in the grammaticality-by-group interaction (F (4, 54)= 3.52; p< 0.05). This means that the differences in the mean scores of the grammatical and ungrammatical tokens are affected by the group variable.

Moreover, if we remove the NS group, we continue to get significant results in the group by grammaticality interaction (F(3,45)=4.54; p<0.01). If we remove the Beg 1 group, the interaction disappears (F(3,42)= 0.67; p>0.50). This means that the group that is responsible for the interaction is the absolute beginners group.

-FINAL GV.

If the final syllable is heavy and contains a GV structure, stress must fall on the penult. Five words complied with this pattern and were categorised 'grammatical'. Five others displayed stress on the penult or antepenult, clearly violating the condition, and were thus categorised 'ungrammatical'. Some examples of real words and nonsense words are given below in (5) , and the results are shown on Table 27 and Figure 15:

(5)

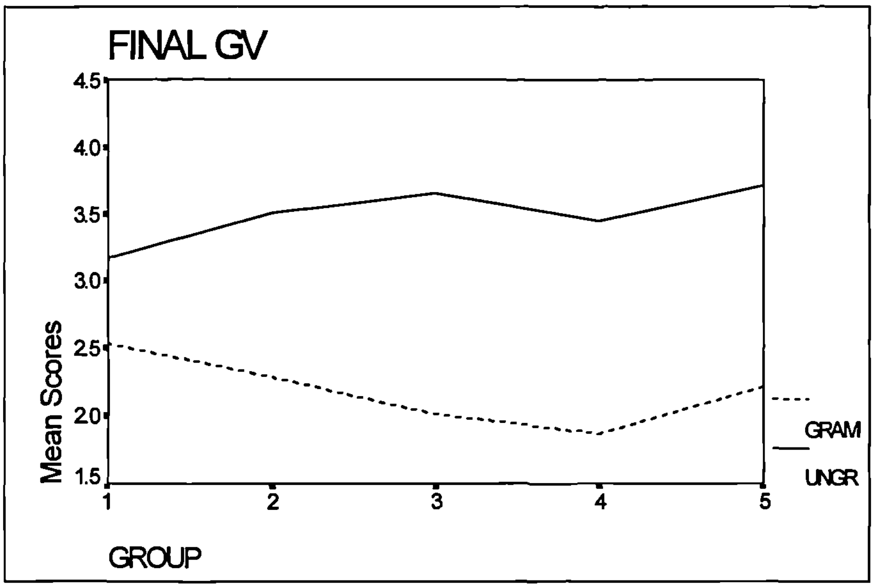
Structure:	σ σ σ(Gram)	*σ σ σ (Ungram)
	|	|
	GV	GV
	a**lé**mia	**já**renia
	con**té**cio	**miás**cagio

Real words: Caricia, Alicia

Table 27

GROUP	Grammatical	Ungrammatical
1 (BEG1)	2.54 (0.59)	3.17 (0.56)
2 (Beg2)	2.29 (0.57)	3.51 (0.66)
3 (Int)	2.02 (0.39)	3.67 (0.79)
4 (Adv)	1.87 (0.78)	3.45 (0.69)
5 (NS)	2.22 (0.76)	3.72 (1.04)

Figure 15



Again, we find differences in the mean scores which are statistically significant depending on whether the words are grammatical or ungrammatical ($F(1,54)=139.77$; $p<0.001$). And as in previous examples, if we then compare the mean scores of the grammatical and ungrammatical words by levels we do not get statistically significant results ($F(4,54)=0.47$; $p>0.5$), but we do get an interaction between the grammaticality status and the group variable ($F(4,54)=2.99$; $p<0.05$). This means that statistically, there is some evidence that the difference in the mean score between categories is affected by the behaviour of one or more groups. If we remove the NS group, we continue to get an interaction ($F(3,45)=3.56$; $p<0.05$) so we have to assume that the group that is causing the interaction is one of the non-native groups. The removal of Beg1 makes the interaction disappear ($F(3,42)=0.6$; $p>0.5$), so we can conclude that the two different behaviours we get are on the one hand that of the absolute beginners, and on the other that of the rest of the non-native and control groups.

- FINAL VC

If the final syllable contains a VC, stress normally falls on this syllable (this is the unmarked setting), but it may also fall on the penult (the marked setting). Where it cannot fall is on the antepenult (ungrammatical). Three different groups of words were created reflecting these rules, each with five words. Recall that the derivation of the marked words is the same as those of the words of the three-syllable window so they will be compared with the words in the three-syllable window in section 5.2.1.3. below[10]. The structure of these categories is exemplified below in (6), and I have also included some real examples.

(6) Structures:

σ σ σ (Gram)	σ σ σ (Gram-m)	* σ σ σ (Ungram)
|	|	|
VC	VC	VC
be**man**	ra**le**men	**dra**semen
bo**dariel**	**car**bel	**sem**potel

Real words:

cara**col**, to**nel**	**ár**bol, **tú**nel

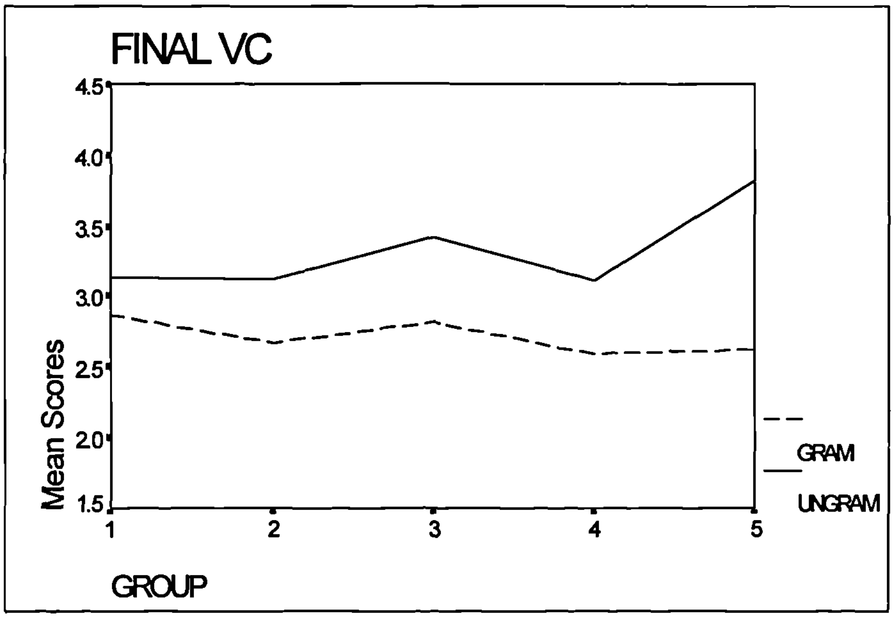
One of the unmarked words ('Doja**bel**') was considered to be ungrammatical by five out of the ten control subjects, so it was removed from the analysis. The mean scores of the unmarked group represent therefore the results of four tokens and those of the ungrammatical group the results of all five original tokens. The results appear in Table 28 and Figure 16.

[10] Recall that marked Final VC words like 'túnel' is held to have an empty V following the final C, (tú.ne.lV). The final consonant is not really a coda but the onset of a syllable with an empty nucleus, so the final two syllables are indeed light and the word would behave like 'médico'

Table 28

GROUP	Grammatical	Ungrammatical
1 (Begl)	2.86 (0.54)	3.14 (0.69)
2 (Beg 2)	2.67 (0.77)	3.12 (0.82)
3 (Int)	2.81 (0.36)	3.42 (0.64)
4 (Adv)	2.59 (0.70)	3.11 (0.74)
5 (NS)	2.62 (0.70)	3.82 (0.68)

Figure 16



As with other words, while we find differences in the mean scores which are statistically significant depending on whether the words are grammatical or ungrammatical (F(1,54)=36.1; p<0.001), when we compare the mean scores of the grammatical and ungrammatical words by groups we do not get statistically significant results (F(4,54)=0.84; p>0.5). However, we do get a trend that might point towards significance in the interaction between the grammaticality status and the group variable (F(4,54)=0.66; p>0.05). This means that statistically, there is some evidence that the difference in the mean score between types is affected by the behaviour of one or more groups. Looking at Figure 6 we might suppose that the group that may be causing this is the control group, as this group shows a greater difference in the mean scores of the judgements for the ungrammatical tokens. If we remove this group and run the statistics again the trend disappears and the interaction becomes non-significant (F(3,45)=0.38; p>0.5). So this means that all the non-native groups are behaving in a similar way with regard to this structure and that the control group is behaving in different way. We will come back to this finding when we discuss the production data.

5.2.1.3. Three-syllable window

Stress in Spanish cannot fall beyond the 3-syllable window (last 3 syllables of the word) and it can only fall on the antepenult if the last two syllables are light. Five grammatical and ungrammatical structures were created with the structures exemplified below in (7), which include some real examples. I will compare these results with the marked Final VC structures as they coincide with the derivations for the grammatical tokens.

(7)

Structures: σ σ σ σ (Gram)	*σ σ σ σ (Ungram)	σ σ σ (marked Final VC)
| |		|
L L		VC
cla**me**nece	ni**lo**strapeda	ra**le**men
tapoco	**ba**sialaca	**car**bel

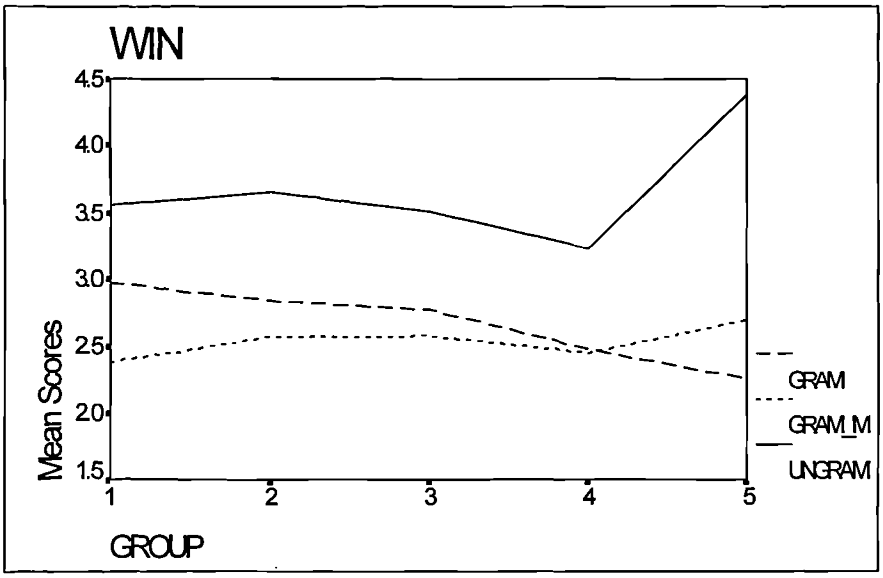
Real words: **mé**dico, **náu**frago

Two grammatical words ('**til**made' and '**ta**poco') were rated ungrammatical by five control subjects and were removed from the data. Three words from the marked Final VC category ('gas**ma**cor', 'ra**le**men' and 'co**llas**ter') were rejected by nine, seven and five native speakers respectively, so they were also removed from the analysis. Results of these words have been included in Table 29 and Figure 17.

