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Doutoramento em Linguística
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To Rui

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RESUMO

Na presente dissertação pretende fazer-se uma descrição do percurso de desenvolvimento fonológico de cinco crianças portuguesas, no que diz respeito à aquisição do acento primário de palavra (aqui referido como acento de palavra).

Na perspectiva da produção, que é aquela que adoptamos nesta dissertação, o estudo da aquisição do acento debruça-se, sobretudo, sobre o modo como as crianças produzem as relações de proeminência (i.e., as sílabas fortes e fracas) existentes nas palavras prosódicas da língua alvo e, também, sobre o modo como as crianças adquirem o algoritmo que subjaz à posição do acento nessa mesma língua.

Em Português, o algoritmo do acento de palavra não é consensual. Andrade & Laks (1992), Lee (1995), Mateus (1983) e Pereira (1999) defendem um acento de natureza estritamente morfológica, sendo o domínio da sua aplicação o radical derivacional, nos não-verbos, e a palavra lexical, nos verbos. Bisol (1992, 1993) e Wetzels (2006) defendem um acento de tipo rítmico, sensível ao peso. Wetzels (2006) assume ainda que apenas nos não-verbos o acento é sensível ao peso silábico. De acordo com Bisol (1992, 1993) e Wetzels (2006), domínio do acento é a palavra lexical, em não-verbos e em verbos.

As duas análises fazem diferentes predições para a aquisição. Caso se assuma um algoritmo de base morfológica, o acento recai na última sílaba do radical derivacional, nos não-verbos, favorecendo produções cuja sílaba final é forte e podendo conduzir as crianças portuguesas para uma tendência inicial iâmbica (Santos, 2007). Pelo contrário, caso se assuma um algoritmo de acento de base rítmica, o acento recai, em geral, na penúltima sílaba da palavra lexical, favorecendo produções cuja penúltima sílaba é forte, conduzindo as crianças que adquirem Português para uma tendência inicial trocaica.

O estudo da aquisição do acento tem sido um tópico abordado na literatura sobre aquisição da fonologia, muitas vezes relacionado com a aquisição do formato das palavras (e.g., Demuth, 1995; Fikkert, 1994). A observação do formato das palavras produzidas pelas crianças, em termos de número de sílabas – mono-, di-, tri- ou polissílabos – e de tipos de sílabas – fortes ou fracas –, tem sido um dos objectos de análise para inferir acerca do processamento do algoritmo do acento na língua alvo. Adicionalmente, a observação das estratégias de truncação (e.g., *toMAto* produzido como [ˈmɑːdo]), de reduplicação (e.g., *chaPEAU* produzido como [poˈpo]) e de epêntese (e.g., *door* produzidos como [ʌˈdoː]) tem fornecido evidência para o estudo da aquisição do formato e do acento de palavra.

Um outro meio usado, ainda, no estudo da aquisição do acento de palavra e de outros aspectos rítmicos e entoacionais das línguas é a análise acústica, onde se medem, objectivamente, os parâmetros responsáveis pelas proeminências, i.e., a frequência

fundamental, intensidade e duração (e.g., Pollock, Brammer & Hageman, 1993; Kehoe Stoel-Gammon & Buder, 1995). Os resultados apontados na literatura sugerem que, antes do 2;0, as crianças podem não controlar os parâmetros acústicos responsáveis pela produção do acento de palavra na língua-alvo, e que nem sempre as crianças colocam o acento de acordo com o da palavra-alvo. A análise acústica conduzida numa amostra de discurso de duas das crianças que fazem parte do *corpus* desta dissertação mostrou que, no início, há uma grande variabilidade na produção dos parâmetros acústicos e do formato das palavras, quer entre crianças, quer nas produções da mesma criança. Os resultados da análise acústica confirmam, ainda, que os parâmetros acústicos usados na produção do acento podem não estar dominados antes dos 2;0.

Em algumas das línguas estudadas (Alemão, Castelhano, Catalão, Francês, Grego, Hebreu, Holandês, Inglês, Português do Brasil, Quiché, Sesotho, etc.), a aquisição do aspecto prosódico acento de palavra tem encontrado resultados variados. Na maior parte das línguas germânicas, uma tendência para monossílabos é observada nas produções iniciais das crianças (e.g., Demuth, 1996b; Fikkert, 1994; Kehoe, 1998). Mais tarde, a maior parte das produções das crianças têm um formato dissilábico e trocaico (e.g., *BUcket* é produzido como [ˈbʌkɪt] e *book* como [ˈbʊkə]). Neste estádio, os dissílabos iâmbicos são truncados para monossílabos (e.g., *giRAFFE* é produzido como [ˈɾæf]) e apenas mais tarde são produzidos como iambos (e.g., [dʒəˈræf]). Também neste estádio, palavras de maior extensão, são truncadas (e.g., *avoCAdo* é produzido como [ˈkɑdo], *Elephant* é produzido como [ˈæfə] e *kangaROO* como [wuː]). Em estádios subsequentes, as palavras de maior extensão são produzidas com o padrão acentual do alvo. Note-se, no entanto, que as línguas germânicas estudadas são trocaicas e possuidoras de um acento que é sensível ao peso silábico. O domínio do acento é, nestas línguas, a palavra lexical.

Durante muito tempo, a hipótese de um viés trocaico universal (Allen & Hawkins, 1979, 1980) prevaleceu nos estudos sobre aquisição do acento e do formato de palavra nas várias línguas. Porém, em línguas de origem românica ou até em línguas de outras famílias (e.g., Hebreu, Francês, Espanhol ou Grego), os resultados não são consensuais (Bat-El, 2009; Braud, 2003; Demuth, 2001b; Tzakosta, 2004, respectivamente). Por exemplo, em Português do Brasil (PB), variedade que partilha semelhanças evidentes com o Português Europeu (PE), os resultados são, desde os primeiros estudos, intrigantes, já que o Português tem um forte ritmo trocaico, e uma tendência iâmbica inicial foi verificada em alguns dos estudos conduzidos até agora (e.g., Santos, 2007a; Stoel-Gammon, 1976).

Os resultados da análise dos padrões de acento, nos dados das 5 crianças Portuguesas observadas nesta dissertação, mostram que, de facto, reduplicações e epênteses são muito frequentes nas produções iniciais e contribuem grandemente para uma tendência iâmbica, que é aparente, já que os resultados também mostram que os monossílabos predominam numa fase inicial. A simultaneidade de produções monossilábicas, onde reduplicações e epênteses são possíveis, e a frequência de truncações em formas-alvo de tipo trocaico e iâmbico, levam-nos a propor que a representação inicial das palavras em PE seja monossilábica, com uma sílaba opcional à esquerda, sem que um pé esteja a ser processado. Mais tarde, os dissílabos (troqueus e iambos não reduplicados) emergem, sem que os dados demonstrem um predomínio de formas trocaicas ou iâmbicas. Num estádio subsequente, uma preferência por formas trocaicas tende a emergir, quer pela preferência de truncação de palavras de tipo iâmbico para monossílabos, quer pela preferência de truncação de formas de tipo fraco-forte-fraco (e.g., '*saPAto*') para troqueus. Estes resultados mostram que, apesar da variabilidade inicial e da tendência aparente para um pé de tipo iâmbico, o PE comporta-se como outras línguas de ritmo trocaico (nomeadamente, o Holandês, o Inglês e o Espanhol), no que diz respeito à aquisição dos padrões de acento.

Nesta dissertação testámos, ainda, a sensibilidade das crianças portuguesas para aspectos relacionados com a aquisição da flexão nominal (nomeadamente, analisando a aquisição da vogal temática) e verbal (analisando as formas verbais mais produtivas). Complementarmente, analisámos palavras onde a sensibilidade ao peso poderia ser evidente, em concreto, palavras como '*aMOR*' e '*LÁpis*', com sílabas pesadas finais, tónicas e átonas.

Os resultados da análise da interacção entre a morfologia e a aquisição dos padrões de acento são inconclusivos. Por um lado, os dados mostram que, inicialmente, os contrastes de género não são produzidos, sugerindo que, de facto, a flexão nominal de género ainda não emergiu, motivando uma maior produção de formas atemáticas (iambos). Por outro, os dados não fornecem evidências claras para um pé inicial iâmbico. As crianças podem produzir reduplicações e epênteses com a sílaba final forte, mas iambos e troqueus-alvo são também sujeitos a truncações em que a sílaba átona – e não apenas a vogal temática – é apagada. Este padrão parece infirmar uma interacção do acento com a morfologia, nas produções iniciais de não verbos.

Os dados mostram ainda que, inicialmente, verbos polissilábicos são evitados. O primeiro padrão a ser adquirido é, em geral, um troqueu que corresponde ao tema do verbo, i.e., à 3ª p.sg. do Presente/Imperativo. Os sufixos flexionais, nomeadamente os do Infinitivo e da 3ª p.sg. do Pretérito Perfeito, que revelariam a emergência da morfologia verbal, são produzidos mais tarde. Os dados obtidos mostram, no entanto, uma sensibilidade das crianças para a classe de palavras durante a aquisição do acento, já que no início da produção, não-verbos mono– e polissilábicos estão presentes no léxico seleccionado pelas crianças observadas, mas apenas verbos monossilábicos são seleccionados no mesmo momento.

Os resultados da análise à sensibilidade ao peso silábico mostram, por um lado, que as palavras como '*LÁpis*' raramente são seleccionadas pelas crianças e que o seu percurso de aquisição é diferente do de palavras como '*aMOR*'. Esta assimetria parece confirmar o carácter excepcional e marcado das primeiras relativamente às segundas e, por outro lado, indica que, de facto, as crianças portuguesas podem ser sensíveis ao peso silábico na sílaba final durante a aquisição do acento de palavra. De facto, num dado momento do desenvolvimento, apesar de produzirem correctamente palavras como '*aMOR*', as palavras como '*LÁpis*' são truncadas ou produzidas com sílaba final leve.

Em suma, as crianças portuguesas mostram ser sensíveis a um algoritmo de acento de base rítmica, com um comportamento semelhante ao das crianças que adquirem línguas trocaicas, mas uma interacção com a morfologia não foi excluída.

Palavras-chave: aquisição, acento, algoritmo, troqueu, palavra

ABSTRACT

In this dissertation, we aim at describing the acquisition path of five Portuguese children, in respect to primary word stress (henceforth word stress).

Portuguese word stress has been widely discussed, some authors arguing for a morphology-based algorithm (Andrade & Laks, 1992; Lee, 1995; Mateus, 1983; Pereira, 1999) and others arguing for a weight-based one (Bisol, 1992; Wetzels, 2006).

Cross-linguistic information on the acquisition of word stress suggested that children acquiring Germanic languages tend to mirror the trochaic tendency of the target system, as a result of the application of a rhythmic stress algorithm. However, in other languages, conflicting results were attested. Acoustic analyses of early words' production in some languages additionally suggested that, before 2;0, children might not master the acoustic parameters for word stress, and that they might not place stress target-like.

The acoustic analysis conducted on a speech sample of two children in our *corpus* showed a great initial variability in the production of the acoustic parameters and in the word shapes, both within the same child and between children. The results of the acoustic analysis further confirm that the acoustic parameters to derive word stress might not be mastered until 2;0.

The results on the production of stress patterns in the speech of 5 Portuguese monolingual children show that, despite an initial difference (in which we observed a neutral emergence of trochees and iambs, and a tendency for reduplications and epentheses), EP resembles other trochaic languages (namely Dutch and English). The predominant initial production of monosyllables, along with reduplications and epentheses at the left-edge of words, which heavily contribute to an apparent iambic tendency, lead us to propose a monosyllabic representation for early words in European Portuguese (EP), with an optional syllable at its left-edge. Later, non-reduplicated disyllables emerge, without favoring trochaic or iambic words. Afterwards, a preference for trochaic words was noticeable, both through the preferential truncation of iambic words, and through the preferential truncation of weak-strong-weak words into trochees, rather than iambs. Trisyllables were the later word shape to be acquired, especially if they had an extrametrical syllable (/SWW/).

Finally, we tested the Portuguese children's sensitivity to aspects related to morphology and syllable weight. The results did not bring indisputable evidence for morphological constraints interacting with word stress acquisition, early non-verbs are produced similarly, irrespective of their morphological constituency and the target stress pattern. Early verb forms emerge later and generally conform to a trochee and a verb theme. The results on weight-sensitivity showed that words with final heavy stressed syllables (e.g., *aMOR* 'love') are acquired earlier than words with final heavy unstressed syllables (e.g., *LÁpis* 'pencil'), and the latter are initially truncated and later produced with a light final syllable. These results suggest that children recognize that stress in /'CV.CVC/ words is not in the final syllable, which, therefore, cannot be heavy.

Overall results provide evidence for an algorithm for word stress that is sensitive to the rhythmic properties of the target language, though an interaction with morphology is not categorically rejected.

Keywords: acquisition, stress, algorithm, trochees, word.

Symbols and abbreviations

EP – European Portuguese
BP – Brazilian Portuguese
W - Weak
S – Strong
[CV_1CV_2] - Non-reduplicated disyllables
[CV_1CV_1]/[S^2] - Disyllabic (simple) reduplications
[CVCV...] - Multiple reduplications
[fS] – Filler sound+syllable
ω - Prosodic word
Σ - Foot/Feet
μ - Mora
σ - Syllable
C - Consonant
V - Vowel
G - Glide
VN - Nasal vowel
VGN - Nasal diphthong
N - Noun
V - Verb
dim. - Diminutive
augm. - Augmentative
fem. - Feminine
masc. – Masculine
pl. - Plural
sg. - Singular
inf. - Infinitive
subj. - Subjunctive
pres. - Present
simp. past - Simple Past
past imperf. - Past Imperfect
pluperf. - Pluperfect
fut. - Future
cond. - Conditional
imp. - Imperative
WM - Word Marker/Class Marker
Nr - Number suffix
TV - Theme Vowel
TM - Tense/Mood suffix
PN - Person/Number suffix
* - Ungrammatical / Not attested in the language
] - morphological boundary
fam. - familiar/informal speech/baby-talk

IPA symbols (used in European Portuguese):

Consonants:

Plosives - [p] pata, [b] bata, [t] fato, [d] fado, [k] cola, [g] gola

Fricatives - [f] faca, [v] vaca, [s] caça, [z] casa, [ʃ] chá, [ʒ] já

Nasals - [m] mota, [n] nota, [ɲ] manha

Liquids - [l] mala, [ɾ] caro, [ʎ] malha, [ɫ] caldo, [ʀ] carro

Vowels:

Oral - [a] pá, [ɛ] pé, [ɔ] pó, [ɐ] cama, [e] cena, [o] bolo, [i] fita, [ɨ] pente, [u] fumo

Nasal - [ɐ̃] canto, [ẽ] lente, [õ] ponte, [ĩ] tinta, [ũ] mundo

Glides:

Oral - [j] pai, [w] pau

Nasal - [j̃] mãe, [w̃] pão

Primary word stress: [ˈ] casa [ˈkazɐ]

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'I wish life was not so short,' he thought.

'Languages take such a time, and so do all the things one wants to know about.'

J. R. R. Tolkien

0. Introduction

In this dissertation we will describe the acquisition of primary word stress in European Portuguese[1], with an emphasis on the early stages of word production.

Language acquisition and development has been the subject of great interest for linguists, psychologists, psycholinguists, philosophers and biologists over the past 70 years (Jakobson, 1941/1968). Either within a continuist (e.g., Locke, 1983; Davis & MacNeilage, 2000) or a maturacionist perspective (e.g., Smith, 1973; Stampe, 1979), the study and systematization of the children's early linguistic behavior and its development across time have provided empirical arguments for theoretical claims on language acquisition and development, and, more generally, on how language is cognitively represented. The observation of children's linguistic behavior, as well as the study of cross-linguistic differences and similarities during the process of language acquisition is one of the ways to investigate how the 'knowledge of language' is structured (Chomsky, 1986).

Studying language acquisition in general, and phonological acquisition in particular, may provide useful insights on the nature of phonological processes, not only at the early stages of word production, but also across development.

The acquisition of word stress is an aspect of phonological acquisition that interacts with word shape and word structure. The study of word stress acquisition provides us with cues on how children go from a stage where words are hardly recognizable to a stage when full words are uttered. The investigation on word stress acquisition is not limited to the acquisition of this supra-segmental feature in a language - stress itself -, but it is also the study of how children build words in the language they are acquiring. Besides the 'construction work' that underlies the acquisition of word stress, the challenge of studying word stress acquisition relies, indeed, on the fact that stress often depends and might be related to other aspects of language acquisition such as syllables, feet, word structure, word size and morphological information. In fact, studying the acquisition and development of word stress is also investigating a set of phonological and phonological-related issues, which can provide insights on the structure of the language across development. Furthermore,

[1] Henceforth EP.

investigating word stress acquisition in EP is particularly challenging, given the controversial status of stress in the language.

In recent years, many issues on the acquisition of word stress and word shape have been introduced and developed, and several assumptions have been challenged. One of the topics that have been debated over the past 3 decades, which is relative to the nature and representation of early prosodic words in the languages, is the 'universal trochaic bias'. The 'trochaic hypothesis' was proposed by Allen & Hawkins (1979, 1980), and suggested that children have, by default, a trochaic (SW) word pattern (e.g., *tiger*). The claim from the authors was based upon three types of evidence: (i) children's early lexicon, (ii) from children's truncated production of trisyllabic words (specifically, /WSW/), and (iii) languages nursery rhymes. The authors found cross-linguistic evidence supporting a universal trochaic constraint in phonological rhythm. However, the primacy of the study of Germanic languages (mostly English, German and Dutch) - which have a clear trochaic pattern - may have shadowed the study of prosodic acquisition in other language families, namely Romance, Semitic and other language families. Indeed, data from non-Germanic languages (French, K'iche', Brazilian Portuguese[2] and even Spanish[3]) have challenged that assumption, suggesting that the 'universal trochaic bias' might not be universal.

Some of the issues that have been addressed in the literature concerning word stress and word shape acquisition refer to:

(i) how and when do children acquire primary word stress;
(ii) whether children's early words match a default monosyllabic or disyllabic template;
(iii) whether children's early disyllabic productions match a default trochaic foot.

These issues have been discussed in the literature of several languages, but not EP.

In Portuguese (EP and BP), there is an ongoing debate on the nature of stress in adult language. The assumption of a strictly morphology-based algorithm (e.g., Andrade, 1992; Mateus, 1983; Pereira, 1999), both for verbs and non-verbs' system has been conflicting with the assumption of a weight-based rule for non-verbs and a morphology-based rule for verbs (Bisol, 1992, 1999; Wetzels, 2003, 2006)[4]. The issue at stake - the nature of word stress algorithm - has been debated for both varieties of the language (both EP and BP), though very

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[2] Henceforth BP.
[3] Despite the general assumption for the universal trochaic bias in early phonological development, Allen & Hawkins (1979) refer to French, Spanish and BP as languages that do not conform a trochaic pattern.
[4] A detailed description on the different approaches to word stress in Portuguese will be given in Chapter 1, section 1.2.

often authors limit their analyses to a single one (EP or BP). The different analyses on word stress make different predictions for acquisition: if we assume a morphology-dependent algorithm, stress fall, in general (in non-verbs), on the domain-final syllable (the stem), favoring word-final stress and driving Portuguese-speaking children into an initial iambic tendency (Santos, 2007a,b[5]). Conversely, if we assume a strict rhythmic, weight-sensitive stress algorithm, stress falls, in general, in the pre-final syllable of the lexical word, favoring early productions in which the penultimate syllable is stressed.

The works from Santos (2001, 2007) on BP word stress, raised important questions and suggest future research paths for the study of word stress acquisition in Portuguese. The author claims for an iambic early bias in BP (the majority of early words in Brazilian children have a [WS] shape) and defends that Brazilian children cannot produce and acquire trochees due to the interaction with morphology, since trochaic – but not iambic – non-verbs bear a final word marker. Until the moment when children are able to produce morphological contrasts (gender and diminutive suffixes), they are not able to produce trochaic words. Indeed, the influence of morphological information in the acquisition of word stress and word shape has also been the subject of analysis in some languages, such as Dutch, English, German, Spanish, French, Greek, Hebrew or BP. However, the research on the topic (phonology-morphology interface) has mainly focused on prosodic domains above the lexical word (e.g., Genari & Demuth, 1997; Demuth & Tremblay, 2008), namely on sequences of function words (determiners and auxiliaries, mainly) followed by a noun. Though many languages studied from a word stress and word shape acquisition perspective are weight-sensitive - namely, Germanic languages -, no Romance language has been tested for the potential effect of weight-sensitivity during acquisition, even if the target language does not show evidence for its relevance in the system.

In this dissertation we will describe and discuss the acquisition of word stress with an emphasis in the early stages. In particular, with this work we aim to:

(i) identify the developmental path for the acquisition of stress patterns and word shape in EP;

(ii) provide empirical evidence for the ongoing discussion on the nature of word stress in the target language;

[5] Throughout this dissertation, we will refer to Santos (2007a) as Santos (2007). Otherwise, we will specify Santos (2007b).

(iii) compare the acquisition of stress patterns in EP with the acquisition of stress patterns and word shape in other languages (namely Dutch, English and BP), in order to contribute for a discussion on the nature of this prosodic aspect in human languages.

Based on the spontaneous speech productions of 5 Portuguese-speaking children, we aim at identifying their acquisition path in the process of mastering word stress and word shape, by means of developmental stages. In addition, we will compare the acquisition of word stress in EP, with the acquisition of word stress in other languages (namely, English, Dutch, French, German, Greek, Spanish and, in particular, BP), and discuss previous models of word stress acquisition. Finally, we intend to provide evidence for or against the different target analyses for word stress.

Acoustic studies were undertaken since the early works on word stress acquisition in production (Allen & Hawkins, 1980). However, only from the mid nineties (1993[6]) very few studies were dedicated to the analysis of the acoustic properties of word stress during the early stages of phonological acquisition. Being a phonetic and phonological aspect of a language, word stress has special interest in the study of phonological acquisition, as it is not easily identified in the early period of word production. Children may not yet control the acoustic parameters necessary to utter word prominence and/or children may not have acquired the phonological rule to derive word stress. The acoustic study of word stress is thus necessary (i) to understand what are the phonetic correlates of word stress in a given time of early phonological development, (ii) what can we infer from the data on theshape of early words and (iii) to provide further empirical evidence for the claims based on perception-based analyses.

This dissertation will be organized as follows.

In Chapter 1, we will introduce stress by firstly presenting the general principles that govern it, first cross-linguistically and, secondly, in Portuguese. We will mention the functions and properties of word stress in the languages of the world and present some prosodic aspects that are related to it, such as the prosodic hierarchy, the word metrical organization and the basic foot governing laws. Also, in Chapter 1, we will furthermore describe the Portuguese stress system. We will provide information on the descriptions conducted for word stress in the language and, secondly, we will present the metrical proposals for word stress in Portuguese. In the third section of this chapter we will provide frequency information about word stress position and words shapes. In the fourth section of this

[6] Cf. Pollock, Brammer & Hageman (1993).

chapter, we will review the issue of the pertincity of the foot, and the discussion on a weight-sensitive or a morphology-based stress algorithm in Portuguese.

In Chapter 2, we will review the main questions regarding the acquisition of word stress, both cross-linguistically and in Portuguese. Special attention to the shape of early words will be given. Also, a review on the acquisition of stress patterns will be conducted on a vast array of languages (Catalan, Dutch, English, French, German, Greek, Hebrew, Kich'e, Sesotho, Spanish), aiming at listing general regularities across languages, with respect to the acquisition of stress patterns and the potential early preference for a given early word shape (monosyllables, trochees or iambs).

In Chapter 3, we will present the database used in the present study, in particular, the information about the children, the data collection and the phonetic transcriptions.

In Chapter 4, we will investigate the acoustic properties of word stress and word prominence in a speech sample of the *corpus* considered in this dissertation. On the one hand, the results of the acoustic analysis enabled us to reliably identify word prominence in the early speech of two Portuguese children, and, on the other hand, the acoustic analysis provided useful cues on the early processing of word prominence and stress patterns.

In Chapter 5, we will investigate the acquisition path of five Portuguese children, with respect to the different word shapes and stress patterns. We will analyze children's productions of mono-, di- and trisyllables, as well as the acquisition path for target monosyllables, target disyllables (trochees and iambs) and trisyllables (/WSW/, /WWS/ and /SWW/). Additionally, we will analyze the strategies undertaken by the five children in each word shape. Special attention will be given to the production of reduplications, epentheses, truncations and stress shift. Moreover, we will compare the acquisition path pursued by Portuguese children, with the stages of word shape and word stress acquisition established for other languages (namely, Dutch, French and Spanish). The early words' representation, the 'trochaic bias hypothesis' and constraints on word size during acquisition will be discussed, as a means to investigate on which prosodic constituents Portuguese children rely on during word construction and word stress acquisition.

In Chapter 6, we will address the discussion on word stress in the target language, based on the acquisition data from Portuguese children. We will discuss (i) the phonology morphology interface, by investigating the relation between stress patterns and inflection in the noun and verb paradigms during acquisition, and (ii) the potential effect of syllable weight in the functioning of word stress in EP, by studying the acquisiton path of words with stressed and unstressed heavy syllables.

Finally, we will present a summary of the main findings and contributions.

The results brought up by this dissertation will hopefully contribute for the understanding of the stress phenomenon in the language and will provide further empirical support for phonological theories and for a theory of language acquisition.

1. A description on word stress

In this chapter we will describe word stress from a cross-linguistic perspective, with special reference to Portuguese. In section 1.1., we will present the general properties of word stress from a cross-linguistic perspective, by making a general description on the distribution of stress and tonal languages[7] in the world and by referring to the relationship between word stress and the constituents that are presumably part of the universal prosodic structure (1.1.1.). Secondly, we will put forward some theoretical instruments of the metrical theory accounting for word stress (1.1.2.). Thirdly, we will present the relationship between feet structures and stress systems (1.1.3.). Finally we will hand over a description on the main acoustic features that are related to word stress (1.1.4).

In section 1.2., we will describe the Portuguese stress system. This section will be divided into five parts: section 1.2.1. will focus on the traditional approaches to word stress, as well as on the preliminary works on the phonology of word stress; in section 1.2.2., we will describe word stress in EP from an acoustic perspective; in section 1.2.3., we will present a number of proposals for word stress in Portuguese, based on metrical analyses; in section 1.2.4., we will provide frequency information of word shapes and syllables types in relation to word stress. And finally, in section 1.2.5., we will highlight some of the main questions raised by the literature on word stress in Portuguese.

1.1. General observations on word stress

A subset of languages in the world use stress to organize prosodic units in speech, as opposed to languages that use tones and intonation (or pitch patterns) to distinguish words and sentences. Tonal languages are mainly represented in Africa and Asia, whereas stress languages are spread mostly throughout Europe, America and Oceania.

[7] As we will see further in this section, not all languages are stress languages. Given that the main topic of this dissertation is word stress we will neglect information on non-stress languages.

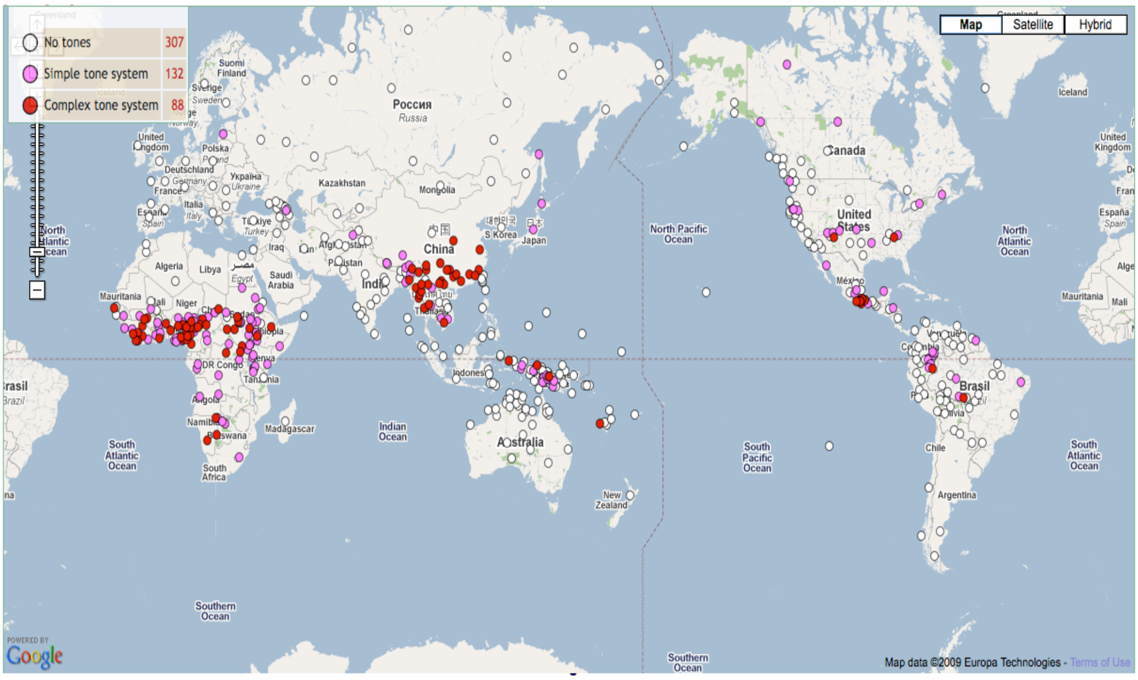


Figure 1. Tonal (purple and red circles) and non-tonal (white circles) languages worldwide (Goedmans & van der Hulst, 2008)

Maddieson in Goedemans & van der Hulst (2008) shows that approximately 58% of the world languages use stress, whereas 42% of languages use tones, as shown in Figure 2, below:

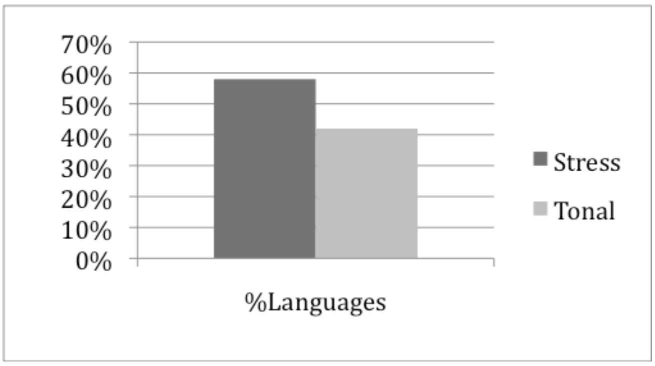


Figure 2. Percentage of tonal and stress languages worldwide (Goedmans & van der Hulst, 2008)

Based on the seminal works by Liberman (1975) and Liberman & Prince (1977), Hayes (1995:8) defines stress as "the linguistic manifestation of rhythmic structure". In stress languages, rhythm in general and stress in particular serves as an organizing infrastructure to words, phrases and sentences in speech. In general terms, and irrespective of the different types of stress that we find in stress languages, stress is related to the way speech is organized and it can be defined as "a matter of relative strength between 'stronger' and 'weaker' syllables" (Kager, 2007:195). A stressed vowel is not intrinsically strong; it is only stronger than the other (unstressed) vowel(s) within a specific domain.

The fact that not all languages have stress and the fact that it is not a regular phenomenon across languages may indicate that stress is not an absolute Linguistic Universal (e.g., Greenberg, 1963; Ferguson, 1978), i.e., it is not a default feature of grammar like grammatical number, negation or vowels and consonants. Also, many unspecialized speakers of stress languages have weak intuitions or show wrong judgments when asked to identify stress in some words[8].

Although there are general regularities on how stress is realized cross-linguistically, there is not a strict characterization of its functioning. Stress varies from language type to language type (for instance, Germanic languages tend to be different from Slavic languages - cf. van der Hulst, 1999) and, within the same type of language, it may also vary (for instance, French is different from any other Romance language in respect to stress, since it has phrase-final accent and not word stress[9]). In some languages, only one stress per lexical word is accepted, whereas in others, two or even three levels of stress are possible. Secondary stress, however, is weaker than primary stress, and tertiary stress is weaker than secondary and primary stress (Goldsmith, 1989; Hayes, 1995; Kager, 1995, 2007, among others).

1.1.1. Word stress and the prosodic hierarchy

When studying speech in general and prominence in particular, researchers early perceived that the speech stream was organized into specific domains that were useful in the description, explanation and understanding of some language phenomena. The speech stream is not an uninterrupted sound chain. Instead, spontaneous speech is mostly organized into 'chunks' that obey and are the result of specific organization (phonological, morphological, syntactic and semantic organization). As far as the phonological aspects of a language are concerned, the speech chain is organized into universal prosodic categories (Hayes, 1989a; Nespor & Vogel, 1986; Selkirk, 1980a). In (1) we present the hierarchy of prosodic constituents that will be adopted in this dissertation.

[8] For a brief review on the perception and identification of lexical stress (and accent) by adult native speakers in other languages (English, Chinese, Norwegian, Japanese, etc.), cf. Beckman (1986: 27-31). For information on EP, cf. Delgado-Martins (1986) and Araújo (2004).
[9] Cf. Delattre (1965) and Dell (1984).

(1) Prosodic hierarchy (Nespor & Vogel, 1986):

Utterance (Phonological Utterance - U)
|
IP (Intonational Phrase - I)
|
PP (Phonological Phrase - ϕ)
|
CG (Clitic Group - C)
|
PW (Prosodic Word - ω)
|
Ft (Foot - Σ)
|
S (Syllable - σ)

Even if in some languages evidence for some constituents is not provided, these categories needed to be evoked to explain phonological and phonetic phenomena cross-linguistically[10]. Specifically, in a wide set of languages stress falls on specific prosodic constituents, such as the prosodic word. The prosodic word is, in this case, the phonological domain for stress assignment. We also know that syllables may be organized in a very fixed manner (into feet), rather than in an arbitrary fashion, in order to provide different types of stress (primary, secondary or tertiary) within words or phrases. Truncations, hypochoristics and reduplications[11], for instance, constitute empirical evidence for the need of fulfilling a prosodic (and often morphological[12]) template in a given language (Broselow, 1982; Kager, 2007; McCarthy & Prince, 1986/1996, 1993/2001, 1995). For instance, in English, a binary trochaic foot (i.e., a foot with two syllables, a strong one followed by a weak one) is preferred (e.g. Anthony -> Tony or Robert -> Bobby). Contrary to French, where words do not have to be preferably and minimally a binary foot (V and CV monosyllables are frequent - Plénat, 1993), in English, prosodic words are minimally a binary foot and feet are preferably binary (CVC, CV.CV or CV:) (McCarthy & Prince, 1986/1996, 1993/2001, 1995).

[10] For a detailed motivation of the prosodic constituents, see Nespor & Vogel (1986), Chapter 2.
[11] Hypochoristics are referred to as nicknames or short names.
[12] On Prosodic Morphology, cf. McCarthy & Prince (1995) and references therein, as well as Kager (2007:223-227).

1.1.2. Metrical aspects

As mentioned in Hayes (1995:1), "[m]etrical stress theory is a branch of theory in generative phonology that deals with stress patterns". It provides the formal representation for stress, in layers or grids, where the rhythmic principles of prominence are formalized. Many authors have proposed several different types of grids. In all of them, a leveled or hierarchical representation of the relevant constituents for word stress is established, in order to assign the strong / weak alternations that govern the rhythmic wave within words and phrases.

Kager (2007) presents a representation of stress within a *Constituentized grid* (following Halle & Vergnaud, 1987). In this grid, the hierarchical elements are, vertically, the different prosodic levels (the syllable, the foot, the prosodic word, and so forth) and, horizontally, information that assigns the rhythm, i.e., the peaks alternations in each level. In (2) we will show the metrical grid proposed by Kager (2007) for the word 'Apalachicola'.

(2) Constituentized grid for the word 'Apalachicola'[13]:

PW-level					x	
Foot-level	x		x		x	
Syllable-level	x	x	x	x	x	x
	(A	pa	la	chi	co	la)

In (2) we first signal the syllables (at the syllable level). In the next level (foot-level), we assign foot-headedness. In the last level (PW-level), we mark the word-headedness. In bounded systems, the rhythmic and metric information must be grouped, according to language-specific principles. The corresponding bounded grid to the word in (2) is presented below.