Table 29

GROUP	Grammatical	Marked final VC	Ungrammatical
1 (BEG1)	2.97 (0.48)	2.38 (0.68)	3.55 (0.53)
2 (Beg2)	2.85 (0.52)	2.58 (0.73)	3.66 (0.53)
3 (Int)	2.78 (0.57)	2.58 (1.16)	3.52 (0.65)
4 (Adv)	2.48 (1.14)	2.45 (1.01)	3.24 (1.02)
5 (NS)	2.27 (0.68)	2.70 (0.92)	4.38 (0.69)

Figure 17



In the comparison of grammatical and ungrammatical examples we find statistically significant results depending on the grammaticality status (F(1,54)=93.09; p<0.001). Once again, the results are not significant when we compare the results across groups (F(4,54)=1.13; p>0.25) but we find a highly significant group-by-grammaticality interaction. Taken together, this means that subjects can clearly distinguish grammatical from ungrammatical words but this distinction is affected by the behaviour of one or more groups. Examination of the results signals that the control group might be responsible for this interaction, as their responses are clearly different from that of the other groups. Removal of this group from the analysis yields clear non-significant interactions (F(3,45)=0.20; p>0.50). So we see a clear cut off point between the behaviour of the non-natives and that of the control group with respect to this category of words.

Another interesting comparison is between the grammatical tokens that represent the three-syllable window and the marked VC final tokens. In this case, we do not find any significant results, neither by grammaticality status (p>0.25) nor by group (p>0.50) nor in the interaction (p>0.10). This behaviour might be good support for the representation of words like 'túnel' as [túnel]V underlyingly, as Harris (1995) suggests.

Another interesting observation with respect to the unmarked examples is that even though statistically we cannot claim that there are any differences between the grammatical examples and the marked grammatical examples, if we look at Figure 17 we can see that the natives give slightly higher mean scores to the marked examples, while the non-natives do the opposite. This might indicate higher awareness on the part of the natives about markedness.

5.2.1.4. Summary of results

Summing up, the different developmental sequences that can be found can be summarised below (the slash represents a clearly significant difference and therefore a different stage):

One syllable window:	FINAL VG	No sequences
Two-syllable window:	PENULT VG	Trend: 1,2,3,4 / 5
	PENULT GV	Trend: 1 / 2,3,4,5
	FINAL GV	1 / 2, 3, 4, 5
	PENULT VC	1 / 2, 3, 4, 5
	FINAL VC	Trend: 1, 2, 3, 4 / 5
Three-syllable window:	Grammatical:	1, 2, 3, 4 / 5
	FINAL VC marked:	No differences

One noticeable thing about these results is that if there are clearly different stages, this always involves either the absolute beginners group or the control group. What this may indicate is that learners either notice the application of these conditions very early on in their acquisition (absolute beginners, group 1, had had an average exposure to Spanish of six months approximately and advanced beginners, group 2, of two and a half years) or else that we are dealing with aspects of grammar that seem to fossilise and take much longer to acquire (recall that the advanced group had been learning Spanish for about seven years on average). These data will be compared with the production data in the next section and we will then be in a position to comment on what type of IL grammar they may be developing in the different stages, both in terms of production and perception.

5.2.2. The production data

Recall that the procedure followed to collect production data to examine stress patterns involved the examination of words which complied with the requirements of the three-, two- and one-syllable window conditions. The words chosen were representatives of these conditions and only these words were transcribed. The productions from the reading task were coded 'reading', those involving spontaneous productions were labelled 'spontaneous' and those produced as elicited imitations were coded 'imitation'. The patterns found in the transcriptions were then grouped by level. The results are included in the following tables. The total number of tokens found is shown in brackets and the proportion this represents is shown above in decimal numbers. Although the coding basically takes into account the position of the stressed syllable, in cases where the syllable structure of the word was altered and this could have had implications for stress assignment, the change in syllable structure was signalled as a new pattern. This is particularly the case in situations where the onset of one of the syllables was produced as the coda of the preceding syllable. Since the appearance of a heavy syllable might have influenced the position of stress, these patterns were coded as a separate category.

Likewise and following the same logic, if different syllable structures which did not affect the position of stress were produced, these structures were coded under the same stress category. Where this happens, I have included a footnote indicating the other alternative structures that are subsumed under the same pattern.

5.2.2.1. The three-syllable window

Four words represented this category. The words were:

'tráfico' ['tra.fi.ko] (=traffic)

'próximo' ['prok.si.mo] (=next),

'rápido' ['ra.pi.ðo] (=quickly)

'médico' ['me.ði.ko] (=doctor).

Results appear in Table 30.

Table 30: THREE-SYLLABLE WINDOW: 'tráfico, próximo, rápido, médicos'.

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (64)	BEG2 (65)	INT (60)	ADV (55)	BEG1 (4)	BEG2 (0)	INT (14)	ADV (16)
$\underline{\sigma}\,\sigma\,\sigma$	0.92 (59)	0.95 (62)	1.00 (60)	0.98 (54)	0.75 (3)	(0)	1.00 (14)	1.00 (16)
$\sigma\,\underline{\sigma}\,\sigma$	0.03 (2)	0.02 (1)	(0)	(0)	(0)	(0)	(0)	(0)
$\underline{\sigma C}$+V+VC	0.05 (3)	0.03 (2)	(0)	0.02 (1)	0.25 (1)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	ADV (0)	INT (0)	BEG2 (0)	BEG1 (1)
$\underline{\sigma}\,\sigma\,\sigma$	(0)	(0)	(0)	1.00 (1)

These words are marked for leftward displacement of stress and we note that there is an almost perfect production of these patterns, both in the reading task and in the spontaneous production task. One could argue that the fact that they have an orthographic accent might have influenced the reading task, but the results of the spontaneous task are so similar that this interpretation would not be a valid one. We have to assume therefore that this particular class of words and this particular marking has been acquired. Recall that in the accceptability judgement task the control group behaved better than the non-natives, which might signal a mismatch in the results of the acceptability and the production task. However this difference was brought about because the control group outperformed the non-natives in the judgement of what was unacceptable (i.e. stress beyond the three syllable window). If we look at the mean scores of the grammatical words, the scores of the non-natives are similar to the scores of the natives. Therefore the results of the acceptability judgment test for grammatical words match the results in production.

One needs to explain, however, how the stress pattern has been acquired. If we look at these words, we note that they have the same structure as the English word 'Canada'. That is, we have three open syllables and stress on the antepenult. Learners could therefore be using the English setting to produce these words corrrectly, and this is what may be driving the high percentage of correct responses found in the acceptability judgement test. The last syllable of all words may be marked as extrametrical and then the stress is pushed to the first syllable. The other possibility, which would have the same surface effect, is that they are marking this particular type of words for leftward displacement of stress, as in Spanish, but that the transfer of this setting does not extend to other nouns. The only way to determine which of the two options is the correct one is by looking at the other stress patterns of penult stress and comparing the results with those found here.

5.2.2.2. The two-syllable window

-PENULT VC

Four words represented this category. The words were:

'bufanda' [bu.ˈfan.da] (=scarf)

'delante' [de.ˈlan.te] (=in front)

'linterna' [lin.ˈteɾ.na] (=torch)

'contento' [kon.ˈten.to] (=happy)

Although all words contained three syllables, the first two had light syllables before the stressed position and the last two had heavy syllables. Results for the former are shown in table 31 and for the latter in table 32.

Table 31: TWO-SYLLABLE WINDOW. Penult VC: 'bufanda, delante'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (23)	BEG2 (25)	INT (24)	ADV (22)	BEG1 (9)	BEG2 (8)	INT (7)	ADV (9)
σ σ̲ σ	0.74 (17)	0.68 (17)	0.79 (19)	0.73 (16)	0.56 (5)	0.75 (6)	1.00 (7)	0.89 (8)
σC+V̲C̲+σ	0.26 (6)	0.28 (7)	0.21 (5)	0.27 (6)	0.33 (3)	0.25 (2)	(0)	0.11 (1)
σ̲ σ[11]	(0)	0.04 (1)	(0)	(0)	0.11 (1)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (6)	BEG2 (2)	INT (3)	ADV (0)
σ σ̲ σ	0.83 (5)	1.00 (2)	1.00 (3)	(0)
σC+V̲C̲+σ	0.17 (1)	(0)	(0)	(0)

[11] The truncation of the word only happened with the word 'bufanda'.

Table 32: TWO-SYLLABLE WINDOW. Penult VC: 'linterna, contento'

	Reading				**Spontaneous**			
GROUP (Total N)	BEG1 (21)	BEG2 (23)	INT (23)	ADV (21)	BEG1 (1)	BEG2 (9)	INT (8)	ADV (10)
σ σ̲ σ	0.81 (17)	0.83 (19)	0.91 (21)	1.00 (21)	1.00 (1)	1.00 (9)	0.75 (6)	0.90 (9)
σ + C̲V̲+ σ	0.19 (4)	(0)	0.09 (2)	(0)	(0)	(0)	0.25 (2)	0.10 (1)
σ̲ σ σ	(0)	0.04 (1)	(0)	(0)	(0)	(0)	(0)	(0)
σC+V̲C̲/̲V̲:+ σ	(0)	0.13 (3)	(0)	(0)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (8)	BEG2 (6)	INT (2)	ADV (0)
σ σ̲ σ	0.87 (7)	1.00 (6)	1.00 (2)	(0)
σ + C̲V̲+ σ	0.13 (1)	(0)	(0)	(0)

The first two words ('bufanda' and 'contento') are equivalent to the English 'agenda'. Once again, English learners could be transferring and applying the rules of English stress in nouns to produce these words correctly. Note that again, we are faced with a high degree of correct responses. Note also that even though the beginner groups are syllabifying the onset consonant of the second syllable in the coda, the position of stress remains unchanged on the penult position. The parameter setting of English and the specification that the last syllable does not count for stress assignment purposes should yield stress on this position as shown below in (8). The Spanish derivation yields the same effect through other means (9).

(8) English rules and parameter settings with the various syllable structures learners prefer:

buf.an.da	bu.fan.da
σC+VC+σ	σ+σ+σ
(• (•) •	• (•) •
•	•

(9) Spanish derivation:

bu.fan.da

σ + σ + σ

• (• •)

•

Learners could therefore be using their English settings and produce the correct output. In the case of the second group of words, the situation is practically the same. If they syllabify the word as in the target form, with two heavy syllables, the English derivation should give us the correct output with stress on the penult, as shown in (10a). However if we examine the second preferred pattern, where the consonant of the second syllable is deleted, stress should be on the first syllable, as shown in (10b). This is not what learners produce. Instead, stress continues to be on the second syllable.

(10) English derivation with the syllable structure chosen:

a. lin.ter.na	b. lin.teø.na
σ+ σ +σ	σ+CV+σ
(• (•) •	(• •) •
•	•

The way that this word is derived in Spanish is shown in (11) below:

(11) lin.ter.na

σ σ σ

(• (• •)

•

The fact that this word continues to be stressed in second position suggests that another mechanism is at play. What the learners could be using is a (universal) default trochaic rhythm, similar to the one found in L1 acquisition in the development of prosodic structure. Learners may be producing such correct patterns not due to transfer, but by applying the trochaic template to these words. They may well be using a Spanish derivation, but what leads me to suggest this is examination of another pattern they are producing, precisely with the word 'bufanda'. In the case of the beginners group, both in spontaneous production and in the reading task we have a very small number of productions where words were truncated. Interestingly, the way that the word was truncated was by keeping a trochaic foot: σ σ stands for productions of the type 'fal.da' and 'fan.da'. These truncations can occur if the template they use is one where the final syllable is counted for stress assignment purposes, but not if the syllable is extrametrical and they are using English derivations. Incidentally, this is not the only case in which truncation ocurred: in the production of the word 'aceituna' [a.θei.'tu.na] (=olive), not included in this analysis, two subjects from the Beg. 2 group produced ['tu.na] in the reading task (this represents 15% of the total productions) and there were two other imitation productions of this type produced by the same group. In addition to that, one subject from the Beg.1 group produced this same truncation in the spontaneous productions. Even though the numbers are small, they are indicative of a process in use at the early levels.

One last comment needs to be made in relation to the results of the acceptability test. In the distinction of grammatical and ungrammatical stress patterns of words that contained a VC penult syllable, we saw that the only group that was causing an interaction was the Beg.1 group. Note that this was not because they were not good at distinguishing the grammatical types (their mean score is even slightly better than that of the native speakers) but because their perception of the ungrammatical patterns was inaccurate. This is quite understandable, as less exposure to a language is needed to realise what is possible (the grammatical patterns, which can be detected in the light of positive evidence) than what is *not* possible (the absences from the system). Their mean score (around three) in the ungrammatical types signals precisely this: that they cannot re-set the parameter based on what is not possible until more evidence is available to them. The evidence seems to be sufficient as early as two years of exposure, since the Beg. 2 group already behaves similarly to natives.

- PENULT VG.

Only one word is represented this category:

Veinte ['bein.te] (=twenty)

Results appear in table 33. This word is unusual in that it is one of the very few that can allow two coda positions in Spanish (see Chapter 2 on coda positions in Spanish).

Often, native speakers pronounce this word as ['ben.te], and these are were some of the pronunciations that were preferred most by the non-natives too. It is unfortunate that no other words were included with this diphthong so that further comments could be made about these structures, especially in the light of the findings about a possible floating representation of the off-glide in syllable structure. Given that the preferred syllable patterns that they display is with a coda consonant, the explanation for the production of this word should be the same as that given for penult VC structures.

It is important to note, however, that the explanation about the use of a trochaic pattern still holds here. Note that a lot of the other productions involve a flipping of the glide: the off-glide becomes an on-glide or even another vowel in another syllable. Despite these changes, stress continues to be placed on the penult position.

Table 33: TWO-SYLLABLE WINDOW. Penult VG: 'Veinte'

	Reading				**Spontaneous**			
GROUP (Total N)	BEG1 (12)	BEG2 (11)	INT (12)	ADV (11)	BEG1 (1)	BEG2 (0)	INT (5)	ADV (6)
<u>σ</u> σ	(0)	0.28 (3)	0.17 (2)	0.18 (2)	1.00 (1)	(0)	(0)	0.33 (2)
<u>CVØn</u>+σ	0.33 (4)	0.36 (4)	0.50 (6)	0.82 (9)	(0)	(0)	1.00 (5)	0.66 (4)
<u>Cjen</u>+σ	0.33 (4)	(0)	0.08 (1)	(0)	(0)	(0)	(0)	(0)
Ci+<u>VC</u>+σ	0.33 (4)	0.36 (4)	0.25 (3)	(0)	(0)	(0)	(0)	(0)

- PENULT GV.

Four words represented this category. The words were:

'rueda' ['rwe.ða] (=wheel)

'cacahuetes' [ka.ka.'we.tes] (=peanuts)

'cubierto' [ku.'βjer.to] (=overcast)

'pariente' [pa.'ɾjen.te] (=relative)

The words were subdivided into different groups depending on the number of syllables they contained. Results for 'rueda' (two-syllable word) have been included in

Table 34, results for 'cacahuetes' (four-syllable word) have been included in Table 35 and results for 'cubierto' and 'parientes'(three-syllable words) in Table 36.

Table 34: TWO-SYLLABLE WINDOW. Penult GV: 'rueda'

	Reading				**Spontaneous**			
GROUP (Total N)	BEG1 (13)	BEG2 (13)	INT (12)	ADV (10)	BEG1 (2)	BEG2 (1)	INT (9)	ADV (11)
$\underline{\sigma}\ \sigma$	0.08 (1)	(0)	(0)	0.10 (1)	(0)	(0)	(0)	0.09 (1)
CV+$\underline{\text{V}}$+σ	0.77 (10)	1.00 (13)	1.00 (12)	0.90 (9)	1.00 (2)	1.00 (1)	0.78 (7)	0.91 (10)
$\underline{\text{CØV}}$+σ	0.15 (2)	(0)	(0)	(0)	(0)	(0)	0.22 (2)	(0)

	Imitation			
GROUP (Total N)	BEG1 (14)	BEG2 (9)	INT (2)	ADV (3)
$\underline{\sigma}\ \sigma$	(0)	(0)	0.50 (1)	(0)
CV+$\underline{\text{V}}$+σ	0.93 (13)	1.00 (9)	0.50 (1)	1.00 (3)
$\underline{\text{CØV}}$+σ	0.07 (1)	(0)	(0)	(0)

Table 35: TWO-SYLLABLE WINDOW. Penult GV: 'cacahuetes'

	Reading				**Spontaneous**			
GROUP (Total N)	BEG1 (7)	BEG2 (12)	INT (11)	ADV (9)	BEG1 (0)	BEG2 (1)	INT (0)	ADV (3)
$\sigma\ \sigma\ \underline{\sigma}\ \sigma$[12]	1.00 (7)	0.92 (11)	0.91 (10)	0.78 (7)	(0)	1.00 (1)	(0)	1.00 (3)
$\sigma\ \sigma$+V+$\underline{\text{V}}$+σ	(0)	0.08 (1)	0.09 (1)	(0)	(0)	(0)	(0)	(0)
,$\sigma\ \sigma\ \sigma\ \underline{\sigma}$	(0)	(0)	(0)	0.22 (2)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (0)	BEG2 (1)	INT (0)	ADV (3)
$\sigma\ \sigma\ \underline{\sigma}\ \sigma$	(0)	1.00 (1)	(0)	1.00 (3)

[12] Includes $\sigma\ \sigma\ \sigma$C+ VC

Table 36: TWO-SYLLABLE WINDOW. Penult GV: 'cubierto, pariente'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (68)	BEG2 (67)	INT (60)	ADV (57)	BEG1 (21)	BEG2 (24)	INT (40)	ADV (28)
σ σ σ	0.03 (2)	0.15 (10)	0.18 (11)	0.37 (21)	(0)	0.08 (2)	0.28 (11)	0.39 (11)
σ+CV+**VC**+σ	0.24 (16)	0.31 (21)	0.40 (24)	0.32 (18)	(0)	0.21 (5)	0.20 (8)	0.14 (4)
CVC+V+**VC**+σ	0.44 (30)	0.46 (31)	0.13 (8)	0.21 (12)	0.72 (15)	0.37 (9)	0.40 (16)	0.22 (6)
ˌσ+CV+**VC**+σ	0.02 (1)	(0)	0.12 (7)	0.07 (4)	(0)	(0)	(0)	0.14 (4)
CVC+**GVC**+σ	0.12 (8)	0.05 (3)	0.07 (4)	0.03 (2)	0.09 (2)	0.17 (4)	0.02 (1)	0.11 (3)
Other[13]	0.15 (10)	0.03 (2)	0.10 (6)	(0)	0.19 (4)	0.17 (4)	0.10 (4)	(0)

In the case of 'rue.da' we see once again that the stress pattern that is chosen by all subjects is a trochaic one. What differs is the way in which syllable structure has been produced. As we can see in (12a), the correct output could have been produced if learners had simply transferred and adopted the correct representation of the syllable as CGV. However if the word is incorrectly syllabified with three syllables and transfer takes place, we should end up with stress on the first syllable. In (13), I show the derivation is Spanish.

(12) English derivation:

a) rue.da	b) ru.e.da
σ + σ	CV+V+σ
(•) •	(• •) •
•	•

[13] Includes σ+CøVC+σ and σC+ØVC+σ

(13) Spanish derivation:

rue.da

σ + σ

• (• •)

•

Once again, the output with stress on the penult can only be derived if we assume that the final syllable plays a role in the derivation. Note that the output produced with the structure CØV+σ ('re.da') is also compatible with the trochaic hypothesis.

Further support for the trochaic approach comes from the next word, 'cacahuetes'. If learners transfer, they will produce the structure in (14a) for cases of correct syllabification, and the structure in (14b) for cases where the diphthong was split into two syllables. Both would yield stress on the antepenult but given that a new syllable is created in (14b), the syllables stress could fall on are different: ca**ca**huetes on (14a) and caca**hu**etes in (14b).

(14) English derivation:

a) ca.ca.hue.tes

σ σ σ σ

• (• •) •

•

b) ca.ca.hu.e.tes

σ σ V·V σ

(• •(• •) •

•

However, stress is overwhelmingly placed on the penult by all learners at all levels and regardless of the syllable structure used. The Spanish derivation is given below in (15)

(15) Spanish derivation:

ca.ca.hue.tes

σ σ σ σ

• (• •(• •)

•

It is evident then, that in order for the learners to produce stress on the penult with both types of syllabification, the final syllable must count for stress and they must be following a trochaic pattern.

Finally, the third group of words, 'pariente' and 'cubierto' shows a similar scenario. Once again, regardlesss of the type of syllabification employed, stress consistently appears on the penult syllable. The generation of these stress patterns following the English settings would be impossible if the final syllable were extrametrical, but not if it is included. Note that, as was the case in the previous examples, the way in which syllables are divided does not influence the position of stress and has more to do with the way that syllable acquisition is progressing. Note that at the early levels there is a tendency (observed in other word types too) to produce a heavy syllable with the onset of the following consonant. At the intermediate level the preference is for the creation of CV+VC syllables. Only the advanced learners produce a number of correct diphthongs. This pattern, however, does not influence the position of stress and the trochaic structure prevails over syllable structure considerations.

A final word on the relationship between the results of the acceptability judgement task and the production data shown is necessary here. The acceptability test yielded results close to statistical significance in the group by grammaticality interaction, and the removal of the Beg. 1 group from the analysis resulted in the disappearance of this trend. The acceptability test results therefore match the results of production data; I interpret the trend found in the same way as before, simply as evidence that absolute beginners need more exposure to the L2 before they can distinguish the ungrammatical tokens.

- FINAL GV.

Five words represented this category:

Mario	['ma.ɾjo]	(=proper name)
Gloria	['glo.ɾja]	(=proper name)
varias	['ba.ɾjas]	(=various pl.)
despacio	[des.'pa.θjo]	(=slowly)
historia	[is.'to.ɾja]	(=story)

Results for 'Mario' and 'Gloria' have been included separately in Table 37 because they are proper names that exist in both languages. Results for 'varias' have been included in Table 38, and results for 'despacio' and 'historia', both trisyllabic words with heavy initial syllables, have been included in Table 39.