[13] In all the literature on stress, * (star/asterisk), *S* or *x* mark strong syllables; .(dot), *W* or ∅ (nothing) mark weak syllables. Also, strong syllables can be designated as 'peaks', and weak syllables can be designated as 'trough'.

(3) Metrical constituency - grouping of grid elements:

PW-level					x	
Foot-level	(x		x		x	)
Syllable-level	(x	x)	(x	x)	(x	x)
	(A	pa	la	chi	co	la)

In this grid we see that syllables are grouped into feet and that these feet are SW or left-headed. In this case, foot dominance is *trochaic* (SW). Right-headed feet are possible as well, and, when right-headed feet (WS) are predominant in a language, we call that language *iambic*. Hayes (1995) claims that:

(i) Elements contrasting in intensity naturally form grouping with initial prominence;
(ii) Elements contrasting in duration naturally form grouping with final prominence.

These claims constitute the ground of the *Iambic/Trochaic Law* and were made upon a set of perception experiments where sounds were made more prominent on intensity basis and on duration basis. In these studies, listeners were asked to judge how the sounds were most appropriately grouped in pairs. Based on the results of the perception experiments and after an analysis of a few iambic languages, Hayes claims that "in iambic languages lengthening is frequent and robust, based on its function in fulfilling a rhythmic target" (Hayes, 1995:84). It does not mean that lengthening cannot be found in trochaic languages (Dutch and German, for instance, are both trochaic and have vowel length contrast), only it is less common.

Kager (2007) presents an inventory of metrical feet, in relationship with syllable weight information, as shown in (4).

(4) Inventory of feet types (Kager, 2007:201)[14]:

	Licit			Degenerate	
Syllabic trochee:	$\underline{\sigma}\sigma$			$\underline{\sigma}$	
Moraic trochee:	$\underline{L}L$	$\underline{H}$		$\underline{L}$	(quantity-sensitive)
Iamb:	$L\underline{H}$	$\underline{H}$	$L\underline{L}$	$\underline{L}$	

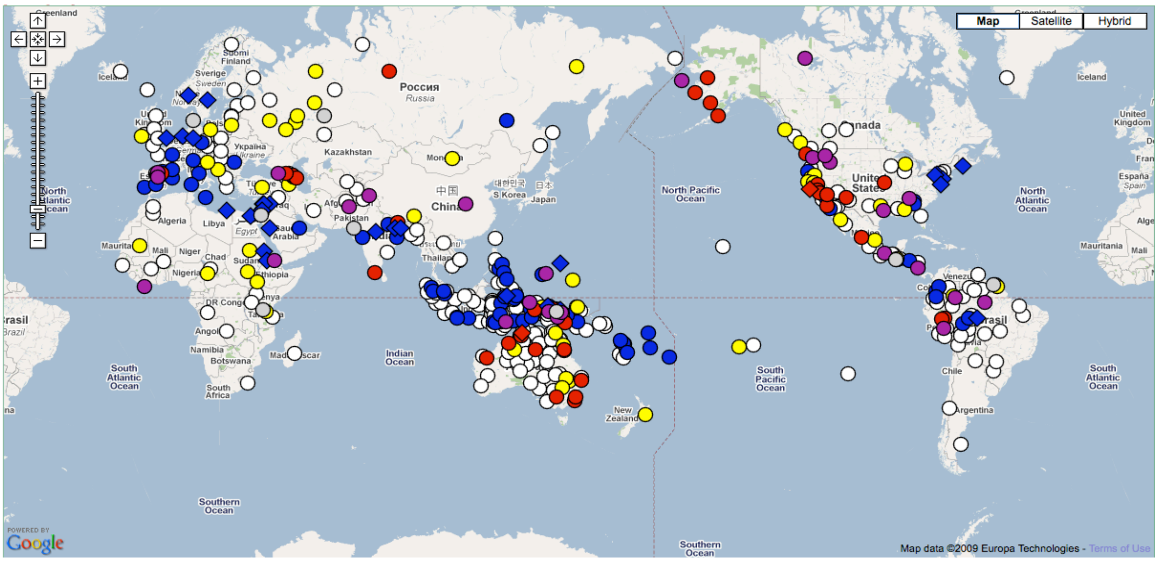
[14] In this representation, 'H' stands for 'heavy' and 'L' stands for 'light' syllables.

The scheme in (4) indicates that trochaic languages can be either quantity-sensitive or quantity-insensitive. If they are quantity-insensitive and left-headed, the disyllabic trochee is the dominant foot (and, in that case, monosyllables are interpreted as degenerate trochees). In this case, $\underline{\sigma}\sigma$ are licit and $\underline{\sigma}$ is degenerate. If they are quantity-sensitive and left-headed, the moraic trochee is the dominant foot ($\underline{\mathrm{L}}\mathrm{L}$) and both heavy ($\underline{\mathrm{H}}$) and light monosyllables ($\underline{\mathrm{L}}$) are accepted (although light monosyllables are considered degenerate). If they are quantity-sensitive and right-headed, the dominant foot is the iamb (a disyllabic one, like $\mathrm{L}\underline{\mathrm{H}}$ or $\mathrm{L}\underline{\mathrm{L}}$, though a monosyllabic $\underline{\mathrm{H}}$ is accepted as well) and, in this case, the degenerate foot is a light monosyllable ($\underline{\mathrm{L}}$).

1.1.3. Quantity-sensitivity and rhythmic patterns

Many of the languages of the world are weight-sensitive, that is, heavy syllables tend to attract stress. In this case, long vowels (CV:), diphthongs (CVG) and closed-syllables (CVC) bear two moras. Moras may be defined as abstract units of time (Trubetzkoy, 1939), which are, simultaneously, "a measure of syllable-weight" (Zec, 2007). In quantity-sensitive[15] systems, bimoraic syllables tend to be heavy and, possibly, stressed. German and Dutch are amongst the languages that are considered to be weight-sensitive (Jessen, 1999; Kager, 1989). Spanish, on the contrary, is assumed to be partly weight-sensitive, as syllable-heaviness is a requirement for stress assignment in the nouns system only (Harris, 1991). In languages like French, Modern Hebrew and Greek, a Branching Rhyme (within the Nucleus or the Coda) does not imply stress and, therefore, heaviness. Those languages are considered to be weight-insensitive[16]. In Figure 3 we present a map of the distribution of stress-timed and syllable-timed languages across the world.

[15] Quantity-sensitive languages may also be designated weight-sensitive or stress-timed.
[16] Non weight-sensitive languages may also be designated quantity-insensitive or syllable-timed.



Red circle	Left-edge: First or second	37
Red diamond	Left-oriented: One of the first three	2
Blue circle	Right-edge: Ultimate or penultimate	65
Blue diamond	Right-oriented: One of the last three	27
Yellow circle	Unbounded: Stress can be anywhere	54
Grey circle	Combined: Right-edge and unbounded	8
Purple circle	Not predictable	26
White circle	Fixed stress (no weight-sensitivity)	281

Figure 3. Weight-sensitivity across languages worldwide (Goedmans & van der Hulst, 2008)

The map presented above shows that, contrary to tonal languages, weight-sensitivity is spread out all over the World. In a total of 500 stress languages, 281 (56.2%) are not weight sensitive (white circles) and 219 (43.8%) are weight-sensitive in various manners (other symbols) (Figure 4).

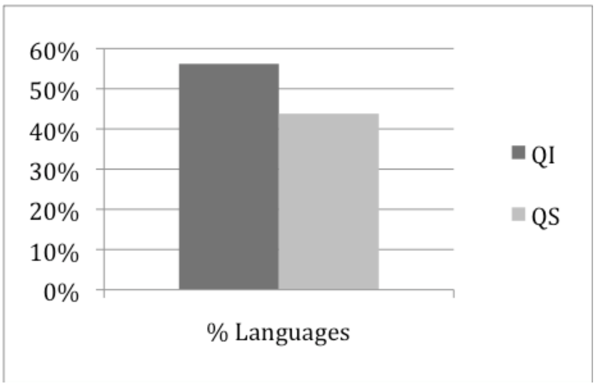


Figure 4. Quantity-sensitive and quantity-insensitive languages worldwide (Goedmans & van der Hulst, 2008)

With respect to stress patterns, languages can mainly be trochaic (if the stressed syllable is the penultimate of the stress domain - SW), iambic (if the stressed syllable is the last syllable of the stress domain - WS) or dual (languages that are equally trochaic and iambic). Figure 5 shows the number of languages with trochaic, iambic and dual rhythm types. Information on languages with no rhythmic stress and undetermined rhythm is provided as well.

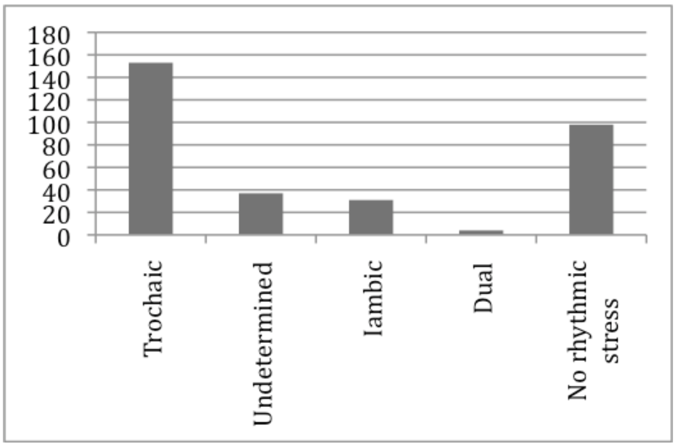
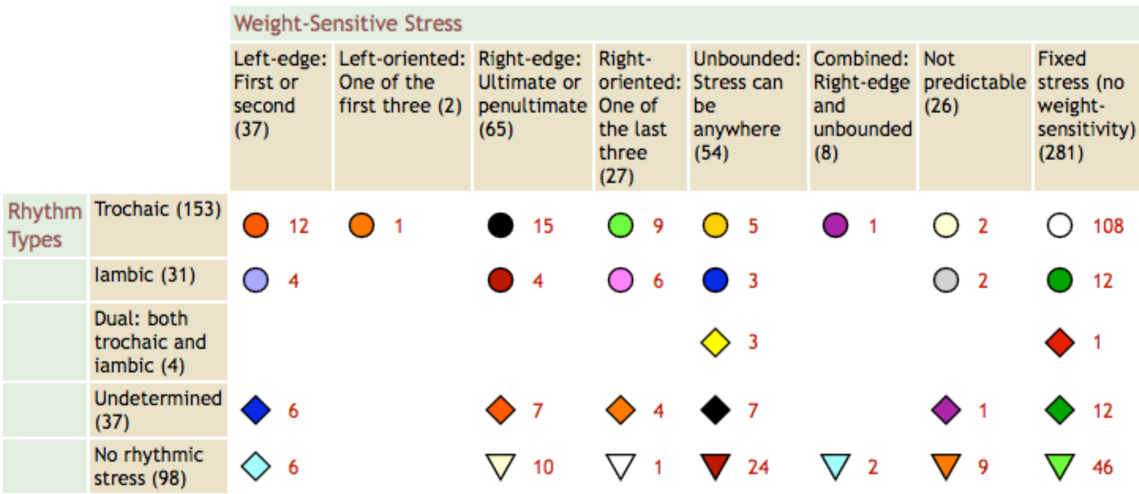


Figure 5. Distribution of rhythmic patterns across the languages of the World (from Goedemans & van der Hulst, 2008)

As we presented previously in this chapter (section 1.1.), although trochaic languages may be quantity-sensitive or not, iambic systems tend to be quantity-sensitive (Hayes, 1981, 1995; Kager, 1995:396). This is illustrated below (Figure 6), where data on the distribution of trochaic, iambic languages and information on weight-sensitivity are presented.



		Weight-Sensitive Stress							
		Left-edge: First or second (37)	Left-oriented: One of the first three (2)	Right-edge: Ultimate or penultimate (65)	Right-oriented: One of the last three (27)	Unbounded: Stress can be anywhere (54)	Combined: Right-edge and unbounded (8)	Not predictable (26)	Fixed stress (no weight-sensitivity) (281)
Rhythm Types	Trochaic (153)	12	1	15	9	5	1	2	108
	Iambic (31)	4		4	6	3		2	12
	Dual: both trochaic and iambic (4)					3			1
	Undetermined (37)	6		7	4	7		1	12
	No rhythmic stress (98)	6		10	1	24	2	9	46

Figure 6. Trochees and iambs in weight-sensitive systems (from Goedmans & van der Hulst, 2008)

The first generalization drawn from the table above is that the vast majority of trochaic languages is not weight-sensitive[17] (43 are weight-sensitive, *108 are not*; 2 are unpredictable with respect to stress location[18]). The second generalization is that most iambic languages are sensitive to weight (19 *contra* 12).

Both the prosodic and metrical phonology frameworks provided some theoretical instruments that enable us to emulate a representation of words and prominences in the adult language. For instance, the notions of foot and prosodic word, proposed by the Prosodic Phonology, are helpful to describe many processes in the languages. Likewise, these structures - feet and words - are not built or organized randomly. They obey a given hierarchy, which, for stress purposes, relies on organized and alternating strong-weak positions. These positions make the metric and the rhythm of phrases and utterances.

1.1.4. Acoustic features of word stress

Stress is not only an abstract representation of a relative prominence. It is a phonological phenomenon with specific acoustic correlates.

Kager (2007) mentions that, cross-linguistically, stressed syllables have in general higher pitch, longer duration and greater loudness. However, phonetic or acoustic cues for stress vary across languages and within context. Higher pitch, longer duration and greater loudness are all phonetic cues for stress, but they do not always work together. Stress is opportunistic or, in Hayes' (1995:7) words, *parasitic*, in the sense that it uses phonetic properties for phonological purposes (like duration contrast or tonal distinctions, in languages where those aspects are phonemic). For instance, in a tonal language, tones and intonation depend on pitch. In general, high pitch cues the stressed or the accented syllable, but it is not that straightforward, especially when phrases and sentences are concerned.

Research on perception showed that pitch and duration, rather than loudness, are related to stress (both in perceptual and productive terms). However, any closer relationship between two or three of the acoustic parameters for word stress must be established in language-specific terms[19].

---

[17] However, some well-studied languages, such as English or Dutch, do not conform to this generalization, both being trochaic and quantity-sensitive.

[18] "Here [in the 'not predictable' category] we group together languages that have no predictability in stress location whatsoever (cf. Burushaski, Spokane, Usan) and languages in which words are said to have several stresses (rhythmic or weight-determined), with none of these being primary, or all being equal" (Goedmans & van der Hulst, 2008: Chapter 15, section 2.3).

[19] References to the acoustic correlates of word stress in Portuguese (EP) will be introduced in section 1.2.2..

1.2. Portuguese word stress

The analyses on Portuguese word stress are complex, often conflicting and, therefore, require a detailed explanation. For that reason, we dedicate an entire section to the issue, aiming to provide thorough information on the matter.

In this section, we will describe word stress in Portuguese. We will first present the general information on Portuguese word stress (section 1.2.1.), by mentioning the descriptions carried out by the traditional and descriptive Portuguese grammars, as well as the early phonological approaches. In 1.2.2., we will present the studies carried out on the acoustic correlates of word stress in the language. In section 1.2.3., we will present the main analyses of Portuguese word stress within the metrical phonology framework. Section 1.2.4. will show the frequency information related to stress in EP, such as word shape frequency and stress position frequency. Finally, we will make a general overview on the main issues raised by the literature on Portuguese word stress (section 1.2.5.).

1.2.1. General description on Portuguese word stress

Word stress in Romance languages in general and in Portuguese in particular has been widely discussed (Bisol, 1992, 1993, 1999; Carvalho, 1987, 1988; Lee, 1995, 2001, 2006, 2007; Mateus, 1983, Mateus & Andrade, 2000; Pereira, 1999; Roca, 1999; Wetzels, 2006).

In languages like Portuguese, Spanish or Italian, deriving from a weight-sensitive language (Latin), where stress was fully predictable on the basis of syllable weight[20], word stress poses several problems from a synchronic perspective. In its evolution to the actual languages passing through Vulgar Latin, Ancient Latin lost and gained a number of stress-related features, like the loss of the short/long vowel contrast and the gain of a simpler (and shorter) word structure (Classical Latin is known to be a synthetic language, where word order was not relevant, whereas Vulgar Latin is known to be more analytic, with preposition multiplying and word order becoming necessary for syntactic purposes - Lee, 2006; Roca, 1999).

The study on word stress in Portuguese is not recent. Since the nineteenth century, several authors have been accounting for the behavior of word stress in the language, often in

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[20] According to Roca (1999), the general rule(s) for stress in Classical Latin is/are: (a) stress a heavy penultimate (syllable), if there is one; (b) otherwise stress the antepenultimate, if there is one; (c) otherwise stress the first syllable.

a merely prescriptive or descriptive manner, but also in a more explanatory perspective[21].

In this section (1.2.1.), we will focus on two main approaches: the more recent descriptive perspectives of the Portuguese traditional grammars (Cuesta & Luz; 1971/1988; Cunha & Cintra, 1984) and the also descriptive phonological approaches to word stress (Andrade, 1977; Barbosa, 1965/1983; Mateus, 1975/1982, 1983 and Mateus, Brito, Duarte, Faria, Frota, Matos, Oliveira, Vigário & Villalva, 2003[22]). We will leave section 1.2.2. to the metrical analyses on Portuguese word stress.

According to Cunha & Cintra (1984), words in Portuguese can have stress in the last, penulimate or antepenultimate syllables. That holds for the classification of oxytonic (or acute), paroxytonic (or grave) and proparoxytonic words, respectively, as shown in (5):

(5) Classification of words in Portuguese, with respect to stress position:

Last syllable (Oxytonics)	**Penultimate syllable (Paroxytonic)**	**Antepenultimate syllable (Proparoxytonic)**
café 'coffee' [kɐˈfɛ]	*gato* 'cat' [ˈgatu]	*árvore* 'tree' [ˈaɾvuɾɨ]
funil 'funnel' [fuˈniɫ]	*sapato* 'shoe' [sɐˈpatu]	*pássaro* 'bird' [ˈpasɐɾu]
rapaz 'boy' [ʀɐˈpaʃ]	*rapazes* 'boys' [ʀɐˈpazɨʃ]	*pêssego* 'peach' [ˈpesɨgu]

In Portuguese, the majority of words with two or more syllables are stressed in the penultimate syllable[23].

Portuguese words are divided into stressed and unstressed, according to their grammatical class. Open class words (nouns, verbs, adjectives and some adverbs) are stressed, whereas closed-class words may or may not be stressed (determiners are unstressed, whereas some pronouns[24], some prepositions and some conjunctions are stressed[25]).

Within early phonological (structuralist) approaches to Portuguese phonology, Barbosa (1965/1983) assumes that the domain for stress in the language is the word, with its enclitic and proclitic elements[26]. Primary and secondary stresses are possible, the latter being

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[21] For a review on the early approaches to Portuguese word stress (from the XIX[th] century to late 1980's of the XX[th] century), cf. Pereira, 1990.
[22] For an English version of the description made for word stress in Mateus *et al.* (2003), cf. Mateus & Andrade (2000:109-117).
[23] For frequency information on stress patterns distribution cf. section 1.2.3., further in this chapter.
[24] Cunha & Cintra (1984:56) refer to the unstressed or 'obliquous' personal pronouns such as '-me', '-te','-se', '-o', '-a', etc.
[25] On stressed and stressed function words, cf. Vigário (2003:173-182;255-258).
[26] The author says: 'Chaque mot comporte, en principe, un accent et un seul [principal]' (Barbosa, 1983:215). Additionally, the authors states that: "L'unité accentuelle est en portugais, dans la plupart des cas, le “mot”, avec,

present in compounds (6), adverbs of manner ending in *-mente* (7), words with *z*-suffixes (8) and Future and Conditional Tenses with a mesoclitic pronoun (9)[27].

(6)	*quebra-nozes* 'breaknuts'	[ˌkɛbɾɐˈnɔziʃ]
(7)	*somente* 'solely'	[ˌsɔˈmẽti]
(8)	*homenzinho* 'man dim.'	[ˌɔmɐ̃j̃ˈziɲu]
	homenzarrão 'man augm.'	[ˌɔmɐ̃j̃zɐˈʀɐ̃w̃]
(9)	*contá-lo-iamos* 'we would tell it'	[kõˌtaluˈiɐmuʃ]

With respect to the principles behind stress assignment, the author says that only tradition can explain its location. According to Barbosa (1965/1983), '[e]n ce qui concerne la place de l'accent dans le mot, rien sinon la tradition ne la détermine dans la synchronie actuelle' (Barbosa, 1983:218)[28]. The author further states that stress in Portuguese plays a distinctive role, i.e., stress - or stress position in particular - allows for a distinction between two words, which, otherwise, would not be different. In (10) we present some instances where word stress plays a 'contrastive' role (Barbosa, 1965/1983):

(10)	*amaram* 'they loved, simp. past' - *amarão* 'they will love'	[ɐˈmaɾɐ̃w̃]/[ɐmɐˈrɐ̃w̃]
	amara 's/he loved, pluperf.' - *amará* 's/he will love'	[ɐˈmaɾɐ]/[ɐmɐˈɾa]
	dúvida 'doubt' - *duvida* 's/he doubts'	[ˈduvidɐ]/[duˈvidɐ]

Within the linear generative phonology framework and following Chomsky & Halle (1968), Mateus (1975/1982) and Andrade (1977) proposed that stress was a phonological feature ([+stress]) assigned by phonological rules within the word domain.

Mateus (1975/1982) provides a rule accounting for the general accentuation in Portuguese, that is, the author presents a general rule for words with the penultimate stress ((11a.)), words with final stress ending in [ɫ], [ɾ], [ʃ][29] ((11b.)), nasal and oral diphthong

s'il y a lieu, ses enclitiques et ses proclitiques." (Barbosa, 1983:216). Vigário (2003) proposed that enclitic elements are incorporated into the previous Prosodic Word, whereas proclitic elements are adjunct to the following Prosodic Word (Vigário, 2003:182-203). However, since stress is assigned on the lexical component and clitics are prosodified, in EP, in the postlexical component (Vigário, 2003:182), word stress does not 'regard' clitic words.

[27] Again, Vigário (2003:218-247) further demonstrated that words such as the above-mentioned are, in fact, two prosodic words, bearing two primary word stresses.

[28] As we will see further in this section, early phonological approaches will, however, establish general principles that will be able to predict stress assignment.

[29] This fricative does not correspond to the plural marker.

((11c.)).

(11) a. *sapato* 'shoe' [sɐˈpatu]

b. *hospital* 'hospital' [ɔʃpiˈtaɫ], *rapaz* 'boy' [ʀɐˈpaʃ] ou *rumor* 'rumor' [ʀuˈmoɾ]

c. *canção* 'song' [kɐ̃ˈsɐ̃w̃], *carapau* [kɐɾɐˈpaw]

In (12) we present the formalization of the general rule proposed by Mateus (1975/1982) for Portuguese word stress.

(12) General stress rule for words with penultimate stress ending in [ɫ], [ɾ], [ʃ], nasal and oral diphthong (Mateus, 1982:241):

$V \rightarrow [+\text{stress}] \ / \ [\ \_\ ]\ (G)\ C_0\ V\ C_0\ \#$[30]

In the cases of *hospital*, *canção* and *carapau*, an underlying final vowel is assumed (*hospital_*, *cançã<u>o</u>*, *carapa<u>u</u>*).

Additionally, the author presents two other rules for words with final and antepenultimate stress ((13) and (14), respectively).

The diacritics [+A] and [+E] stand for oxytonic and proparoxytonic words, in the following stress rules.

(13) Stress rule for words with final stress (Mateus, 1982:241):

$$\begin{bmatrix} V \\ +A \end{bmatrix} \rightarrow [+\text{stress}] \ / \ [\ \_\ ]\ C_0\ \#$$

(14) Stress rule for words stressed in the antepenultimate syllable (Mateus, 1982:241):

$$\begin{bmatrix} V \\ +E \end{bmatrix} \rightarrow [+\text{stress}] \ / \ [\ \_\ ]\ C_0\ V\ C_0\ V\ C_0\ \#$$

In (15a.) and (15b.), words with final stress (*café* 'coffee' and its plural form - rule in (13)) and antepenultimate stress (*pássaro* 'bird and its plural form - rule in (14)) are presented, respectively:

[30] Mateus & Andrade (2000:119) later evoke this rule with slight changes in the formalization: $V \rightarrow [+\text{stress}] \ / \ [\ \_\ ]\ C_0\ V\ C_0\ \#]_{N,A}$. Both account for non-verbs with penultimate stress, like *casa* [ˈkazɐ] 'house', *caixa* [ˈkajʃɐ] 'box', *cabelo* [kɐˈbelu] 'hair'.

(15) a. *café* 'coffee' [kɐˈfɛ], *cafés* 'coffees' [kɐˈfɛʃ]

b. *pássaro* 'bird' [ˈpasɐɾu], *pássaros* 'birds' [ˈpasɐɾuʃ]

The verbal system, however, had a more irregular behaviour towards stress. In order to account for the proparoxytonic verb forms, the author proposes a rule with morphological boundaries, where the theme vowel is made visible. This rule predicts the theme vowel to be stressed, if it is not in word-final position, as shown in (16) (Mateus, 1982:241):

(16) $V \rightarrow$ [+stress] / + [_] + C_0 V (C_0 V) C_0 #] $_{[Vb]}$[31]

The rule in (16) derives words like *fizéramos* 'we did, pluperf.' [fiˈzɛɾɐmuʃ] or *fazíamos* 'we did, past imperf.' [fɐˈziɐmuʃ].

Following the observation of different stress descriptions for non-verbs and verbs, Mateus (1983) first elaborated a description on stress in EP, according to whom stress depends on the morphological constituency of the word. According to the author's analysis, in nouns and adjectives, stress falls on the last syllable of the stem (exceptions are lexically marked as such), whereas in verbs, stress falls on the last syllable of the stem or in the theme vowel (Future and Conditional Tenses are exceptional, and marked as such). This descriptive work still held some problems. In nouns like *viagem* 'trip' or *órfão* 'orphan' stress does not fall on the last syllable of the stem, and in verbs forms like *baterei* 'I will beat' or *bateria* 'I would beat', stress does not fall, neither in the last vowel of the stem nor the theme vowel.

Since Mateus' (1983) description, many authors have established a relationship between stress assignment and words' morphological constituency (Andrade, 1992; Andrade & Laks, 1992; Lee, 1995; Pereira, 1999; Mateus & d'Andrade, 2000; Mateus *et al.*, 2003).

According to the description in *Gramática da Língua Portuguesa* (Mateus *et al.* 2003[32]), stress in non-verbs is generally on the last vowel of the stem and in the penultimate vowel of the lexical word in verbs[33].

Instances in (17), below, account for stress assignment in non-verbs, having into account the morphological constituency of the words (following Mateus *et al.*, 2003).

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[31] [Vb] stands for 'verb'. Mateus & Andrade (2000:119) later evoke this rule with slight changes in the formalization: $V \rightarrow$ [+stress] / [_] ((+C_0 V) C_0 V) C_0 #] $_{[Vb]}$. Both account for verb forms like *falas* [ˈfalɐʃ] 'you speak', *falámos* [fɐˈlamuʃ] 'we spoke, simp. past' and *falávamos* [fɐˈlavɐmuʃ] 'we spoke, past imperf.'.

[32] Most of the descriptions made in Mateus *et al.* (2003) with respect to word stress follow Pereira (1999). We will present Pereira's metrical analysis ahead, in section 1.2.3.

[33] By the 'non-verbs' category, we mean nouns, adjectives and all morphosyntactic categories internal do the Noun Phrase (except clitic determiners) as all these categories have similar inflection (e.g. adjectives agree in gender and number with the noun they modify and they have the same morphological constituency as nouns) and behave similarly with respect to stress assignment (Mateus & Andrade, 2000; Mateus *et al.,* 2003:1050,fn16).

(17) Non-verbs paradigm:

a. *mesa* 'table' [ˈmezɐ] mes]$_{\text{Stem}}$+a[34]
leite 'milk' [ˈlɐjtɨ] leit]$_{\text{Stem}}$+e
b. *animal* 'animal' [ɐniˈmaɫ] animal]$_{\text{Stem}}$
café 'coffee' [kɐˈfɛ] café]$_{\text{Stem}}$
c. *mesinha* 'table dim.' [mɨˈziɲɐ] mesinh]$_{\text{Stem}}$+a

The information above shows that, in non-verbs, word stress is in the last vowel of the stem (17a, b. and c.). When the last vowel of the stem is lexically marked as 'not stress', stress withdraws one syllable (17d.).

d. *júbilo* 'exultation' [ˈʒubilu] júbil]$_{\text{Stem}}$+o
fácil 'easy' [ˈfasiɫ] fácil]$_{\text{Stem}}$

Another important fact is that non-verbs stressed in the last syllable tend not to have the class/gender marker: *animal* 'animal' [ɐniˈmaɫ], *amor* 'love' [ɐˈmoɾ], *papel* 'paper' [pɐˈpɛɫ], *café* 'coffee' [kɐˈfɛ], *jacaré* 'aligator' [ʒɐkɐˈɾɛ]).

Verbs have a more irregular stress assignment and it is generally in the penultimate vowel of the lexical word, as shown in (20). However, morphological constituency is crucial to guide stress, in particular theme vowel, tense and mood suffixes.

In verbs, stress falls:

- on the (vowel of the) Tense and Mood suffix in Future and Conditional tenses, as presented in (18):

(18) a. *calará* 's/he will shut up' [kɐlɐˈɾa] calará]$_{\text{TM}}$
b. *calaremos* 'we will shut up' [kɐlɐˈɾemuʃ] calare]$_{\text{TM}}$mos
c. *calaríamos* 'we would shut up' [kɐlɐˈɾiɐmuʃ] calarí]$_{\text{TM}}$amos

[34] The gender marker in Portuguese is /-a/, /-o/, /-e/ or ∅, surfacing as [ɐ], [u], [ɨ] or ∅, respectively, and it is never stressed. [ɐ] marks, in general, feminine words (nouns, adjectives, determiners and pronouns), whereas [u], [ɨ] or ∅ mark, in general, masculine words (nouns, adjectives, determiners and pronouns). Some nouns and adjectives like mapa 'map' [ˈmapɐ] or poeta 'poet' [puˈɛtɐ] are exceptional, as they are masculine.

- on the theme vowel, if it is followed by a Tense and Mood suffix, shown in (19):

(19) a. *calei* 'I shut up, simp. past' [kɐˈlɐj] cale]$_{T}$i]$_{TM/PN}$

b. *morreu* 's/he died' [muˈʀew] morre]$_{T}$u]$_{TM/PN}$

c. *caláramos* 'we shut up, pluperf. ' [kɐˈlaɾɐmuʃ] calá]$_{T}$ra]$_{TM}$mos]$_{PN}$

d. *morrêramos* 'we died, pluperf.' [muˈʀeɾɐmuʃ] morrê$_{T}$ra]$_{TM}$mos]$_{PN}$

- on the penultimate syllable of the lexical word, if any of the previous conditions do not apply, as demonstrated in (20):[35]

(20) a. *calo* 'I shut up pres.' [ˈkalu] calo]$_{T/TM/PN}$

b. *comemos* 'we eat' [kuˈmemuʃ] come]$_{T}$mos]$_{PN}$

c. *dormimos'* we sleep' [duɾˈmimuʃ] dormi]$_{T}$mos]$_{PN}$

Conjunctions and prepositions are unstressed in general, and adverbs either integrate the general stress pattern (penultimate stress) or are exceptional for historical reasons (Mateus *et al.* 2003:1050,fn16[36]).

1.2.2. Acoustic description of EP word stress

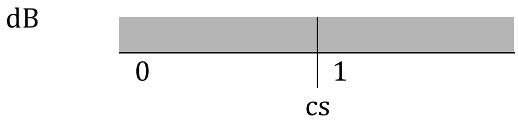
In EP, the stressed vowel exhibits higher values for duration and intensity than the unstressed vowel(s) of the word (Delgado-Martins, 1986[37], 1988; Mateus *et al.*, 2003). Andrade & Viana (1989) suggest that: (i) duration degrees correspond to degrees of stress and (ii) stressed syllables are longer than unstressed syllables. Delgado-Martins (1986, 1988) shows that energy is the acoustic correlate for stress perception and production in Portuguese. The author defines energy as "l'intégrale de l'intensité par la durée" (Delgado-Martins, 1986:30). In this sense, duration alone does not signal stress, but rather the amount of intensity that is put into a vowel in a relative amount of time. The figures presented in (21) and (22) illustrate two vowels with the same energy but different intensity and duration.

[35] See Appendix A for a systemic relationship between verbs tenses and stress in Portuguese.

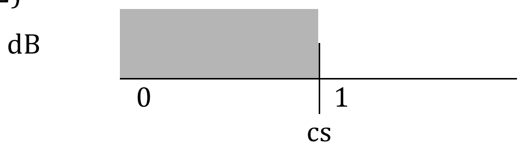
[36] Cf. footnote 33.

[37] The conclusions presented in Delgado-Martins (1986:80) are taken from a former study (Delgado-Martins, 1977).

(21)



(22)



Despite the fact that (21) is twice as longer as (22), (22) is produced with the double intensity of (21). In this case, according to Delgado-Martins (1986), (21) and (22) are produced with the same amount of energy.

The author analyzed intensity, fundamental frequency, duration and energy in the vowel [i], in three words differing in the stressed vowel only: *explícito* 'explicit' [ʃˈpli̲situ] / *explicito* 'I make explicit' [ʃpli̲ˈsitu] / *explicitou* 's/he made explicit' [ʃpli̲siˈto]. She analyzed the three words in three different contexts (in isolation, in a fixed sentence and in a free sentence) and concluded that (Delgado-Martins, 1986:30):

(i) duration and energy only cued the stressed vowel in the last or antepenultimate syllable of the word;

(ii) fundamental frequency and intensity is not a cue for word stress, but rather of the phrase context.

(iii) in the penultimate syllable, there are no regular acoustic cues that account for stressed vowels.

The studies conducted by Delgado-Martins (1986, 1988), later confirmed and extended in Frota (2000) confirmed that fundamental frequency is mainly related to intonational events at the phrase and utterance level, and does not directly cue word stress.

Intensity and duration, computed together under the form of energy, are the relevant acoustic parameters to cue word stress (though not in the default position, i.e., in the penultimate vowel). However, it is worth noticing that if, on the one hand, duration and intensity play a pivotal role within the EP stress system, on the other hand, "there is a general agreement that duration is a by-product of stressing" (Mateus & Andrade, 2000:118), rather than a stress-conditioning factor.

1.2.3. Metrical analyses

In this section, we will first present the analyses for EP and secondly for BP, since the two varieties of the language have often been studied from two different perspectives. In general, authors focusing on BP mainly proposed a stress algorithm based on syllable weight

(Bisol, 1993, 1999; Wetzels, 2003, 2006[38]), whereas authors on EP proposed that stress in Portuguese relies on morphological constituency (Andrade, 1992, 1996, 1997; Andrade & Laks, 1992; Mateus & Andrade, 2000; Pereira, 1999).

As we will further see in this review, despite the great explanatory adequacy of both approaches, several conflicting issues arise from the comparison of the two analyses[39]: if we consider a morphology-based algorithm, the domain for word stress is the stem in non-verbs and the lexical word for verbs, whereas the weight-based algorithm generally predicts that the domain for stress is the lexical word[40]. Additionally, the foot has not always been mentioned as a relevant prosodic constituent in the metrical and rhythmic organization with respect to word stress (Pereira, 1999).

The work on Portuguese stress within the metrical theory began to arise in the late eighties. Within a non-linear phonology approach, Andrade (1988/1992, 1996, 1997) and Andrade & Laks (1992) proposed a metrical analysis of word stress for Portuguese. The work by these authors was seminal with respect to the establishment of the metrical and rhythmic principles for word stress in Portuguese. Most of the authors that proposed metrical analyses for word stress in Portuguese relied on morphological constituency, though some authors have suggested that weight, and not morphology, plays a role on stress assignment.