Table 37: TWO-SYLLABLE WINDOW. Final GV: 'Mario, Gloria'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (65)	BEG2 (62)	INT (59)	ADV (55)	BEG1 (26)	BEG2 (33)	INT (14)	ADV (27)
σ σ	0.18 (12)	0.53 (33)	0.50 (31)	0.84 (46)	0.08 (2)	0.67 (22)	0.64 (9)	0.70 (19)
σC+GV	0.48 (31)	0.29 (18)	0.29 (17)	0.07 (4)	0.42 (11)	0.30 (10)	0.29 (4)	0.07 (2)
σC+V+V	0.25 (16)	0.18 (11)	0.17 (10)	0.09 (5)	0.42 (11)	0.03 (1)	0.07 (1)	0.22 (6)
Other[14]	0.09 (6)	(0)	0.02 (1)	(0)	0.08 (2)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (1)	BEG2 (2)	INT (3)	ADV (0)
σ+ σ	1.00 (1)	(0)	0.33 (1)	(0)
σC+GV	(0)	1.00 (2)	0.66 (2)	(0)

Table 38: TWO-SYLLABLE WINDOW.Final VG: 'varias'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (13)	BEG2 (11)	INT (12)	ADV (11)	BEG1 (0)	BEG2 (1)	INT (0)	ADV (0)
σ σ	0.08 (1)	0.18 (2)	0.50 (6)	0.82 (9)	(0)	(0)	(0)	(0)
σC+GV	0.38 (5)	0.55 (6)	0.25 (3)	0.18 (2)	(0)	1.00 (1)	(0)	(0)
σC+V+V	0.08 (1)	0.27 (3)	0.17 (2)	(0)	(0)	(0)	(0)	(0)
Other[15]	0.46 (6)	(0)	0.08 (1)	(0)	(0)	(0)	(0)	(0)

[14] Includes σ+CV+V and σ+CV+V

[15] Includes σC+øV; σ+CøV and σ+CV+V.

Table 39: TWO-SYLLABLE WINDOW. Final GV: 'despacio, historia'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (23)	BEG2 (23)	INT (22)	ADV (24)	BEG1 (0)	BEG2 (3)	INT (0)	ADV (4)
σ σ σ	0.48 (11)	0.74 (17)	0.86 (19)	0.71 (17)	(0)	0.67 (2)	(0)	1.00 (4)
σ+CVC+V+V	(0)	0.04 (1)	(0)	0.04 (1)	(0)	(0)	(0)	(0)
σ+σC+GV	0.26 (6)	0.04 (1)	0.09 (2)	0.08 (2)	(0)	(0)	(0)	(0)
Ø+CCV+σ[16]	0.04 (1)	0.09 (2)	(0)	0.17 (4)	(0)	(0)	(0)	(0)
Other[17]:	0.22 (5)	0.09 (2)	0.05 (1)	(0)	(0)	0.33 (1)	(0)	(0)

The first thing that we note is that the structures learners use in Tables 37 and 38 are the same, and the preference is also the same: in the upper levels, σ σ is preferred over σC+ GV. What is different is that the Beg.2 group seems to prefer the second structure in the case of 'varias' and the first structure in 'Mario' and 'Gloria'. This is also the first instance in which a GV structure is preferred over the splitting the vocoids into two syllables and creating V+V. I interpret this as an influence from the prosodic pattern they are adopting. In the previous cases, the splitting of the diphthong into two syllables put the on-glide in a position outside the trochaic template (beyond the last two syllables of the word) and so it did not affect stress assignment. Here, however, the spliting of the diphthong might bring about the consequence of marking this structure for leftward displacement of stress. This explanation also assumes therefore, that the grid mark is assigned to each syllable head, not for each nuclear X as in the case of Spanish, where the glide also gets a grid mark. The derivation in Spanish is shown in (16) below:

(16) Spanish derivation:

Ma.rio

σ σ

(• •)•

•

Assuming that the trochaic pattern is what is driving stress assignment and that the grid marks are assigned to each syllable, the representation of their IL is shown in (17):

(17) Interlanguage derivation:

[16] This type of truncation was limited to the word 'historia'.

[17] Includes σ σ+CV+V and σC+VC+GV

(17) Interlanguage derivation:

a) Ma.rio	b) Mar.io	c) Mar.i.o
σ σ	σC+GV	σC+V+V
(• •)	(• •)	(• •)•
•	•	•

(17a) and (17b) are self-explanatory: if the trochaic template creates a foot with two syllables and one grid mark is given for each syllable, the edge marking parameter places a bracket at the end of the word, since the word is not morphologically specified, the boundary parameter places a bracket before the heavy syllable in (17b) and the iterative construction parameter places another before the first syllable in (17a). Finally, the head parameter projects the leftmost grid onto the next line to create a left head. In (17c), however, in order to arrive at the learners' productions, we need to mark the word for leftward displacement of stress (in other words, to mark the last syllable as extrametrical) if we want to obtain the same results. Otherwise, with a trochaic foot, stress would appear on the second syllable (Ma.**ri**.o). The fact that the stress is produced on the first syllable, though, would imply that they are transferring the English extrametrical conditions for nouns. Interestingly, we note that in the case of 'Mario', the absolute beginners group (Beg. 1) shows a much greater preference for the structures σC+V+V than in the word 'varias'. This preference can also be observed in the spontaneous productions. The fact that both 'Mario' and 'Gloria' are words that exist in English and that the structure σC+V+V is favoured for these two words but not for the others would support this analysis. Transfer is therefore much more likely to occur, especially at early levels, when words are cognates or borrowings that exist in both languages. When they are not, the picture that we get reflects another developmental pattern.

In the case of three-syllable words, the same comments apply. Note that the preference for GV syllables prevails here too and that once again, we find some truncation in the case of the word 'historia', produced as ['sto.ɾja]. Again, I put this truncation down to the effect of the trochaic template.

Finally, I would like to comment on the results of the acceptability judgement test. The group that was causing an interaction was the Beg.1 group. If we look at the production data, we can see that across the three types of words, they are the ones who produce fewer target productions and also the ones who display more variation. Their behaviour in production matches then the results of the acceptability test, and we can assume that with this particular type of word, even though the trochaic pattern may be operating, it may not be fixed and learners may still be under the influence of English extrametricality setting.

- Marked FINAL VC.

Four words represented this category. The words were:

'túnel' ['tu.nel] (=tunnel)

'móvil' ['mo.βil] (=cellular)

'árbol' ['ar.βol] (=tree)

'huésped' ['wes.peð] (=guest).

The first two words contained a light syllable in the stressed position, whereas the last two words contained a heavy syllable. Since this could affect the position of the stress, results have been separated into two tables. Table 40 contains the results for 'túnel' and 'móvil' and Table 41 the results for the other two words.

Table 40: Two-syllable window: Final VC marked: 'Túnel, móvil'

	Reading				**Spontaneous**			
GROUP (Total N)	BEG1 (39)	BEG2 (36)	INT (35)	ADV (34)	BEG1 (22)	BEG2 (44)	INT (33)	ADV (29)
σ̲ σ	0.10 (4)	0.17 (6)	0.51 (18)	0.71 (24)	0.32 (7)	0.11 (5)	0.46 (15)	0.72 (21)
σ σ̲	0.56 (22)	0.58 (21)	0.37 (13)	0.17 (6)	0.54 (12)	0.25 (11)	0.24 (8)	0.17 (5)
σC+**V̲C̲**	0.13 (5)	0.05 (2)	0.08 (3)	(0)	(0)	0.21 (9)	0.09 (3)	(0)
σ̲**C̲**+σ	0.21 (8)	0.20 (7)	0.03 (1)	0.12 (4)	0.14 (3)	0.43 (19)	0.21 (7)	0.10 (3)

	Imitation			
GROUP (Total N)	BEG1 (4)	BEG2 (5)	INT (0)	ADV (2)
σ̲ σ	0.25 (1)	0.60 (3)	(0)	(0)
σ σ̲	0.50 (2)	0.40 (2)	(0)	1.00 (2)
σC+**V̲C̲**	0.25 (1)	(0)	(0)	(0)

Table 41: Two-syllable window: Final VC marked: 'árbol, huésped'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (24)	BEG2 (25)	INT (25)	ADV (22)	BEG1 (4)	BEG2 (4)	INT (14)	ADV (12)
$\underline{\sigma}\ \sigma$	0.33 (8)	0.56 (14)	0.80 (20)	0.91 (20)	1.00 (4)	1.00 (4)	1.00 (14)	0.83 (10)
$\sigma\ \underline{\sigma}$	0.58 (14)	0.12 (3)	0.12 (3)	0.09 (2)	(0)	(0)	(0)	(0)
$\underline{\sigma}\ \sigma$ +Ce	(0)	(0)	(0)	(0)	(0)	(0)	(0)	0.17 (2)
$\sigma\ \underline{\sigma}\ \sigma$	0.09 (2)	0.32 (8)	0.08 (2)	(0)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (3)	BEG2 (3)	INT (1)	ADV (0)
$\underline{\sigma}\ \sigma$	0.67 (2)	1.00 (3)	1.00 (1)	(0)
$\sigma\ \underline{\sigma}$	0.33 (1)	(0)	(0)	(0)

One of the most striking things that we find when we examine these results is that even though these words also have penult stress, the subjects do not produce correct scores anywhere near the 90 or 100% frequency we have been observing until now. Recall that these words are in fact words like the ones that exemplify the three-syllable window condition, because the last consonant is in fact the onset of a syllable with an empty nucleus. The word 'túnel' is therefore represented [tú.ne.l]V and marked for leftward displacement of stress. Note also that in the acceptability judgement task, the two types of words were not treated differently by the various groups. However, the control group gave slightly higher scores to these words, which I interpreted as a signal of their markedness. If we look at the production data, we see that the advanced group, which, of all the non-natives was the one that was closer in making the same distinction as the natives in the acceptability task, is producing also the highest number of correct stress placements. The difference in the judgements, although not statistically significant, is revealed clearly in the production data. Note also that even though these words are very close to the English 'tunnel' and 'mobile', an explanation which appeals to transfer fails to explain why we get such a large number of iambic patterns among the beginners. Learners are clearly noticing something different about these words, otherwise they would be correctly produced with stress on the first syllable, either using a trochaic pattern, as in many of the words we have seen so far, or by using transfer. What they are noticing is that these words end in a consonant, and this group of words, as we know, has a different underlying representation in Spanish, with an empty vowel at the end.

The type of positive evidence available to learners to show that these words are different comes from morphology. Harris (1995) explains that the stems of all native Spanish nouns belong to one of three declension classes, which he labels A, B or C.

A classes are nouns that end in –o (mostly masculine)[18]: '**pá**jaro'(=bird) '**pe**rro' (=dog).

B classes are nouns that end in –a (mostly femenine): '**sá**bana' (=sheet), 'sa**ba**na' (=savanna)

C classes are nouns that end in V. There are two subclasses within this group. One group is made up of words that realise this V with the maximally underspecified vowel in Spanish –e: '**á**rabe' (=Arab), 'ja**ra**be' (=syrup), and another is made up of a special subclass that does not realise the V phonetically and ends in a consonant: 'ca**ni**bal' (=cannibal), 'ani**mal**' (=aninal). The only case in which this unrealised vowel surfaces is in the case of plural formation, as the plurals of those words are 'ca.ni.ba.les' and 'a.ni.ma.les'. 'Canibal' (ca**ni**balV) is therefore like '**á**rabe' and 'animal'(ani**ma**lV) is therefore like 'ja**ra**be'.