Andrade (1988/1992:109) postulated four basic principles for Portuguese stress, within the metrical phonology framework:

(i) Feet are binary and prominent on the left;
(ii) Word trees are built from right to left;
(iii) An element that stands alone is, by itself, a foot;
(iv) Once foot trees are built, build binary trees prominent to the right, until the word level is reached[41].

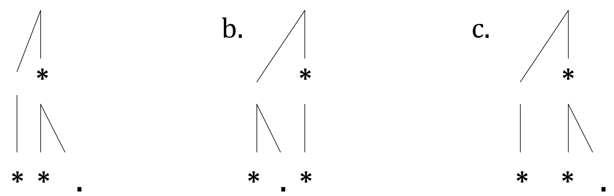
The author postulates the following rule for stress assignment in non-verbs: "If there are no vowels in the context ...]$_{\text{Stem}}$]N,A, then the last vowel of the *stem* constitutes itself a

[38] One exception is Lee (1995), who proposed that stress in BP relies on morphological constituency.
[39] In this section we will present the metrical analyses proposed by the various authors. These issues will be addressed in greater detail in section 1.2.5..
[40] The assumption according to which the lexical word is the domain for stress in weight-based approaches to word stress is not categorical. For instance, Wetzels (2006) defends a weight-sensitive stress algorithm for non-verbs and a morphology-based algorithm for verbs. Lee (2006, 2007) defends that stress is the result of morphological and prosodic/rhythmic constraints. Syllable weight is only relevant for non-verbs stressed in the last syllable. This issue will be addressed further in this section.
[41] My translation from the original in Portuguese: "a. Os pés são binários e proeminentes à esquerda; b. As árvores constroem-se da direita para a esqueda; c. Um elemento que se encontra sozinho constitui, por si só, um pé; d. Uma vez construídas as árvores de pé, constroem-se as árvores binárias, proeminentes à direita, até ao nível da palavra." (Andrade, 1992:109).

foot" (Andrade, 1992: 110[42]). The principles presented above account for words like *cabelo* 'hair', *jacaré* 'aligator' and *amor* 'love', presented in (23a.), (23b.) and (23c.), respectively.

(23) Metrical analysis for paroxytonic and oxytonic Nouns and Adjectives (Andrade, 1992:110)

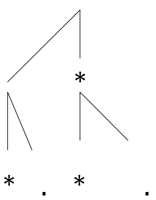
a. b. c.



cabel] *o*] 'hair' *jacaré*]] 'aligator' *amor*] *e*] 'love'

In the case of words like *amor* 'love', *rapaz* 'boy' or *hospital* 'hospital', with word-final consonant, the final gender marker /-e/ is assumed[43]. To derive proparoxytonic words like *catastrófico* 'catastrophic', the last vowel of the stem is lexically marked as extrametrical[44], as represented in (24).

(24) Metrical analysis for proparoxytonic Nouns and Adjectives (Andrade, 1992:111):



catastróf~~ic~~] *o* 'catastrophic'

Despite the descriptive power of Andrade's (1988/1992) proposal, an argumentation for the extrametrical character of word internal suffixes remains absent.

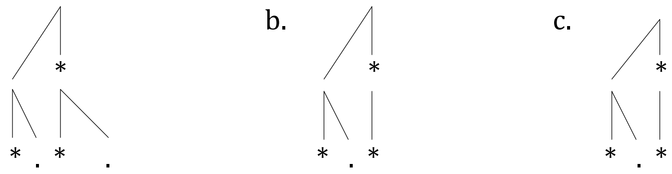
In verbs, the general rule for stress assignment is that the stressed vowel is, by default, the theme vowel. Tense markers are extrametrical (except Future and Conditional Tense markers). One principle must be applied to Present and Past tenses, referring that "stress the last vowel of the stem[45], if after that vowel only one (metrical or extrametrical)

[42] Idem: "Se não existir uma vogal no contexto ...]R.D.]N,A, então a última vogal do Radical Derivacional constitui um pé, por si só" (Andrade, 1992:110).
[43] In line with the Portuguese Linear Phonology analysis of that time (cf. Mateus, 1975; Andrade, 1977).
[44] This vowel is part of the suffix *-ic-*,that means 'relative to'. Other suffixes, such as *-ito*, *-eo*, *-io*, *-érrimo* and *-ésimo*, etc. present similar behavior (Andrade, 1992: 111,fn6) and they will be considered as *stress-repellent* in subsequent work by the author.
[45] The author assumes that in verbs, the stem corresponds to the theme: root+theme vowel.

vowel appears" (Andrade, 1992:129[46]). In (25) we show Andrade's (1988/1992) metrical representation for the Present and Past tenses.

(25) Metrical analysis for Present and Past tenses (Andrade, 1992:118,123,121):

a. b. c.



acaba]*mos*][47] *acaba*]*st~~e~~*] *acaba*]*~~va~~*]

'we finish' (pres.) 'you finished' (simp. past) 'I/s/he finished'(past imperf.)

In Future and Conditional tenses the stem assumed ends in a consonant[48]. Thus, the rule for Future and Conditional tenses would be: if the stem ends in a consonant, then the following vowel constitutes a foot itself[49]. In (26), we present the metrical analysis for the Future and Conditional tenses, according to Andrade (1992).

(26) Metrical analysis for Future and Conditional tenses (Andrade, 1992:125,127):

acabar]*ei* *acabar*]*i~~a~~*[50]

'I will finish' 'I would finish'

---

[46] My translation from the original in Portuguese: "No sistema verbal [o acento] é também na última vogal do Radical Derivacional, se depois dela só houver uma vogal, métrica ou extramétrica, com excepção do Futuro e do Condicional (...)" (Andrade, 1992:129).

[47] In a Present verb form like *acabo* 'I finish', the phonological representation assumed is *acaba*]+*o*]. The theme vowel and the Person and Number (PN) suffix are subject to coalescence and stress withdraws one syllable back. The same happens with the Present Subjunctive: e.g. *acaba*]*e* -> *acabe*, *acaba*]*es* -> *acabes*, etc.

[48] The argument brought up to assume a stem ending in a consonants, in Future and Conditional tenses, are the mesoclitic constructions like ***falar**-te-emos* 'we will talk to you', in which the PN morpheme (underlined) is detached from the 'stem' (bold).

[49] The formalization presented is C]Stem (X) V ⇒ C] R. D (X) *V, (X) being an object clitic pronoun, and *V being a foot. For practical reasons regarding text ease, we replaced the formalization presented for the footed vowel by *V. See Andrade (1992:125,129).

[50] In the Conditional tense the final vowel -a- in *acabaria* 'I would finish', *acabaríamos* 'we would finish' is considered as extrametrical as well, since it is the trace of the verb form *haver* 'there to be' (in the Present and Imperfect tenses, respectively), which used to be part of the Future tense in Latin: *acabar+hia*. The same happens in the Future (*acabar+hei*), though the author does not assume an extrametrical vowel in this case (*acabar~~e~~i*), as it would entail incorrect surface forms (*acabárei*).

Later, Andrade & Laks (1992) propose an alternative analysis for primary word stress in Portuguese. In this approach, the authors clearly state that "main stress falls on the last vowel of the stem, or in the penultimate, if there is an extrametrical vowel" (Andrade & Laks:1992:17[51]). The four principles established in Andrade (1992) were replaced by one general rhythmic principle (in (27)) and three parameters (in (28)).

(27) Rhythmic Principle: "Rhythmic wave, peak-trough anchored at the right, first peak strong" (Andrade & Laks, 1992:19)

(28) Parameters for stress assignment (Andrade & Laks, 1992:20):

1. In L_0 project the vowels;
2. In L_0, perfect grid right-left, through, first peak strong;
3. In L_1, End rule, right

Two main aspects distinguish Andrade & Laks' (1992) from Andrade's (1992) paper: one, the authors establish one single principle for nouns and verbs ((27)); second, the authors assume a word-final empty slot in athematic words like *café_* and *hospital_*. The final syllable is no longer a foot itself, but rather part of a trochaic foot, where the weak position is not phonetically realized (see the representations for *modelo* 'model', *hospital* 'hospital' and *café* 'coffee' - (29a.,b.,c., respectively)). In the case of *café* and *hospital*, a word-final empty position is assumed[52]. Using a 'grid-only' formalism, the authors account for stress assignment in Portuguese:

(29) Stress in Nouns/Adjectives (Andrade & Laks, 1992:20,21)

a.	b.	c.	d.
*	*	*	*
. * .	* . * .	. * .	* . * . .
model o	*hospital _*	*café _*	*catastrófico*
'model'	'hospital'	'coffee'	'catastrophic'

Some 'morphological specificities' (Andrade & Laks, 1992:26) interfere with the rhythmic principle mentioned in (27): the defective gender marker and some suffixes in

[51] My translation from the original in Portuguese: "o acento principal incide na última vogal do radical, ou na penúltima no caso de haver uma vogal extramétrica" (Andrade & Laks, 1992:17).
[52] The formalization is taken from Andrade & Laks (1992:20).

nouns (*-ic-*, *-simo*, *-rrimo*[53], etc.) are exceptional and must be considered as troughs, such as tense markers and agglutinated PN suffixes, in verbs. The case of the Future and Conditional tenses is not mentioned in the paper.

For verbs, the application of the principle in (27) and the parameters in (28) allows for the following representations:

(30) Stress in Verbs (upon Andrade & Laks, 1992:24)

```
a.                      b.                      c.
   *                       *                       *
 . * .                   . * .                   . * .  .
parti   'I broke'       bateu   's/he hit'      falávamos   'we spoke'
```

In this proposal, verb analysis is simplified comparing to Andrade's (1992) proposal, since the peak-trough alternations, and not metrical information within morphological constituents, are the general principles governing rhythm. However, extrametricality is still a problem. Though more adequately motivated in theoretical terms - since it is considered a lexical trough - there is still no empirical motivation for that claim.

It is worth noticing that all the analyses from Andrade and colleagues rely on the assumption that Portuguese word stress is an interaction between rhythmic principles and morphological information. This assumption will be followed in subsequent works from other authors.

Within the Idsardi's (1992)[54] framework, Pereira (1999) accounts for word stress in the language. Like some of her Portuguese predecessors (namely, Andrade, Laks and Mateus), the author defends that stress in the language is an interaction between rhythmic principles and morphological factors. Pereira (1999) defends that the stem is the domain for stress assignment in non-verbs (Pereira, 1999:129) and the lexical word is the domain for stress assignment in verbs (Pereira, 1999:169). In (31) we will show the basic parameters for word stress and in (32) we will apply the parameters to a metric grid, as proposed by Pereira (1999) for Portuguese nouns.

[53] The authors use the term 'stress-repellents' for the first time in this paper (p. 21), to argue for the lexically marked character of these suffixes.

[54] For a review and update on this framework, cf. Halle & Idsardi (1995).

(31) Basic parameters for word stress in nouns - unmarked (Pereira, 1999:129-139):

a. *Syllable Boundary Projection parameter:* project a line 0 element for each syllable;
b. *Edge Marking parameter:* place a left parenthesis to the left of the right-most element (Line 0);
c. *Iterative Construction of Constituents*: place a parenthesis every two elements, from the right-most element (Line 0);
d. *Head Location parameter:* project the left-most element of each constituent onto the next line of the grid (Line 1);
e. *Edge Marking parameter:* place a right parenthesis to the right of the right-most element (Line 1);
f. *Head Location parameter:* project in Line 2 the right-most element of the constituent (Line 1).

In (32) we will show the application of the parameters in (31), for the words *pedaço* 'bit' and *chafariz* 'fountain'.

(32) Application of the parameters in (31) - Pereira (1999:137):

Line 2	x	x
Line 1	x)	x x)
Line 0	x (x	(x x (x
	pedaç]*o* 'bit'	*chafariz*] 'fountain'

It is worthwhile mentioning that Pereira (1999) does not refer to the metrical (or extrametrical) status of the word marker. The author states that "the application of the stress rules apply to the stem, ignoring the subsequent morphological constituents" (Pereira, 1999:129[55]).

For marked cases, the stress domain-final syllable is lexically marked with the information of 'do not stress' within a specific syllable (e.g. *súp<u>li</u>ca* 'suplication', *âm<u>bar</u>* 'amber'). In these cases, the Edge Marking parameter in line 0 does not apply, as mentioned in (33):

[55] My translation from the original in Portuguese: "(...) as regras de atribuição do acento [aplicam-se] sobre o radical derivacional, ignorando os constituintes morfológicos que se seguem" (Pereira, 1999:129).

(33) Basic parameters for word stress in nouns - marked (Pereira, 1999:139-142):

a. *Syllable Boundary Projection parameter:* project a line 0 element for each syllable;
b. *Edge Marking parameter:* does not apply (Line 0);
c. *Iterative Construction of Constituents*: place a parenthesis every two elements, from the right-most element (Line 0);
d. *Head Location parameter:* project the left-most element of each constituent onto the next line of the grid (Line 1);
e. *Edge Marking parameter:* place a right parenthesis to the right of the right-most element (Line 1);
f. *Head Location parameter:* project in Line 2 the right-most element of the constituent (Line 1).

(34) Application of the parameters in (33) - Pereira (1999:141):

Line 2	x	x
Line 1	x)	x)
Line 0	(x x	(x x
	súplic]*a* 'supplication'	*âmbar*] 'amber'

In verbs, a more complex algorithm is proposed. In order to derive the correct stress placement, information regarding certain suffixes is required. The theme vowel signals the default stress position. We now recall the three principles that guide stress location in Portuguese verbs, according to Pereira (1999). In Portuguese verbs, stress falls:

(i) in the (vowel of the) Tense and Mood suffix in Future and Conditional tenses;
(ii) in the theme vowel, if it is followed by a Tense and Mood suffix;
(iii) in the penultimate syllable of the morphological word, if any of the previous conditions apply.

In (35) we will present the basic parameters for verb stress.

(35) Basic parameters for word stress in verbs (Pereira, 1999:169-174)

a. *Syllable Boundary Projection parameter:* project a line 0 element for each syllable;
b. *Mood and Tense suffix Edge Marking parameter:* place a left parenthesis to the left of the left-most element (Line 0);
c. *Theme vowel Edge Marking parameter:* place a left parenthesis to the left of the left-most element (Line 0);
d. *Iterative Construction of Constituents*: place a parenthesis every two elements, from the right-most element (Line 0);
e. *Head Location parameter:* project the left-most element of each constituent onto the next line of the grid;
f. *Edge Marking parameter:* place a right parenthesis to the right of the right-most element (Line 1);
g. *Head Location parameter:* project the right-most element of each constituent onto the next line of the grid.

In Figure 7 we will show a summary of the order of conditions application (Line 0 first), depending on the verb tenses:

	Present	**Past**	**Future and Conditional**
Line 1	Head Location Parameter Edge Marking Parameter	Head Location Parameter Edge Marking Parameter	Head Location Parameter Edge Marking Parameter
Line 0	Head Location Parameter Iterative Construction of Constituents Syllable Boundary Projection Parameter	Head Location Parameter Edge Marking Parameter (Theme vowel) Syllable Boundary Projection Parameter	Head Location Parameter Edge Marking Parameter (Mood and Tense Suffix) Syllable Boundary Projection Parameter

Figure 7. Order of application of stress parameters in Portuguese verbs

The application of the stress parameters according to (35) and Figure 7 ordering is given in (36):

(36) Stress parameters application in verbs (Pereira, 1999:174-189):

```
         Present           Past                Future and Conditional
Line 1    x                    x                         x
          x)                   x                        (x
         (x    x)          x    (x  x              x    x  (x  x
         cant]o 'I sing'   cant] e]  i 'I sang'    cant]a]re]i 'I will sing'
Line 0    x                    x                         x
         (x    x)          x    (x  x              x    x  (x  x
         cant]o 'I sing'   cant] e] i 'I sang'     cant]a]re]i 'I will sing'
```

Following Andrade & Laks (1992) and Pereira (1999), Mateus & d'Andrade (2000) establish a principle that allows for alternation of strong (S) and weak (W) syllables, peaks and troughs, respectively, assuming the need for a SW rhythmic pattern. According to the *Principle of the Rhythmic Wave*, "[t]he rhythmic wave is triggered by trough-first anchored at right, first peak strong." (Mateus & d'Andrade, 2000:122). Prominences are licensed in different levels: the first one is the syllable level (L_0), the second one is the rhythmic peaks level (L_1) and, the third one is the level in which the strengthened element in L_1 appears (L_2). Prominences are assigned into a 'perfect grid', according to the following parameters:

(37) *"In L_0 project the syllables; on L_0 right-to-left perfect grid, trough; on L1, End Rule, right."* (Mateus & Andrade, 2000:122)

The parameterized formalization of these principles would be:

(38) *In L_0 Perfect Grid right-left, trough, first peak strong.* (Mateus & Andrade, 2000:122)

In (39) we present the scheme for word stress assignment in the words *modelo* 'model' and *organizado* 'organized' (these two words belong to the non-verbs' paradigm).

(39) Non-verbs (Mateus & Andrade, 2000:123)

```
L2          x                              x
L1      .   x   .                .    x  .  x  .
L0      x   x   x                x    x  x  x  x
        mo del]  u   'model'     or   ga ni za d]u   'organized'
```

In (40) we present the scheme for stress assignment in verbs forms *falei* 'I spoke, simp. past' and *falava* 'I spoke past imperf.'

(40) Verbs (Mateus & Andrade, 2000:126,127)

L_2		x				x		
L_1	.	x	.		.	x	.	
L_0	x	x	x		x	x	x	
	fa	*la*]	*i*	'I spoke'	*fa*	*la*]	*va*	'I spoke, past imperf.'

In the words *hospital*] 'hospital' or *café*] 'coffee', the authors assume a 'defective class marker' and postulate an empty V slot, which is placed after the stem ((41)). In the marked cases, like in the words *hospital* 'hospital', *útil*] 'useful' or *catastrófico*] 'catastrophic', the authors assume a pre-assigned rhythmic trough.

(41) Non-verbs (Mateus & Andrade, 2000:123,124):

L_2	x		x	
L_1	x . x .		x . .	
L_0	x x x x		x x x	
	hospital]	'hospital'	*ú til*]	'useful'

The metrical analyses presented thus far have accounted mostly for stress assignment in EP. As for BP, Bisol (1992, 1993) presents a metrical analysis assuming a quantity-sensitivity approach[56]. Bisol's proposal for word stress in Portuguese assuming quantity-sensitivity was seminal, but shows some problems, namely within the verbs' paradigm, which still presents a great amount of cases and exceptions.

The author establishes a primary stress rule according to which the domain for word stress is the word. The Quantity-Sensitive (QS) rule states the following: "assign an asterisk (*) to the final heavy syllable, i.e., the last branching-rhyme syllable; otherwise, construct non-iteratively a binary left-headed constituent (* .) at the right boundary of the word" (Bisol, 1993:21). The author agrees with the fact that morphological information is relevant to the stress algorithm and determines that the stress rule is cyclic in non-verbs and noncyclic in verbs[57], and applies whenever a derivational morpheme is added in non-verbs, whereas in verbs, the above-mentioned stress rule is non-cyclic.

---

[56] It is worth noticing that stress placement in both varieties is generally the same, despite some differences regarding loan words (cf. Wetzels, 2006) and words with epenthetic vowels (e.g. *adapta* 's/he adapts' is produced as [ɐˈdaptɐ] in EP, and as [aˈdapi̠ta] or [adaˈpi̠tɐ] in BP (Andrade, 1997).

[57] Bisol (1994:20) states that: "[T]he difference (between stress assignment in non-verbs and in verbs) comes from the morphological structures, which gives rise to the following: while in non-verbs (2) [the primary stress

Extrametricality is still necessary to account for final and antepenultimate stress. However, according to Bisol, extrametricality in Portuguese only applies in final consonants - which is the case for unstressed final heavy syllables (e.g., *útil* 'useful') -, or syllables - in the case of words with antepenultimate stress (e.g., *número* 'number').

Three additional rules are necessary for stress assignment in Portuguese:

(i) *Formation of Prosodic Constituents* (FPC) - Adjoins a light syllable to the preceding one, creating a left-headed constituent;

(ii) *Stray Syllable Adjunction* (SSA) - Incorporate the stray syllable as the weak member of an adjacent foot;

(iii) *End Rule Final* (ERF) - Project the asterisk created as the main stress of the word.

The proposal from Bisol (1993) allows for the following representations of non-verbs:

(42) Stress assignment in non-verbs (Bisol, 1993:21-24):

	a.	b.	c.	d.	e.
Lexicon:	/kaz+a/	/koronel/	/numer+o/	/util/	/kafEC/
Syllabif.:	ka za	ko ro nel	nu me ro	u til	ka fEC
QS:	----	(*)	----	----	(*)
Extram.:	----	----	<ro>	<l>	----
FPC:	(* .)	----	(* .)	(* .)	----
SSA:	----	----	(* . .)	----	----
ERF:	(*)	(*)	(*)	(*)	(*)
Output:	káza	koronél	númeru	útil	kafé
	'house'	'colonel'	'number'	'useful'	'coffee'

In (42c.) and (42d.), the final syllable and the final consonant of the words, respectively, are peripheral and considered extrametrical. In (42e.), an abstract word-final consonant in the word-final rhyme is assumed in the phonological representation. Evidence supporting this assumption comes from derived words. For instance, a derived word of *café* bears an internal consonant, *cafeteira* 'coffee kettle', *cafezal* 'field of coffee', *robô* 'robot', *robótico* 'robotic', etc.

rule, whose domain of application is the word] is a cyclic rule, in accordance with Halle & Vergnaud, in verbs (2) [idem] is a noncyclic rule which applies only once, when the formation of the word is accomplished."

In verbs, a different rule for extrametricality is necessary. For the general rule applied to non-verbs, two rules must be added: (i) Mark as extrametrical the final syllable of the first and second persons plural of the Imperfective tenses; (ii) Otherwise, mark the consonant with status of inflection (Bisol, 1993:27).

In the case of the Future tenses (Future and Conditional), which are, according to Andrade (1992), problematic from the perspective of a stress assignment, the author stipulates another rule, Avoid Stress Shock (ASS), which say "Erase *" (Bisol, 1993:28).

The application of the rules established for verbs, according to Bisol (1993) results in the representations in (43).

(43) Stress assignment in verbs (Bisol, 1993:28):

	a.	b.	c.	d.
Lexicon:	/kaNtaS/	/kaNtar/	/kaNtasemoS/	/falar/ /ei/
Syllabif.:	kaN taS	kaN tar	kaN ta se moS	fa lar ei
Extram.:	<S>		<moS>	
QS:		(*)		(*) (*)
FPC:	(* .)		(* .)	
SSA:			(* . .)	
ASS:				(*)
ERF:	(*)	(*)	(*)	(*)
Output:	kãn tas	kan tár	kan tá se mus	fa la réi
	'you sing'	'to sing'	'if we sang'	'I will speak'

According to Bisol (1993), the generalization accounting for weight-sensitivity in BP is the following: stress falls on the penultimate syllable of the word (on the trochaic foot), unless the final syllable is heavy (e.g., *gáto* 'cat', *abérto* 'open', but *pomár* 'orchard', *coronél* 'colonel'). The foot of the language is, therefore, the moraic trochee. In verbs, the general rule applies (e.g., *cánto* 'I sing', *cantár* 'to sing'), but, additionally, we need to specify as extrametrical the final syllable of the first and second person plural of the Imperfective tenses (e.g., *cantávamos* 'we sang'), and the consonant with status of inflection (e.g. *cántas* 'you sing').

Contrary to Bisol, Lee (1995) proposes an analysis of word stress in Portuguese where stress is morphology-dependent and proposes rhythmic principles within a metrical approach to word stress in Portuguese. The author claims that Portuguese is not weight-sensitive and establishes two domains for stress assignment: α and β. The α-level is the domain for stress assignment in nouns, β is the domain for stress assignment in verbs. The author assumes that the domain for stress assignment in non-verbs is the stem and that the word structure of non-verbs is organized in binary, right-headed constituents (as shown in (44a.) and (44c.), respectively). Since word stress in Portuguese always falls on one of the last three syllables of a word, it is non-iterative (see (44b.)). The parsing direction, within the word domain is right-to-left (as presented in (44d.)).

(44) Stress rules in non-verbs - *unmarked* - Lee (1995:153):

Domain α: stem

a. Binary constituent

b. Non-iterative

c. Right-headed

d. Right to Left[58]

The principles in (44) account for the words in (45) - Lee (1995:153):

(45)	*café]* 'coffee'	*almoç]o* 'lunch'	*tonel]* 'large barrel'
	(. *)	(. *)	(. *)

In (46) and (47), we will show Lee's analyses for word stress in non-verbs, for the marked cases. The difference between (44) and (46) is the head direction of the foot ((44,46b.)). Whereas in the unmarked case, the foot is right headed, in the marked case the foot is left-headed.

(46) Stress rules in non-verbs - *marked* - Lee (1995:154)

Domain α: stem

a. Binary constituents

b. Left-headed

c. Right to Left

d. Non-iterative

The rules in (46) account for the words in (47) - Lee (1995:155):

(47)	*túnel*] 'tunnel'	*abóbor]a* 'pumpkin'
	(* .)	(* .)

[58] My translation from the original in Portuguese: "Domínio: radical derivacional; a. Constituinte binário; b. Não iterativo; c. Cabeça à direita; d. Direita para a esquerda" (Lee, 1995:153).

According to Lee's analysis, the gender marker in nouns is extrametrical and nouns in Portuguese are, by default, iambic. The author defends the gender marker extrametricality by arguing that it fulfills the peripherality condition of extrametricality, it is deleted in derivational processes (e.g. *cam<u>a</u>* 'bed' -> *cam~~a~~inha* 'cama dim.'; *sapato* 'shoe' -> *sapat~~o~~eiro* 'shoe maker') and it is never in stressed syllable.

As for stress assignment in verbs, that is, in the β-Level, the author proposes that the word structure of verbs is organized in binary, left-headed constituents (thus, in trochaic feet), which are built non-iteratively. The parsing direction within the word domain is right-to-left.

In (48) we present the formalization of the parameters proposed by Lee (1995) for the unmarked case of verbs stress.

(48) Stress rules in verbs - *unmarked* (Lee, 1995:160):

Domain β: lexical word (*<u>fa</u>la*] 's/he speaks', *fa<u>la</u>mos*] 'we speak')

a. Binary constituents

b. Left-headed

c. Non-iterative

d. Right to Left

The rules in (48) would account for the words in (49) (Lee, 1995:161):

(49) *computo* 'I compute' falam 'they speak' *falamos* 'we speak'

(* .) (* .) (* .)

As for non-verbs, the marked and unmarked case in verbs only differs in the direction of the foot head. In the unmarked case, feet are left-headed, whereas in the marked case, the feet are right-headed.

The marked counterpart for (48) is expressed in (50):

(50) Stress rules in verbs - *marked* (Lee, 1995:162)

Domain β: lexical word (*bati*] 'I hit, simp. past)', *baterá*] 's/he will hit')

a. Binary constituents

b. Right-headed

c. Non-iterative

d. Right to Left

In (51) we present the words accounted for by the rule in (50) (Lee, 1995:162):

(51)	*bati* 'I hit, simp. past)	baterá 's/he will hit'	falar 'to speak'
	(. *)	(. *)	(. *)

As Bisol (1993), the author considers that the 2nd p.pl. of the Past tenses (*falávamos* 'we spoke, past imperf.' [fɐˈlavɐmuʃ], *falássemos* 'we spoke, past imp. subj.' [fɐˈlasɨmuʃ], *faláramos* 'we spoke pluperf.' [fɐˈlaɾɐmuʃ]) has a final extrametrical syllable (-*mos*).

Within an OT approach, Lee (2001, 2006, 2007) later defended that Portuguese is a hybrid system: in non-verbs, stress assignment is rhythmic (weight-sensitive), whereas stress assignment in verbs is purely morphological. Based on the evolution from Latin to Portuguese and the differences resulting from the change (Lee, 2006), namely, the loss of case markers in nouns (e.g. *amo:r<u>em</u>* (Lat.) > *am<u>or</u>* (Port.) 'love')[59], the author maintained the idea according to which morphological constituency is necessary to explain stress assignment in the latter. The author maintained the idea of an iambic default foot in non-verbs (i.e., main stress is on the head of the right-most syllable of a binary foot within the stem). Also, within an OT perspective, Lee (2001, 2006, 2007) argued for the importance of morphological constituency in stress assignment, in verbs. The difference between Lee (1995) and Lee (2001, 2006, 2007) is that in the former, the author argues for the strict morphological dependence of word stress, whereas in the latter, an interaction between phonological and morphological properties is defended.

Although Lee's proposal is able to describe and explain word stress in Portuguese, his work poses one main problem: it is not theoretically plausible that languages have two feet types (one default and one marked). According to Goldsmith (1989), Hayes (1995), Kager (2007), van de Veijver (1998), among others, each language sets one, and one only, foot type that must be applied to syllables in order to build metrical trees. Every syllable standing alone must be analyzed as a degenerate foot or be considered as extrametrical (Hayes, 1995).

In summary, metrical theories, either relying on a weight-sensitive or morphology-dependent algorithm, are able to account for stress assignment in Portuguese. Metrical theories determine the organization of the strong-weak alternations of the rhythmic wave within the word domain. Furthermore, by establishing, not only metrical, but also extrametrical positions in generally unaccounted data (namely SWW words), metrical theories can predict the construction of well-formed prosodic words in Portuguese.

[59] For a more detailed view on the evolution of word stress from Latin to Portuguese, see also Pereira (1997) and Pereira (2007).

1.2.4. Syllable types, word shapes and word stress in EP - frequency information

Another important issue regarding a description of a language is frequency information. It provides presumable tendencies and patterns, which can provide arguments for different analyses on a given linguistic aspect.

Mateus & Andrade (2000:109) affirm that "[f]or the majority (over 70 per cent) of nouns, adjectives and adverbs ending in an oral vowel, stress falls on the syllable before the last"[60]. Mateus *et al.* (2003:1050,fn16) specify that 70% of the nouns and adjectives in the language bear stress in the last vowel of the stem[61].

In Figures 8, 9 and 10 we present frequency information on word shapes and stress distribution in EP, from an oral *corpus* from the 1990's[62]. In Figure 8, 'S' stands for a monosyllable, 'SS' stands for a disyllable and '≥SSS' stands for words with three or more syllables.

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[60] No information on the source of the linguistic material underlying these numbers is provided.
[61] Idem.
[62] Frequencies extracted from the *corp*us TA90PE, with 22994 orthographic words, using ©Martins, Vigário & Frota, 2004-2007, v.1: FreP - Frequency information in Portuguese (http://www.fl.ul.pt/LaboratorioFonetica/frep/).

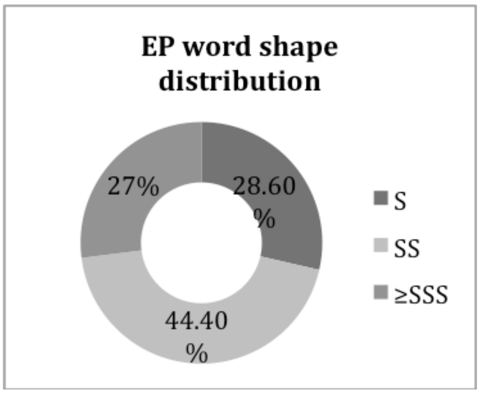

Figure 8. Word shape distribution in European Portuguese (verbs and non-verbs together).

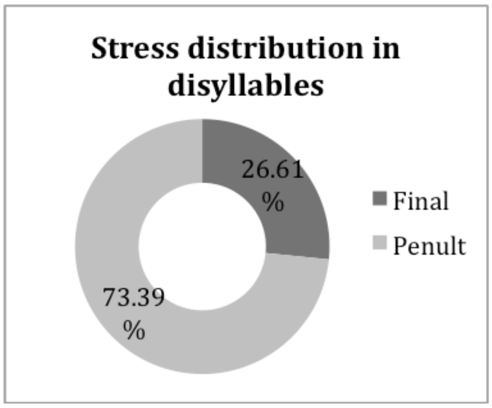

Figure 9. Distribution of word stress in disyllables (verbs and non-verbs together).

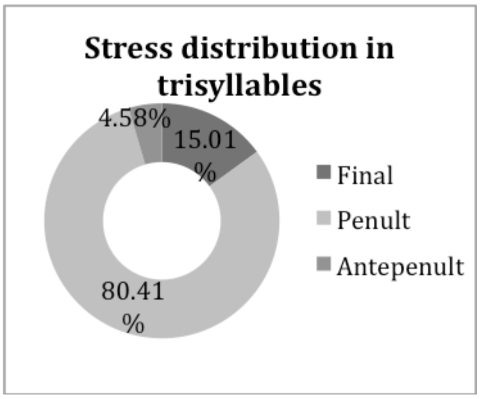

Figure 10. Distribution of word stress in tri-syllables (verbs and non-verbs together).

Figure 8 shows that Portuguese has nearly equal amount of monosyllables and words longer than three syllables (28.6% and 27%, respectively). Nevertheless, disyllables are the most common word shape in the language (44.4%). In the total amount of words in EP, 19% are trisyllabic and 8% have more than 3 syllables (in total, 27% of words are longer than 3 syllables - Vigário, Freitas & Frota, 2006:188). Also, 7.4% have a monosyllabic CV structure and 21.2% are monosyllables and have a non-CV structure (CVG, CVGN, CVC, CVN, CVNC, CVGNC - Vigário, Freitas & Frota, 2006:188).

As for the distribution of stress position per syllable within the words (Figures 9 and 10), we observe that in disyllables, stress falls predominantly (73.39%) in the penultimate syllable. In trisyllables, 80% of the words have penultimate stress (Figure 10). The data presented in Figures 9 and 10 lead us to assume that Portuguese has predominantly a trochaic rhythm.

Data on BP written texts shows that 63% of the words are trochaic, 12% are iambic and 25% have other word shapes (Cintra, 1997). Researchers on word stress in EP and BP acknowledge also that word prominence in Portuguese is predominantly organized into trochaic feet (-SW - Bisol, 1999; Pereira, 1999: 135,170). However, final stress is also possible, presumably due to syllable-final consonants in non-verbs, as suggested by Bisol (1992, 1993, 1999) and Wetzels (2006). The data in (52) provides information on the percentage of each Rhyme structure in stressed and unstressed position in EP.

(52) Distribution of Rhymes (%) per stress position (adapted from Vigário, Martins & Frota, 2006):

Rhyme structure	**Stressed**	**Unstressed**	**TOTAL**
(C)V	19.1	**45.26**	64.36
(C)VC[63]	4.87	**9.16**	14.03
(C)VN	**5.31**	2.71	8.02
(C)VGN	**4.36**	1.26	5.62
(C)VG	**3.43**	0.74	4.17
(C)VGC	**1.20**	0.01	1.21
Other[64]			2.59

The distribution of syllable types between stressed and unstressed position in EP shows that:

(i) CV is the most frequent syllable type;
(ii) Branching Rhymes (VC) are more frequent in unstressed position;
(iii) Nasal vowels (VN), oral and nasal diphthongs (VG and VGN) are more frequent in stressed position;
(iv) Simultaneous Branching Rhymes and Branching Nuclei (VGC) are more frequent in stressed position.

Bisol (1992) investigated stress position in words with a final consonant[65] in BP and the results indicated that 78% of the words ending in a consonant are oxytonic and 22% are paroxytonic.

[63] The (C)VC syllables accounted for here take into consideration, not only syllable-final /ɾ/ and /l/, but also, /s/. The phoneme /s/ may correspond to the plural marker, as in *casa<u>s</u>* 'houses ['kazɐʃ], or to a phoneme which does not correspond to a morphological constituent, as in *rapa<u>z</u>* 'boy' /ʀɐ'paʃ/.
[64] In 'Other' we include (C)VGNC and (C)VNC Rhymes.
[65] The data were collected from written text (*Dicionário Delta Larousse*).

1.2.5. Issues raised in the descriptions on Portuguese word stress

The review made thus far shows that the descriptions of Portuguese word stress have been the subject to several controversies. One of the first stress-related issues on Portuguese regards the pertinacity of feet in the language. The second one concerns the weight/morphology dependence of word stress in Portuguese.

In the following sub-sections we will summarize the issue concerning the pertinacity of feet in Portuguese (section 1.2.5.1.), and the issue regarding the weight/morphology dependence of word stress in the language (1.2.5.2.).

1.2.5.1. The pertinacity of feet in Portuguese

A few works on Portuguese (mainly EP) claim that there is no empirical evidence for the foot in the language (Mateus *et al.* 2003:1060; Vigário, 2003:336). Bisol (1999) and Wetzels (1992, 1995, 2006), however, mention two phonological processes that involve the foot and thus may provide evidence for this constituent in BP[66]. These two processes are the Dactylic Lowering and the Spondaic Lowering and we will describe them in the following paragraphs.

The Dactylic Lowering is a process that prohibits mid and high vowels in the stressed syllable of a dactylic foot (SWW). For instance:

(53) a. *ró̲tulo* 'label' - [ˈʀɔ̲tulu] but not *[ˈʀo̲tulu][67]

b. *pé̲tala* 'petal' - [ˈpɛ̲tɐlɐ] but not *[ˈpe̲tɐlɐ]

The Dactylic Lowering does not show exceptions in words with derivational suffixes (e.g., *fon*[ˈɔ]*logo* 'phonologist', [ˈɛ]pico 'epic', etc) but has a few exceptions in non-derived words (e.g., *f*[ˈo]*lego* 'deep breath', *b*[ˈe]*bedo*/*b*[ˈe]*bado* 'drunk', *p*[ˈe]*ssego* 'peach', *tr*[ˈo]*pego* 'lame', *es*[ˈo]*fago* (BP) 'esophagus', *est*[ˈo]*mago* 'stomach').

The Spondaic Lowering is a constraint that does not allow for mid vowels within the strong syllable of the spondee foot, that is, within the stressed vowel of a word with a 'heavy'[68] final unstressed syllable.

[66] Even though it is a reference for BP, the processes the author refers to are valid and suitable for EP as well.
[67] Instances in (53) and (54) were taken from Wetzels (2006).
[68] The author assumes that Portuguese is weight-sensitive.

(54) a. *mó̱vel* 'mobile' - [ˈmɔ̱vɛɫ] but not *[ˈmo̱vɛɫ]

b. *repó̱rter* 'reporter' - [ʀɨˈpɔ̱ɾtɛɾ] but not *[ʀɨˈpo̱ɾtɛɾ]

The Spondaic Lowering does not occur if the plural marker is adjoined (e.g., *m*[ˈe]*sas* 'table pl.' and not **m*[ˈɛ]*sas*).

Both the Dactylic Lowering and the Spondaic Lowering do not apply to words in which verb suffixes are adjoined (in the case of the dactyl lowering - e.g., *perd*[ˈe]*ssemos* 'we lost, past imperf. subj.'; in the case of the spondaic lowering - e.g., *esqu*[ˈe]*sas* - 'you forget, pres. subj.').

Although Wetzel's arguments have a broad descriptive adequacy, some studies clearly claim that there is no phonological evidence for the foot in the language (Mateus *et al.*, 2003: 1060; Vigário, 2003:336). Wetzels proposal has some problems, disfavoring the evidence for the foot (either the dactyl or the spondee) in Portuguese (Vigário, p.c.):

(i) Exceptions to the Dactylic Lowering where no low vowels are found suggest that the 'neutralized' vowels may be low vowels underlyingly, and do not result from a rule application. The author (Wetzels, 1992, 1995) and Bisol (1999) point out some of the words to which the Dactylic Lowering do not apply (e.g., *f*[ˈo]*lego* 'deep breath', *b*[ˈe]*bedo*/*b*[ˈe]*bado* 'drunk', *p*[ˈe]*ssego* 'peach', *tr*[ˈo]*pego* 'lame', *es*[ˈo]*fago* (BP) 'esophagus', *est*[ˈo]*mago* 'stomach', [ˈe]xito);

(ii) The fact that the Spondaic Lowering does not apply in inflected forms (e.g., *m*[ˈe]*sas* 'table pl.'), and the fact that it is noticeable in non-derived (e.g., *d*[ˈɔ]*lar* 'dolar', *C*[ˈɛ]*sar* 'name') and derived words (e.g., *m*[ˈɔ]vel 'mobile', d[ˈɔ]cil 'docile') suggests that low vowels can be represented in the lexicon and it may not be a strict phonological process (Bisol, 1999; Wetzels, 1995, 2006), but rather a morpho-phonological process.

Another empirical argument disfavoring the pertinacity of feet in Portuguese, regards the formation of hypochoristics and the processes of word truncation in the language. If we assume that hypochoristics reflects some degree of prosodic organization (McCarthy & Prince, 1995), namely minimal words and the predominant feet in a language, we will see that there is not a particular foot requirement in Portuguese, as S, WS and SW hypochoristics are observable in the language (Pereira, 1999:96). Nicknames like *Zé* (*José*) [ˈzɛ], *Fá*

(*Mafalda*) [ˈfa], *Zezé* (*José*) [zɛˈzɛ], *Dani* (*Daniel*) [daˈni], *Chico* (Francisco) [ˈʃiku] ou *Lena* (*Helena*) [ˈlenɐ] are frequent in Portuguese. Additionally, word truncation might have varied prosodic formats (*telemóvel* 'cell phone' > *móvel*, *heterossexual* 'heterosexual' > *hétero*, *internet* 'internet' > *net* - Vigário, 2003:254). According to Vigário (2003:336) the target of a truncation process[69] in EP does not seem to be the foot, but rather the Prosodic Word.

1.2.5.2. Weight-sensitivity or morphology-dependence.

The debate in the literature on stress in Portuguese confirms that the distinction between weight-sensitive and morphology-dependent stress is not as straightforward as it is for many Germanic languages, like Dutch or English (Kager, 1989). On the one hand, authors claim that Portuguese is weight-sensitive (Bisol, 1992, 1993, 1999; Carvalho, 1987, 1988; Wetzels, 1992, 2003, 2006); on the other hand, authors defend that morphological constituency constrains the location of stress in Portuguese (Andrade, 1992, 1996, 1997; Andrade & Laks, 1992; Lee, 1995; Mateus, 1983; Mateus & d'Andrade, 2000; Pereira, 1999). Also, the issue was often taken as a 'BP-weight-sensitive' *versus* 'EP-morphology-dependent'.

With respect to the frequent the theoretical claims applied to one system (EP or BP), Pereira (1999) affirms "It does not seem necessary to me to specify such difference, as there are no differences in stress location [...] between the two varieties of the language" (Pereira, 1999:83, fn79)[70].

Carvalho (1987, 1988) argues that EP, but not BP, has unstressed vowel reduction, since full unstressed vowels should be interpreted as complex segments (in this case, VV). Merging vowels phenomena such as the one found in <u>*a*</u> <u>*a*</u>*juda* ([ɐ ɐˈʒudɐ]), a phrase that is commonly produced as [<u>a</u>ˈʒudɐ] 'the help', are examples of evidence for weight playing a role in EP phonology. The reduced character of unstressed vowels constitutes evidence for the phonological value of the weight in the language. Based on these assumptions, the author specifies that heavy syllables are those where no vowel reduction is found, whereas light syllables have reduced vowels. According to Carvalho (1988), heavy syllables in Portuguese are:

[69] The author uses the designation 'clipping', for what we refer to as truncation.
[70] My translation from the original in Portuguese: "Não me parece necessário especificar tal diferença, dado não haver, no que respeita à localização do acento tónico, que é o que aqui está em causa, diferenças significativa entre as duas variantes da língua" (Pereira, 1999:83,fn79). Andrade (1996, 1997) make the same remark.

(i) The stressed syllables, which, in general, have full vowels - *bola* [ˈbɔlɐ] 'ball', *mala* [ˈmalɐ] 'suitcase', *meta* [ˈmɛtɐ] 'finishline';

(ii) The syllables with a vowel followed by /l/ or a glide - e.g. *selvagem* [sɛɫˈvaʒɐ̃j̃] 'wild', *faisão* [fajˈzɐ̃w̃] 'grouse';

(iii) The syllables with nasal vowels - e.g. *pintar* [pĩˈtaɾ] 'to paint';

(iv) The unstressed syllables with low vowels (/ɛ, a, ɔ/) - e.g. *pregar* [pɾɛˈgaɾ] 'to preach', *corar* [kɔˈɾaɾ] 'to blush', *ganhar* [gaˈɲaɾ] 'to win'.

In the examples given in the lines above, heavy syllables appear to be irrespective of stress assignment[71]. Actually, the main problem with Carvalho's analysis is that he considers heavy vowels that are full but might be unstressed. The author actually does not use weight to claim for a weight-sensitive stress in the language, but rather he argues for the contrastive role of syllable weight in the phonology of EP.

Bisol (1992, 1993, 1999) and Wetzels (1992, 1995, 2003, 2006) defend that BP is weight-sensitive (although the vast majority of arguments adduced are suitable for BP *and* EP). Bisol (1993, 1999)[72] assumes that both nouns and verbs are sensitive to syllable weight, whereas Wetzels (2006) only considers weight-sensitivity in nouns. The former assumes that stress in BP is weight-sensitive based on three types of evidence:

(i) Final stress is preferred when a word ends in a consonant[73], i.e., whenever a word ends in a heavy syllable, stress falls on that syllable, and not on the penultimate, as illustrated in (55):

(55) *rapaz* 'boy' [ʀɐˈpaʃ], *colher* 'spoon' [kuˈʎɛɾ], *anel* 'ring' [ɐˈnɛɫ])

(ii) When the word ends in a vowel, penultimate stress is preferred, i.e., when a word ends in a light syllable, stress falls on the penultimate syllable, as shown in (56):

(56) *gato* 'cat' [ˈgatu], *boneca* 'doll' [buˈnɛkɐ]).

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[71] For a criticism on Carvalho (1987, 1988), cf. Pereira (1999:101-119).
[72] Bisol (1999) presents a review on previous works from the author (Bisol, 1992, 1993).
[73] We assume that this generalization applies to words in which the word-final /-s/ is not the plural marker, like in *rapaz* 'boy' /ʀɐˈpaʃ/, *nariz* 'nose' /nɐˈɾiʃ/, *cabaz* 'basket' /kɐˈbaʃ/, etc, as opposed to words like *casas* 'houses' /ˈkazɐʃ/, *gatos* 'cats' /ˈgatuʃ/, etc. On this assumption, the plural marker /-s/ is irrelevant for syllable weight purposes.

(iii) When the penultimate syllable of a word is heavy, stress never withdraws to the antepenultimate syllable, i.e., whenever the penultimate syllable is heavy, stress cannot surpass and falls on that syllable, as presented in (57):

(57) *cadastro* 'criminal record' [kɐˈdaʃtɾu]/*[ˈkadɐʃtɾu], *covarde* 'coward' [kuˈvaɾdɨ]/ *[ˈkuvaɾdɨ]).

Both authors consider that most words with final stressed open-syllable (*café* 'coffee' [kɐˈfɛ], *javali* 'wild pig' [ʒɐvɐˈli], *sofá* 'couch' [suˈfa]) are of foreign origin, as the majority of these words (if not all) have an African, French, English and indigenous basis.

In summary, four facts suggest that *weight* plays a role in stress assignment (Carvalho, 1987, 1988; Bisol, 1994, 1999; Wetzels, 1992, 2003, 2006):

(i) EP has full stressed vowels and unreduced unstressed vowels, suggesting that full unstressed vowels might be the result of a coalescence phenomenon and therefore have complex (heavy) segments[74] - e.g., *s*[ɛ]*lvágem* 'wild', *c*[a]*ixóte* 'box', *séni*[ɔ]*r* 'senior', *c*[ɔ]*rar* 'to blush'.

(ii) In the nouns' system, *heavy* syllables, i.e., syllables ending in a consonant (/ɾ, l, s[75]/) or a glide overwhelmingly bear stress, in general (cf. table in (52), with frequency information on syllable types in stressed and unstressed position). Syllable weight counts for stress assignment directly and indirectly at the Rhyme level (i.e., syllables are *heavy* at the level of the Rhyme and at the level of the Nucleus - /VC, VG, VN, VNC, VGC, VGN, VGNC/) - e.g., *balão* 'balloon', *carapáu* 'mackerel', *rapáz* 'boy', *amór* 'love', *anél* 'ring'.

(iii) In Portuguese, antepenultimate syllables are never stressed when the penultimate syllable is *heavy* ('CV.CVC.CV) - e.g., *cérebro* 'brain' and *cadastro* 'criminal record' but **cádastro*;

(iv) Stressed mid vowels in prefinal syllables followed by a final *heavy* syllable are neutralized (Spondaic Lowering) - e.g., *móvel* 'desk'/'**m*[o]*vel*', *órfão* 'orphan'/'*[ˈo]*rfão*.

[74] According to this perspective, EP is weight-sensitive and BP is not (Carvalho, 1988).
[75] Cf. footnote 73.

The alternative approach, according to which word stress in Portuguese relies on morphological information, namely on morphological constituency, was defended by Andrade (1992, 1996, 1997), Andrade & Lack (1992), Lee (1995), Mateus (1983), Mateus & d'Andrade (2000), Pereira (1999), Vigário (2003). From the descriptions presented (cf. section 1.2.1. and references to Mateus, 1983 and Mateus *et al.*, 2003 therein), three main facts suggest that morphology plays a role in Portuguese word stress assignment (Lee, 1995, 2001, 2006, 2007; Mateus & Andrade, 2000; Pereira, 1999):

(i) Non-verbs and verbs are subject to different word stress algorithms;

(ii) In non-verbs, stress generally falls on the last syllable of the stem;

(iii) Non-verbs' rule derives oxytonic athematic words without final consonant - *café]* 'coffee', *chaminé]* 'chimney', *sofá]* 'couch', *champô]* 'shampoo'[76];

(iv) In verbs, regularities as to stress assignment in morphological constituents, and not as referring to word position or syllable weight (namely theme vowels and tense and mood suffixes) are observable - e.g., *calará* 's/he will shut up', *calaríamos* 'we will shut up'.

After we have presented the general description of word stress from a cross-linguistic perspective and the analyses proposed for Portuguese word stress, a few questions and problems are yet to be listed.

From the reports presented above, the claim for a strict weight-sensitive or morphology-dependent stress in Portuguese is hard to defend. Some authors state that Portuguese word stress is weight-sensitive and other authors defend that it is morphology-dependent. However, most of the authors agree that stress is a rhythmic feature that interacts with morphology.

The assumption of a weight-sensitive or morphology-dependent word stress in Portuguese may have several implications for word stress analyses in the language. The first

[76] Although it is not the most frequent stress pattern in Portuguese, many words, from the common vocabulary, have word final stress in an open syllable. Here we list some of them: *café* 'coffee' [kɐˈfɛ], *jacaré* 'aligator' [ʒɐkɐˈɾɛ], *javali* 'wild pig' [ʒɐvɐˈli], *sofá* 'couch' [suˈfa], *sopé* 'mountain bottom' [suˈpɛ], *capilé* 'sweet drink' [kɐpiˈlɛ], *aloé* 'aloe' [ɐluˈɛ], *avô* 'grandfather' [ɐˈvo], *avó* 'grandmother' [ɐˈvɔ], *balancé* 'swinger' [bɐlɐ̃ˈsɛ], *champô* 'shampoo' [ʃɐ̃ˈpo], *canapé* 'starter' [kɐnɐˈpɛ], *chulé* 'stink (feet)' [ʃuˈlɛ], *comité* 'comitee' [kumiˈtɛ], *esquimó* 'esquimo' [ʃkiˈmɔ], *chaminé* 'chimney' [ʃɐmiˈnɛ], *ilhó* 'grommet' [iˈʎɔ], *oboé* 'oboe' [obuˈɛ], *pontapé* 'kick' [põtɐˈpɛ], *trenó* 'bobsled' [tɾɨˈnɔ].

implication concerns the domain of application of stress and the second implication regards determination of extrametricality.

In most of the analysis defending morphology-dependence (Andrade, 1992; Andrade & Laks, 1992; Mateus, 1983; Mateus *et al.*, 2000, 2003; Pereira, 1999), the domain for stress application is the stem in non-verbs and the lexical word in verbs. In the majority of the approaches defending weight-sensitivity, the domain for word stress is the lexical word (Bisol, 1992, 1993, 1999; Wetzels, 2003, 2006[77]).

The determination of which constituents are extrametrical also depends on the approach taken. Assuming that Portuguese word stress relies on the morphological constituency, the morphological information out of the stem might be considered as extrametrical (Andrade, 1992; Lee, 1995). In weight-sensitive analyses, SWW non-verbs may bear an extrametrical syllable, as well as SW non-verbs with a final heavy syllable (Bisol, 1992, 1993; Wetzels, 2006).

The pertinacity of feet in the language is also a matter of debate in the literature, some authors providing evidence for the Spondaic and Dactylic foot and others clearly stating that the foot is not relevant in any phonological process. Often, the authors' analyses on BP or EP may lead to the idea that the two varieties of the language may present different behaviour towards word stress, which does not hold true.

Assuming that stress in Portuguese is not lexically specified - the literature pointed, otherwise, for a 'rule-based' stress[78], either morphologically conditioned or weight-sensitive - , children acquiring Portuguese need to learn the rule for word stress. But how do they learn word stress? How will a child build words in order to mark word prominence?

In this dissertation we aim at shedding light on the conflicting issues that have been listed. Based on the speech productions of Portuguese children, we intend to contribute with new empirical data to the debate on the nature of Portuguese word stress, particularly in EP.

[77] As mentioned in footnote 40, Lee (2006, 2007) constitutes an exception to these approaches, assuming weight-sensitivity *and* morphology-dependence in non-verbs and a strict morphology-dependence in verbs.

[78] Despite early assumptions of Portuguese word stress as a 'free stress' language (i.e., stress had no fixed location and its placement was unpredictable - Barbosa, 1965/1983), phonological analyses provided robust evidence for a fixed, predictable stress assignment.

2. The acquisition of word stress

In the previous chapter, we descrubed the general principles of word stress, both cross-linguistically and in Portuguese. We observed that word stress is not a universal linguistic feature. It is, though, a phonological aspect of many languages, used for phonological contrast. In Portuguese, the descriptions on word stress have posed a number of problems, namely concerning its domain of application (either the stem or the lexical word), the foot shape, weight-sensitivity, sensitivity to word class and nature and the extent of extrametricality[79].

In this chapter, we will review the main topics mentioned in the literature regarding the acquisition and development of word stress and word shape, with special reference to:

(i) The representation of early words;
(ii) The initial stress patterns, as well as their development;
(iii) The nature and role of early fillers and reduplications in prosodic development;
(iv) Word stress acquisition from an acoustic perspective;
(v) The meaning of the acquisition of stress patterns for a theory of language acquisition.

We will first present the acoustic studies carried on word stress acquisition (section 2.1.). In section 2.2., we will describe the developmental paths for word stress across languages. In this section, we will give special attention to the early words' representation (section 2.2.1.) and the order of acquisition of the different stress patterns (section 2.2.2.). In section 2.3. and 2.4., we will focus on two aspects which have often been evoked by the literature on prosodic acquisition and the acquisition of stress patterns: fillers sounds and reduplications, respectively. In section 2.5., we will present the results from previous studies on Portuguese word stress acquisition and, finally, in section 2.6., we will review the main issues expressed for the acquisition of word stress, and we will present our research questions and hypotheses.

[79] These problems have been listed recently by Lee (2006).

2.1. Acoustic studies on word stress acquisition

The acoustic study of word stress, both in adults and in children's speech, became a common resource, as more accurate instrumental methods were made available by technology. In fact, the need for instrumental data becomes crucial when it comes to identifying particular aspects of children's speech (either segments, syllables, stress or other prosodic aspects), which might not be adult-like.

Early speech is difficult to transcribe and word prominence can be hard to identify in a stage when meaningless and meaningful speech overlap, when reduplications are frequent and when great variation is present. Bernhardt & Stemberger (1998:443) point out that '[t]he acoustic cues for stress are complex, and there are indications that young children may not be able to control them very well. (...) When transcribing the speech of very young children, it is often difficult to transcribe stress consistently.'

In the acoustic studies, researchers measure the relevant acoustic parameters for word stress, in order to describe how children assign prominence, and, consequently, to argue for the presence or absence of a given default stress pattern. When studying word stress acquisition or the acquisition of rhythm, researchers usually carry out a description on how the acoustic parameters (mainly fundamental frequency, intensity and duration) are used by children, and bring empirical evidence for or against a theoretical claim, frequently related to the early representation of word stress and footing in a given language.

In the following paragraphs, we will review available studies focusing on the acoustic properties of stress during acquisition. We will furthermore show that the use children make of the acoustic parameters in order to correctly produce word stress may not be mastered until the age of 2;0.

The work by Allen & Hawkins (1980) was pivotal in the acoustic analysis of word stress from a language acquisition perspective. The authors carried out an acoustic study on stress and accent[80] in the speech productions of three English-speaking children, aged 2;8-3;4. The authors measured duration and fundamental frequency in 100 utterances (50, collected in two separate sessions) with two or more words, and reported that the speech productions of three children very much resembled the adult speech: final and post-nuclear stressed syllables tended to be longer than the initial ones and falling contours were found for most of the syllable types. The authors further showed that the observed children used both acoustic parameters to derive target-like accented phrases.

Pollock, Brammer & Hageman (1993) investigated the use of fundamental frequency,

[80] By 'stress', the authors mean 'word prominence' (e.g. 'ba<u>lloon</u>', '<u>ca</u>mel'); by accent the authors mean phrasal stress or phrasal prominence (e.g. 'the <u>bear</u>'). For a notion of stress and accent, cf. Beckman (1986).

intensity and duration to stress words in young children's speech. They recorded productions of a group of eighteen English-speaking children – 3 groups of six children with 2-, 3- and 4 years old – and analyzed them acoustically, by measuring fundamental frequency, intensity and duration of novel disyllabic words. Their results suggest that only 3 and 4 year olds made correct use of fundamental frequency, intensity and duration to mark a target-stressed syllable. Also, in the three age groups the stressed syllable was significantly longer than the unstressed syllable. However, 2 year olds produced on average longer stressed syllables than 3 and 4 year olds, and did not correctly control fundamental frequency and intensity to mark the stressed syllable, both in target 'CVCV and CV'CV words. Although perceptual analysis (also carried out) did not detect persistent use of level stress, it showed that stress assignment in 2 year olds' productions was at the chance level[81]. The experiments carried out by Pollock *et al.* (1993) point out that the use 2 year-olds make of the acoustic parameters to mark word stress is not yet controlled and that the transcription of word stress of young children's speech can be a difficult task. Children over 3 years old, on the contrary, already controlled all the acoustic parameters in the correct sense to mark the prominent vowel in a word.

Examining the acoustic correlates of stress in spontaneous productions of children aged 1;6-2;6, Kehoe, Stoel-Gammon & Buder (1995) showed that young English-speaking children were able to use stress contrast in an adult-like fashion in most of their productions (by using higher fundamental frequency, greater amplitude or longer duration to contrast syllables). However, the use of the acoustic parameters was not yet completely controlled, as tokens perceived as incorrectly stressed (30%) had different acoustic properties than those perceived as correct. The authors argued for an insufficient control over the phonetic parameters in marking stress, rather than the incorrect use of the lexical stress pattern (mostly SW, for English). The authors further observed considerable variability among children in the sense that some children tended to incorrectly stress words more than other, thus suggesting that "stress shift appears to be an idiosyncratic quality of children's speech" (Kehoe *et al.*, 1995: 349).

Lleó & Arias (2007) provided a theoretical analysis (within the Optimality Theory framework) of word and phrasal stress acquisition, by acoustically analyzing spontaneous speech data in two Spanish monolinguals aged 1;0-2;6. The results from Lleó & Arias (2007) indicated that the children mastered word stress since their early productions, despite having an effect of final lengthening in single trochees, showing that the use of duration (but not amplitude and pitch) in trochees is not yet controlled. In tri- and quadrisyllables with

[81] "Results of the perceptual analyses indicated that interjudge reliability was particularly poor for the younger subjects" (Pollock *et al.,* 1993:198).

penultimate stress, both children expectedly lengthened and raised the pitch of the penultimate vowel but the use of amplitude varied. In quadrisyllables, both children mastered duration, as penultimate syllables were lengthened in general. An analysis of the stress errors performed by the two children suggested that few trochees were not produced as such. However, some target iambic-shaped words were produced as trochees, at around 1;8-1;9. Level stress was the most frequent strategy used by these children when word stress was not produced target-like. Lleó & Arias' results suggested that Spanish-speaking children mirror the target language tendency, although they do not necessarily produce the acoustic correlates of stress in an adult-like manner. This, in fact, led adults to perceive word stress in a not yet adult-like manner or, as the authors state, in an 'immature way'.

From a compared perspective, Vihman, DePaolis & Davis (1998) studied stress/accent[82] acquisition in English and French-speaking children, both carrying out an acoustic analysis and a perception-based one, until de 25-word point (16 English-speaking children and 5 French-speaking children). The results of the acoustic analysis suggested that French children lengthen the second vowel of disyllables in an adult-like fashion. As for pitch and intensity, French children tended to use higher fundamental frequency and amplitude in the second syllable, but some variability was observed. English-speaking children showed a high level of variability in duration, pitch and amplitude.

Also in English and French, Rose & Champdoizeau (2008) presented data from a bilingual English-French speaking child, aged from 2;0 to 4;02. The authors analyzed fundamental frequency, intensity and duration in disyllables and observed that the child's English and French productions were mainly target-like, both in rhythmic terms as well as in terms of the realization of the relevant acoustic parameters for each one of the target languages. English disyllables were produced with higher pitch and intensity in the first vowel whereas French disyllables were produced with longer second vowel.

In sum, acoustic research on the acquisition of word stress and word prominence had lead us to believe that there seems to be conflicting results on how early the mastery of the acoustic parameters to produce word stress target-like occurs, though a general pattern is observed: before 2;0, children may not be able to correctly produce word stress. Some evidence of incorrect word stress production includes the non adult-like production of the acoustic parameters, the use of level stress or the production of stress errors (for instance, producing iambs in target trochees or vice-versa). Cross-linguistic differences were also attested, namely in analyses comparing data from bilingual childen. After 2;0, children seem to produce word prominence in an adult-like manner, either by contrasting the syllables

[82] There is no word stress but only phrase(-final) accent in French (Delattre, 1965; Dell, 1984).

within a word or by correctly using the relevant acoustic parameters in order to produce target-like stressed words.

2.2. The acquisition of word stress across languages

In this section, we will present a review on the major works on the acquisition of word stress.

The research on the acquisition of word stress and stress patterns has been focused on three aspects of children's linguistic behavior: (i) children's productions of the stress patterns (either comparing the children's productions with target stress patterns or only observing children's output forms), (ii) children's truncation patterns and (iii) children's stress errors.

In the following paragraphs we review the literature on the acquisition of stress patterns and word shape, bearing in mind the outputs for children speaking different languages. In addition, we will present cross-linguistic and language-specific tendencies and the interpretation of the findings carried out by the authors.

In this section, we will present some proposals for the representation of early words (section 2.2.1.) and for the acquisition of stress patterns across languages (section 2.2.2.).

2.2.1. Early words' representation

Within the field of prosodic acquisition in general, and word stress acquisition in particular, researchers have often discussed the shape early words have at the onset of production, both from a representational perspective and a production point of view.

In this section, we will introduce the proposals for the shape of early words produced by children speaking different languages, by pointing out what is the prosodic structure of these early words, namely with respect to a monosyllabic or disyllabic prosodic template. Information regarding the later stages of word production – namely, in respect to the acquisition and development of target disyllables and polisyllables, where stress patterns are noticeable – will be dealt with in the following section.

In his early work on child language, Jakobson (1941/1969) observed that young children started with a basic CV syllable (though V and VC are also possible), in order to maximally contrast the speech sounds produced. During the early periods of speech production, these initial syllables might appear singly or be reduplicated (e.g. *papa* and *mama*), as described by the author:

"Pour ce qui est de l'ordre de ces constituants, la séquence "consonne suivie de voyelle" semble quasi contraignante (...). Pendant la période de babil du développement de l'enfant, une grande partie des syllabes prononcées consistent en la succession d'un son vocalique et d'une articulation consonantique. (...) Dans le language du petit enfant, les termes *papa-maman,* de même que les premières mots formant unité, ne comportent pas de consonnes différentes, et les formes disyllabiques répètent habituellement une seule et même consonne." (Jakobson, 1941/1969:124,125)

Cross-linguistic research has indeed demonstrated that the basic unit children start with in production is a monosyllable (Ingram, 1989, 1992; Vihman, 1992). It does not seem clear, however, whether the production of the syllable in an early stage might indicate that the sylable is a 'lexical organizing unit' (Vihman, 1992:415).

Several reports in the literature have suggested that the first articulated and meaningful utterances are the product of the contrast between a consonant and a vowel (MacNeilage & Davis, 1993, 2000, 2001), which can be produced in isolation or in a repetition of syllables, and that it may reflect the children's phonological structure.

Studying the prosodic development of children, several authors claim that, at the onset of word production, the children's unit of analysis is the syllable (Demuth, 1995, 1996a,b; Demuth & Fee, 1995; Fee, 1996; Fikkert; 1994; Johnson & Salidis, 1996). These authors proposed that children speaking two Germanic languages - English and Dutch - mainly produce the Core Syllable, either CV or CV:, as, in this stage, vowel length is not yet mastered.

In the onset of word production, children mainly pay attention to the segments and the syllable structure and mostly produce core syllables, as illustrated in (58).

Stage I: Core Syllables - CV (No vowel length distinctions)

(58) Monosyllabic productions - unmastery of vowel quantity (Dutch[83] and English - Demuth, 1995, 1996b):

Orthogr.	*Target*	*Output*	*Child, Age*
klaar	/klaːr/	[kaː], [kɑ]	*J.*, 1;4-1;5
dit	/dɪt/	[tiː], [tɪ]	
juice	/dzus/	[du], [duː]	*PJ*, 1;8
juice	/dzus/	[gu], [guː]	

[83] All examples (Dutch and English) are in Demuth (1995, 1996b). The Dutch renditions therein were taken from Fikkert (1994).

The developmental path proposed by these authors (Fee, 1992; Demuth & Fee, 1995; Demuth 1995, 1996a,b) predicts that, in the early stages, a prosodic word would be a CV monosyllable. And this was indeed observed in other languages, both Germanic and Romance languages, namely German, Catalan and French (Lleó & Demuth, 1999, for German; Prieto, 2006 for Catalan; and Rose, 2000 and Demuth & Johnson, 2003, for French), as we will describe below.

Comparing the prosodic acquisition of German and Spanish, Lleó & Demuth (1999) also claim that the early words found in the speech of German-speaking children are often monosyllables, though with a CVC structure, as shown in (59)[84].

(59) Monosyllabic productions of German-speaking children (Lleó & Demuth, 1999:2):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
kaputt	'broken'	/kaˈpʊt/	[ˈpʊth]	Britta, 1;7.11
Fasan	'pheasant'	/faˈzaːn/	[ˈzɐn]	Thomas, 1;8.2
karton	'box'	/karˈtoːn/	[ˈton]	Thomas, 1;9.0
kaputt	'broken'	/kaˈpʊt/	[ˈpuχ]	Marion, 1;10.5

An early monosyllabic tendency was found for Catalan in Prieto (2006). Early CVC monosyllables were observed, though CV syllables could also be produced, both resulting from /CVC/ truncation or /CV/ targets, as illustrated in (60).

(60) Monosyllabic production of Catalan-speaking children (Prieto, 2006:245):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
mà	'hand'	/ˈma/	[ˈma]	Ot, 1;5.4.
tot	'all'	/ˈtot/	[ˈtʰo]	Lluís, 1;2.20
pa	'bread'	/ˈpʰa/	[ˈpʰa]	Lluís, 1;3.20
carn	'meat'	/ˈkarn/	[ˈtan]	Anna, 1;2./1;5
llum	'light'	/ˈʎum/	[ˈbum]	Laura, 1;7.20

In French, Rose (2000) observed that children could produce CV words for CV targets. Target CVC words are mostly realized as CV, as well. The renditions in (61) illustrate the early tendency for CV forms in French.

[84] Further ahead, in section 2.2.2., we will note that many authors argue for the early production of a disyllabic trochee in Spanish.

(61) Monosyllabic production of French-speaking children (Rose, 2000:99,101,113):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
Guy	'name'	/gi/	[gi]	*Clara,* 1;03.07
l'eau	'the water'	/lo/	[lɔ]	*Clara,* 1;04.07
oui	'yes'	/wi/	[wiː]	
non	'no'	/nɔ̃/	[na]	*Théo*, 1;11.10
oui	'yes'	/wi/	[we]	*Théo*, 2;03.06
livre	'book'	/liv/	[ji]	*Clara*, 1;04.14
pomme	'apple'	/pɔm/	[bɔː]	*Clara*, 1;06.22
pique	'(it) pikes'	/pɪk/	[pɪ]	*Théo*, 2;01.19
voir	'(to) see'	/vwaʁ/	[va]	*Théo*, 2;02.16

These findings indicate that, at the onset of word production, French children might be processing the syllable, by producing only monosyllabic forms. However, the findings from Demuth & Johnson (2003), indicate that one Parisian French-speaking child, aged 1;1-1;8, produced CV or reduplicated CVCV words (CV_1CV_1), for CV and CVCV targets, respectively, as shown in (62).

(62) Production of monosyllabic and reduplicated words of a French-speaking child (Demuth & Johnson, 2003:221):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
merci	'thank you'	/mɛʀsi/	[ʃi]/[si]	1;3
pupée	'doll'	/pupe/	[pepe]	1;3
tout	'all'	/tu/	[tu]	1;3
pain	'bread'	/pɛ̃/	[pa]	1;4
là	'there'	/la/	[na]	1;4
chapeau	'hat'	/ʃapo/	[popo]	1;4
pelle	'shovel'	/pɛl/	[pepe]	1;4
canne	'stick'	/kan/	[tata]	1;4
chat	'cat'	/ʃa/	[a]	1;5
oeuf	'egg'	/œf/	[toto]	1;5

Co-occurring mono- and disyllabic reduplicated forms, provide evidence against an obligatory binary or disyllabic foot in the early speech of French children and support the idea that, at the beginning, French children are processing the syllable, even if they use it in utterances larger than a monosyllable.

The results in the literature for the early word's representation suggest the production of a syllable, in the early stages of word production. The syllable under children's attention can surface as a monosyllable (CV, CV: or CVC), as in Dutch, English and German, or be reduplicated (CV_1CV_1), as in French.

2.2.2. The acquisition of stress patterns

As soon as words with more than one syllable start to emerge in children's speech, the acquisition of word stress as a contrasting feature may start to take place. The contributions from a vast array of languages to the topic of word stress acquisition have been often related to aspects such as the initial foot structure and the development of the word structure. However, cross-linguistic comparisons, as well as descriptions made on particular languages, have not always been consensual.

A review on Germanic languages (mainly English and Dutch) suggests that, after children start producing mainly monosyllables, they go up in the prosodic hierarchy, passing through the foot, to the prosodic word domain (Demuth, 1995; Fikkert, 1994). A considerable amount of studies on the field further suggests that, in Germanic languages, namely Dutch, English and German the initial foot is the trochee (Allen & Hawkins, 1979, 1980; Bernhard & Stemberger, 1998; Demuth, 1996a; Fikkert, 1994; Gerken, 1990, 1994, 1996; Kehoe, 1998, 2000, 2001; Kehoe & Stoel-Gammon, 1997; Pater, 1997). Note that Germanic languages are considered to be heavily trochaic (Kager, 1989). Expectedly, children speaking Germanic languages produce trochaic words earlier than iambic ones and they tend to truncate WSW trisyllables preferably into SW words. Additionally, the initial weak (unstressed) syllable of WS words is often deleted in the early stages of word production, while the weak syllable of SW words is preserved ('(ba)<u>lloon</u>' as opposed to '<u>ca</u>mel').