L2 learners of Spanish, seem to be aware of the difference between vowel and non-vowel final words in Spanish and this is the type of evidence they use to change their representation. The fact that they use it is evidenced by the fact that they are not exhibiting a trochaic pattern as they have done with the other type of words. But in addition to noticing that consonant-final words have this unrealised vowel, learners have to notice that words can be accented in two different ways. Words can follow the unmarked stress pattern and end up with final stress (as on the words that we will see in the next section, like 'ca**lor**' (=heat)) or they can be marked for leftward displacement of stress, in which case words would follow the same derivation as three-syllable window words (like '**trá**fico'). So there are two steps in the process. One is to notice that the words have a final unrealised V and the other that they have a marked stress pattern. Some evidence that they have noticed that there is an empty vowel in the representation is the low number of correct stress patterns that we see. Even beginners seem to be noticing this. Both in reading and in spontaneous production they prefer surface iambic σ σ

[18] Stressed syllables are shown in bold.

structures. If they have noticed that the V is present underlyingly, at the beginning they are producing the trochaic pattern and assuming that all consonant final words are unmarked. It is only later, in the face of positive evidence that they change this assumptions, and mark these words more appropriately. The stages might be the following in (18):

(18)

Stage 1:

Underlying V present. Trochaic template

[tú.ne.l] V

σ σ σ

• (• •)

•

Stage 2:

Underlying V present. Marking for leftward displacement of stress

[tú.ne.l]$_{\mathcal{L}}$ V

σ σ σ

(• •) •

•

Stage 1 corresponds to the first 2 levels (Beg.1 and Beg. 2) and stage 2 corresponds to the intermediate level. This explanation would be supported if all unmarked final consonant words displayed final stress and also if we found some other evidence that would show that they are indeed making use of this final unrealised vowel.

We will see in the next section that both pieces of evidence exist. In the analysis of the marked words, we find some evidence of the existence of the unrealised vowel. So far, I have not commented the results of Table 41, which were also marked words with a first heavy syllable. Note that the results are almost parallel. The only difference is that in the case of the Beg. 2 group they are more likely to produce the stressed syllable on the initial syllable if it is heavy. The results of the spontaneous production task are different, but the number of tokens produced here is too small to allow us to make meaningful comparisons between the two tables. I would, however, like to draw the attention to the other two production types: $\underline{\sigma}$ σ Ce and σ $\underline{\sigma}$ σ. What the first one shows is the appearance of the realised V as the maximally underspecified vowel in Spanish in spontaneous production by the advanced group. This is evidence that the underlying V is indeed there, but we would obviously want to see this also in lower levels too. Once again, we have very few instances of spontaneous production with these words, but we will see this vowel emerging in other cases in the next section. The second structure refers to a specific realization of the word 'huésped', which had been produced as 'u.és.ped', with an addition of another syllable. Note that even though the diphthong was split into two syllables, stress never went as far as the antepenult.

- Unmarked FINAL VC.

Eight words represented this pattern. The words were:

terror	[te.'ɾor]	(=terror)
calor	[ka.'lor]	(=heat)
licor	[li.'kor]	(=liquor)
jamón	[xa.'mon]	(=ham)
mantel	[man.'tel]	(=tablecloth)
ciudad	[θju.'ðað]	(=city)
animal	[a.ni.'mal]	(=animal)
alrededor	[al.re.ðe.'ðor]	(=around)

Because these words varied in length and syllable structure configuration, they were subdivided into four different sub-classes:

Two syllables (both light): 'terror, calor, licor, jamón'. Results are shown in Table 42

Two syllables (first heavy, second light): 'mantel, ciudad'. Results are shown in Table 43.

Three syllables: Two light, one heavy: 'animal'. Results are shown in Table 44.

Four syllables: 'alrededor'. Results are shown in Table 45.

Table 42: TWO-SYLLABLE WINDOW: Final VC unmarked: 'Terror, calor, licor, jamón'.

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (49)	BEG2 (52)	INT (48)	ADV (43)	BEG1 (20)	BEG2 (27)	INT (12)	ADV (16)
σ σ̲	0.86 (42)	0.92 (48)	0.98 (47)	1.00 (43)	1.00 (20)	1.00 (27)	1.00 (12)	1.00 (16)
σ̲ σ	0.06 (3)	0.04 (2)	0.02 (1)	(0)	(0)	(0)	(0)	(0)
σC+VC	0.08 (4)	0.04 (2)	(0)	(0)	(0)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (1)	BEG2 (0)	INT (0)	ADV (0)
σ σ̲	1.00 (1)	(0)	(0)	(0)

Table 43: TWO-SYLLABLE WINDOW. Final VC unmarked: 'mantel, ciudad'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (33)	BEG2 (27)	INT (34)	ADV (32)	BEG1 (1)	BEG2 (1)	INT (12)	ADV (11)
σ σ̲	0.73 (24)	0.63 (17)	0.73 (25)	0.78 (25)	(0)	1.00 (1)	0.75 (9)	0.73 (8)
CV+V+σ̲	0.12 (4)	0.30 (8)	0.18 (6)	0.22 (7)	(0)	(0)	0.25 (3)	0.27 (3)
σ̲ σ	0.06 (2)	0.04 (1)	0.09 (3)	(0)	(0)	(0)	(0)	(0)
C̲V̲+V+σ̲	0.09 (3)	0.04 (1)	(0)	(0)	1.00 (1)	(0)	(0)	(0)

	Imitation			
GROUP (Total N)	BEG1 (1)	BEG2 (0)	INT (1)	ADV (0)
σ σ̲	1.00 (1)	(0)	1.00 (1)	(0)

Table 44: TWO-SYLLABLE WINDOW. Final VC unmarked: 'Animal'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (12)	BEG2 (13)	INT (12)	ADV (10)	BEG1 (11)	BEG2 (11)	INT (9)	ADV (7)
σ σ $\underline{\sigma}$ [19]	0.25 (3)	0.15 (2)	0.17 (2)	0.50 (5)	0.27 (3)	0.18 (2)	0.33 (3)	0.14 (1)
,σ σ $\underline{\sigma}$[20]	0.42 (5)	0.54 (7)	0.50 (6)	0.40 (4)	0.36 (4)	0.45 (5)	0.44 (4)	0.29 (2)
,σ σ $\underline{\sigma}$+Ce	(0)	(0)	(0)	(0)	0.09 (1)	0.18 (2)	0.11 (1)	0.28 (2)
$\underline{\sigma}$ σ σ [21]	(0)	0.08 (1)	0.17 (2)	0.10 (1)	(0)	(0)	0.11 (1)	0.28 (2)
Other[22]	0.33 (4)	0.23 (3)	0.17 (2)	(0)	0.27 (3)	0.18 (2)	(0)	(0)

Table 45: TWO-SYLLABLE WINDOW. Final VC unmarked: 'alrededor'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (15)	BEG2 (24)	INT (21)	ADV (21)	BEG1 (0)	BEG2 (0)	INT (1)	ADV (7)
σ σ σ $\underline{\sigma}$	0.60 (9)	0.58 (14)	0.52 (11)	0.57 (12)	(0)	(0)	1.00 (1)	0.43 (3)
σ ,σ σ $\underline{\sigma}$	0.07 (1)	0.21 (5)	0.38 (8)	0.38 (8)	(0)	(0)	(0)	(0)
σ $\underline{\sigma}$ σ σ	(0)	0.08 (2)	0.10 (2)	(0)	(0)	(0)	(0)	(0)
σ σ $\underline{\sigma}$ σ	0.13 (2)	0.13 (3)	(0)	(0)	(0)	(0)	(0)	(0)
Other:[23]	0.20 (3)	(0)	(0)	0.05 (1)	(0)	(0)	(0)	0.57 (4)

The predictions made for final-consonant words are confirmed here. Note that the overwhelming majority of words in Table 42 are produced with word-final stress. This is also the case in the spontaneous and imitation data (despite the small numbers in the latter). Words in Table 43 also show stress on the final syllable, even in cases where the diphthong has been split into two syllables. Note that no spontaneous data displays penult stress. But the most interesting cases come from the cognate 'animal' in Table 44. This word shows a larger number of word-initital stress patterns, which are likely attributable to English influence. However, we do not get penult stress, which would be evidence against the proposal presented here. All the other productions involve final stress. More interesting are the spontaneous productions with the unrealised vowel realised as /e/. The

[19] Includes σC+V+$\underline{\sigma}$

[20] Includes ,σC+σ $\underline{\sigma}$

[21] Includes $\underline{\sigma C}$+V+σ

[22] Includes $\underline{\sigma C}$+V+,σ and $\underline{\sigma}$ σ $\underline{\sigma}$.

[23] Includes: ,σ σσ $\underline{\sigma}$; $\underline{\sigma}$ σ $\underline{\sigma}$ σ; σ σ ø $\underline{\sigma}$ and σ $\underline{\sigma}$ ø σ

fact that we see examples of realisation of the vowel for learners at all four levels lends support to the idea that from the very early stages, the unrealised vowel is present underlyingly.

The pattern of preferred final stress is also present in Table 44 with the four-syllable word. However these results are not completely clear. There are some σ $\underline{σ}$ σ σ patterns which are obviously the result of pure transfer and application of English stress patterns, and also a variety of other options. Of note is that the longer the word, the more variation that word exhibited, including deletion of consonants and vowels and the appearance of secondary stresses, which might obscure more general patterns of production. However, if we take together the number of final stressed items with and without secondary stress, the picture is not very different from that found in the previous words examined.

5.2.2.3.One-syllable window.

-FINAL VG.

Only one word was included here:
Paraguay [pa.ɾa.ˈgwai] (=Paraguay)

It was unfortunate that the only word for this particular type was a borrowing too, as the results are probably tainted by the pronunciation of this particular word in English. This, however, could hardly be avoided, as multisyllabic final VG words are extremely rare in Spanish, and are typically borrowings or words that also exist in English (like 'convoy'). Given that other words that are similar to English produced slightly different results and showed more interference from English pronunciation, I will not suggest that any of the patterns found in Table 46 can be extended to other final VG words. What we see is a clear influence from English, in fact, with pronunciations that favour initial stress and a scenario where only the advanced students ever produce final stress.

Table 46: ONE-SYLLABLE WINDOW. Penult VG: 'Paraguay'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (14)	BEG2 (14)	INT (12)	ADV (11)	BEG1 (4)	BEG2 (7)	INT (10)	ADV (12)
σ σ σ	(0)	(0)	(0)	0.46 (5)	(0)	(0)	(0)	0.25 (3)
σC+V+σ	0.43 (6)	0.21 (3)	0.33 (4)	0.27 (3)	0.50 (2)	0.29 (2)	0.40 (4)	0.33 (4)
σC+V+,σ	0.14 (2)	0.57 (8)	0.17 (2)	(0)	(0)	0.71 (5)	(0)	0.08 (1)
Other:[24]	0.43 (6)	0.21 (3)	0.50 (6)	0.27 (3)	0.50 (2)	(0)	0.60 (6)	0.33 (4)

	Imitation			
GROUP (Total N)	BEG1 (3)	BEG2 (4)	INT (0)	ADV (0)
σC+V+σ	0.67 (2)	0.25 (1)	(0)	(0)
σC+V+,σ	(0)	0.75 (3)	(0)	(0)
Other:[25]	0.33 (1)	(0)	(0)	(0)

-VOWEL-FINAL MARKED WORDS.

Certain vowel final words are marked for stress on the last syllable. Two words were included in this category:

Café [ka.'fe] (=coffee)
Canapé [ka.na.'pe] (=sandwich)

The results for 'café' (two-syllable word) are shown in Table 47, and for 'canapé' in Table 48.

Table 47: ONE-SYLLABLE WINDOW. Vowel final marked: 'café'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (13)	BEG2 (14)	INT (12)	ADV (11)	BEG1 (26)	BEG2 (1)	INT (13)	ADV (11)
σ σ	0.23 (3)	0.64 (9)	0.50 (6)	0.82 (9)	0.50 (13)	(0)	0.62 (8)	0.82 (9)
σC+V	0.62 (8)	0.22 (3)	0.50 (6)	0.18 (2)	0.50 (13)	(0)	0.38 (5)	0.18 (2)
σC+V	0.15 (2)	0.14 (2)	(0)	(0)	(0)	1.00 (1)	(0)	(0)

[24] Includes , σ σ σ; ,σC+ V+ σ; σC+ V+ σ, σC+ V+ σ; σ σ σ; σ σ ,σ and σ σ σ
[25] Includes , σ σ σ; ,σC+ V+ σ; σC+ V+ σ, σC+ V+ σ; σ σ σ; σ σ ,σ and σ σ σ

Table 48: ONE-SYLLABLE WINDOW. Vowel final marked: 'canapé'

	Reading				Spontaneous			
GROUP (Total N)	BEG1 (12)	BEG2 (12)	INT (12)	ADV (21)	BEG1 (1)	BEG2 (0)	INT (1)	ADV (4)
$\sigma\ \sigma\ \underline{\sigma}$ [26]	0.42 (5)	0.42 (5)	0.50 (6)	0.64 (7)	1.00 (1)	(0)	(0)	0.75 (3)
$\underline{\sigma}\ \sigma\ \sigma$ [27]	0.08 (1)	0.08 (1)	(0)	(0)	(0)	(0)	1.00 (1)	(0)
$\sigma\ \underline{\sigma}\ \sigma$	0.42 (5)	0.42 (5)	0.33 (4)	0.36 (4)	(0)	(0)	(0)	(0)
$,\sigma\ \sigma\ \underline{\sigma}$	0.08 (1)	0.08 (1)	0.17 (2)	(0)	(0)	(0)	(0)	0.25 (1)

	Imitation			
GROUP (Total N)	BEG1 (4)	BEG2 (5)	INT (1)	ADV (3)
$\sigma\ \sigma\ \underline{\sigma}$ [16]	0.75 (3)	0.80 (4)	1.00 (1)	0.67 (2)
$\underline{\sigma}\ \sigma\ \sigma$ [17]	(0)	0.20 (1)	(0)	0.33 (1)
$,\sigma\ \sigma\ \underline{\sigma}$	0.25 (1)	(0)	(0)	(0)

The first striking difference between the two words is that, while final stress is overwhelmingly preferred by all groups with the two syllable word 'café', there is a fair number of productions of penult stress in the case of the three-syllable word 'canapé'. And this is in the reading task, occurring despite the fact that these words are orthographically marked with an accent mark to signal their special status. What the production data in 'café' show is that learners are neither using their L1 settings (which would put stress on the first syllable: (**ca**.fe) nor the default trochaic pattern. Clearly this word has been correctly marked for rightward displacement of stress from early stages, given the high number of correct productions by the beginners' groups. I really do not have any good explanation for why the same marking does not take place with the three-syllable word. Maybe length plays a role here, and the fact that we have a large number of unstressed syllables before the stressed one forces the appearance of stress before the last syllable. This would favour the natural tendency to create rhtyhm based on an alternation of peaks and troughs. In the absence of further examples, this is the only explanation I can advance.

[26] Includes $\sigma C{+}\sigma\ \underline{\sigma}$

[27] Includes $\underline{\sigma C}{+}\sigma\ \sigma$

5.2.4. Summary of findings

In this section, we looked at the production data of stress patterns and found that in the case of the two-syllable window condition, words that end with a final vowel seem to be produced using a trochaic template that generates penult stress. The use of the trochaic template is quoted in the L1 acquisition literature (Fikkert 1994, Demuth 1995) as the prosodic mechanism that drives the production of minimal bisyllabic words in children. Given that English is also a trochaic language, the use of this template is not an indication that learners are accessing innate linguistic mechanisms in the same way that children do. Learners can invoke these patterns from their L1 without direct access to these mechanisms. The evidence that is available to them in Spanish is robust (the majority of words in Spanish have penult stress) and thus drives their representations in the right direction. Evidence of this trochaic pattern is also seen in consonant-final words. It is the use of this pattern and the correct representation of these words with an unrealised vowel word-finally that enables them to generate the unmarked final stress patterns correctly.

In terms of marked patterns, we also observed that when extrametricality markings coincide with the general marking in their L1, all learners are able to mark the extrametrical elements correctly. This was the case of words that exemplified the three-syllable window, where the final syllable was extrametrical (or marked for leftward displacement of stress) and this coincided with the English setting.

When the pattern was not so evident, as in the case of marked final VC words, we witnessed some developmental stages. For the first two levels, the default trochaic pattern was favoured, resulting in final stress for the majority of the words. After the intermediate level, markedness is appropriately incorporated into the learners phonology.

In the case of final open stressed words, the pattern seemed to be easy to acquire in the case of bisyllabic words. In the case of words longer than two syllables, the beginner groups produced a roughly equal number of default stress assignments on the penult and correct assignments on the final syllable. This was evidence of lack of correct marking for stress. In the absence of other data, word length was the only evidence that could be presented to explain these different results. Therefore, with the exception of some cognates and cases of positive transfer, there is no evidence that extrametricality settings in the L1 greatly influence the production of L2 forms. Instead, we saw that new parameter settings can be adopted over time.

In addition, we saw that the inclusion of words that were either cognates or borrowings could skew results of production data, as these words showed a high incidence of stress and/or syllabic structures found in the learners' L1.

With respect to the interaction of stress and syllable structure, we saw that while stress was constrained by the trochaic template and newly learnt markedness considerations, syllable structures could vary a great deal. This variation was found more commonly beyond the penult syllable. Patterns of syllable divisions not found in Spanish (such as the splitting of the diphthongs into two syllables or the movement of an onset to the coda of the preceding syllable) are allowed as long as these changes do not interfere with stress assignment. The behaviour found in stress assignment also lends support to the proposal put forward regarding the MSD in syllable onsets. Learners are probably misinterpreting the GV combinations as V+V sequences because the stress can be correctly assigned on the penult with the trochaic template despite this. Therefore it takes them longer to produce correct GV forms and correct the underlying representation for the on-glide because by analysing the stress pattern incorrectly, they are ignoring one of the more robust pieces of evidence in Spanish that they have to trigger the change in the underlying representation of the glide; the fact that the presence of GV in a syllable in final or penult position attracts stress.

We also saw that the results of the spontaneous data did not seem to be radically different from those found in the reading task. However, without the spontaneous data we would not have been able to deduce that certain principles were in operation. It was truncation data that showed us the operation of the trochaic pattern and epenthesis of /e/ in final consonant words that lent support to the ideas proposed, and both were found mostly in spontaneous data.

Finally, the results of all the production data largely mirror and explain the pattern of homogeneity of responses found among groups in the acceptability judgement test and lend support to the appropriateness of the use of this methodology to tap learners' underlying competence. A full picture of the real mechanisms that drive production, however, could not be obtained without the analysis of all the production data here, and the two methods of analysis complement each other.

Chapter 6: Conclusions

This thesis deals with the acquisition of syllable structure and stress in Spanish as a second language. In Chapter 1, we laid the ground of the theoretical learning model adopted in the thesis. In Chapter 2, we provided an account of the syllable and stress systems in Spanish and English, the two languages involved in this study. We also discussed the implications that the differences between the two systems had for L2 acquisition, and we identified the research questions. We saw that some of the difficulties related to parameter re-setting, others were related to changes that needed to be made in the underlying representation. In Chapter 3 we described the procedure followed for data collection and discussed methodological issues. In Chapter 4, we provided an overview of the research carried out in the L1 and L2 acquisition of prosodic structure. In Chapter 5, we discussed the data from the two tests and suggested some possible explanation for the learners' behaviour. In this final chapter, we will evaluate the methodology adopted and .put the results of the analysis in the context of the learning theory outlined in Chapter 1.

The method used to collect our production data is not particularly innovative in the field of SLA. However, some words about the tasks and items used are appropriate at this point as an evaluation of the procedure. The fact that the majority of results did not differ greatly depending on whether the word was read or produced spontaneously by the learners, and that at the early levels it was difficult to obtain many spontaneous productions due to the lack of vocabulary, might imply that reading tasks should be preferred over spontaneous data collection. Our view is that both should be included. Without the spontaneous data, we would not have had good evidence that the learners had developed an underlying final syllable with an empty vowel in consonant-final words and we would not have been able to fully explain our results. With respect to the test items, it has also been shown that the use of cognates or borrowed words that exist in both languages should be avoided, as they blur the picture of the processes that are really at play.

The acceptability judgement task constituted an innovative approach. This test was devised to try to tap the learners' L2 competence in those cases where production could not give us indication of the representation that the learner had.. The extension of this technique to tap learners′ competence when we also had production data constituted an added measure to evaluate the validity of the technique.

The judgement test generally worked well, and the results obtained generally correlated with the behaviour learners were showing in production. There were only a few examples in which the test showed unexpected results. This was the case of the VGs and VCs clusters, in which the control group performed below the levels expected. An error in test design is one of the possible explanations for this anomaly, but we should not discard the possibility that these results may be concealing something else with respect to the speakers′ underlying representations. It could well be the case that these are highly marked structures or they involve unproductive processes and native speakers only accept these structures when they appear in words that they recognise, but not in the case of nonsense words.

The overall validity of the test when it was accompanied by production data suggests its usefulness for situations in which production data was impossible to obtain. If this test is used in other studies, my only caveat would be that the items used should be carefully designed and tested. The larger the control group, the more validity the test as a whole will have.

We now turn to an evaluation of the results found in the larger field of SLA research. In Chapter 1, we outlined the parametric model and explained how it could work as a learning theory for L1 and L2 acquisition. While there is agreement that principles and parameters guide L1 acquisition and that the Subset Principle might effectively function as a learning principle to ensure that the correct parameter setting is arrived at, we saw that in the case of L2 acquisition the opinions as to the degree to which UG is available to the learner are divided.

One can easily see that the position that learners do not have access to UG is not compatible with the results of this study. With respect to syllable structure, it is clear that all productions comply with the Sonority Principle: all nuclei are occupied by the most sonorous segments, and segments decrease in sonority as we approach the syllable margins. All words also contained some alternation of stressed and unstressed syllables, demonstrating knowledge about some underlying rhythmic principle of stress alternation. In addition, the learners′ productions can all be explained by making reference to parameter settings or other linguistic rules/markings.

If learners show access to the principles and parameters of UG, then the next question that needs to be asked is how that access is achieved, whether it is through the L1 or whether it is directly, bypassing the native language. Moreover, what makes examination of this issue in phonology particularly interesting is that prosodic aspects are not normally explicitly taught. In other areas, like syntax, these factors might be affected by additional variables that would not interfere in a naturalistic setting. In order to answer this question, I would like to consider the three different learning situations that the learners in this study had to overcome:

i) Parameters in L1 and L2 coincide

Most of the parameters in stress (the Projection Parameter (PP) for non-verbs, the cases examined in this thesis, the Iterative Constituent Construction Parameter (ICCP), the Head Parameter (HP)), and some of the parameters in the syllable (the Onset Parameter, Minimal Sonority Distance Parameter, the Branching Rhyme and Branching Nucleus Parameters and the Extrarhymal Parameter) are representatives of this situation.