In a seminal investigation on phonological rhythm, Allen & Hawkins (1979) establish a few cues that may account for a definition of the rhythm across languages. The authors suggest that children's early reduplicative disyllables, children's early lexicon and nursery rhymes may indicate the default rhythm of a language and show the bias children are prone to during language acquisition. Also, the authors add that the truncation patterns in trisyllabic words may indicate the children's preference for a specific (SW or WS) initial rhythm or stress pattern. Looking at reduplications, early lexicon and truncation patterns, Allen & Hawkins (1979) report the results of an English-speaking child, indicating that the early word shapes of that child were mostly trochaic. Likewise, nursery rhymes in English suggest a very strong bias towards a trochaic foot.

The Trochaic Bias Hypothesis, initially proposed by Allen & Hawkins (1979), had a great repercussion throughout the subsequent years, especially in Germanic languages like English, Dutch and German. In the following year, Allen & Hawkins (1980) undertook a production study where children aged 3;7-6;7 were presented with non-sense words similar in segmental content, but contrasting in the stress position (e.g. [ˈtaki] and [taˈki]). Children perceived the difference between SW and WS words but had difficulty in producing WS (either using inappropriate stress or deleting the initial syllable). These results confirmed the results found previously, indicating that children's early productions were biased towards a trochaic template.

In the nineties, many works, mostly from Germanic languages, confirmed the early trochaic tendency found by Allen and Hawkins. Gerken (1990, 1994, 1996) investigated the omission patterns in English-speaking children and concluded that it was more likely that the initial weak syllable of WS was omitted, when compared to the weak syllable of target SW words, both in isolation and at the sentence level. English-speaking children more easily maintained syllables within a trochaic foot, thus providing further support for the claim of the early trochaic tendency in English.

Fikkert (1994) also found an early trochaic tendency in the speech of Dutch children. In a comprehensive work on prosodic acquisition, Fikkert (1994) proposed a developmental path for word stress acquisition in Dutch. Based on the computational model from Dresher & Kaye (1990), Fikkert accounts for children's behavior within the Principle & Parameters model. The author focuses, not only on the early word shape, but also on the word stress patterns across development. Fikkert's (1994) proposal for the acquisition of word stress in Dutch constitutes, indeed, a clear example of a learnability model for word stress.

After an initial stage (Stage 0) in which Dutch children mainly produce CV or CV: monosyllables[85], Dutch acquisition data indicated that SW words were produced target-like[86], whereas WS words were prone to truncation.

In (63), we present some renditions from Noortje in Stage 1 (Fikkert, 1994).

(63) Stage 1 of word stress acquisition in Dutch - /WS/ produced as a monosyllable (Fikkert, 1994:206):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
banaan	'banana'	/baːˈnaːn/	[ˈnaːm]	*Noortje*, 2;3.7
konijn	'rabbit'	/koːˈnɛin/	[ˈkɛin]	*Noortje*, 2;3.23

[85] Cf. section 2.2.1..
[86] Fikkert (1994:201) shows the percentages of deletion of the unstressed syllable in /SW/ and /WS/ words and the percentage of stress errors in the same words. In both tables, /SW/ words had very low percentages, suggesting that they were produced target-like from the beginning. However, in Chapter 6, the author presents results for /S/ or /-WS/ words, but not for /SW/.

In Stage 1, disyllables become part of the child's system. At this point, the child needs to know (i) how feet are parsed in his/her language (Left-to-Right or Right-to-Left), (ii) where is the head of the foot (at the Right edge or at the Left edge), (iii) whether weight plays a role in his/her language and, in particular, on stress assignment, (iv) whether there are extrametrical syllables and, finally (v) whether feet in his/her language are binary or unbounded.

In (64) we present the parameter setting for word stress acquisition at this stage.

(64) Parameters set at Stage 1 for word stress acquisition (Dutch acquisition data - Fikkert, 1994:280):

Directionality parameter	Feet are built from the	[Right]
Headedness parameter	Feet are strong on the	[Left]
QS parameter	Feet are QS	[No]
Extrametricality parameter	There is an extrametrical syllable	[No]
B/U parameter	Feet are	[Binary]

According to the author, the fact that children mainly produce trochees and truncate iambs is, in itself, an evidence for a Right-to-Left parsing and a quantity-insensitive, binary, Left-headed foot. It is agued that, if children were processing feet directionality from Left-to-Right (in the assumption of binarity), one should expect that WS were produced maintaining the leftmost syllables of the target word and SW words would be truncated. Furthermore, the rightmost syllable would only be maintained if it were strong. Conversely, in a Right-to-Left approach, the leftmost foot and syllable would always be maintained, even if it were a weak one. Since evidence for a Right-to-Left directionality was found, the author proposes that Right is the default value for directionality and Left is the default value for headedness.

At Stage 1, there is no evidence that Dutch children have set a marked value for directionality, headedness and extrametricality. At this stage, the parameters for edge of extrametricality, main stress and defooting parameter are irrelevant.

At Stage 2, the parameters set are maintained equal to Stage 1, but Dutch children start processing disyllables, both in target SW and WS. However, the child now puts all the target words – /WS/ included – into a quantity-insensitive trochaic foot, as shown in (65).

(65) Stage 2 of word stress acquisition - /WS/ words produced as [SW] (Fikkert, 1994:203):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
guitar	'guitar'	/χiːˈtaːr/	[ˈhiːtaː]	*Catootje*, 1;10.11
konijn	'rabbit'	/koːˈnɛin/	[ˈkɪnaː]	*Catootje*, 1;10.11

At Stage 3, Dutch children realize that the output form does not always match the input (namely when producing trochees out of target iambs) and that disyllables can be either SW or WS. At this stage, Dutch children produce iambic words with level stress, providing evidence for a prosodic word longer than one foot. Since WS do not conform a foot, s/he produces two feet, that is, a word with two main stresses.

(66) Stage 3 of word stress acquisition - two feet and level stress (Fikkert, 1994:214,288):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
kasteel	'castle'	/ˌkɑsˈteːl/	[ˈtɑsəˈsøː]	*Tirza*, 1;11.19
konijntjes	'bunnys'	/koːˈnɛint͡jəs/	[ˈkɔnɪˈnɛint͡jəs]	*Tirza*, 2;6.12
David	'name'	/ˈdaːvɪt/	[ˈtɑˈfuːn]	*Robin*, 2;1.26
tractor	'truck'	/ˈtrɛktɔr/	[ˈtɑkˈtɔɹ]	*Robin*, 2;2.37

At Stage 3, Dutch children set the parameter values for the quantity-sensitivity, weight, iterativity and binarity/unboundedness parameter. They realize that their language is quantity-sensitive and what counts as a heavy syllable. The child closes syllables (VC) that count as heavy and realizes that there are two types of feet in his/her language - /SW/ and /WS/ -, whose prominences are assigned on the basis of syllable weight. The words like /'CV.(C)VC/ are not produced target-like, but with level stress (['CV.'(C)VC]), since the final syllable of these words is extrametrical and extrametricality is not yet acquired. Therefore, they put the same amount of prominence in both syllables: in the syllable corresponding to the head of the trochaic foot (the penultimate syllable) and in the final heavy syllable.

At this stage, children also realize that words can be longer than one foot, which triggers the iterativity parameter to its marked value [Iterative]. Likewise, on the assumption that Dutch has binary constituents (e.g., it has polisyllabic words with penultimate stress, thus, it is not unbounded), when children perceive that stress is QS, they realize that feet are binary, setting the [binary] value for B/U parameter. At this point, children's productions have maximally binary feet.

In (67), we present the parameters that are set at stage III of word stress acquisition in Dutch (Fikkert, 1994).

(67) Parameters set at Stage 3 for word stress acquisition (Fikkert, 1994:290):

QS parameter	Feet are QS	[Yes]
Weight parameter	Closed syllables are heavy	[Yes]
Iterativity parameter	Feet are iterative	[Yes]
B/U parameter	Feet are	[Binary]

Finally, at Stage 4, children correctly produce disyllabic words with final stress and set the word-tree dominance parameter - [Right]. The fact that children are able to correctly produce disyllabic words with final stress, but not polisyllabic words with final main stress provides evidence for the setting of the marked value for the Obligatory Branchingness (OB) parameter. At this stage, children realize that feet themselves branch in the language and that main stress must be assigned to the rightmost *branching* foot.

(68) Stage 4 of word stress acquisition - Prosodic Words (Fikkert, 1994:291):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
microfoon	'microphone'	/ˌmiːkroːˈfoːn/	[ˈmiːkəˌsoːn]	*Tirza*, 2;0.5
krokodil	'aligator'	/ˌkroːkoːˈdɪl/	[ˈkoːkəlˌtɔj]	*Tirza*, 2;1.17

At this stage, Dutch children set the remaining parameters for word stress: the main stress parameter and the OB parameter.

(69) Parameters set at Stage 4 for word stress acquisition (Fikkert, 1994:297):

Main stress parameter	The word-tree is strong on the	[Right]
OB parameter	A foot receiving main stress must be branching	[Yes]

According to Fikkert (1994), word stress acquisition in Dutch might be summarized in the following five stages:

Stage 0:	$/S/_{PW} \rightarrow$	the word consists of one core syllable.
Stage 1:	$/SW/_{PW} \rightarrow$	children realize that the words might be disyllabic and a trochaic foot is processed - /WS/ are truncated into [S], whereas /SW/ do not undergo any developmental pattern; /WSW/ are truncated into [SW] and not [S].
Stage 2:	$/SW/_{PW} \rightarrow$	[SW] and /WS/ -> [SW]: this stage is different from Stage 1 in the sense that /WS/ do not become [S] anymore but [SW] instead (through the addition of a syllable). Metathesis and duplications support the claim that the syllable, and not the foot, is being processed
Stage 3:	$/\sigma_{\Sigma}\sigma_{\Sigma}/_{PW} \rightarrow$	in /WS/ - the 2 syllables are perceived as belonging to two different feet and both vowels are prominent (level stress). Children realize that the word can be longer than one foot.
Stage 4:	$/\text{-}SW/_{PW}$ and $/\text{-}WS/_{PW} \rightarrow$	Target-like production.

Table 1. Developmental stages for word stress acquisition in Dutch (Fikkert, 1994)

The data from Fikkert (1994) were later extended to English (Demuth, 1995, 1996a,b,c). As presented in section 2.1.1., Demuth & Fee (1995), Demuth (1995, 1996a,b), Fee (1996) and Johnson & Salidis (1996) propose that prosodic acquisition in English starts with a monosyllable, later evolving to larger and more complex structure. According to the authors, data as presented in (70) illustrate this early stage in prosodic acquisition, both in Dutch and in English.

(70) Stage I of prosodic acquisition: Core Syllables - CV (No vowel length distinctions - Demuth, 1995, 1996b)[87]:

Orthogr.	*Target*	*Output*	*Child, Age*
klaar	/klaːr/	[kaː], [kɑ]	*J.*, 1;4-1;5
dit	/dɪt/	[tiː], [tɪ]	
juice	/dzus/	[du], [duː]	*PJ*, 1;8
juice	/dzus/	[gu], [guː]	

After an initial stage where children mainly produce monosyllables, prosodic words would be either monosyllabic or disyllabic, but obligatorily bimoraic (with minimally two short vowels, a VC syllable or a long vowel). In (71) we present instances from Stage II of prosodic acquisition:

(71) Stage II of prosodic acquisition: Minimal Words/Binary Feet (Demuth, 1995, 1996b):

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
Core Syllables - (C)VCV	*aap*	'monkey'	/ˈaːp/	[ˈaːpə]	*T.*, 1;4-1;6
	tuin	'garden'	/toyn/	[ˈtœynɑ]	*N.*, 2;5-2;7
Closed syllables - (C)VC	*deze*	'these'	/ˈdeze/	[teif], [deːs]	*J.*, 1;6-1;7
	poes	'cat'	/puːs/	[puːs]	
	egg	---	/ɛg/	[iʔ], [ɛʔ], [ɛg]	*MH,* 1;7
Vowel length distinctions - (C)VV	*stoel*	'chair'	/stuːl/	[tyː]	*J.*, 1;10-2;0
	daar	'there'	/daːr/	[daː]	
	cheese	---	/tʃiz/	[di]	*AS*, 2;2
	nose	---	/noz/	[nu]	

In the third stage, children would start building up a foot and assigning prominence to a vowel in the prosodic word. Instances in (72) account for Stage III of prosodic acquisition.

[87] Cf. footnote 83, on Dutch data in Demuth (1995, 1996a,b).

(72) Stage III of prosodic acquisition: Prosodic words larger than a binary foot (one stress per foot):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
microfoon	'microphone'	/ˌmiːkroːˈfoːn/	[ˈmiːkəˈfoːn]	*R.*, 1;10-2;1
olifant	'elephant'	/ˈoːliːˌfɑnt/	[ˈoːfɑˈfɑːn]	*J.*, 2;1-2;4
tomato	---	/təˈmato/	[ˈmaːdo], [dəˈmaːdo]	*AS*, 2;3
elephant	---	/ˈɛləfənt/	[ˈɛbininin]	
motorbike	---	/ˈmotərbaik/	[ˈmuːgəgaːbaik]	

Finally, at stage IV, children would produce a prosodic word target-like.

(73) Stage IV of prosodic acquisition: Prosodic words (target form):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
pantoffels	'slippers'	/ˌpɑnˈtɔfɔls/	[ˌpɑnˈtɔfəls]	*C.*, 2;4
limonade	'lemonade'	/ˌliːmoːˈnaːdə/	[ˌmiːmoːˈmaːtɑ]	*N.*, 2;9

The comparative analyses of English and Dutch prosodic development suggest that the acquisition of stress patterns starts with a shorter unit (a CV syllable) and evolves, in the course of development, into a longer, more complex structure. Both analyses defend that the early foot is a trochee (i.e., a word with a Strong-Weak pattern - e.g. '<u>ca</u>mel'). Both Fikkert (1994) and Demuth (1995, 1996a,b) defend a bottom-up approach of prosodic acquisition, as formulated in (74).

(74) Bottom-up approach to prosodic acquisition:

U
…
|
I
…
|
Φ
…
|
C
…
|
ω
[ˈkuːˈnɛi]|
Σ
[ˈkuːlɑ]
|
σ
[ˈtɛin]

Kehoe (1998, 2000, 2001), Kehoe & Stoel-Gammon (1997), and Pater (1997) confirmed the early tendency for the deletion of initial unstressed syllables of trisyllabic and quadrisyllabic words in English-speaking children. A higher deletion rate in the initial stressed syllables was found. However, the results suggested that the truncation patterns were conditioned, not only by metrical aspects (Pater, 1997), but also by the lack of prosodic salience of initial weak syllables (Kehoe, 2000, 2001).

Analyzing the spontaneous and elicited speech of 18 English-speaking children aged 1;10-2;10, Kehoe (1998) proposed a metrical approach to word stress acquisition and compared the data obtained with the ones proposed for Dutch by Fikkert (1994). The author investigated children's production errors in /'SWS/, /SW'S/, /SWW/ and /WSW/ novel and familiar words. The results indicated 3 main stages in prosodic development of English-speaking children.

In Stage I, denominated the 'Trochaic constraint stage', English children aged 1;10 mainly produce one or two-syllable truncations conforming a trochaic foot, though /'SWS/ and /SW'S/ words were episodically produced. At this stage, English children were dealing with foot-type and directionality, truncating target words to [SW] from the rightmost edge (e.g., avocado [ˈkʰɑdo]). The younger children often used stress shift in the direction of heavy unstressed syllables, showing that a rule on weight-sensitivity was active at that stage.

Stage II is an 'experimental stage'. Children aged 2;4 produced target trisyllables mostly with level and incorrect stress forms, since only one foot is being processed in this stage. In Stage II, children are learning extrametricality, quantity-sensitivity and main stress.

At Stage III, which characterized the speech of 2;10 year-olds, few errors were observed. Trisyllables with initial main stress are correctly produced.

Though there is strong agreement found in Germanic languages regarding the shape of early disyllabic words, some authors rejected the primacy of the trochaic tendency, mainly in English (Klein, 1984; Pollock *et al*., 1993; Vihman, DePaolis & Davis, 1998). In a case study, Klein (1984) found great variability in the multisyllabic utterances of one English-speaking child aged 2;0. Some words were produced correctly, others were misstressed and some others were produced with level stress, which, the author argues, provides evidence for a neutral start and the 'lexical primacy during early stages of learning word stress', since children did not commit many stress errors, providing evidence for the absence of any rule (or regularization) taking place. In an acoustic study on the acquisition of word stress in English-speaking children, Pollock *et al.* (1993) argue for a neutral start in learning to stress, since no indisputable evidence for the early 'trochaic bias' was found, although "some evidence of a trochaic bias was seen in the complete deletion of [initial] unstressed syllables" (p. 198).

Using both acoustic measurements and perceptual analyses, Vihman, DePaolis & Davis (1998) studied the speech of French and English-speaking children. The results of the perceptual analysis demonstrated that French children's productions were mostly iambic. American children, on the contrary, showed more unbalanced results. Five (out of 9) produced more trochees, whereas 3 of them produced mainly iambs and 1 of them produced as many trochees as iambs. Upon these results, the authors challenge the trochaic bias hypothesis for English language, and propose that an analysis of American data should take into account the amount of disyllabic phrases, like *'the ball'* or *'all gone'* (rather than disyllabic words), consisting of a function word plus a monosyllable due to the 'frequent occurrence in the input of monosyllabic words carrying the nuclear accent of the phrase and preceded by an unstressed syllable, often a function word such as an article' (Vihman, DePaolis, & Davis, 1998:942). In brief, in the early stages of word production, children may not rely on word prominence, but on phrasal stress instead. Rose & Champdoizeau (2008), also acoustically analyzing the speech of a bilingual French and English-speaking child, clearly stand against the universal trochaic bias and argue that the target-language properties play an important role in the children's grammatical interpretation of word stress.

The early dominance of the trochaic bias found in Germanic languages, however, did not always find a match during the period of acquisition of non-Germanic languages, providing evidence against the universal or unmarked status of the trochaic foot.

Authors, mainly working on non-Germanic languages also suggested that children's early words may be neutral in terms of stress patterns, meaning that children's early words do not display a particular stress pattern, either trochaic or iambic (Hochberg, 1988a, on Spanish and Tzakosta, 2004, on Greek). The results and the analyses proposed for Spanish, French, Catalan, Greek, Hebrew, Sesotho, K'iche' and BP indicate conflicting results with respect to the stress patterns displayed by children during acquisition.

Early reports on Spanish (Hochberg, 1988a) mention an important degree of variability in the early speech of children, regarding a preference towards a particular stress pattern, namely the trochee, the most frequent foot in the language. The author reported that, in the early speech of Spanish children (from 19 to 22 months-old) stress placement was random, though stress accuracy (i.e., the rate of correct stress placement) increased with age. The author defended that children's productions are not biased towards a trochee, thus claiming a neutral start approach to stress. Despite the great variability found, Hochberg (1988b) further defended that stress learning is rule-driven, based on spontaneous and imitated productions of Spanish-speaking children aged 3, 4 and 5. The author observed that irregular patterns tended to be regularized, thus arguing against a lexically-based mechanism for word stress.

Conversely, in a comparative study on Spanish and German, both trochaic languages, Lleó & Demuth (1999) analyzed the spontaneous speech of three Spanish-speaking children and four German-speaking children between the ages of 1;4-2;3. The authors confirm that, in the beginning, Spanish speaking-children mainly have a syllabic trochee, as shown in (75a.), whereas German speaking-children preferred a moraic trochee, as illustrated in (75b.).

(75) Lleó & Demuth's representation proposal for the early word shape in Spanish and German (Lleó & Demuth, 1999:3[88]):

a. Spanish	*b. German*
PW	*PW*
|	|
Σ	Σ
/\	|
CV CV	CVC

88 The page number referred to is relative to the manuscript version of the paper, downloaded from *www.cog.brown.edu/~demuth/articles/1999%20Lleo&Demuth.pdf*, downloaded on November 30th 2007.

In a comparison between Spanish and English prosodic acquisition, Roark & Demuth (2000) conclude that Spanish-speaking children produce words longer than a disyllable earlier than English, Dutch and German-speaking children. Soon Spanish-speaking children go through a stage where CV'CVCV are produced, whilst English-speaking children still prefer CVC words. Spanish children would, according to Roark & Demuth (2000), be able to produce a disyllabic trochaic foot earlier than English-speaking children. The later findings presented in Demuth (2001b) for Spanish acquisition demonstrated that, in his/her early stages, an Argentinean Spanish-speaking child, is able to produce disyllables with both trochaic (as in (76)) and iambic (as in (77)) stress patterns.

(76) Early trochaic productions in Spanish (Demuth, 2001:8):

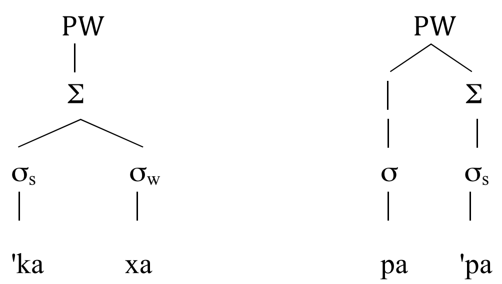
Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
caja	'box'	/ˈkaxa/	[ˈkaxa]	S., 1;8
esta	'this'	/ˈesta/	[ˈeta]	

(77) Early iambic productions in Spanish (Demuth, 2001:8):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
papá	'daddy'	/paˈpa/	[paˈpa]	S., 1;8
acá	'here'	/aˈka/	[aˈka]	

At this stage, however, iambic and trochaic feet should not be available in the child's system. Instead, the stressed syllable of iambs is mapped onto a monosyllabic foot, with the preceding syllable represented at a higher level of the prosodic hierarchy. The representation of the trochees (*caja* 'box') and iambs (*papá* 'daddy') according to Demuth (2001b:8) is the following:

(78) a. Trochees b. Iambs



The arguments for this representation arise from the production of WSW words as SW and never WS, as well as from the production of early determiners, before truncated

WSW words. At this stage, trisyllables are mostly truncated to disyllables (79).

(79) Early WSW truncation in Spanish - [SW] (Demuth, 2001b:8) :

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
hamaca	'hammock'	/aˈmaka/	[ˈmaka]	S., 1;8
ventana	'window'	/benˈtana/	[ˈtana]	S. (1;9)

Early target-like production in disyllables and the truncation patterns found for words longer than two syllables (namely, /WSW/ truncated to [SW]) suggest that in Spanish, like in English and Dutch, the Minimal Word restriction conforms to a disyllabic trochaic foot. Thus, rather than having two feet types (an iambic and a trochaic one), the author argues that it is possible that the child uses a prosodic structure like the one in (78b.), while producing [WS] forms.

Hebrew-speaking children tend to prefer the trochaic stress pattern, which is less frequent in the language (Adam & Bat-El, 2008). The authors argue that, given the high frequency of iambic nouns in the language, data from a Hebrew-speaking child provided evidence for a universal bias towards a trochaic pattern. The child under observation produced target trochaic forms earlier than target iambic forms and this pattern was kept for a long period, as illustrated in the renditions in (80).

(80) Early trochaic tendency in Hebrew (Adam & Bat-El, 2009:264)[89]:

	Orthogr.	*Gloss*	*Output*	*Age*
/-SW/	*sáfta*	'gradma'	táta	1;03.14-1;04.24
	túki	'parrot'	kúki	
	tapúax	'apple'	púax	
	banana	'banana'	nána	
/-WS/	*kapít*	'spoon'	tik	
	ipopotám	'hyppo'	máta/tatá	
	bakbúk	'bottle'	búk/bakbúk	1;05.04-1;05.08
	kivsá	'sheep'	sa/kísa/kisá	1;05.15-1;05.29

Tzakosta (2004) investigated the acquisition of stress by 11 Greek children aged 1;7-3;5, in spontaneous context. In Greek, a trochaic, quantity-insensitive language (Drachman & Malikouti-Drachman, 1999), children did not prefer trochaic to iambic stress patterns as they alternate between both in early word production data (Tzakosta, 2004). Early truncation of both /SW/ and /WS/ forms provide evidence, both for an early monosyllabic word and

[89] No phonetic transcription is provided.

against a trochaic tendency. In (81) we present some renditions of Greek children, where truncation of /SW/ and /WS/ to monosyllable are attested.

(81) Neutral tendency in Greek (Tzakosta, 2004b:103[90]):

Gloss	*Target*	*Output*	*Chid, Age*
'fig'	/ˈsiko/	[ko]	B., 1;10
'those'	/aˈfta/	[ta]	B., 1;11
'to play'	/ˈpezi/	[pe]	F., 1;11
'carriage'	/kaˈrotsi/	[jo]	
'from'	/aˈpo/	[po]	Ma., 2;8.7

In Sesotho and Catalan, both trochaic languages - though Sesotho is a language with vowel lengthening in the penultimate syllable of a phrase and Catalan has an approximate amount of trochees and iambs (trochees still being more frequent) - children seem to mirror the tendency of the target language and are faithful to trochees since the beginning of word production (Demuth, 1996a and Prieto, 2006, respectively).

In (82) we illustrate the trochaic tendency found in Sesotho.

(82) Early trochaic tendency in Sesotho (Demuth, 1996a:173[91]):

Orthogr.	*Gloss*	*Output*
ntate	'father'	tate
ma-simba	'chips'	timpa
chelete	'money'	teete

According to Prieto (2006), in a first stage of prosodic development, Catalan children mainly produce CVC monosyllables, though CV targets could be produced faithfully as well[92]. After that stage, children's productions were constrained by a maximal disyllabic foot: trochaic words are produced target-like, whereas iambic words are mostly truncated to [S], as shown in (83).

[90] Instances were taken from Tzakosta (2004b). No orthographic transcription is provided.
[91] Instances in Demuth (1996a) were taken from Connelly (1984:73-74). Though no stress mark is provided, Demuth (1996a:173) states, below the instances, that "[p]roductions in the one-word stage in Sesotho can therefore be represented by a strong-weak trochaic foot, just like that shown for English and Dutch".
[92] Cf. instances in (60), in the previous section.

(83) Early trochaic tendency in Catalan prosodic acquisition (Prieto, 2006:246):

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
/SW/	*globus*	balloon	/ˈglɔβus/	[ˈβɔβu]	Lluís, 1;0.5
	papa	'daddy'	/ˈpapə/	[ˈpʰapʰɐ]	Lluís, 1;1.10
	hola	'hello'	/ˈɔlə/	[ˈoːwɐ]	Lluís, 1;2.15
	terra	'earth'	/ˈtɛlə/	[ˈtɛlɐ]	Lluís, 1;6.7
/WS/	*tractor*	'tractor'	/trəkˈto/	[ˈtʰo]	Lluís, 1;3.20
	Joan	'name'	/ʒuˈan/	[ˈan]	Lluís, 1;6.7
	sisplau	'please'	/sisˈplaw/	[ˈpaw]	Ot, 1;6.24

In iambic languages such as K'iché or French[93], children display variable behavior. French children tend to mirror the iambic tendency of the target language or they do not favor any stress patterns at all (Demuth, 1996a; Vihman, DePaolis, & Davis, 1998; Braud, 2003; Demuth & Johnson, 2003; Rose & Champdoizeau, 2008).

Examining the productions of two children acquiring Quebec French, Rose (2000) found that CV and CV'CV words are preferably produced in the early stages of word production. As shown in section 2.1.1., Rose (2000) found that, at an initial stage, the two children observed could produce CV words for CV targets (84a.). Target CVC words are mostly realized as CV (84b.) and reduplication is frequent in disyllabic targets in both children, although the attempted words may already be reduplicated forms (84c.). In (84), we show an initial tendency for monosyllabic forms (CV and CVC) and the co-occurrence of these forms with reduplications.

(84) Early monosyllabic forms in Quebec French (Rose, 2000:99,101,113):

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
a. /(C)V/	*Guy*	'name'	/gi/	[gi]	Clara, 1;03.07
	l'eau	'the water'	/lo/	[lɔ]	Clara, 1;04.07
	non	'no'	/nɔ̃/	[na]	Théo, 1;11.10
b. /(C)VC/	*livre*	'book'	/liv/	[ji]	Clara, 1;04.14
	pomme	'apple'	/pɔm/	[bɔː]	Clara, 1;06.22
	pique	'(it) pricks'	/pɪk/	[pɪ]	Théo, 2;01.19
	voir	'(to) see'	/vwaʁ/	[va]	Théo, 2;02.16
c. /CVCV/	*coucou*	'pick-a-boo'	/kuku/	[guˈgu]	Théo, 1;10.27
	pain	'bread'	/bobo/	[boˈbo]	
	crayon	'pencil'	/kχɛjɔ̃/	[keˈjɔ]	Clara 1;07.27
	poisson	'fish'	/pwasɔ̃/	[pɔˈsɔ]	Théo, 2;04.28

93 It is worth reminding that French does not have an iambic foot but rather it has fixed phrase-final accent, as prominent syllables are always at the end of a phonological phrase (Delattre, 1965; Dell, 1984).

The data showed above suggest that in the beginning, both CV and CV'CV words are possible in the early speech of Quebec French-speaking children. The co-occurrence of CV and CVCV patterns suggest that, in French, a binary foot, or the foot itself, may not be under children's attention, at the onset of prosodic acquisition. The data from French in Rose (2000) were later confirmed in Braud (2003) and Demuth & Johnson (2003).

Braud (2003) clearly stands against an iambic foot in the acquisition of French, as monosyllables and disyllables are produced faithfully from the beginning, and trisyllables may have a high rate of syllable preservation as well. In most cases, the determiner is kept in the children's production, like in *un escargot* 'a snail' /ɛ̃nɛskargo/ produced as [ɛ̃kago], or *un hélicopter* 'an helicopter' /ɛ̃nelikɔptɛr/ produced as [ɛ̃nekɔktɛr]. The author argues for the processing of an early prosodic template larger than the foot, or even the word, in French. The early reduplications, noticeable not only in disyllables but also in polisyllables, were not the result of an internal organization within the foot, but, instead, the fulfillment of a larger prosodic template. The results found in Braud (2003) suggest that prominence was not assigned on the basis of the foot, but rather on the basis of a larger prosodic constituent, such as the phonological phrase, as furthermore occurs in adult French.

Demuth & Johnson (2003) also found that, in stage I, the French child observed also produced CV or reduplicated CVCV words (CV_1CV_1), for CV and CVCV targets, respectively.

In (85), we recall the instances presented in section 2.1.1., showing the possible occurrence of monosyllabic, along with reduplicated forms in the acquisition of French.

(85) Early tendency for monosyllabic (and reduplicated) forms in French (Demuth & Johnson, 2003:221, 222):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
merci	'thank you'	/mɛʀsi/	[ʃi]/[si]	
pupée	'doll'	/pupe/	[pepe]	1;3
tout	'all'	/tu/	[tu]	
pain	'bread'	/pɛ̃/	[pa]	
là	'there'	/la/	[na]	
chapeau	'hat'	/ʃapo/	[popo]	1;4
pelle	'shovel'	/pɛl/	[pepe]	
canne	'stick'	/kan/	[tata]	
chat	'cat'	/ʃa/	[a]	1;5
oeuf	'egg'	/œf/	[toto]	

At this stage, the child reduplicated CVC targets (/CVC/ -> [CV_1CV_1]) and truncated trisyllables into [CVCV], as shown in (86).

(86) Tendency for reduplication in French (Demuth & Jonhson, 2003:219, 221):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
poupée	'doll'	/pupe/	[pepe]	1;3
pelle	'shovel'	/pɛl/	[pepe]	1;4
domino	'domino'	/domino/	[ɔjɔ]	1;4
balle	'ball'	/bal/	[baba]	1;5
porte	'door'	/pɔʀt/	[pɔpɔ]	
omnibus	'bus'	/ɔmnibys/	[byby]	
sausisson	'sausage'	/sosisɔ̃/	[tɔti]	1;6

As Rose (2000) and Braud's (2003), the findings from Demuth and Johnson (2003), namely the occurrence of (C)V-(C)VCV alternating forms, suggest that binary feet are not an obligatory requirement in French prosodic acquisition and that stress might not be assigned on the basis of a (binary) foot. One aspect that is distinctive of French, and is also found in Spanish (Demuth, 2001b) and Portuguese (Baia, 2008; Santos, 1995, 2001, 2007; Stoel-Gammon, 1976), is the one concerning reduplicated words. Authors have referred that the early speech of Portuguese children is highly reduplicated and that it was used as an empirical argument to claim for the processing of a prosodic structure larger than a syllable or even a foot (Santos, 2001). We will come back to this issue when Portuguese acquisition data are at stake[94].

The review made thus far enables us to observe that there is a great variability in the early stages of word production concerning word shape and word stress. The properties of the target language, the children's ages that are taken into account and the type of data considered, may in fact lead to wavering, conflicting results and may imply too many irresolute paths. In Table 2, we will summarize the results for the languages reviewed, concerning the shape of early words and stress patterns.

[94] Cf. section 5.2., further in this dissertation.

Study	Language	Rhythm in the Target	QS	Age	Production	Developmental Prosodic Tendency
Fikkert (1994) *Demuth (1996)*	Dutch	Trochaic	Y	1;0-2;9	Spontaneous (12 children)	$\sigma > SW]_{\Sigma} > \omega$
Klein (1984)	English	Trochaic	Y	2;0	Spontaneous Experimental (1 child)	Neutral
Tzakosta (2004)	Greek	Trochaic	N	1;7-3;5	Spontaneous	σ > Neutral
Hochberg (1988)	Spanish	Trochaic	Y (nouns only)	1;7-2;2	Spontaneous and imitated (4 children)	Neutral
Demuth (2001)				1;8-2;3	Spontaneous (1 child)	$\sigma > SW]_{\Sigma}$
Bat-El (2008)	Hebrew	Trochaic	N	1;02-1;07	Spontaneous (1 child)	$SW]_{\Sigma}$
Prieto (2006)	Catalan	Trochaic	N	1;1-2;11	Spontaneous (4 children)	$\sigma > SW]_{\Sigma}$
Demuth (1996)	Sesotho	Phrasal stress (penultimate lengthening - trochaic)	Y (penultimate lengthening phrase finally)	Not available	Not available	$SW]_{\Sigma}$
Rose (2000)	French	Phrasal stress (final)	N	1;0-4;0	Spontaneous (2 children)	No foot: σ, CV.CV, CV.CV.CV
Braud (2003)				1;9-5;0	Spontaneous Experimental	
Demuth (2003)				1;1-1;8	Spontaneous (1 child)	
Vihman et al. (1998)				>25 wp	Spontaneous (5 children)	$WS]_{\phi}$
Demuth (1996)	K'iche'	Iambic	Y	Not available	Not available	σ

Table 2. Shape of early words - cross-linguistic information

In Table 2, we observe that when a language is trochaic, either a neutral or a trochaic tendency is found. In many languages, an early processing of a monosyllable is frequent. In French, a language with phrase-final accent, no evidence for an iambic foot was found. Instead, a high variability between monosyllabic and disyllabic forms was noticed. In clearly iambic systems, such as K'iche', a heavy monosyllable (CV: or CVC) was earlier produced. From the table above, we observe that iambs are disfavored in early acquisition data. The table showed above demonstrates that early prosodic acquisition is often an echo of language-specific properties.

2.3. The nature and role of filler sounds in early prosodic acquisition

The nature and role of filler sounds in early acquisition has been long discussed in the literature. The questions mentioned are: what is the linguistic status of filler syllables? What can filler sounds tell us about the early processing of word shape and stress patterns?

Most of the literature is unanimous in considering that fillers make part of a set of characteristics of the speech of young children (e.g., Bottari, Cipriani & Chilosi, 1994; Demuth, 2001b; Peters, 1993, 1995, 1997, 2001a,b,c; Peters & Menn, 1993; Veneziano & Sinclair, 2000). Children acquiring many languages produce filler sounds and some children use them more than others (Simonsen, 2001). The production of filler sounds seems to be very often related to rhythmic, intonational and prosodic aspects of acquisition, as children may use them to attain the properties of the adult speech by, for instance, fulfilling a given rhythmic or prosodic template that is motivated by prosodic constraints of the target language. The early prosodic representation of both fillers and reduplicated words is, however, subject to discussion. In the following paragraphs we will present a review on these two aspects of early speech production.

Filler sounds are commonly observed in the early speech of children and it is common to interpret them as the result of an interaction between phonology, morphosyntax and pragmatics. The behavior of fillers varies within children acquiring the same language. Literature reports have pointed that some children have a more 'gestaltist' approach, following an acquisition path in production more consistent with whole phrases (thus producing more 'filler' elements), whereas other may have a more 'analytic' perspective and produce more isolated syllables (thus producing less 'filler' elements) (Simonsen, 2001).

All authors, however, agree that filler syllables result from the interaction between phonology and morphosyntax, in a stage when the different modules of grammar are not yet completely mastered. The phonological status of these 'unglossable syllables'[95] has been a matter of debate in the literature on phonological and morphosyntactic acquisition (Bottari, Cipriani & Chilosi, 1994; Demuth, 2001a,b, 2007; Demuth & Tremblay, 2008; Gerken, Landau & Remez, 1990; Gerken & McIntosh, 1993; Lleó, 1997, 2001a, 2001b; Lleó & Demuth, 1999; Peters & Menn, 1993; Peters, 1997, 2001a,b,c; Veneziano & Sinclair, 2000; Veneziano, 1997, 2001). Specifically, the role of filler syllables in prenominal position has been closely related to the early awareness and production of determiners, although their co-occurrence with verbs and adverbs might be problematic under this approach[96].

In an early study on perception and production of function morphemes in young children, Gerken, Landau & Remez (1990) demonstrated that 2-year-olds are able to distinguish between grammatical function morphemes and non-function morphemes in perception. Gerken & McIntosh (1993) complemented the previous analysis showing that 2-year-olds are able to discriminate function morphemes such as determiners from pseudo-auxiliaries, though they are not able to produce them target-like. These results suggest that young children process grammatical function morphemes, even if they are not able to realize them phonetically. Following this line of research, a wide set of studies supported the idea that production limitations constrain children from using grammatical function morphemes in speech, at the early stages (Bernhardt & Stemberger, 1998; Demuth, 2001b, 2007; Gerken, 1996; Gennari & Demuth, 1997; Lleó & Demuth, 1999). Despite the fact that children are not able to produce grammatical morphemes target-like from the beginning, the use of filler sounds is observed in many languages, and the relationship between the production of these filler sounds and their evolution into grammatical morphemes was often suggested.

One of the main problems researchers working with data from children's early speech have to deal with regards the criteria that distinguish filler from non-filler sounds. Frequently, the turning points between the production of fillers and proto-morphemes and between the production of proto-morphemes and morphemes (determiners, pronouns, modals, auxiliaries, etc.) are not easy to tackle. Veneziano (2001) and Peters (2001a,b) established a group of phonological and morphological features, as well as functional and production properties, allowing for an identification of the different stages children might go through in the production of filler syllables. According to the authors, three moments are distinguishable in the evolution of filler sounds in the speech of young children: a premorphological stage, a protomorphological stage and, finally, a morphological stage.

In Table 3, we present Peter's (2001b) summary on the status and function of fillers

[95] The expression 'unglossable syllables' is taken from Peters (2001a,b).
[96] The occurrence of filler sounds before verbs and adverbs was observed in Portuguese (Costa & Freitas, 2001 and Miguel & Freitas, 1998). This issue will be discussed in section 2.5.2..

in cross-linguistic acquisition data:

	Phonological	Functional	Morphological	Production
Premorphology	- Full syllable; - Limited set of vowels; - No/few consonants;	- Prosodic extender; - Not lexically selected;	-------------	Phonological extension of the item it is attached to.
Protomorphology	Some match to set of morphemes in this position;	- Rhythmic placeholder; - Lexically selective; - Idiosyncratic;	- Morphological placeholder; - May be amalgamated;	
Full morphemes	Match the target within articulatory ability;	Approaching adult;	- Split into subclasses; - Systematic;	Becoming automatized

Table 3. Characteristics of fillers at different stages of development (from Peters, 2001b:232)

In a premorphological stage, filler syllables produced are normally full syllables (mostly vowels, though consonants may appear). In (87) we present some instances of an English-speaking child, observed in Peter's studies (e.g., Peters, 1993, 1995, 2001a,b; Peters & Menn, 1993).

In the following examples, 'D' stands for 'Daddy', 'S' stands for 'Seth' and '^' stands for main stress (age between brackets).

(87) Renditions of filler syllables in the premorphological stage[97]:

S: *m ^p(l)ay? m ^p(l)ay?* (1;6)

At this stage, fillers' function is to extend a word or phrase and they do not select specific lexical items (they may appear with nouns, verbs, adverbs, etc.). Fillers sounds are unglossable at this point.

At a protomorphological stage, the phonological form of fillers starts to resemble the form of the morphemes that will occupy that position. They mark a rhythmic and

[97] The examples were taken from the CHILDES website (http://childes.psy.cmu.edu/topics/fillers/characteristics.html, http://childes.psy.cmu.edu/topics/fillers/pre/pre.html and http://childes.psy.cmu.edu/topics/fillers/proto/proto.html – downloaded on October 31st, 2006). Peters uses CHILDES notations (for further information on the notation criteria and database information cf. http://childes.psy.cmu.edu/manuals/).

morphological position within the utterance and start being lexically selective.

(88) Seth's renditions of filler syllables in the protomorphological stage[98]:

a. Proto-*wanna* with proto-article:
S: *ng cwose uh ^door?* (1;10)
S: *wuh brutsh uh ^teef?* (1;11)

b. Proto-subject:
S: *uh ^empty dere.* (2;1)
D: *it's empty there. that's right.*

Finally, at the stage of full morphemes, a systematic match between the child's utterances and the adult target is attained and children produce articles, modals and auxiliaries in a target-like manner.

The 'identification problem' is closely related to another problem, which is the status and role of filler sounds in emergent grammars. As stated above, fillers are generally assumed to be the precursors of later phonological and morphosyntactic structures such as function words, normally reflecting children's pathway from phonology to morphology. Fillers can thus be interpreted as bootstrapping elements to the awareness of other grammatical modules, i.e., filler sounds evolve to morphosyntactic elements.

Many authors have suggested that the use of filler sounds by children might be a strategy to drive their speech to feet, words or phrases as, in many cases, filler sounds evolve to grammatical function morphemes, such as determiners, auxiliaries and verb or noun inflection marks (Demuth & Tremblay, 2008; Gennari & Demuth, 1997; Gerken, 1996; Lleó, 2001; Lleó & Demuth, 1999; Veneziano, 2001). Reports in the literature indicate that, indeed, the prosodic structure may license grammatical function morphemes.

According to Gerken (1996), in an iambic English phrase like 'the pig' or in an iambic word like 'giraffe', the initial weak syllable is omitted. However, in a sentence like 'Tom pushed the zebra' the article is phonetically present, as it is located inside a trochaic foot.

[98] Idem.

(89) Production of 'the pig' and 'giraffe' (iambs) vs. '(Tom) pushed the zebra', (Gerken, 1996:687, 690, 694):

	S	(W)
(the)	pig	
(gi)	raffe	

S	W
pushed	the

S	W
ze	bra

Gerken (1996) suggests that English-speaking children only produce grammatical morphemes in unmarked prosodic structures of their language, such as the trochaic foot, as illustrated in the above-mentioned examples. Comparing the production of determiners in German and Spanish monolingual children, Lleó & Demuth (1999), Lleó (2001) found similar results. (Proto-) determiners and multisyllabic words were produced earlier in Spanish than in German (and other Germanic languages, like English and Dutch). According to the authors, this is because the prosodic structure of Spanish provide stronger (more frequent) evidence for multisyllabic words and multisyllabic phrases.

(90) Spanish examples of determiner+disyllabic noun (Lleó & Demuth, 1999:413[99]):

Orthogr.	*Gloss*	*Output*	*Child, Age*
pala	'shovel'	[ˈhaˈbɛləʔ]	María, 1;4.21
mamá	'mummy'	[əˈməmɛ^{h}]	
cubo	'bucket'	[hʊˈguwə]	
peine	'comb'	[ʔaˈpaːlɛːh]	María, 1;6.3
globo	'balloon'	[ˈɐwewɔh]	
papa	'porridge'	[ʔʊmˈbɐbɐ^{h}]	
vaca	'cow'	[havevaː]	Miguel, 1;4.5
boca	'mouth'	[avava]	
vaca	'cow'	[ʊːnˈvæva]	Miguel, 1;5.1
agua	'water'	[hɛˈaːva]	

According to Lleó & Demuth (1999), after Spanish children are able to produce a disyllabic trochee, they soon start producing /WSW/ utterances, where a trochaic foot (/SW/) is preceded by an unfooted syllable. The explanation for this difference is two-folded:

[99] No information about the target phonetic form is provided.

on the one hand, determiners in Spanish are always prosodified as proclitics, and the set proclitic+noun is equivalent to a trisyllable when it is followed by a disyllable; and on the other hand, Spanish-speaking children have in general more multisyllabic targets than German-speaking children, and multisyllabic words with penultimate stress are more frequent in Spanish than in German (holding for a frequency perspective). In German, a different case occurrs, as determiners are either full forms and are themselves a foot, or they are reduced and encliticized to the previous Prosodic Word.

(91) Articles in Spanish: forms and prosodification (Lleó & Demuth, 1999:414):

$_{PW}$[el $_{F}$[ˈpero]] $_{PW}$[la $_{F}$[ˈpala]]

(92) Articles in German: forms and prosodification (Wiese, 1996:250, *apud* Lleó & Demuth, 1999:415):

$_{PW}$[$_{F}$[der]] $_{PW}$[$_{F}$[Mann]] $_{PW}$[$_{F}$[die]] $_{PW}$[$_{F}$[Klappe]]

$_{PPh}$[$_{PW}$[$_{F}$[noch]] $_{PW}$[$_{F}$[ein]] $_{PW}$[$_{F}$[Kipper]]]

$_{PPh}$[$_{PW}$[$_{F}$[noch] n̩]] $_{PW}$[$_{F}$[kipper]]]

Thus, in Spanish prosodic acquisition, the earlier emergence of grammatical function morphemes such as determiners might be due to the adult language prosodization of these morphemes. The production of determiners or proto-determiners within prosodically licensed positions was further confirmed by Gennari & Demuth (1997) for the acquisition of Spanish. The authors suggested that Spanish-speaking children map and earlier produce determiners within the Clitic Group and the Phonological Phrase, as they are able to produce them before disyllables (e.g., *la cása* 'the house' - /W SW/), when trisyllables (e.g., *konéxo* 'rabbit' - /WSW/) were not produced target-like[100].

The authors claim that children tend to produce the syllables inside the trochaic foot (producing both syllables in /SW/ and omitting the first syllable in /~~W~~SW/ words), adding that determiners and other clitic words are produced because they are adjoined to the Clitic Group level, and not to the Prosodic Word level. These findings provide evidence for:

[100] The same tendency was found for SWSW targets (including Prosodic Words like *escaléra* 'scale' and phrases like *à la casa* 'to the house'), only with higher omission percentages in weak syllables than those observed in WSW targets (e.g. *konéxo* 'rabbit' and *la casa* 'the house').

(i) The early production of determiners and proto-determiners within prosodically licensed positions (namely within levels of the prosodic hierarchy that are above the Prosodic Word level, like the Clitic Group and the Phonological Phrase);

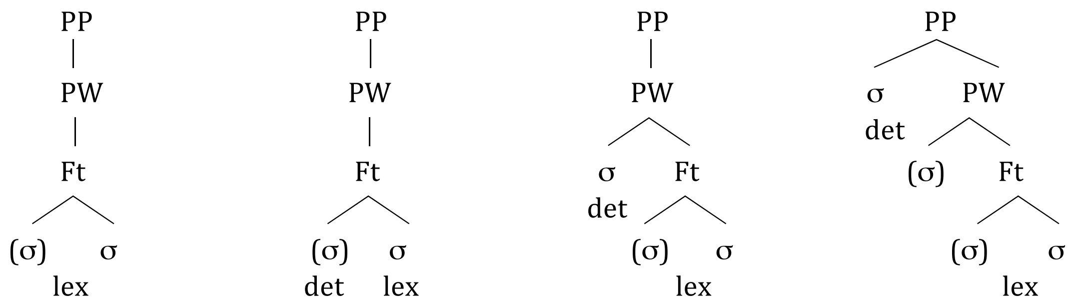
(ii) An early sensitivity to the constituents of prosodic structure above the Prosodic Word. Also, these results indicate that proto-determiners may not be produced to match a foot template, but rather higher prosodic domains.

With respect to (ii), specifically, Veneziano (2001) argues that the use of filler sounds might be a strategy used to match the predominant phrase-final accent found in French, which is a language where footing does not occur. French children may produce fillers to match a prosodic template that is larger than the foot. Demuth & Tremblay (2008) claim that French determiners first appear in prosodically licensed positions, namely within a foot before monosyllables, or outside the foot (at the prosodic word level) in larger words. Initially, children produce them before a monosyllable but not before disyllables (93b.); only later, French-speaking children start producing determiners before di- (93c.) and trisyllabic words (93d.).

This order of emergence is related to different stages of prosodic development, as presented in (93).

(93) Prosodic development of French determiners (from Demuth & Tremblay, 2008:119)[101]:

a. No clitic b. Foot-internal clitic c. PW-internal clitic d. Free clitic



[101] 'Det' stands for 'determiner'; 'lex' stands for 'lexical item' (from Demuth & Tremblay, 2008). It is worthwhile saying that Demuth & Tremblay's approach to prosody in French acquisition contradicts Braud's (2003) analysis, as the latter claims that no feet are processed in the early speech of French-speaking children, but larger prosodic constituents instead (mainly phrases).

The studies mentioned above (Demuth, 2001b; Demuth, 2007; Demuth & Tremblay, 2008; Gennari & Demuth, 1997; Lleó & Demuth, 1999; Roark & Demuth, 2000; Peters, 2001, Simonsen, 2001, Veneziano, 2001) suggest that the production of fillers is not necessarily related to feet constraints, but it can also be related to the processing of larger prosodic constituents, such as the prosodic word, the clitic group or the phonological phrase. The studies presented also indicate that the production of filler sounds in early language acquisition is language-dependent and licensed by the prosodic structure.

2.4. The nature and role of reduplications in early prosodic acquisition

Like fillers, reduplicative speech is often considered as a production strategy, occurring between pre-speech and speech. Reduplications without referential value have been characterized as one of the main features of canonical babbling (Vihman, 1996:110-11). At this stage, reduplications may be understood as a mean by which children practice their articulation to later speech and by which children start training the 'language game' (Ferguson & Macken, 1983; MacNeilage & Davis, 1993).

Reduplications with referential value were interpreted as having numerous linguistic functions: pragmatic, semantic, phonological and morphosyntactic. Leroy & Morgenstern (2005:475) mention that "It [reduplication] reflects the child's acquisition of pragmatic functions as well as the child's appropriation of the language system". Again, some children, more than others, may use reduplicative productions in early phonological acquisition, though many authors have seen reduplication as a universal property of language acquisition (Moskowitz, 1973; Fee & Ingram, 1982).

Reduplications can be defined as a repetition of a syllable creating a pattern that shares consonantal and/or vocalic features ([CV_1CV_1] – e.g., 'another' produced as [ɲeːɲe] - Waterson, 1971, *apud* Klein, 2005:71 - or 'candy' produced as [ɲaɲi] - Ingram, 1979:145). It can either be the extension of a monosyllable (e.g., 'cat' produced as [kækæ]), or it can duplicate a syllable in adult disyllables or multisyllabic words (e.g., 'water' produced as [wɔwɔ]). Though reduplications are present in children's early speech, the subject has not been widely debated in the literature on child language and even less so in the literature on early prosodic representations.

Reduplications have been studied by a few authors, mainly focusing on the relationship between the early production of reduplications and the later production of monosyllabic and multisyllabic words or closed syllables and multi-word utterances (Fee &

Ingram, 1982; Ferguson, 1983; Schwartz, Leonard, Wilcox & Folger, 1980; Schwartz & Leonard, 1983; Veneziano, Sinclair & Berthoud, 1990; Klein, 2005).

Lleó (1990) related the production of reduplications with the early appropriation of the phonological system of the language children are acquiring and, specifically, with the construction of their language's prosodic structure, which feet, words or phrases are part of. According to the author, reduplications are the result of children's 'ability to create phonological rules' and the capacity to "work out certain phonological processes" (Lleó, 1990:274). Reduplication is not necessarily related to reduced segmental inventories and the need to replace not acquired segments, as the child observed in the study increased reduplications as homonymy decreased. Instead, the author argues that the patterns attested in the child observed indicate that the word is the phonological unit under processing in the early stages of phonological acquisition. The child starts to produce trisyllables by repeating one syllable of the target word, as if the child is attempting to produce the whole word with the syllabic material available in his/her system. These results were later reported by Vihman (1996) as empirical evidence for a 'whole-word' phonology during early language development.

In French acquisition, reduplications are frequent[102] (Braud, 2003; Rose, 2000; Wauquier-Gravelines, 2003). Until rather late in development, French speaking-children use both truncation and reduplication to fulfill a phonological template that is larger than a syllable or a foot. Reduplications may be used in producing mono-, tri- and polisyllables, as the instances below indicate.

(94) French reduplications in a 3 year-old child - target monosyllables and trisyllables[103] (Wauquier-Gravelines, 2003:10[104]):

	Orthogr.	*Gloss*	*Output*
/σ/	*ours*	'bear'	[ɛ̃nunuʁs]
	os	'bone'	[ɛ̃nonos]
/σσσ/	*arrasoir*	'watering-can'	[ɛ̃ʀoʀɔzwaʁ]/[ɛ̃ʀeaʀɔzwaʁ]
	coccinelle	'lady-bird'	[ynkokosinɛl]
	aspirateur	'vacuum cleaner'	[ɛ̃ʀaʀastatœʁ]
	hélikoptère	'helicopter'	[ɛ̃nenikɔtɛʁ]

[102] See also examples (84)-(86), in this chapter.

[103] This study is conducted using data from Clara, the Quebec French-speaking child from Rose (2000), and Claire, a standard French-speaking child. The renditions presented here are from Claire.

[104] The page number referred to in this reference is relative to the manuscript version of the paper, downloaded from *http://pagesperso-orange.fr/Sophie.Wauquier/download/Publications.htm* on May 3rd, 2009.

Disyllables are rarely reduplicated and reduplications tend to occur in large target words. Since French is a language with phrase-final accent and no evidence for footing, Braud (2003) and Wauquier-Gravelines (2003) suggest that morphological templates, in which determiners and part of a lexical word are produced and are under the children's attention in early phonological acquisition. Therefore, the production of reduplications is a strategy used to match, not a prosodic constituent (like a syllable or a foot), but rather a morphological template - a lexical unit -, in which the early determiner is part of the lexical unit, and not an independent morphological unit.

In summary, fillers and reduplications appear to be frequent in a period of prosodic organization, when feet might be - but are not necessarily - under processing. They appear as strategies used by the children to appropriate the system they are acquiring, by matching feet, word, phrasal or even morphological templates. These strategies might be used, not because of feet size and shape constraints, but rather due to word or phrase size and shape requirements.

2.5. The acquisition of word stress in Portuguese

In this section we will present the descriptions and analyses on stress acquisition in Portuguese, that have been purported to this date. We will review the studies where the acquisition of word shapes and stress patterns has been investigated, both in BP and EP, with special reference to the studies on the production of filler sounds and reduplications in Portuguese-speaking children. Additionally, a review of the acoustic properties of word stress and stress-related aspects during acquisition will be carried out.

2.5.1. The acquisition of word shapes and stress patterns

In BP, several studies were conducted in order to investigate the acquisition of word stress and stress patterns (Baia, 2006, 2008a,b,c,d; Bonilha, 2005; Rapp, 1994; Santos, 2001, 2005, 2007; Stoel-Gammon, 1976). In EP, a preliminary research on the acquisition of the Prosodic Word, from a frequency perspective, was conducted, though the acquisition and development of stress patterns has not been the focus of the analysis (Vigário, Freitas & Frota, 2006). However, these sets of studies have some incompatible findings.

Rapp (1994) first proposed that Brazilian children would display an initial trochaic tendency. Rapp's conclusions were drawn from a *corpus* of speech data from 8 children aged from 1;6 to 2;0. This research consisted in collection of experimental data and was carried out to analyze the truncation patterns in BP early words.

Interestingly, in most research based on spontaneous data, the shape of early words more frequently observed in Portuguese conforms to an iamb (Baia, 2006, 2008; Bonilha, 2005; Santos, 2001, 2003, 2005, 2007a,b; Stoel-Gammon, 1976).

In a work on the acquisition of primary word stress in BP, Santos (2001) mainly focused on the acquisition of intonational, stress-related aspects, based on the spontaneous speech productions of two Brazilian children. The author establishes four moments of primary stress acquisition:

(i) In an early stage of word production, children are acquiring different intonational contours[105], applied in different pragmatic contexts. It is not possible to distinguish word and intonational prominence, as they are able to produce utterances larger than a syllable or a foot in variable manners. The production of phonological constituents larger than a syllable or a foot (namely, by addition of filler syllables - cf. instances in (95)) and the observation of different intonational contours lead the author to suggest that children are not dealing with word stress at this stage, but rather phrasal stress.

(95) Segmental and syllabic material large than a syllable or a foot, produced to match several intonational contours (Santos, 2001:234,235):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
banana	'banana'	/baˈnɐ̃na/	[məmaˈmana]	R., 1;6.3
aconteceu com a garrafa	'it happened with the bottle'	/kwagaˈxafa/	[kotikaˈfafa]	R., 1;6.6
a janela	'the window'	/aʒaˈnɛla/	[kaleˈlɛla]	R., 1;6.6.
fecha	'close'	/ˈfɛʃa/	[aˈfɛsa]	R., 1;6.22
aqui	'here'	/aˈki/	[aˈki]	T., 1;5.21
passarinho	'birdie'	/pasaˈɾĩɲu/	[pajˈʃĩɲu]	T., 1;6.3
sapato	'shoe'	/saˈpatu/	[saˈpatʊ]	T., 1;7.23

(ii) After an initial stage (from approximately 1;8 to 2;3), children set one default contour: (L)LH*(L)%. This contour mainly consists of a *head* (optionally preceded by a syllable) + *nucleus* and a *tail*. The *nucleus* is the last stressed syllable of the tone group. The *head* is associated to the first stressed syllable occurring before the nucleus (and all the unstressed syllables that appear in

[105] See Santos (2001, 2003, 2005) for the varied contours found in BP early acquisition.

between). The tail consists of all the post-nuclear syllables. In this stage, the Brazilian children observed fulfilled this contour with segmental and syllabic material, such as target stressed syllables and filler sounds, as shown in (96).

(96) Fulfilling of the (L)LH*(L)% contour:

(L)	L	H*	(L)	%	-> intonational contour
(σ)	∪	—	(σ)		-> iambic structure
	[a	ˈpej]			*põe* 'put'
	[be	ˈke	dʊ]		*brinquedo* 'toy'
[ʔə	mi	ˈni	na]		*menina* 'girl'

At this point, word stress is not yet being computed, and phrasal accent (right-headed) is still at stake. In (97) we present some renditions of the two children observed by Santos (2001), where several word shapes are attempted, in order to fulfill the (L)LH*(L)% intonational contour.

(97) Fulfilling the (L)LH*(L)% intonational contour (Santos, 2001:243,244,245):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
diferente	'different'	/difeˈɾẽȷ̃tʃi/	[feˈɾẽtʃi]	T., 1;9.24
pau	'stick'	/ˈpaw/	[aˈpaw]	T., 1;11.2
bicho	'animal'	/ˈbiʃu/	[ʔmˈbiso]	T., 1;11.4
música	'song'	/ˈmuzika/	[muˈzika]	T., 2;0.21
machucou	'hurt'	/maʃuˈkow/	[masˈko]	T., 2;0.26
menina	'girl'	/meˈnĩna/	[ʔəmiˈnina]	T., 2;2.28
palhacinho	'clown dim.'	/pasaˈɾĩɲu/	[paˈsĩɲʊ]	R., 1;8.25
coelhinho	'bunny'	/koeˈʎĩɲu/	[kaˈlĩɲʊ]	R., 1;8.25
brinquedo	'toy'	/bɾĩnˈkedu/	[beˈkedʊ]	R., 1;10.0
adivinha	'guess'	/adʒiˈvĩɲa/	[dʒiˈvĩɲɐ]	R., 1;11.12
gravador	'keep-recorder'	/gɾavaˈdoɾ/	[graˈvadoɾ]	R., 2;0.5

In the examples presented above we observe that children produce mostly di- and trisyllabic words, both final stressed and penultimate stressed, and fulfill the (L)LH*(L)% intonational contour. Filler sounds are possible (e.g., [aˈpaw]), as well as stress shift - e.g., [muˈzika]).

(iii) In a third phase (from 2;3 onwards), children mainly produce disyllabic words. At this stage, children produce both [SW] and [WS] words, providing evidence for a binary phrasal constituent being processed. At this point, Brazilian children use both types of words ([SW] and [WS]) to fulfill one fixed intonational contour: LH*L%. Therefore, two domains interact in stress assignment: the word and the phrase. In (98), we schematize the mapping of Brazilian children's disyllabic production onto the LH*L% intonational contour.

(98) Disyllabic ([SW] and [WS]) words mapped onto a LH*L% intonational contour (Santos, 2005:81):

```
L     H*     L  %   -> intonational pattern
(w     s)       #   -> iambic pattern
      (s     w) #   -> trochaic pattern
```

The representation in (98) accounts for the productions in (99).

(99) Binary phrasal constituent - [SW] and [WS] (Santos, 2001:249,253):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
blocos	'notebooks'	/ˈblɔkus/	[ˈblɔkʊs]	T., 2;3.4
agora	'now'	/aˈgɔɾa/	[aˈgɔ]	T., 2;3.4
verdura	'vegetables'	/veɾˈdura/	[veɾˈdu]	R., 2;0.20
rabo	'tail'	/ˈxabu/	[ˈxabʊ]	R., 2;2.2
sabão	'soap'	/saˈbɐ̃w̃/	[saˈbɐ̃w̃]	R., 2;2.19

The examples presented above show the production of both [SW] and [WS] words. According to the author, these two word shapes are used to fulfill the LH*L% intonational contour found in a third moment of the acquisition of Brazilian Portuguese.

(iv) Finally, children learn that stress and accent have different principles. SWW words (with extrametrical syllables) are produced target-like. These words do not fit the LH*L% contour anymore and that provides evidence for children having learnt the word stress algorithm in the language. In (100) we present some examples of the production of words with an extrametrical syllable (/SWW/) by the two Brazilian children observed in Santos (2001).

(100) Acquisition of the stress algorithm: extrametricality (Santos, 2001:261):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
música	'song'	/ˈmuzika/	[ˈmuzika]	T., 2;3.4
plástico	'plastic'	/ˈplastʃiku/	[ˈplastʃiku]	T., 2;3.4
Malévola	'Cruella'	/maˈlɛvola/	[maˈlɛvalɐ]	R., 2;6.19
lógico	'logical'	/ˈlɔʒiku/	[ˈlɔʒikʊ]	R., 3;2.19

Santos' (2001) work provides a valuable contribution to the discussion on the early stress patterns found during Portuguese acquisition. It suggests an interchangeable focus between lexical and intonational aspects and relates phrasal stress with the early iambic tendency found. According to the author, the algorithm for word stress is only mastered when /SWW/ words, that is, extrametricality, are acquired. Santos (2001), however, did not allow for a robust discussion on the relevance of weight during the acquisition of word stress in BP, as the children's productions were not conclusive. Though the children observed ignored final heavy syllables, producing ['CV.CVC] words, - and providing evidence for weight-insensitivity -, simultaneously, they could also produce oxytonic patterns ([CV.'CV] or [CV.'CVC]) since the early stages of word production - supporting weight-sensitivity. Stress errors in the direction of the heavy syllable were not observed either. The author further argues that both phonological and morphological aspects interact in the acquisition of word stress in BP, since Brazilian children are able to produced derived words with correct stress placement.

Apart from the developmental path described above, one main conclusion can be drawn from Santos' proposal: it suggests that word stress acquisition in BP proceeds top-down, that is, it starts from the upper-levels of the prosodic hierarchy (such as the intonational phrase).

Contrary to Santos (2001, 2003, 2005), Bonilha (2005) argues for an early acquisition of word stress in BP. The Brazilian child under observation did not produce a great amount of filler sounds and larger utterances, providing evidence against the role of intonational structure during the acquisition of word stress. The results found in Bonilha (2005) further suggest that there is a neutral start in BP stress acquisition, though the data presented indicate a slight tendency for iambs, namely through the tendency to preserve the stressed and initial syllables ([<u>S</u>W] and [<u>WS</u>]). In the early stages of phonological acquisition, monosyllables and disyllables prevail, and disyllables can be both [SW] and [WS]. As for weight, Bonilha (2005) found evidence for weight-sensitivity in the speech of the child observed, since:

(i) Words with final stressed heavy syllable (/CV.'CVG/ words) were produced correctly from the beginning, as shown in (101).

(101) Correct production of targets with final heavy syllables (Bonilha, 2005:311)[106]:

Orthogr.	*Gloss*	*Output*	*Child, Age*
mamãe	'mommy'	[mɐ̃ˈmɐ̃j̃]	G., 1;1.22
papai	'daddy'	[paˈpaj]	G., 1;5.20
baton	'lipstick'	[baˈtõw̃]	G., 1;6.3

The non-production of final heavy syllables with Coda consonants (e.g., *tracto<u>r</u>* 'tractor' /tɾaˈto<u>ɾ</u>/) was associated to the later acquisition of specific segments in the Coda.

(ii) Words with penultimate stress (/'CV.CV/), words with final stressed heavy syllable (/CV.'CVC/) and words with final stressed light syllable (/CV.'CV/) were acquired earlier than words with penultimate stress but with final heavy syllables (/'CV.CVC/) and words with antepenultimate stress (/'CV.CV.CV/)[107].

The author argues for the unmarked character of /-'CV.CV/, /CV.'CVG/ and /CV.'CV/ words and the marked character of /'CV.CV.CV/ and /'CV.CVC/ words, as suggested by Bisol (1992).

In both studies (Santos, 2001 and Bonilha, 2005), the strategy of stress shift in heavy syllables to light syllables and vice versa was scarce.

In later work, Santos (2007) examined the early stress patterns in the early speech of BP-speaking children, comparing nouns and verbs, as well as reduplicated and non-reduplicated words[108]. Regarding nouns, the results in Santos (2007:40) suggest that:

(i) /SW/ tokens were mostly produced correctly from the beginning, though truncation to [S] was observable, especially in the early sessions;
(ii) reduplicated /WS/ tokens were mostly produced correctly from the beginning;
(iii) non-reduplicated /WS/ tokens were in much lesser amount than /WS/

[106] No phonetic transcription for the target is provided.
[107] No renditions of the child are presented. For comparative results on the production of /'CV.CV/, /CV.'CVC/, /CV'CV/ and /'CV.CVC/ words in the Brazilian child observed, cf. Bonilha (2005:317).
[108] The author designates as 'familiar lexicon' the early lexicon produced by the children. From the data, it is possible to see that most of those words were reduplications (and monosyllabic forms such as *pai* 'father' - cf. Tables 14, 15 and 16 in Santos, 2007:50-52). For that reason we overextend the concept and generally denominate it as reduplications.

reduplicated tokens;

(iv) non-reduplicated /WS/ nouns were either produced correctly or truncated to [S], though, due to the reduced number of tokens, the percentage values presented might be misleading;

(v) /SW/ tokens were more frequent than non-reduplicative /WS/ tokens;

(vi) reduplicative /WS/ tokens were more frequent than /SW/ tokens;

(vii) monosyllables were mostly produced correctly from the beginning.

In verbs, the results in Santos (2007:52-59) showed that:

(i) /SW/ tokens were mostly produced correctly from the beginning (though some instances of truncation could be found);

(ii) /WS/ tokens were mostly produced correctly from the beginning (though some instances of truncation could be found, but in smaller amounts than in /SW/);

(iii) monosyllables were mostly produced correctly from the beginning.

Given the higher percentage rates in /WS/ and the tendency for [WS] reduplications, the author argues for an early iambic foot in BP. The early iambic tendency attested might be due to the fact that the unstressed word-final word marker in non-verbs is extrametrical. This proposal was already suggested in Santos (2001) and supported Lee's (1995) analysis. In verbs, and since most early verb forms are non-finite (Infinitives), Santos (2007) suggests that morphosyntactic reasons underlie the early production of /WS/ verb forms[109].

According to Santos (2007), in order to produce trochees, Brazilian children must, on the one hand, learn extrametricality[110] in non-verbs and, on the other hand, master morphological contrasts (inflection and derivation). In their early stages, the words produced by Brazilian children mostly consist in reduplicated words which do not have word marker (e.g., *mamã* ‘mommy’, *papá* ‘daddy’, *bebé* ‘baby’), as opposed to words such as *<u>ca</u>s]+a* ‘house’, *<u>ga</u>t]+o* ‘cat’, *sa<u>pa</u>t]+o* 'shoe'). As soon as children learn extrametricality and master morphological contrasts (gender, tense, number contrasts) they will be able to produce trochaic words. Examples from Santos (2007), from the early and the later stages of word

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[109] Following Lee (1995), according to whom the default foot in non-verbs is an iamb and in verbs is a trochee, the Brazilian children's early productions should favor trochaic forms. However, that was not the case. Santos (2007:109,110) argues that "[t]hough the default value of stress in verbs conforms to a trochee, morphosyntactic reasons force the production of iambs, rather than the one of trochees." (My translation from the original in Portuguese: "Assim, embora o valor *default* de acentuação dos verbos seja o troqueu, razões morfosintáticas fazem com que a produção de iambos supere a dos troqueus.")

[110] Cf. Chapter 1, section 1.2.3..

production in BP, are shown in (102) and (103), respectively, showing the unmastery of morphological contrast in nouns and in verbs.

(102) Early stages of word production in BP, before the morphological contrasts are mastered (Santos, 2007:45, 54):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
sapato	'shoe'	/saˈpato/	[paˈpa]	R., 1;3
abre	'open'	/ˈabɾe/	[ˈabe],[ˈbe]	R., 1;4
abre	'open'	/ˈabɾe/	[ˈabe],[aˈbu], [ˈbu]	R., 1;5
sapato	'shoe'	/saˈpato/	[paˈpati], [paˈpaki],[paˈpa]	R., 1;6
abre	'open'	/ˈabɾe/	[aˈpe]	

In these examples we observe that the target final word marker (e.g., *sapato* 'shoe') is not produced. Instead, the child reduplicates the stressed syllable or produces it with filler insertion at the left edge, creating an iambic pattern, or, better, produces a trochee without producing the word marker (e.g., [paˈpati], [paˈpaki]). Word stress in verbs is variable.

Later, the word marker is produced, inflection is mastered, and words are produced target-like.

(103) Later stages of word production in BP, after gender contrast is mastered (Santos, 2007:42, 45, 54):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
bola	'ball'	/ˈbɔla/	[ˈbɔla]	R., 1;8
abre	'open'	/ˈabɾe/	[ˈabe]	R., 1;9
bola	'ball'	/ˈbɔla/	[ˈbɔla]	
sapato	'shoe'	/saˈpato/	[saˈpatu]	R., 1;11
abre	'open'	/ˈabɾe/	[ˈabe]	
sapato	'shoe'	/saˈpato/	[saˈpatu]	R., 2;20
abre	'open'	/ˈabɾe/	[ˈabe],[ˈabi]	

Based on the differences found in BP and Dutch data (Fikkert, 1994), i.e., based on the fact that the productions of BP-speaking children display an early iambic tendency and Dutch children's productions display a trochaic one, Santos (2007) defends that the parameter value for the foot cannot be specified in the early grammar. The author argues that, contrary to Dutch children, which display an early [SW] tendency, the early disyllabic productions of BP-speaking children are mostly [WS], either they are the result of epenthesis on the left of the circumscribed syllable or they are the product of a target-like production of a reduplicated iamb. The different tendencies found in BP and Dutch provide evidence for an unspecified default parameter value for the foot head (that is, no 'left' or 'right' value is present at the onset of word production in BP).