In the case of stress, the trochaic template that L2 learners use can only be produced based on the application of the three stress Parameters (PP, ICCP and HP) that operate in both English and Spanish. As we saw, it is impossible to determine whether the setting of these parameters comes directly through the L1 or whether the settings of the trochaic rhythm constitute a universal default setting in UG and learners have direct access to them. What seems to be the case, however, is that stress assignment overrides syllable structure considerations: syllable structures that contain on-glides may be produced differently as long as the trochaic template is satisfied.

In the case of syllable structure different situations emerge. For the Onset and MSD parameters it looks as if the learners initially do not transfer them. Beg.1 students behave significantly differently with respect to the other learners in their judgement of grammatical CCV clusters. However, the identity of the setting of these parameters in their L1 and L2 helps them set the L2 values and they quickly behave similarly to native speakers of Spanish.

We also saw that there is not enough evidence the nucleus parameter has been reset. The interaction of several of the tests which involved rhyme segments shows that codas seem to be acquired before the nucleus. However, there is no good evidence that suggests that the off-glide, the only segment that can occupy the other position in a branching nucleus, is indeed represented here. In fact, learners′ indeterminate judgements seem to imply that this segment may a kind of 'floating segment' whose representation has not been fixed. As for the extrarhymal parameter, we also saw that the judgements about rhymes that contain /s/ were different from those of native speakers. This was interpreted as a sign that the English representation is maintained throughout the different stages.

ii) Parameters in the L1 are a subset of the ones in the L2.

The Minimal Word Parameter was the only example of this type, with the setting in English more restrictive than in Spanish. As we saw, both the acceptability judgement test and the production data showed that learners across all levels had managed to reset this parameter. This speedy acquisition, however, should be taken with caution, as there was some doubt that the learners were in fact resetting the parameter. It is possible that the segmental structure of the variety of English these learners spoke might have been the cause of this apparent acquisition. The evidence that this parameter has been reset to a more restrictive setting must remain inconclusive until further research is carried out with other learners who speak other varieties of English.

iii) Parameters in the L1 are a superset of the ones in the L2.

The Extrasyllabicity Parameter was the only example of this type. This parameter allows the generation of sCCV onsets. The data from the acceptability judgement test revealed that learners gave mean ratings which were significantly different from those of CCCV, which is evidence of an L1 effect. However, an analysis of sCCV and CCCV types also revealed that learners underwent a similar developmental progression in the sharpening of their intuitions on ill-formedness. The beginners and intermediate groups behaved in a similar way, and even though the advanced group was able to sharpen their judgement, their mean score was significantly different from that given by the control group. However, this was evidence that over time, L2 learners can also manage to realise that a given structure is not possible in a second language. This is a particularly interesting finding because it implies that negative evidence may not be necessary to realise that something is not possible in the L2, at least in phonology. It also means that L2 learners can indeed reset a particular parameter to a more conservative setting.

Developmental progression is not found in other impossible structures, such as VCCC, which are not possible in their L1. Non-natives do not behave significantly differently from natives, evidencing once again that awareness about ill-formedness is indeed possible among L2 learners. One may puzzle over the reason why, in the case of CCCV structures, we see a developmental progression of their intuitions and in the case of VCCC we do not see one, when neither structure is found in the learners' L1. The reason for this may have to do with the position these clusters occupy in the syllable. Rhyme positions are usually developed in L1 acquisition before onset clusters (Demuth 1995). The earlier realization in L2 acquisition that VCCC is not possible may well have to do with this as well.

iv) Underlying representations in L1 and L2 are different.

Note that even though only the parameter settings above can be said to be in a subset or superset relationship, there are a number of other cases in which the English grammar generates a set of superset structures which are not present in Spanish (English allows up to two consonants in the coda whereas Spanish only allows one, English allows up to three other extrametrical coronal consonants) or in which the Spanish grammar generates a superset (creation of (C) LGV structures). These outputs can be said to be in a subset-superset relationship, but we cannot invoke the Subset Principle to explain them because they are the result of different underlying representations. Recall that even though the rhyme can branch in Spanish, it cannot be occupied by two consonants; likewise, the structure LGV can appear in Spanish because the glide occupies the nucleus and therefore it does not violate the MSD parameter. A similar case in stress is the Edge Marking Parameter. The settings for the insertion of brackets are identical in both languages. Both insert right and left brackets in words that are marked for left or rightward displacement of stress. What differs is the way that words are marked underlyingly for these displacements and the learnability question is whether it is possible to change these representations (in the case of glides and VCC) or markings (in the case of extrametricality in stress).

In the case of stress, we saw that if the extrametricality markings coincide with the L1 (three-syllable window condition) , this setting is normally transferred. Otherwise, the correct setting in the L2 can be acquired over time by the learners, even in cases in which there was a need to develop an unrealised vowel underlyingly to complete the derivation, and there is no evidence that any other markings are transferred.

With respect to syllable structure, learners differ in the degree to which they identify that two-consonant codas are not possible. We saw that even though they get progressively better at disallowing two-consonant codas, they are never as sharp as the control group about their judgements. Finally, in the case of on-glides, the acceptability judgements are as good as those given by native speakers. However, analysis of the production data shows that there are very few cases in which the learners produce these structures correctly. More often than not, the syllable is split into two and the glide is turned into a full vowel (CV+VC). This might indicate that learners are accepting these structures because they are perceiving two syllables. The acceptability judgement data might be concealing this along with other important issues.

In the light of these findings, we can therefore conclude that learners do show a certain degree of transfer in their production. However, in the case of syllable structure transfer is mainly confined to cases of underlying representation (representation of the off-glide, specification of [+cons] for the two elements in the coda) or to segments which are licensed by adjunctions (the /s/ in sCCV and extrarhymal /s/). In the case of stress, the only transfer is positive transfer of extrametricality.

By contrast, parametric transfer is rare. We saw that there is a large number of parameters in which the learner seems to start with a default setting. This is particularly evident in cases in which the parameter exists in L1 with the same setting as in L2 and also in cases in which the L1 is a superset of the L2. I propose that it is this adoption of an initial default setting that allows the L2 learners to identify that certain structures are not possible in a language without the use of negative evidence. Learners assume that structures are impossible unless they encounter evidence to the contrary. This is what allows them to sharpen their intuitions about what is not possible in the L2 over time. Further evidence that shows that mechanisms similar to the ones found in L1 acquisition are at play comes from the fact that the branching coda parameter seems to be set before the branching nucleus parameter.

These data then lend support to the idea that L2 acquisition is a process in which the same mechanisms as those found in L1 acquisition are at play. That does not mean to say that the final outcome will be the same as in L1 acquisition: as we saw, transfer seems to be very deeply rooted in aspects related to underlying representations and there were several instances in which even advanced L2 learners were at an earlier stage or stages in the development of the setting of a particular parameter (sCCV). Examination of data from a group with longer exposure to the language may indicate whether these are fossilisations or whether we are just witnessing a slow developmental process.

Appendix A

QUESTIONNAIRE

ALL ANSWERS WILL BE TREATED IN THE STRICTEST CONFIDENTIALITY.

SURNAME:......................................

FIRST NAME:...

AGE: ....YEARS OLD

1- What is your mother tongue?

2- List the languages you can speak (other than your native language) and state the periods during which you studied them or have been exposed to them.

LANGUAGE	PERIODS OF EXPOSURE/STUDY
example: German	**1992-two semesters at University**

3- How long have you been learning Spanish?

..............YEARS ....MONTHS

4- Were any of your Spanish teachers native speakers? If so, where were they from? How long did they teach you for? How many hours a week did you have with them?

REGION-COUNTRY	PERIOD OF TEACHING	WEEKLY TUITION
ex. Granada (Spain)	**1991-1992**	**1 hr./wk**

5- How many hours <u>a week</u> do you spend on average doing the following outside teaching hours?

	Time spent (in hours)	Further details
Watching Spanish language TV		
Listening to Spanish language radio		
Talking to native speakers		
Using self-study audio-visual material		
Other :		

6- Think about the non-native Spanish teachers you have had. List them by year and try to rate their pronunciation according to the folllowing scale:

1) Native standard. Their pronunciation was flawless.
2) Near native. You can rarely find traces of their native language (e.g. English).
3) Reasonable pronunciation, but you can find traces of their native language.
4) Fairly accented Spanish. Poor pronunciation.
5) Heavily accented Spanish. Very poor pronunciation.
6) I don't know

YEAR	RATING
example: 1991-1992	**2**

7- Have you ever lived in a Spanish-speaking country (long visits)? If so, where, when and for how long?

PLACE	YEAR	LENGTH OF TIME
example:Argentina	**1993**	**9 months**

8- Have you ever been to a Spanish-speaking country (short visits)? If so, where, when and for how long?

PLACE	YEAR	LENGTH OF TIME
example: Mexico	**1994**	**2 weeks**

9- Are either of your parents Spanish speakers? If so, how much Spanish has been spoken at home until now?

10-Have you ever had any phonetic training for any language (including Spanish) or taken a linguistics course which included phonetics? If so, give details.

11- How important is your accent in Spanish? Plaese circle one:
I want to:
a- be indistinguishable from a native speaker
b-to have a good enough accent so I am always understood
c-people will know I am American, so my accent does not concern me
d- I have never thought about my accent.
e- Other (please specify)

12-Give a judgement of your level of Spanish:
a) Absolute beginner b) 'False' beginner c) Advanced beginner d) Low-intermediate
e) Intermediate f) Upper-intermediate g) Low-advanced h) Advanced i) Upper-advanced j) Near-native k) Native

13- What Spanish language courses have you taken at University so far?

14- Why are you learning Spanish?

15- Would you be willing to collaborate in this research?

If the answer is YES, how could I contact you? (Please provide e-mail/ telephone...)

THANK YOU VERY MUCH FOR YOUR HELP!

Appendix B: Native speakers' questionnaire and acceptability judgement sheet.

TEST 1: JUICIOS DE ACEPTABILIDAD.

No rellenar este espacio CÓDIGO: NIVEL:

APELLIDOS: NOMBRE: ¿Cuántos idiomas has estudiado y cuándo empezaste a estudiar cada uno de ellos? ¿Has tenido alguna vez algún profesor de idiomas extranjeros nativo? Si la respuesta es afirmativa, especifica el tiempo que te dio clase. ¿Has pasado algún tiempo en un país donde se hable alguno de los idiomas que has estudiado? Si la respuesta es afirmativa, di dónde y durante cuánto tiempo.

Oirás una serie de palabras en la cinta. **Todas ellas** son palabras inventadas, pero algunas podrías ser palabras posibles en español y otras serían imposibles. Cada palabra será pronunciada precedida del número de orden y se repetirá dos veces. Juzga la aceptabilidad de las palabras de acuerdo con la siguiente escala y asegúrate de que **no dejas ninguna palabra en blanco.**

1	2	3	4	5
Seguro que es posible	Quizás sea possible	No sé	Quizás sea imposible	Seguro que es imposible

1.	14.	27.
2.	15.	28.
3.	16.	29.
4.	17.	30.
5.	18.	31.
6.	19.	32.
7.	20.	33.
8.	21.	34.
9.	22.	35.
10.	23.	36.
11.	24.	37.
12.	25.	38.
13.	26.	39.

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Appendix C: Marking sheet.

TEST 1: ACCEPTABILITY JUDGEMENT.

Do not fill in this section CODE: LEVEL:

SURNAME: NAME: SPANISH COURSE:	 TUTOR'S NAME:

You will hear a series of words on the tape. <u>**All**</u> of them are nonsense words, but some could be possible words in Spanish and some would be impossible. Each word will be pronounced preceded by the number and will be repeated twice.

Rate the acceptability of the words according to the following scale in the columns below..

1	2	3	4	5
Certainly Possible	Maybe possible	Don't know	Maybe Impossible	Certainly impossible

1.	27.	53.
2.	28.	54.
3.	29.	55.
4.	30.	56.
5.	31.	57.
6.	32.	58.
7.	33.	59.
8.	34.	60.
9.	35.	61.
10.	36.	62.
11.	37.	63.
12.	38.	64.
13.	39.	65.
14.	40.	66.
15.	41.	67.
16.	42.	68.
17.	43.	69.
18.	44.	70.
19.	45.	71.
20.	46.	72.
21.	47.	73.
22.	48.	74.
23.	49.	75.
24.	50.	76.
25.	51.	77.
26.	52.	78.

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1	2	3	4	5
Certainly Possible	Maybe possible	Don't know	Maybe Impossible	Certainly impossible

Appendix D: List of words used.

Table 1

WORD ID	WORD	TYPE	TARGET	GRAMMATIC
1	Sadocírns	SY	17	0
2	Alémia	ST	5	1
3	Colátey	ST	9	0
4	Riás.to	SY	10	1
5	Jas	SY	2	1
6	Baciána	ST	12	1
7	Corriácia	ST	12	1
8	Ca.riáil.to	SY	11	0
9	Nilóstrapeda	ST	21	0
10	Botérma	ST	13	1
11	Nriséta	SY	4	0
12	Ru.lién.to	SY	10	1
13	Dutílda	ST	13	1
14	Sémpotel	ST	6	0
15	Tácopo	ST	21	1
16	Gróco	SY	4	1
17	Collíguay	ST	9	0
18	Colóista	SY	20	1
19	Sa	SY	1	1
20	Claménece	ST	21	1
21	Porsebérd	SY	15	0
22	Sabocón	ST	8	1
23	Splóco	SY	22	0
24	Pas	SY	2	1
25	Perspatána	SY	18	1
26	Dálcospa	ST	13	0
27	Davóy	ST	9	1
28	Drúmas	SY	4	1
29	Sepérf	SY	15	0
30	Drásemen	ST	6	0
31	Tísdelia	ST	5	0
32	Ro	SY	1	1
33	Ceréite	ST	14	1
34	Ñlóque	SY	4	0
35	Cho	SY	1	1
36	Péis.do	SY	20	1
37	Fiátoter	ST	6	0
38	Cariémato	ST	21	1
39	Nécoda	ST	21	1
40	Dalcánta	ST	13	1
41	Cáteino	ST	14	0
42	Contécio	ST	5	1
43	Acóntraiso	ST	14	0
44	Frigérmf	SY	16	0
45	Cortácia	ST	5	1
46	Cáidosen	ST	6	0

47	Cuáin.co	SY	11	0
48	Acrestíplo	SY	4	1
49	Dojabél	ST	8	1
50	Tó	SY	1	1
51	Sablupénf	SY	15	0
52	Násiata	ST	12	0
53	Sotrorrólnk	SY	16	0
54	Ca	SY	1	1
55	Pánasay	ST	9	0
56	Bin	SY	2	1
57	Fnléspo	SY	3	0
58	Cótresma	ST	13	0
59	Obstráse	SY	18	1
60	Pmreflámo	SY	3	0
61	Dáisodia	ST	5	0
62	Taríl	ST	8	1
63	Násoy	ST	9	0
64	Depálnd	SY	17	0
65	Dnésco	SY	4	0
66	Balécompa	ST	13	0
67	Gnráscon	SY	3	0
68	Liragáy	ST	9	1
69	So.puéin.do	SY	11	0
70	Fánkiesa	ST	12	0
71	Prosóin	SY	19	0
72	Táufto	SY	19	0
73	Miáscagio	ST	5	0
74	Cadóy	ST	9	1
75	Pasómol	ST	7	1
76	Panrélio	ST	5	1
77	Tílmade	ST	21	1
78	Lóirioca	ST	12	0
79	Plumélmf	SY	16	0
80	Luéin.dia	SY	11	0
81	Ca.llué.ro	SY	10	1
82	Ta.rrion.dé.la	SY	10	1
83	Abspúmo	SY	18	1
84	Cióteina	ST	14	0
85	Sálotren	ST	6	0
86	Périaso	ST	12	0
87	Jáscondo	ST	13	0
88	Sclacáto	SY	22	0
89	Insparáta	SY	18	1
90	Colláster	ST	7	1
91	Acónte	ST	13	1
92	Dun	SY	2	1
93	Cedórnd	SY	17	0
94	Cabórnt	SY	17	0
95	Ralémen	ST	7	1
96	Cáltraico	ST	14	0
97	Gnásca	SY	4	0

98	Peliáma	ST	12	1
99	Genéica	ST	14	1
100	Doróite	ST	14	1
101	Démalpolsay	ST	21	0
102	Cárbel	ST	7	1
103	Plesecómb	SY	15	0
104	Sapólm	SY	15	0
105	Clúntiola	ST	12	0
106	Llué.co	SY	10	1
107	Siotéima	ST	14	1
108	Instére	SY	18	1
109	Cespélmp	SY	16	0
110	Sprumésco	SY	22	0
111	A.déin.so	SY	19	0
112	Ausméca	SY	20	1
113	Dnrepeséto	SY	3	0
114	Ral	SY	2	1
115	Táleito	ST	14	0
116	Amiéza	ST	12	1
117	Ca.lóun.ta	SY	19	0
118	Ajuále	ST	12	1
119	Práista	SY	20	1
120	Fnépo	SY	4	0
121	Bemán	ST	8	1
122	Compáime	ST	14	1
123	Anánay	ST	9	0
124	Cáusma	SY	20	1
125	Scratéca	SY	22	0
126	Cáum.bo	SY	19	0
127	Riádodie	ST	5	0
128	Járenia	ST	5	0
129	Básialaca	ST	21	0
130	Boncóy	ST	9	1
131	Feserárnk	SY	16	0
132	Centérua	ST	5	1
133	Ísterta	ST	13	0
134	Jinástra	SY	4	1
135	Gasmácor	ST	7	1
136	Strupéto	SY	22	0
137	Pfnémo	SY	3	0
138	Curupáy	ST	9	1
139	Bráteleba	ST	21	0
140	Bodariél	ST	8	1
141	Nomólte	ST	13	1
142	Dácosicia	ST	21	0
143	Cha.piéur.mo	SY	11	0
144	Celupérnt	SY	17	0
145	Clúnas	SY	4	1

Appendix E: Story

Tengo unos amigos que se llaman **Luisa** y **Gabriel**. Son hermanos y son de **Paraguay** pero viven en España en una **ciudad** que se llama **Cuenca**. Esta es una **historia** que les pasó a ellos un día. Era un día de invierno y **no** hacía **sol** ni **calor**. El cielo estaba **cubierto** de nubes y de vez en cuando había rayos y **truenos**. Era por la tarde y **Luisa** iba a ir a ir a casa de unos **parientes, Mario** y **Gloria**, que vivían en otra **ciudad** porque la habían invitado a una **fiesta.** Estos **parientes** tenían un **huésped** en la casa, un amigo **griego** y querían presentarle a sus **familiares** y amigos. A **Luisa** le encantan las **fiestas.** Su hermano también tenía una **invitación** pero decidió **no** ir porque estaba **muy** cansado. **Gabriel** prefería quedarse en casa viendo la **televisión**, durmiendo la **siesta** y tomándose un **café** o **té caliente** cuando el tiempo era tan malo. **Luisa** decidió que era mejor tomar el coche en vez de tomar el **autobús. Luisa** se puso la **gabardina, luego** los **guantes** y la **bufanda,** le dijo **adiós** a su hermano, abrió la **puerta** y salió a la calle.

El tiempo era tan malo que **Luisa** decidió conducir **despacio** para **no** tener un accidente. La **carretera** era **muy buena** y **no** había mucho **tráfico.** De repente, vio un **animal,** creía que era una **liebre,** cruzando la **carretera delante** del coche. Pisó el freno para **no** atropellarla y se salió de la **carretera**. Salió del coche y vio que tenía una **rueda** en el barro y **no** podía salir de allí. ¡Qué mala **suerte**! pensó. Miró a su **alrededor**: estaba oscuro, era de noche y **no** había ningún coche. A las orillas de la **carretera** sólo había **árboles muy gruesos** y grandes. **No** sabía qué hacer. Decidió esperar en el coche pero pasaron **veinte** minutos y **no** pasó nadie por la **carretera**. Decidió entonces salir y empezar a caminar por la **carretera,** hasta llegar al próximo **pueblo.** Tenía una **linterna.** Después de unos diez minutos llegó a un **túnel.** Mientras pasaba por él tuvo verdadero **terror,** porque estaba **muy muy** oscuro. Al llegar al final del **túnel** vio una **luz** a lo lejos y se dio cuenta de que era el **pueblo** que buscaba. Empezó entonces a caminar **más rápido.** Tenía mucho miedo

Para entonces era ya **muy** tarde y en la **fiesta** estaban esperando a **Luisa. Luisa** suele ser **muy** puntual, así que sus parientes llamaron a casa para saber a qué hora había salido. **Gabriel** estaba viendo la televisión y sonó el **teléfono.**

-¿Diga?

-Hola **Gabriel**, soy **Gloria**. Te llamo para preguntarte si **va** a venir **Luisa** a la **fiesta.**

-Sí, por supuesto, ¿**no** está ahí? Salió de casa hace un rato, hacia las 5 de la tarde.

-**No**, todavía **no** ha llegado. El tiempo es **muy** malo, pero **no** se tarda **más** de media hora, ¿**no**?

-**No**. ¿Habrá tenido un accidente?

-**No** lo **sé**, pero ella es siempre puntual. **No** te quiero preocupar, pero ¿por qué **no compruebas** con la policía si ha habido algún accidente?

-Lo haré, pero lo **más** probable es que el coche se haya estropeado: es un coche **muy** viejo y ya se ha parado en **varias ocasiones.**

Gabriel cogió el coche y finalmente encontró el de **Luisa** a un lado de la **carretera**. Empezó a preocuparse **más**. Miró por los **alrededores** pero **no** estaba por allí. Decidió continuar por la **carretera** para llegar al **próximo pueblo** y decírselo a la policía. Pero cuando llegaba cerca del **pueblo** vio a su hermana caminando. Paró el coche y **Luisa** montó. Decidieron entonces ir a la fiesta juntos. Llegaron bastante tarde pero la fiesta resultó agradable. Los **parientes** de **Gabriel** y **Luisa** son **médicos** y tienen mucho dinero, así que cuando hacen **fiestas** siempre hay mucha gente interesante y **buena** comida. Había mesas grandes con **manteles** blancos y bandejas llenas de comida: embutidos, quesos, **jamón, canapés, aceitunas, cacahuetes** salados, pasteles, ensaladas, Había también muchas botellas de bebida: zumos de naranja, tomate, limonada, vinos y **licores. Gloria** y **Mario** se pusieron **muy contentos** al ver a **Luisa** y a **Gabriel** en la fiesta. Desde ese día, **Luisa no** sale de casa sola en el coche sin llevar un **teléfono móvil** para casos de **emergencia.**

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