Given the contradicting results from experimental and spontaneous data regarding the early stress patterns in Portuguese (Rapp, 1994; Santos, 2001, 2007; Bonilha, 2005), and aiming at defining the initial prosodic template in the acquisition of BP, Baia (2008a,b,c,d) carried out a set of studies, aiming at investigating the initial word shape in BP. Experimental data from 42 Brazilian children aged 1;5-3;0 were collected, with a complementary *corpus* of spontaneous speech from 1 child aged 1;5-3;0. The results from spontaneous data confirmed an initial iambic tendency, and a later tendency for trochaic words. The results from the experimental study, however, suggested a more neutral approach to the acquisition of stress patterns in BP-speaking children, as a higher production rate for trochees was observed, though the difference between trochees and iambs produced target-like was not statistically significant. Baia (2008a) demonstrated that there was a difference between spontaneous and experimental data in the prosodic acquisition of Brazilian-speaking children: experimental data showed that iambs were more frequently truncated than trochees in an early stage. Trochees, however, were more frequently prone to stress shift. Target WSW words tended to be truncated to [SW], whereas /WWS/ tended to be truncated to [WS]. Target SWW words were overwhelmingly produced as [SW]. Through the comparison between spontaneous data, in which the whole lexicon is taken into account, and experimental data, where no reduplications were elicited, Baia (2008b) observed a neutral start approach to prosodic acquisition in BP. Indeed, spontaneous child data in Portuguese (EP and BP) has a high frequency of reduplicated iambic targets like *bebé*/*bebê* 'baby' or *mamã*/*mamãe*[111] 'mommy'). Disregarding the reduplications, Baia (2008a) does not find an iambic tendency in early prosodic acquisition in BP. Therefore, the author argues for an apparent iambic tendency in BP prosodic acquisition. Experimental data did not corroborate spontaneous data because the author did not incorporate reduplicated target words that are iambs as stimuli in the experimental study. These findings seem to explain the contradicting results between experimental studies (Rapp, 1994), which tend to indicate an early trochaic tendency, and spontaneous data (namely, Santos, 2001, 2007), which tend to indicate an early iambic tendency. In sum, the tendency found in spontaneous data and the comparison between spontaneous and experimental data indicated that:

[111] *Bebé/bebê* and *mamã/mamãe* regard the words 'baby' and 'mommy', in EP and BP, respectively.

(i) Reduplications are frequent in Portuguese;

(ii) Reduplications heavily contribute to the early iambic tendency found in the Brazilian children's speech.

The studies referred to thus far, regard the acquisition of word stress and stress patterns in BP. The study from Vigário, Freitas & Frota (2006), however, focused on the acquisition of the Prosodic Word in EP.

Vigário, Freitas & Frota (2006) investigated the speech productions of three[112] Portuguese-speaking children, João, Inês and Marta, from de ages of 0;10-2;0. The authors studied the shapes of the early words produced by these children and evaluated the role of frequency of adult language and child-directed speech within the children's outputs. The results indicated that there are no minimality or maximality requirements on word size in the early speech of Portuguese children. They showed that:

(i) monosyllabic CV targets were produced target-like from the beginning of word production, as demonstrated in (104).

(104) CV targets produced accordingly (Vigário, Freitas & Frota, 2006:192):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
dá	'give-imp.'	/ˈda/	[ˈda]	Inês, 1;0.25
pé	'foot'	/ˈpɛ/	[ˈpɛ]	
dá	'give-imp.'	/ˈda/	[ˈdɐ]	João, 1;02.01
é	'(it) is'	/ˈɛ/	[ˈɛ]	
é	'(it) is'	/ˈɛ/	[ˈɛ]	Marta, 1;02.0
pé	'foot'	/ˈpɛ/	[ˈpe]	

(ii) monosyllabic CVC[113] targets were early produced as [CV], as shown below.

[112] This child, Inês, is the same that is part of our database.

[113] As CVC targets, the authors considered all non-CV monosyllables, that is, all monosyllables not ending in oral vowel (meaning monosyllables with oral and nasal diphthongs, as well as nasal vowels and syllables closed with /s/, /l/ or /ɾ/).

(105) CVC targets produced as [CV] (Vigário, Freitas & Frota, 2006:192):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
mão	'hand'	/ˈmɐ̃w̃/	[ˈmɐ]	Inês, 1;01.30
quer	's/he wants'	/ˈkɛɾ/	[ˈkɛ]	Marta, 1;02.0
cão	'dog'	/ˈkɐ̃w̃/	[ˈkɔ]	Marta, 1;03.08
cão	'dog'	/ˈkɐ̃w̃/	[ˈkɐ]	João, 1;06.18

(iii) disyllabic targets (/SW/ or /WS/) were mainly truncated to [CV], although target-like productions were possible as well.

(106) Disyllabic targets truncated or produced target-like (Vigário, Freitas & Frota, 2006:193):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
avó	'grandmother'	/ɐˈvɔ/	[ɐˈdɐ]	João, 1;0.12
tia	'aunt'	/ˈtiɐ/	[ˈtiɐ]	João, 1;08.13
praia	'beach'	/ˈpɾajɐ/	[ˈpa]	João, 2;0.19
balão	'balloon'	/bɐˈlɐ̃w̃/	[ˈlaw]	Marta, 1;03.08
bolso	'pocket'	/ˈboɫsu/	[ˈbɔtɐ]	Inês, 1;08.02

(iv) trisyllabic targets (/CV'CVCV/) were not avoided in the early stages and they emerged early in the children's speech. Truncation of /CVCVCV/ to [CV] and [CVCV] (either [SW] and [WS]) and target-like productions were possible as well.

(107) Truncation of CVCVCV targets to [CV] and [CVCV] ([SW] and [WS]) and target-like productions (Vigário, Freitas & Frota, 2006:195):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
caracol	'snail'	/kɐɾɐˈkɔɫ/	[ˈtoɐ]	Marta, 1;03.08
coelho	'rabbit'	/kuˈɐʎu/	[kɨˈkeʎu]	Marta, 1;05.17
sapato	'shoe'	/sɐˈpatu/	[pɐˈpɐ]	Inês, 1;04.09
banana	'banana'	/bɐˈnɐnɐ/	[ɐˈmɐnɐ]	Inês, 1;05.11
piscina	'swimming pool'	/piʃˈsinɐ/	[piˈtinɐ]	Inês, 1;09.19
sapato	'shoe'	/sɐˈpatu/	[ˈpa]	João, 1;07.24

The authors further showed that prosodic fillers are frequent, both with monosyllables and with longer targets, in nouns, verbs and adverbs (108)[114], though no phonological representation or assumption on the nature of these filler sounds is proposed.

(108) Prosodic fillers in monosyllables and longer targets (Vigário, Freitas & Frota, 2006:197):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
mãe	'mother'	/ˈmɐ̃j̃/	[ɨˈmɐ]/[ˈmɐ]	João, 0;11.06
não	'no'	/ˈnɐ̃w̃/	[ɨˈnɐ]	João, 1;10.08
dá	'give-imp.'	/ˈda/	[ɐˈda]/[ˈda]	Inês, 1;0.25
pato	'duck'	/ˈpatu/	[ɐˈtɐ]/[ˈtɐ]	João, 0;11.06
chupeta	'pacifier'	/ʃuˈpetɐ/	[ɐˈpi]/[ˈpi]	Inês, 1;01.30

In summary, the reviews on Portuguese word stress acquisition presented above indicate that, at an early stage, the word shape being processed might be a monosyllable, though other word templates are possible. This is in line with the findings from Bonilha (2005) and Vigário *et al.* (2006). At this same stage, reports on the literature state that children might be processing phrasal stress, and not word stress, as they may add segmental material to the stressed syllable and produce words longer than a monosyllable (Frota & Matos, 2009; Santos, 2001; Frota & Vigário, 2008). When disyllables are being produced, conflicting results were found. Some authors argue for a neutral approach, i.e., for no initial preference for a trochaic or an iambic foot (Bonilha, 2005; Vigário *et al.*, 2006; Baia, 2008b). One author argues for an iambic tendency (Santos, 2007) and one author claiming for a trochaic tendency (Rapp, 1994).

The table presented below summarizes the findings in previous studies on Portuguese word stress and stress-related aspects of acquisition.

[114] The occurrence of filler sounds in Portuguese early speech was previously discussed in Costa & Freitas (2001), Freitas (1996) and Freitas & Miguel (1998). We will review this issue in the following section.

<table>
<tr><th>Study</th><th>Language</th><th>Target</th><th>QS</th><th>Age</th><th>Method</th><th>Tendency</th></tr>
<tr><td>Rapp (1994)</td><td rowspan="4">BP</td><td rowspan="6">Trochaic or iambic[115]</td><td rowspan="6">Undeterm.[116]</td><td>1;6-2;0</td><td>Experimental (8 children)</td><td>$SW]_{\Sigma}$</td></tr>
<tr><td>Santos (2001)</td><td>0;11-3;4</td><td>Spontaneous (2 children)</td><td>$WS]_{\Phi}$</td></tr>
<tr><td>Bonilha (2005)</td><td>1;01-3;09</td><td>Spontaneous (1 child)</td><td>Neutral ~Iambic</td></tr>
<tr><td>Santos (2007)</td><td>1;3-3;6</td><td>Spontaneous (2 children)</td><td>$WS]_{\Sigma}$</td></tr>
<tr><td>Vigário et al. (2006)</td><td>EP</td><td>0;10-2;0</td><td>Spontaneous (3 children)</td><td>σ > Neutral</td></tr>
<tr><td>Baia (2008)</td><td>BP</td><td>1;5-3;0</td><td>Spontaneous (1 child) and experimental cross-sectional (42 children)</td><td>$WS]_{\Sigma}$ in spontaneous data; Neutral in experimental data</td></tr>
</table>

Table 4. Shape of early words - Portuguese (BP and EP).

Table 4 summarizes the conflicting results found for Portuguese acquisition of word stress. Santos (2001) argues that words stress is not acquired at the early stages of word production. However, children's initial productions conform to an iambic phrase. Bonilha (2005) does not claim an initial iambic foot, though her results indicate that [WS] words are produced correctly from the beginning. On the other hand, the conflicting results found in spontaneous and experimental studies (Baia, 2008) seem to indicate that, indeed, the high frequency of reduplications, whose phonological status is far from clear, might bias the results to an 'apparent iambic tendency', when in fact, children's productions are neutral in terms of feet production. The results from Vigário, Freitas & Frota (2006) also pointed to a neutral approach.

The debated domain for word stress, the unclear status and shape of feet, as well as the undetermined role of syllable weight in the target system have brought additional problems to the possible explanations for the contradicting results found across the literature.

[115] Cf. Chapter 1, section 1.2.3. and 1.2.5.1., and references therein to Bisol (1992, 1993, 1999), Lee (1995, 2006, 2007), Pereira (1999) and Wetzels (2006).
[116] Idem.

2.5.2. Fillers and reduplications in the path of prosodic acquisition in Portuguese

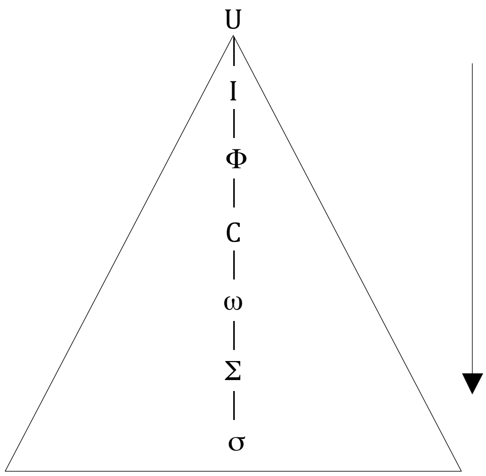
For fillers and reduplications in Portuguese, not many studies have been carried out. The paucity of studies, namely regarding filler sounds, appears to be due, on the one hand, to the difficulties posed when a distinction between fillers and determiners is at stake. Indeed, in EP and BP there is a phonetic coincidence between the fillers produced by the children and the target form of determiners (in general, children produce [ɨ], [ə] or [ɐ] for the feminine article [ɐ] and for the masculine article [u]), which makes the task of identification and distinction of fillers and determiners extremely difficult. On the other hand, the proposals on the representation of early words have not been consensual among authors. It is not clear yet what the early representation of words is in Portuguese, whether it is a monosyllable or a constituent larger than a syllable; whether it is a trochee or an iamb.

Though we are aware that filler sounds and reduplications are two distinct issues in phonological development, we will discuss them together here, though in separate moments, since they have been both used to argue for a top-down approach to prosodic acquisition.

In Portuguese, the use of fillers syllables at the onset of word production has been mostly related to rhythmic, intonational and prosodic factors (Freitas, 1996; Freitas & Costa, 2001; Freitas & Miguel, 1998; Santos, 1995, 2003, 2005; Scarpa, 1998, 1999; Santos & Scarpa, 2005).

Santos (1995, 2003, 2005), Scarpa (1998, 1999) and Santos & Scarpa (2005) observe that Brazilian children use both filler sounds and reduplications to fit a phonological constituent larger (and higher in the prosodic hierarchy) than a syllable or the prosodic word. The authors suggest that, at the onset of word production, Brazilian children are not processing word stress and do not use prominence at the word level: Brazilian children rely on higher prosodic domains in their early utterances. The evidence for an initial processing of a prosodic domain higher than the syllable or the prosodic word arises from the fact that, initially, children's productions do not conform to a single syllable and very often neither a word. Filler sounds in (Brazilian) Portuguese acquisition are interpreted as prosodic fillers, rather than morphological placeholders, as they are mainly used to fill an intonational contour – a (L) L H* (L) contour (Santos, 1995, 2003, 2005; Santos & Scarpa, 2005) – and not necessarily to mark a morphosyntactic position. If the words selected from the target are smaller than the intonational contour, children lengthen the utterance by means of insertions, reduplications and hiatuses in diphthongs. Conversely, when children's intake is longer than the intonational contour, children make their utterances shorter, by means of truncation (Santos, 1995, 2003). These strategies (filler insertion and reduplication, on the one hand, and utterance truncation, on the other hand) allow children to fulfill intonational constituents and to mark intonational boundaries, thus bootstrapping the acquisition of the lower levels of the prosodic hierarchy. Therefore, Santos and Scarpa argue for a top-down approach to prosodic acquisition. According to Santos (1995, 2001, 2003, 2005) and Scarpa (1998, 1999), children start building prominences from the higher levels of the prosodic hierarchy, and gradually focus their attention in lower phonological domains, as exemplified in (109).

(109) Top-down model of prosodic acquisition (Santos & Scarpa, 2005):



[ˀmˀuˈsuːkʊ]	'juice' (T., 1;10.15)
[aˈmɛ]	'onomatpoeia for goat' (T., 1;10.22)
[mˀˈbiso]	'animal' (T., 1;11.04)

The use of filler sounds and reduplications in early Portuguese phonological development might be used as a strategy to fulfill an intonational contour and, thus, mark intonational boundaries and drive children towards the domain of word stress.

Santos & Scarpa (2005) suggested that the child observed may work with higher and lower levels (the phonological phrase and the foot, respectively) of the prosodic hierarchy, in order to '[maximize] a metrical template as an optimal prosodic form' (Santos & Scarpa, 2005:174), by means of filler sounds.

Using Peters' (2001) proposal, Costa & Freitas (2001), Freitas (1996) and Freitas & Miguel (1998), on EP, support Scarpa's analysis, according to which filler sounds are produced in order to fulfill a larger rhythmic template. At the onset of word production, filler sounds in Portuguese have a prosodic, and not a morphological function. The authors use Peters' (2001) proposal and suggest that prenominal positions have a direct path from premorphology (fillers) to full morphology (determiners). An intermediate stage where filler sounds may have a protomorphological status is problematic since very often there is co-occurrence of full morphemes with premorphology, with filler vowels right-adjacent to verbs and adverbs until late in speech development.

In (110), we provide instances of filler insertion before nouns, verbs and adverbs.

(110) Filler insertion before nouns, verbs and adverbs in EP (Freitas, 1996:81, 82):

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
não	'no'	/ˈnɐ̃w̃/	[ɐˈnɐ]	Inês, 1;01
dá	'give'	/ˈda/	[ɐˈda]	Inês, 1;01
Bambi	'name'	/ˈbɐ̃bi/	[ɐˈbɐ]	Inês, 1;03
pão	'bread'	/ˈpɐ̃w̃/	[ɐˈpɐ]	Inês, 1;05
quer	'want'	/ˈkɛɾ/	[əˈkɛ]	Inês, 1;05

With respect to reduplications, recent literature on phonological acquisition has mentioned that Portuguese is indeed a language where a high rate of (iambic) reduplications is noticeable at the beginning of word production (Baia, 2006, 2008a,c,d; Santos, 2007). Baia (2008a) furthermore claims that reduplications contribute for the early iambic tendency found in the early speech of Brazilian children. Baia (2008a,c) argues that the method used in the data collection may influence the results, as experimental studies rarely include reduplicated words.

In the Portuguese-speaking children's productions we observe reduplicated words that were themselves reduplicated in the adult speech (e.g., *mamã/mamãe* 'mommy', *babá*, 'nanny', etc[117]) or, alternatively, we can find words that were not reduplicated in the target, but can be reduplicated by the children (e.g., [kɔˈkɔ] produced for *es<u>co</u>la* 'school', [paˈpa] produced for *sapato* 'shoe'). In (111), we present some instances of the reduplications that can be found in Portuguese-speaking children, both for target-reduplicated words and for target non-reduplicated words.

[117] Much of Portuguese baby-talk is reduplicated: *mamã* 'mommy', *papá* 'daddy', *bebé* 'baby', *cocó* 'poo', *chichi* 'pee', *ó-ó* 'nap', *tautau* (used when a child misbehave), *babá* 'nanny', *papar* 'to eat fam.', *vovô* 'grandpa', *vovó* 'granny', *titi* 'uncle/aunt fam.'.

(111) Reduplications in the Portuguese early speech:

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*	*Study*
Target Redupl.	*mãe/mamãe (BP)*	'mommy'	Not available	mamãe[118]	---- [119]	Stoel-Gammon (1976:23)
	pai/papai	'daddy'	Not available	papai	----	
	cabra/memé	'goat'	Not available	memé	----	
	vovó	'grandma'	/vɔˈvɔ/	[bɐˈbɐ]	JoãoII, 1;9.11	Freitas (1997:133)
	mamã (EP)	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	Inês, 0;11.14	Vigário *et al.* (2006:193)
	bebé (EP)	'baby'	/bɛˈbɛ/	[βɐˈbɛ]	Marta, 1;02.0	
	pássaro/piupiu	'bird'	/ˈpasɐɾu/ /piwˈpiw/	[piˈpiw]	G., 1;6.17	Bonilha (2005)
	cocô (BP)	'poo'	/koˈko/	[koˈko]	L., 1;8	Santos (2007:51)
	dodói	'wound fam.'	/doˈdɔj/	[doˈdɔj]	R., 1;4	
Target non-redupl.	*peito/mama*	'breast'	Not available	teté	----	Stoel-Gammon (1976:23)
	pénis	'penis'	Not available	pipí	----	
	nádegas	'buttocks'	Not available	bumbum	----	
	orelhas	'ears'	/oˈɾɐʎɐʃ/	[geˈge]	Inês, 1;5.11	Freitas (1997:139)
	sapato	'shoe'	/sɐˈpatu/	[pɐˈpɐ]	Inês, 1;04.09	Vigário *et al.* (2006:195,197)
	laranja	'orange'	/lɐˈɾɐ̃ʒɐ/	[lɐˈlaː]	Inês, 1;05.11	
	tractor	'tractor'	/tɾaˈtoɾ/	[taˈta]	G., 1;5.20	Bonilha (2005)
	chapéu	'hat'	/ʃaˈpɛw/	[papaˈpaw]	R., 1;8	Santos (2007:43)

The tendency for reduplication can be so strong, both in the children's data and in the adult speech, that the children's names are also frequently subjected to that process. In the case of the children observed in this study, for instance, *Clara* /ˈklaɾɐ/ was often produced as [kaˈka], *Inês* /iˈneʃ/ was produced as [neˈne] and Luma often referred to herself as [taˈta].

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118 No phonetic transcription is provided.

119 Stoel-Gammon (1976) does not provide a full description of the data underlying the research. The author further argues that "[t]he analysis of Brazilian baby-talk presented here is not intended as an exhaustive study of the use of baby-talk in Brazil" (Stoel-Gammon, 1976:22). The paper mainly aims at making a general description on baby-talk in the language, from the different linguistic perspectives: type of lexicon, phonology, grammar, use and attitudes.

All the claims carried out on BP for an early iambic foot have been mostly made upon these types of structures (Baia, 2008a; Santos, 2001, 2007; Stoel-Gammon, 1976). However, literature on the topic (namely on French - Braud, 2003; Wauquier-Gravelines, 2003) has suggested that reduplications might not be used to fulfill foot requirements of the language.

In sum, the status and role of filler sounds and reduplications in word stress and word shape acquisition is yet to be discussed in EP. Despite evidence that they can contribute to the fulfillment of a foot in the language, data have also demonstrated that the use of filler sounds and reduplications might be related to the processing of larger phonological constituents that will bootstrap children's attention to word prominence. The use of these strategies during acquisition might be interpreted as evidence for a top-down model of prosodic acquisition, which is inconsistent with previous findings for Germanic languages like Dutch or English (Demuth, 1995; Fikkert, 1994).

2.5.3. Acoustic studies on word stress acquisition in Portuguese

In EP, very few studies have been carried out on the acoustic properties of word stress during acquisition.

Frota & Vigário (2008) and Frota & Matos (2009) focus on the intonational and durational patterns (respectively) of a Portuguese child[120]. Frota & Vigário (2008) describe that level stress (e.g., *bola* 'ball' /ˈbɔlɐ/ produced as [ˈpaˈpa]) and stress shift in the direction of iambs (e.g., *bola* 'ball' /ˈbɔlɐ/ produced as [paˈpa]) is frequent at the beginning. These results were borne out both from the perceptive transcription and tonal association observed in the initial stages. Before 1;09, L. does not produce the pitch alignment, the inventory of pitch accents and boundary tones in an adult-like manner, though the choice of tonal events is mastered since 1;05. In the speech of the child observed, final stress stabilizes earlier (from 1;4 onwards) than penultimate stress (from 1;10 onwards). After 1;09, the child masters the alignment, the inventory of pitch accents and boundary tones and, simultaneously, the word stress patterns and accent. Based on the evidence of stress, segmental duration and pitch accent patterns, Frota & Vigário (2008) propose an account of prosodic phrasing during development in EP. The authors furthermore suggest an interplay between word stress and accent during in EP prosodic acquisition, with an initial stage where the child observed produced a syllable as a prosodic word and a phrase (Stage 1: S=PW=phrase) and a second

[120] The child under observation in this study is Luma. The corpus is, however, different from the one collected for this dissertation. The corpus in which Frota & Vigário (2008) and Frota & Matos (2009) based their analyses (LumaLiDa) consists in daily collections, whereas our corpus (Phon_EP_Mono) consisted in biweekly data collection. To access LumaLiDa, cf. http://www.fl.ul.pt/LaboratorioFonetica/LumaLiDa.htm.

stage, where the child distinguishes the syllable from the prosodic word (Stage 2: S≠PW=phrase).

Frota & Matos (2009) ellaborates a developmental proposal of the prosodic structure in EP, based on the duration patterns of L., the same child. The authors confirmed Frota & Vigário's findings, namely with respect to the above-mentioned stage 1 and 2. The authors detected two moments in the duration patterns of L.: the first moment (i.e., until 1;04), where a strong correlation between the duration of syllables and the number of syllables in higher prosodic domains (namely, the prosodic word and the intonational phrase) was found, provided evidence for a phase where the child does not distinguish the syllable, the prosodic word and the intonational phrase (Stage 1: S=PW=phrase). Secondly, disyllabic words emerge (i.e., after 1;04, until 1;08-09) and, after this moment, no correlation between the syllable, on the one hand, and the Prosodic Word and the Intonational Phrase, on the other hand is found (Stage 2: S≠PW=phrase). The data additionally pointed to a third moment, in which the child distinguishes the prosodic word and the phrase, namely by producing phrase final lengthening (Stage 3: S≠PW≠phrase). Frota & Matos (2009) also showed that syllable position within the utterance, but not stress, affect syllable duration. These results lead the authors to suggest that, initially (in Stage 1), L. has a 'harmonic' prosodic processing.

Acoustic studies on the acquisition of word stress and stress-related aspects in EP are scarce. However, the few studies carried out thus far suggest that, initially, different levels of the prosodic structure, namely the intonational and phonological phrase, as well as the syllable, might be interacting during prosodic acquisition.

2.6. Summary of the main issues, research questions and hypotheses

The reviews made thus far have demonstrated that, learning to assign stress involves the processing of a set of principles that are related to syllables, feet and prosodic words, which, as we have seen in Chapter 1, are the prosodic constituents word stress regards to.

Playing the linguist's role, the child needs to realize, first of all, whether stress in her/his language is rule-based or lexical, that is, whether stress in her language is a property of specific morphemes or words. If stress is learned on a lexical basis, stress errors are not expected, as they are not the result of a generalization. In this case, children may simply produce stress, in the target stressed syllable, and no patterns are observed. In the assumption of unspecified lexical representations, and since in languages with lexical stress, stress is a property of the words and morphemes, children acquiring lexical stress should not have productions with any word prominence in the beginning. As soon as stress is specified in the lexicon, words are produced accordingly and once more no stress errors are expected. If, otherwise, word stress is not learned on a lexical basis, and it is rule-driven, errors and production strategies are expected. Until the stress rule is learned, the child needs to know that stress falls on specific constituents (namely, on feet, words or morphemes). Additionally, it is necessary that the child realizes whether the language she is acquiring is weight-sensitive and what the direction of the rhythmic wave is for stress purposes. The child needs to know what is a foot, whether it is relevant in her language or not, and, if so, where is the foot head. Additionally, the child needs to learn what to rely on in order to assign stress: whether on morphological constituency or on phonological information.

In sum, according to the main topics presented in Chapter 1, in a language like Portuguese, where stress is a property of words (thus called 'Prosodic Words'), the learner needs to acquire:

(i) the domain of word stress;
(ii) whether stress in his/her language is weight-sensitive;
(iii) whether stress in his/her language is sensitive to word classes;
(iv) what is the directionality of main stress;
(v) where should s/he start building words from;
(vi) where is the head of a foot;
(vii) which constituents are considered as extrametrical.

From the perspective of the adult language description, EP faces four main problems: the first one regards the identification of the domain for stress, the second one is related to the establishment of the foot shape, the third one concerns quantity-sensitivity and the fourth one is related to extrametricality.

Given the conflicting and often contradictory results found for the acquisition and development of stress patterns in Portuguese (Baia, 2008a; Bonilha, 2005; Rapp, 1994; Santos, 2001, 2007; Stoel-Gammon, 1976), these are the research questions we aim to address in this dissertation:

(i) How is word stress acquired in Portuguese?
(ii) What can the development of word shape and stress patterns tell us about the stress algorithm in Portuguese?

Cross-linguistic information showed that languages with a trochaic rhythm (at the word level) either show a trochaic or a neutral tendency. In most of these languages, the domain for stress is the phonological word (Dutch, English, Spanish, Catalan) and quantity-sensitivity is observed. An iambic rhythm has been only claimed for languages where prominence is domain-final, such as French, and, in that particular case, the foot might not be the target of children's attention.

Even though previous works on the acquisition of word stress in Portuguese have suggested an early iambic tendency, on the above-mentioned assumptions - that Portuguese is a language with a trochaic rhythm, as furthermore suggested by the literature on word stress and by the frequency information provided in Chapter 1 - we hypothesize that *Portuguese children will display an early trochaic tendency*.

Assuming that Portuguese children are sensitive to the target language properties, we expect that Portuguese children mirror the rhythm of the target language. The observation of a trochaic tendency should be found in the:

(i) Early production of target trochees;
(ii) Truncation of /WS/ words to [S];
(iii) Truncation of /WSW/ to [SW];
(iv) Later production of /WWS/ and /SWW/ words.

If these patterns are to be found, evidence for an early sensitivity to the trochaic rhythm of the language will be provided. Additionally, these results might indicate that a binary [SW] constituent, and not the stem, is being processed as the domain for word stress. These patterns will furthermore provide evidence for an algorithm proposing that the default stress position in Portuguese is in the penultimate syllable of the lexical word (Bisol, 1992, 1993; Wetzels, 2006). In this case, an investigation on the role of weight-sensitivity will be required. In particular, we hypothesize that if children are sensitive to weight, then it is expected that children obey the general weight-based rule for stress assignment (stress the penultimate syllable of the lexical word, or the final syllable if it is heavy - Bisol, 1992, 1993; Wetzels, 2006). Evidences for stress-attraction in heavy syllables can be found, namely through an earlier acquisition of unmarked /CV.'CV(C)/ words and a later acquisition of marked /'CV.CVC/ words. Conversely, if children are sensitive to a morphology-based algorithm, we have to assume that Portuguese children know morphological constituency since the early stages of word production. Namely, we have to assume that Portuguese-speaking children are able to identify, within the input, what is - and what is not - the domain for word stress.

A trochaic tendency will be consistent with the findings for other trochaic languages, either Germanic, such as Dutch (Fikkert, 1994) and English (Demuth, 1996), or Romance, like Catalan (Prieto, 2006) or Spanish (Demuth, 2001).

Although previous works on BP have demonstrated that iambs can be preferred over trochees during Portuguese acquisition, we hypothesize that this early iambic tendency is apparent. An early iambic tendency is hard to argue for Portuguese acquisition, due to several aspects, that we have already mentioned in our review, and which we now reitterate:

(i) Typological reasons – as shown in Chapter 1[121], trochees are more frequent than iambs cross-linguistically.

(ii) Frequency information of the adult language – as also shown in Chapter 1[122], an initial iambic tendency is very hard to explain in a language with a heavily trochaic rhythm like Portuguese. Even considering that the algorithm for stress assignment entails an underlying iambic foot, we have to consider that children are provided with strong evidence for stress in the penultimate syllable.

(iii) The morphology-based algorithm, which predicts a domain-final default stress position (stress the last vowel of the stem), considers the word marker, a very frequent structure in the system, as extrametrical or 'invisible' for stress assignment.

(iv) An iambic tendency was disfavored in the path of language acquisition – as shown in Tables 2 and 4, iambs have been clearly disfavored in the path of acquisition.

The early iambic tendency found in Portuguese phonological acquisition, as well as the nature of early reduplications and fillers sounds, will be discussed, on the basis of new data from EP. The issue of a top-down and bottom-up approach to prosodic acquisition will also be addressed, on the light of the results.

In this dissertation we aim at providing a descriptive and explanatory path for word stress acquisition in EP, based on the spontaneous speech production of 5 monolingual Portuguese children. We will investigate the nature of early prosodic words and their development in the Portuguese children's system, on the basis of the results. We intend to

[121] Cf. section 1.1.3., Fig. 5.
[122] Cf. section 1.2.4., Figs. 9 and 10.

present data on word stress acquisition in Portuguese, by showing a relationship between the children's patterns and the prosodic structure. Additionally, we aim at providing empirical evidence for target analyses on word stress in Portuguese and for the early processing of a phonological aspect of language.

3. Methodological aspects

In this chapter, we will present the database that demonstrates the research performed to investigate the acquisition of word stress in EP.

First, we will introduce the data considered. We will describe the collection procedure and we will present the children's ages across sessions and the number of sessions taken per child (3.1.). Secondly, we will present the database properties, notation and transcription criteria. We will describe the database and provide information on the criteria underlying the transcription of the target and the children's productions (3.2.). Finally, we will specify the developmental thresholds for emergence and acquisition, in the analyzed data (3.3.).

3.1. The data - subjects and sessions

For the research conducted on the acquisition of word stress in EP we considered longitudinal spontaneous speech from 5 Portuguese monolingual children: Clara, Inês, Joana, João and Luma[123].

The children's speech was collected every other week (in the case of João and Luma) and on a monthly basis (in the case of Inês, Clara and Joana). Three researchers videotaped the children[124].

The data from Clara, João and Luma were recorded in a Canon MV210 digital video camcorder and videotaped in analogue format (Hi8 cassettes), between 2004 and 2007. Inês and Joana were recorded on a Sony Handycam Video 8, AF Hi-Fi Stereo, during the 1990's. In all cases, the analogue format was imported to digital format using iMovie© software, and compressed for 320 x 240 (.mov) format.

Table 5 summarizes the relevant information about the data collection and the transcribed sessions:

[123] Luma is a pseudoname.

[124] Inês and Joana were videotaped by Maria João Freitas; Clara was videotaped by Teresa da Costa and Susana Correia; Luma and João were videotaped by Susana Correia.

	Age (1st session)	Number of sessions	Time gap between sessions (aprox.)	Avg. duration of sessions	Total duration of sessions
Clara	0;11.1[125]	12	1 month	46,7 min.	9h54m
Inês	0;11.14	30		42 min.	21h
Joana	0;11.24	33		29,4 min.	16h17m
João	1;0.1	22	2 weeks	48,6 min.	18h22m
Luma	0;11.23[126]	37		45,1 min.	30h27m

Table 5. Information about videotaped sessions and data collection

In the tables below we will present the number of sessions per child, the children's ages during the sessions and the number of utterances per session. By 'number of records accounted' we mean the number of records that contain a word, a phrase or a sentence phonetically transcribed. Records containing unintelligible speech were not taken into account in these tables, as they did not provide data for the purpose of this research. The number of types and tokens mentioned in these tables is not cumulative, from session to session. It means that, in a session with 11 tokens and in a session with 26 tokens, some types and tokens might be overlapping.

Clara (birthdate: 2005-06-01)

Session number	Child's age	Nr. of records accounted	Types	Tokens	T-T ratio[127]
1	0;11.1	4	2	4	0.50
2	1;0.13	3	3	3	1.00
3	1;1.3	13	6	22	0.27
4	1;2.22	20	5	19	0.26
5	1;3.6	20	7	19	0.37
6	1;4.19	21	8	29	0.28
7	1;5.16	62	16	69	0.23
8	1;6.6	34	12	46	0.26
9	1;7.11	51	14	64	0.22
10	1;8.20	132	33	220	0.12
11	1;9.23	259	70	464	0.15
12	1;10.15	333	56	519	0.11

[125] The recordings of Clara started at 0;9, but only from 0;11 onwards target words were perceived.
[126] The recordings of Luma started at 0;7, but only from 0;11 onwards target words were perceived.
[127] T-T ration was calculated using CLAN. Light and dark shading indicate the period before and after the 25 word point, respectively.

Inês (birthdate: 1992-11-19)

Session number	Child's age	Nr. of records accounted	Types	Tokens	T-T ratio
1	0;11.14	128	7	22	0.32
2	1;0.25	176	11	76	0.15
3	1;1.30	205	26	172	0.15
4	1;3.6	272	40	222	0.18
5	1;4.9	206	35	139	0.25
6	1;5.11	345	65	396	0.16
7	1;6.11	299	59	322	0.18
8	1;7.2	346	71	341	0.21
9	1;8.2	446	111	515	0.22
10	1;9.19	510	136	898	0.15
11	1;10.29	573	203	1271	0.16
12	2;0.11	644	232	1904	0.12
13	2;1.10	602	303	1578	0.19
14	2;2.1	483	243	1467	0.17
15	2;3.8	348	264	1224	0.22
16	2;4.19	487	290	1664	0.17
17	2;5.24	308	218	983	0.22
18	2;7.16	502	329	1567	0.21

Joana (birthdate: 1995-06-22)

Session number	Child's age	Nr. of records accounted	Types	Tokens	T-T ratio
1	0;11.24	68	2	2	1.00
2	1;0.25	69	2	5	0.40
3	1;2.7	87	5	8	0.63
4	1;2.29	76	7	12	0.58
5	1;4.6	92	3	3	1.00
6	1;5.5	100	2	3	0.67
7	1;6.24	111	12	28	0.43
8	1;8.4	94	13	20	0.65
9	1;9.25	138	39	77	0.51
10	1;10.22	206	55	125	0.44
11	2;0.9	229	120	233	0.52
12	2;2.19	264	135	319	0.42
13	2;4.1	195	143	351	0.41
14	2;6.24	420	249	984	0.25

João (birthdate: 2004-05-02)

Session number	Child's age	Nr. of records accounted	Types	Tokens	T-T ratio
1	1;0.1	53	1	6	0.17
2	1;0.28	63	2	5	0.40
3	1;1.12	112	3	13	0.23
4	1;1.28	52	4	12	0.33
5	1;2.13	75	3	14	0.21
6	1;2.30	61	6	19	0.32
7	1;3.21	115	9	45	0.20
8	1;4.17	99	13	36	0.36
9	1;5.12	113	19	57	0.33
10	1;5.26	124	22	87	0.25
11	1;6.16	156	19	79	0.24
12	1;7.0	185	28	92	0.30
13	1;7.20	191	18	107	0.17
14	1;8.4	178	23	66	0.35
15	1;8.25	136	26	79	0.33
16	1;9.25	276	73	198	0.37
17	1;10.11	288	75	227	0.33
18	1;10.26	286	89	276	0.32
19	1;11.10	316	109	296	0.37
20	1;11.19	281	102	297	0.34
21	2;0.6	261	89	243	0.37
22	2;0.20	288	102	302	0.34

Luma (birthdate: 2003-10-24)

Session number	Child's age	Nr. of records accounted	Types	Tokens	T-T ratio
1	0;11.23	2	2	2	1
2	1;0.13	2	1	2	0.5
3	1;0.28	15	3	16	0.19
4	1;1.10	38	4	39	0.1
5	1;2.7	5	3	5	0.6
6	1;2.22	21	6	22	0.27
7	1;3.5	46	9	54	0.17
8	1;3.19	64	9	68	0.13
9	1;4.2	23	7	23	0.3
10	1;4.17	5	3	5	0.6
11	1;5.9	9	8	9	0.89
12	1;5.24	19	6	21	0.29
13	1;6.6	38	8	43	0.19
14	1;6.20	27	8	30	0.27
15	1;7.5	77	14	100	0.14
16	1;7.19	52	7	81	0.11
17	1;8.2	29	6	36	0.17
18	1;8.15	40	11	48	0.23
19	1;9.7	28	6	41	0.15
20	1;9.29	83	22	105	0.21
21	1;10.18	82	19	95	0.2
22	1;11.1	59	14	93	0.15
23	1;11.15	85	16	112	0.14
24	1;11.29	78	18	94	0.19
25	2;0.13	109	22	73	0.3
26	2;0.27	114	32	102	0.31
27	2;1.10	163	24	140	0.17
28	2;2.4	155	24	151	0.16
29	2;2.22	232	38	221	0.17
30	2;3.26	357	80	417	0.19
31	2;4.11	373	114	481	0.24
32	2;4.25	477	116	721	0.16
33	2;5.15	421	159	625	0.25
34	2;5.20	380	164	677	0.24
35	2;6.6	335	155	591	0.26
36	2;6.20	432	203	842	0.24
37	2;6.27	260	171	575	0.3

The data were recorded at the children's homes, in spontaneous situations. The mother and/or another caretaker were present, together with the researcher in the sessions.

The children's ages considered for this research were comprised between 0;11 and 2;7. The phonetic transcriptions of Clara, João and Luma were only available until 1;10, 2;0 and 2;6 respectively. In the remaining children (Inês and Joana), we randomly established an initial maximum age (2;7 and 2;6[128]). Since we aimed at focusing on the early stages of word production, we did not take into account speech productions beyond that age limit. As we will see in Chapters 4, 5 and 6, this age limit allowed us to observe the acquisition of the regular stress pattern in Portuguese (namely, /SW/, /WS/ and /WSW/ words[129]). However, due to this limitation, we observed the emergence of /SWW/ and /WWS/ trisyllables, but the acquisition of the different verb tenses in the *corpus*[130] was not completed.

3.2. Database properties, transcription and notation criteria

Two trained researchers (both Portuguese native-speakers) phonetically transcribed the *corpus* and inserted the phonetic transcriptions in *Phon* database (Rose, MacWhinney, Byrne, Hedlund, Maddocks, O'Brien, Wareham, 2006). The transcribed sessions were, afterwards, inter-changed between the two transcribers for revision. Each transcriber inserted 50% of the children's speech and revised the 50% of the other transcriber. In dubious cases, a third researcher carried out a blind transcription and, in the case of persistent indecision, that utterance was marked and disregarded from our analysis.

3.2.1. Database description and functioning

The data were manually inserted in *Phon* database. Figure 11 represents the session editor window, where the phonetic transcriptions were carried out.

[128] 2;6 was the age limit considered in this dissertation, but Inês was collected at 2;5 and at 2;7. Therefore, we decided to choose the upper bound.

[129] In Chapter 5, we will focus on target monosyllables, trochees, iambs and trisyllables (/WSW/, /WWS/ and /SWW/). As we will see, though /WWS/ and /SWW/ trisyllables will be analyzed, they will have a reduced amount of tokens, both in the children's intake and in the children's actual productions.

[130] This issue will be recalled in the relevant section (Chapter 5). As far as word stress acquisition is concerned, it is worthwhile saying, at this point, that the non-observation of the acquisition of /SWW/ and /WWS/ trisyllables, and the full acquisition of verbs' inflection until 2;7 might provide evidence for the disparate character of these structures in the Portuguese children's speech.

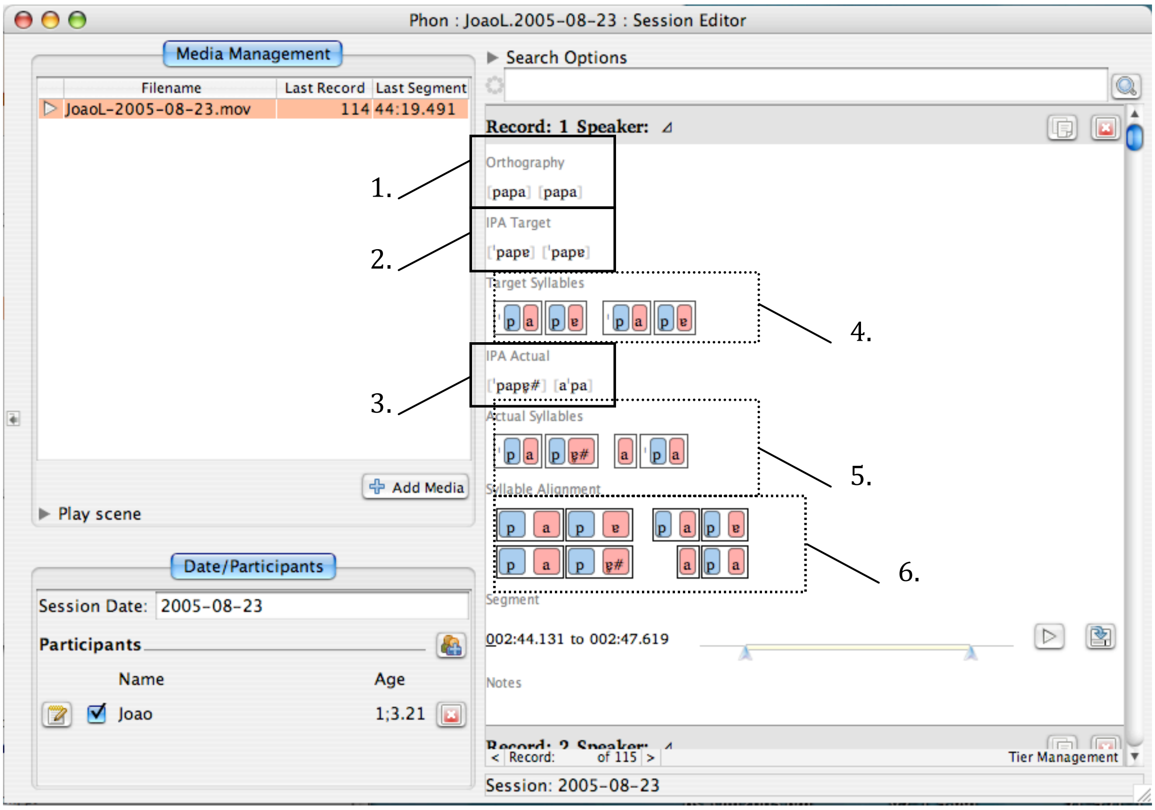

Figure 11. ***Phon*** **database transcription window**

This window provides information on the child and the session being analyzed, as well as the child's age (automatically computed). A built-in media window plays the video of the session being transcribed. In this window it is possible to observe the fields for the:

1. Orthographic transcription (field 'Orthography');
2. Phonetic transcription of the target (field 'IPA Target');
3. Phonetic transcription of the child's production (field 'IPA Actual');
4. Syllabification of the target (field 'Target Syllables');
5. Syllabification of the child's production (field 'Actual Syllables');
6. Alignment between the syllables of the target word and the syllables of the word uttered by the child (field 'Syllable Alignment').

Phon database allowed for specific searches regarding the phonological properties of the transcriptions, both in the fields regarding the target and in the fields regarding the children's productions. As far as the topic of this research work is concerned (the acquisition of word stress), it was possible to search for:

(i) number of words;
(ii) number of syllables within a word;
(iii) syllable structure in different word positions;
(iv) stress patterns.

The searches were undertaken using the 'Data Tiers' command for the results of the children's 'Actual' productions. For the correspondence between the 'Actual' and the 'Target' tiers, we used the 'Aligned Groups' command.

Only phonological words were considered in this dissertation. Though clitic and onomatopoeic words were orthographically and phonetically transcribed, they were disregarded from the searches undertaken in this dissertation.

3.2.2. Criteria of transcription and insertion in the database

The *corpus* considered for the acquisition of word stress took into account the children's speech from the beginning of word production. The children's speech was fully transcribed and the data considered for the analyses were taken from the entire session. Any adult or child-directed speech was not transcribed.

Orthographic and phonetic transcriptions were carried out for each record of the database, in all children and in all sessions. Fields 1., 2. and 3. (Figure 11) were fulfilled by the transcribers, whereas syllabification (4. and 5. - 'Target Syllable' and 'Actual Syllable', respectively), and the 'Target'-'Actual' utterance alignment (6. - 'Syllable Alignment') were automatically paired with the transcription.

3.2.2.1. Criteria for the transcription of the target words

We transcribed the target words as faithfully as possible to the adult standard EP (Mateus & d'Andrade, 2000; Mateus, Brito, Duarte, Faria, Frota, Matos, Oliveira, Vigário & Villalva, 2003). Below, we present the criteria established for the transcription of the target words produced by the five observed children:

1. *Semi-phonological transcription*

The phonetic transcription of the target (within the field 'IPA Target') had a semi-phonological character, i.e., on the one hand it does not represent oral language as it is in spontaneous speech in EP but, on the other hand, it is not necessarily in accordance with the phonological representation proposed for the target language. It means that, for instance, the word *telefone* 'telephone' is transcribed as [tɨlɨˈfɔnɨ] and not *[tɫˈfɔn][131], but a word such as *pneu* 'tire' was not transcribed [pɨˈnew], but [pˈnew] instead (phonological representation is /p_neu/, with an empty headed initial syllable). We chose to preserve, in the target transcription, the vowel [ɨ], every time it is the result of vowel reduction from the phonological vowel /e,ɛ/. This option allowed us to preserve the adult syllables and word boundaries, which could be important for the searches carried out on syllable types, number of syllables per word, and stress placement.

2. *Sandhi phenomena*

As far as between-word phonological processes are concerned, we accounted for:

(i) the voicing assimilation process:

e.g., asas pretas 'black wings' [ˈazɐʃ] [ˈpɾetɐʃ] transcribed as [ˈazɐʃ] [ˈpɾetɐʃ];

asas brancas 'white wings' [ˈazɐʃ] [ˈbɾɐ̃kɐʃ] transcribed as [ˈazɐʒ] [ˈbɾɐ̃kɐʃ];

(ii) the re-syllabification of lateral consonant in word final position when the following word starts with a vowel:

e.g., sol amarelo 'yellow sun' [ˈsɔɫ] [ɐmɐˈɾɛlu] transcribed as [ˈsɔl] [ɐmɐˈɾɛlu];

(iii) the re-syllabification of the fricative consonant in word final position when the following word starts with a vowel:

e.g., asas amarelas 'yellow wings' [ˈazɐʃ] [ɐmɐˈɾɛlɐʃ] transcribed as [ˈazɐz] [ɐmɐˈɾɛlɐʃ].

Every time there were adjacent vowels in different words, we transcribed the words such as they are produced separately, in order to keep the number of syllables of each target word:

e.g., gato amarelo 'yellow cat' [ˈgatu] [ɐmɐˈɾɛlu] transcribed as [ˈgatu] [ɐmɐˈɾɛlu]

[131] In EP spontaneous adult speech, unstressed /e,ɛ/ is systematically reduced to [ɨ] and very frequently deleted.

3. –sC

–sC clusters (e.g., *escola* 'school' [ʃˈkɔlɐ], *escada* 'staircase' [ʃˈkadɐ]) are analyzed in the target system (Andrade & Rodrigues, 1999) as sequences of Coda of an empty headed syllable followed by an obstruent (_C.CV). Despite having an orthographic vowel at the left-edge of the word, there is no such vowel in standard EP (e.g., *escada* *[ɨʃˈkadɐ]). Therefore, the phonetic transcription of the target words did not carry a word-initial vowel.

4. Diphthongs and glides

In the target, glides were transcribed in falling diphthongs only, as these are the only true diphthongs in EP (Mateus & d'Andrade, 2000). Rising diphthongs were transcribed as sequences of two vowels, i.e., nuclei of two phonological adjacent syllables that might be realized as a rising diphthong (e.g., *piano* 'piano' was transcribed as [piˈɐnu] and not as [ˈpjɐnu]).

5. Stress

Primary word stress was placed before the stressed syllable and not before the stressed vowel.

6. Cues given by the interlocutor

In some cases, before the child's utterances, the adult interlocutor provided linguistic cues to the child (e.g., Adult: *Olha, é uma ba...* 'Look, it's a po...'; Child: *...tata, batata* 'tato, potato'). In these cases, since no adult speech was transcribed, the interlocutor utterance was represented between brackets '()' in the orthography field of the target word produced by the child (e.g., Orthography: (*Ba*)*tata*.).

3.2.2.2. Criteria for the transcription of the children's productions

The phonetic transcription carried out for the children's speech was as faithful as possible, mainly concerning place and manner of articulation of the consonants, stress and the number of syllables in a word. Unclear or dubious utterances were marked with an asterisk (*).

7. Stress

Primary word stress was placed before the stressed syllable and not before the stressed vowel in the phonetic transcriptions of the children's speech.

When non-natural clusters (e.g., obstruent+obstruent, nasal+nasal or obstruent+nasal) were produced, we marked stress before the first consonant of the consonantal sequence (e.g., /bɐˈlɐ̃w̃/ produced as [ˈmɲɐ̃w̃]), as it was not possible to determine, at the moment of the transcriptions, in which stage of syllable development the children were going through.

8. *Pauses*

Pauses were marked every time transcribers perceived a silence in the children's speech. They were signaled with <#> (cardinal) in the phonetic transcription field and <...> (ellipses) or <,> (comma) in the orthography field.

Throughout this dissertation, target words will be transcribed between slashes - e.g. *bola* 'ball' /ˈbɔlɐ/ -, as opposed to the children's actual productions, which will be transcribed between square brackets - e.g., [ˈbɔlɐ].

3.2.2.3. Coding and analyzing filler sounds and reduplications

An important aspect concerning phonetic transcription in early language acquisition is the definition of criteria to determine whether a sound is a filler sound or not, and how can we identify and categorize children's reduplications.

Filler sounds are normally considered to be attached to a prosodic word. Being often confounded with determiners or functors - all of these being unstressed words - it was necessary to establish specific criteria to determine whether a sound attached to a word identified as such has a filler sound status, or a prosodic or morphological one. Despite the admittedly difficult task of discriminating filler sounds *vs.* determiners in Portuguese-speaking children's speech, in this dissertation, the criteria followed by the transcribers to decide whether a sound was a filler or a determiner were, concomitantly:

(i) Gender agreement with the Noun in definite determiners (e.g., *o/a* 'the') - in a target phrase like *o* [u] *pé* [ˈpɛ] 'the foot masc.', a production like [ɨˈpɛ], [əˈpɛ] or [ɐˈpɛ] was considered a production with a filler sound, as opposed to the target-like production [uˈpɛ]. In a target production like *a* [ɐ] *pá* [ˈpa] 'the shovel fem.', a production like [ɨˈpa], [əˈpa] or [uˈpa] was considered a production with a filler sound, as opposed to the target-like production [ɐˈpa].

(ii) Presence of indefinite and demonstrative determiners in a specific session (e.g., *um/uma* 'a'; *este/esta* 'this'; *esse/essa* 'that'; *outro/outra* 'other'; *aquele/aquela* 'that') - the appearance of indefinite and demonstrative determiners indicated that the prenominal position was already available (from this moment onwards, a determiner, and not a filler, was normally considered in the transcription).

(iii) Absence of filler sounds before verbs or adverbs in a specific session - since, from beginning, children used filler sounds in all sorts of words (mostly nouns, verbs and adverbs), the absence of filler sounds before verbs or adverbs in a child's speech indicated that filler sounds were not at use anymore.

Despite the pre-defined criteria, the transcription and coding of filler sounds in the Portuguese children's speech were problematic. At the early stages, filler syllables were clearly identifiable as such and, at the later stages, determiners were clearly noticeable as well. However, the identification and distinction between filler syllables and determiners in the intermediate stages of word production were admittedly difficult to carry out.

With regard to reduplications, and as far as the early stages of phonological acquisition are concerned, they can be a multiple repetition of a given syllable (e.g., *mamã* 'mommy' produced as [mɐ̃ˈmɐ̃mɐmɐ] or [mɐmɐmɐ], Inês, 0;11.14,) when no pauses were detected between syllables, or a simple repetition of a given syllable (e.g., *sapato* 'shoe' produced as [papa], Joana, 1;9.25). For this reason we will distinguish these two types of reduplications by designating the former as 'multiple reduplications' and the latter as 'simple reduplications'. In the tables and figures showed in the results' chapters (Chapter 5 and 6), multiple reduplications will be abbreviated as [CVCV...], whereas simple (disyllabic) reduplications will be abbreviated and referred to as [CV_1CV_1]. These will be opposed non-reduplicant disyllables, which we will abbreviate as [CV_1CV_2].

3.3. Criteria for emergence and acquisition

The discussion on when one should consider that a structure is acquired in the children's system has been a matter of debate in the literature on language acquisition (Bernhardt & Stemberger, 1998:2-17) and has often been related to the meaning of 'Stage'

(Ingram, 1989:32-58).

At the beginning, many of the children's utterances, either viewed from a phonological perspective or not, tend to be non adult-like. Of course, at this period, some common properties between the child's production and the target words are noticeable and that is the reason why parents, caretakers and researchers identify a child's production as a word or a phrase in the target system (Vihman & McCune, 1994).

When studying the language acquisition process in typically developed children, the expected developmental path normally displays a continual increasing rate of target-like production, from the early moment to the late moment of observation. From the period when children simply do not select a given structure in their intake[132], to a moment when tokens of that same structure are totally produced target-like, normally three moments are distinguishable: the moment of emergence, the moment of acquisition (or mastery) and the moment of stability (Matzenauer, 1990).

In this dissertation we will consider as *emergent* or *in acquisition process* a structure that has a consistent production below (≤) the 49% target-like. By 'consistent', we mean one production appearing at least one time in one session, with continuity in the following sessions. We will consider as *acquired but not stable*, a structure that has a target-like production rate between 50% and 75% target-like (based on Freitas, 1997[133]). However, we will consider this target-like production rate to which cumulatively corresponds to at least 10 tokens in the child's intake. For the time being, we will consider that a child acquired a given structure, as s/he produces it correctly most of the time, though s/he might often produce it with some instability. The *stability* point will be attained when a child produces a given structure that has a rate of target-like production between 76% and 100%.

[132] The term 'intake' has been recently used to designate the words that children select and attempt in production (Fikket & Levelt, 2008). This term competes with the expression 'target word'.
[133] Cf. Freitas, 1997:136,fn2.

4. A preliminary acoustic study on the acquisition of word stress

The acoustic analysis carried out in this dissertation was mainly motivated by the fact that word stress was difficult to identify in the early productions of Portuguese children. As referred to in Chapter 2[134], Bernhardt & Stemberger (1998) mention that the identification and analysis of word stress in the speech of young children might be a difficult task to carry out, due to maturational aspects intrinsic to the development and, specifically, to the great variability found, both intra-child and between-children, in the early stages of speech production. In fact, during the phonetic transcriptions carried out on the speech productions of the children considered in our *corpus*, the difficulties found in identifying word prominence and the frequent perception of level stress in the early stages of word production led us to conduct an acoustic analysis aiming at (i) identifying word prominence in the early disyllables and (ii) bringing reliability to the phonetic transcriptions.

Apart from being an abstract (phonological) property of some languages, obeying to specific regularities and functioning principles, in stress languages, word stress corresponds, also, to variations in the realization of physical (phonetic) correlates, like fundamental frequency, intensity and duration, within vowels (Hayes, 1995; Kager, 2007).

As mentioned in Chapter 1, word stress in EP is mainly realized by means of a vowel being produced with higher energy in relationship with the remainder vowels of the word (Delgado-Martins, 1986, 1988). According to the author, energy is the result of the integral of intensity by duration. Within the same prosodic word, stressed vowels are normally longer and produced with greater intensity than unstressed vowels. Taken together, intensity and duration are, thus, the relevant cues for producing and perceiving word stress in EP. Fundamental frequency, on the contrary, is mainly related to intonational events and it is related to the accent at higher phonological domains, such as the phonological and the intonational phrases (Frota, 2000).

As presented in Chapter 2[135], several studies have been conducted on the acoustic properties of word stress, within a language acquisition perspective (Allen & Hawkins, 1980; Kehoe, Stoel-Gammon & Buder, 1995; Lleó & Arias, 2007; Pollock, Brammer & Hageman, 1993; Rose & Champdoizeau, 2008; Vihman, DePaolis & Davis, 1998). The results of the studies suggest that, before 2;0, children may not be able to correctly master the relevant acoustic parameters for word stress (fundamental frequency, intensity and duration) and, therefore, children might not be able to contrast the vowels within a word in order to produce stress in a target-like fashion. The results of these studies further point to the

[134] Cf. section 2.1..
[135] Cf. section 2.1..

frequent recursion to stress shift and level stress, i.e., cases where no word prominence is perceived within the vowels of a word, in the early stages of word production.

Following previous reports in the literature according to which word stress in the early stages might not be mastered (Kehoe, Stoel-Gammon & Buder, 1995; Lleó & Arias, 2007; Pollock, Brammer Hageman, 1993; Vihman, DePaolis & Davis, 1998), and considering the initial difficulties in identifying word stress in the early speech of Portuguese children, we hypothesize that, in the beginning of word production, Portuguese children may not contrast the two vowels in early disyllables.

The present study is a preliminary research conducted on a sample of the *corpus* considered in the dissertation project[136], aiming at studying the acoustic properties of word stress. In this chapter, special attention will be given to the production of each acoustic parameter, and to the production the acoustic parameters in the direction of a specific target word shape (/SW/ or /WS/). The acoustic analysis will enable us to identify word stress through the measurement of the acoustic parameters, bringing reliability to the perception-based transcriptions. For that purpose, we will conduct a *qualitative* analysis of the acoustic parameters related to word stress cross-linguistically (fundamental frequency[137], intensity and duration[138]). We will investigate the mean values of each acoustic parameter separately, in both vowels of /SW/ and /WS/ and across sessions. We will analyze the two vowels produced in disyllables, across sessions. In each acoustic parameter, we will plot the means of each vowel (V1 and V2) in different sessions, both in /SW/ and /WS/. Additionally, we will investigate the presence of a significant difference between the mean values of the vowels in disyllables in the same session, per acoustic parameter and per child. After, we will conduct a *quantitative* analysis, by measuring the amount of prominence put into each one of the vowels produced in disyllables by the children under analysis. Since duration and intensity are the relevant acoustic parameters for word stress in EP (Delgado-Martins, 1977, 1986, 1988; Frota, 2000[139]), we will standardize and sum up the values for intensity and duration in each vowel, for /SW/ and /WS/. The results found allowed to investigate the amount of prominence put into a given vowel of a disyllable produced, to understand whether children's productions were contrastive for words stress and, consequently, to identify word stress.

This chapter will be organized as follows: we will first present the method carried out on the acoustic analysis (section 4.1.). Secondly, we will present the results (section 4.2.). The results' section will be divided into two parts: a first part, regarding the qualitative analysis

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[136] More detailed information on the *corpus* and the method used in the acoustic analysis will be provided in section 4.1., ahead.

[137] Fundamental frequency will also be referred to as FØ.

[138] As we observed in Chapter 2, section 2.1., these are the parameters used by all authors investigating word stress acquisition within an acoustic perspective.

[139] For further details on the acoustic properties of word stress in EP, cf. Chapter 1, section 1.2.2..

on the acoustic parameters observed separately (4.2.1.), and a second part, regarding the quantitative analysis on word prominence in the two vowels of the disyllables produced by the two children analyzed (4.2.2.). Finally, we will discuss the results found and draw some general conclusions (section 4.3. and 4.4., respectively).

4.1. Method

Given the preliminary and exploratory nature of this acoustic analysis[140] and the time-consuming character of the task developed, we sampled the speech productions of two of the children participating in our *corpus*, Joana and Inês. These were the two children to be transcribed and the two children where the transcription problems first arose.

We considered the speech productions from 11 sessions (session 1-11) in Joana, and the speech productions from 7 sessions (session 1-5, session 10 and session 12) in Inês. We analyzed the speech productions of the two children until statistically significant differences between the two syllables were found, with respect to the production of intensity and duration, which, as we have seen in the previous section, are the relevant acoustic parameters for word stress in EP. In Joana, and since most of her speech productions were monosyllables, we analyzed all the sessions until the stress mastery (i.e., until /WS/ were produced with higher values of intensity and duration in the second vowel, and /SW/ were produced with higher values of intensity and duration in the first vowel). Since Inês was the most productive child in the database and given that she had a great amount of disyllabic productions, we decided to analyze her five initial sessions. However, in session 5, the child only produced three analyzable /SW/ words. Therefore, we selected session 10, analyzing the first 15 iambic targets and the first 15 trochaic targets. In this section, target-like productions of the stress patterns were observed in /SW/, but not in /WS/. After this, we randomly selected session 12, analyzing the first 15 target iambs and the first 15 target trochees. In session 12, we found a target-like production of both stress patterns in Inês speech.

After the transcription task, we retrieved all the disyllabic productions of Joana and Inês, using the 'Data tiers' command in *Phon* search module. With this command it is possible to search for disyllabic words in the children's production tier ('Actual stress pattern'). Here, we inserted trochaic, iambic and level stress codes, in order to get all the possible relevant disyllabic word shapes produced by the children.

In the table below we present the number of target disyllables (tokens) in Joana and

[140] It is worth noticing that the acoustic analysis carried out in this chapter was conducted in the early stages of the phonetic transcriptions.

Inês' productions, across sessions.

Sessions	Joana	Age	Inês	Age
S1	0	0;11.24	11	0;11.14
S2	2	1;0.25	41	1;0.25
S3	1	1;2.7	61	1;1.30
S4	0	1;2.29	112	1;3.6
S5	0	1;4.6	65	1;4.9
S6	1	1;5.5		
S7	1	1;6.24		
S8	3	1;8.4		
S9	37	1;9.25		
S10	25	1;10.22	305	1;9.19
S11	72	2;0.9		
S12			467	2;0.11
TOTAL	142		1062	

Table 6. Number of disyllabic words (tokens) produced by Joana and Inês across sessions

For the acoustic analysis we used *Praat* software, measuring both vowels (V1 and V2) of actual disyllables for maximum FØ and intensity, and the total duration of that same vowel.

Since the *corpus* considered is based on spontaneous, unstructured speech, some additional remarks must be made, in order to motivate the reduced amount of sessions and targets considered for this analysis.

Firstly, productions with simultaneous speech or simultaneous noise, unintelligible productions and multiple reduplications (with 3 or more syllables) were frequent but they not analyzed.

Secondly, from session 10 onwards, Inês started to produce two-word utterances. Due to intonational factors, we only analyzed disyllabic words in phrase final position. With Inês, we analyzed all the disyllables until session 5, and the first 25 records in sessions 10 and 12. Until the end of the acoustic analysis, Joana had not reached the two-word point. Therefore, all the disyllables in Joana were analyzed, although only 70 were considered for the results of the acoustic analysis.

Table 7 summarizes the number of tokens acoustically analyzed in each child, across sessions.

<table>
<tr><th rowspan="2">Sessions</th><th colspan="2">Joana</th><th colspan="2">Inês</th></tr>
<tr><th>/-SW/</th><th>/-WS/</th><th>/-SW/</th><th>/-WS/</th></tr>
<tr><td>S1</td><td>0</td><td>0</td><td>1</td><td>5</td></tr>
<tr><td>S2</td><td>0</td><td>2</td><td>1</td><td>18</td></tr>
<tr><td>S3</td><td>0</td><td>0</td><td>4</td><td>23</td></tr>
<tr><td>S4</td><td>0</td><td>0</td><td>11</td><td>21</td></tr>
<tr><td>S5</td><td>0</td><td>0</td><td>3</td><td>26</td></tr>
<tr><td>S6</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td>S7</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td>S8</td><td>0</td><td>0</td><td></td><td></td></tr>
<tr><td>S9</td><td>7</td><td>11</td><td></td><td></td></tr>
<tr><td>S10</td><td>4</td><td>12</td><td>15</td><td>15</td></tr>
<tr><td>S11</td><td>14</td><td>20</td><td colspan="2"></td></tr>
<tr><td>S12</td><td colspan="2"></td><td>15</td><td>15</td></tr>
<tr><td>TOTAL</td><td colspan="2">70</td><td colspan="2">171</td></tr>
</table>

Table 7. Number of tokens considered and analyzed per session in Joana and Inês disyllabic words

Table 7 shows that the number of tokens acoustically analyzed in each child is very different. In Joana, 70 tokens were considered for the acoustic analysis, whereas in Inês, that number increased to 171. Specifically, we observe that, when compared to Inês', Joana's intake is scarce in disyllabic targets. This child does not have any /SW/ words and has only 2 analyzable /WS/ words (in session 2). In addition, it is worth noticing that in sessions 1, 2, 3 and 5 in Inês, few /SW/ tokens were analyzed.

After registering the values of the three acoustic parameters, in the two vowels of disyllables produced by each child, outliers were disregarded. Afterwards, we carried out a qualitative analysis, by analyzing each acoustic parameter separately, both in the first and the second vowel. We compared each acoustic parameter in the first and the second vowel, in target trochees and in target iambs. Since normal distribution and homogeneity of variances was not obtained, we used a non-parametric test (Wilcoxon Signed-Rank Test, two tailed) to test for differences between the first and the second vowel of children's productions (on the hypothesis according to which V1 was higher than V2, and the contrary). A significance level of p<.05 will be considered, meaning that a statistically significant difference is found when the p value is equal or smaller than .05.

Subsequently, we carried out a standardization task in order to statistically analyze the data and to compare the relative strength of each vowel in relation to one another. The standardization task enabled us to rescale the acoustic parameters values into various comparable values (Abdi, 2007). We normalize the results by finding the mean of duration and intensity (the two relevant acoustic parameters for EP) by session, and by subtracting this mean value to the value of that parameter for a given word. The result was divided by the standard deviation of that same parameter, in that session. The standard score (z) may be formulated in the following terms:

$z = \dfrac{\chi - \mu}{\sigma}$, where χ is a raw score (in this case, the value of the acoustic parameter) to be standardized, μ is the mean and σ is the standard deviation.

In Tables 8, 9 and 10 we present an example of the method used to standardize the acoustic parameters. Table 8 shows the raw values for intensity and duration in both vowels for the word *mamã* 'mommy', in session 2:

Session	Record	TargWord	Int V1 (dB)	Int V2 (dB)	Dur V1 (s)	Dur V2 (s)
2	42	mamã	85.72	81.61	.137	.338

Table 8. Instance of acoustic measurements for a word - raw scores

The average for intensity and duration in that session was 81.34 dB and .2160 s and the standard deviation was 3.18 dB and .1136 s. The result of the standardization for the word presented would then be:

Session	Record	TargWord	Int V1	Int V2	Dur V1	Dur V2
2	42	mamã	1.38	.08	-.70	1.07

Table 9. Instance of standardized values for the relevant acoustic parameters

The standardization results are consistent with the raw scores. If we look at intensity values, we verify that the first vowel was produced with larger intensity. After the standardization task, the first vowel remains with a higher value.

The results from the standardization of intensity and duration were, then, summed-up for each vowel, in order to give us one single relative value for each vowel, as shown below:

Session	Record	TargWord	Int V1	Int V2	Dur V1	Dur V2
2	42	*mamã*	1.38	.08	-.70	1.08

Σ Σ

Session	Record	TargWord	V1	V2
2	42	*mamã*	.68	1.16

Table 10. Sum of standardized values for V1 and V2

From the results of the standardization task, it is possible to conclude that the second vowel was the strengthened vowel.

After standardizing and summing-up the duration and intensity values for each vowel, we carried out a paired sample *t*-test, in order to test whether the difference between the first and the second vowel was significant or not in the course of development (and, specifically, which one of the vowels was produced with higher values).

All the results were computed using SPSS 11 for Macintosh.

4.2. Results

In this section we will present the results from the acoustic analysis carried out on the disyllabic productions of two EP-speaking children, Inês and Joana[141].

First, we will conduct a qualitative analysis, by accounting for the mean values of each acoustic parameter (fundamental frequency, intensity and duration). Afterwards, we will conduct a quantitative analysis where we will consider the amount of prominence (i.e., of intensity + duration) in each vowel of disyllables, across sessions, in the speech of two children considered.

4.2.1. Qualitative analysis

In this section, a comparison between the use of each acoustic parameter will be carried out. We will show the results of the average for each vowel (V1 and V2), in each acoustic parameter (fundamental frequency, duration and intensity), across sessions. It is worth noticing that, in Joana's case, the number of sessions per target stress pattern is different, as, in session 2 this child has two analyzable /WS/ words, but no /SW/. The results from each child, for /SW/ and /WS/ will be shown separately.

4.2.1.1. Fundamental frequency

Fundamental frequency has a key role in the word stress production and perception in many languages (namely, English). Given its cross-linguistic relevance for word stress production and perception, both in adult and in child language, an analysis on the values of

[141] For further details on the children, cf. Chapter 3., section 3.1..

fundamental frequency was, thus, necessary. However, it is worthwhile noticing that fundamental frequency is not a relevant acoustic parameter for word stress in EP. According to Delgado-Martins (1986, 1988) and Frota (2000), variation in the fundamental frequency is a relevant cue, both in perception and production, for phrasal stress and intonational events.

In the figures below, we present the results of the average for fundamental frequency across sessions, in Joana and Inês' productions of /WS/ and /SW/ words. Figures 12 and 13 show the acoustic analysis for FØ in Joana's productions, whereas Figures 14 and 15 present the same type of data for Inês' productions.[142]

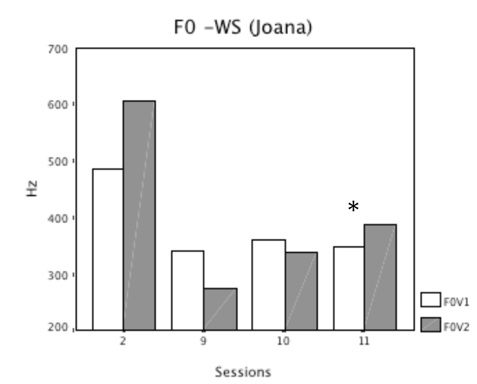

Figure 12. FØ values per session for V1 and V2 in /WS/ (Joana)[143]

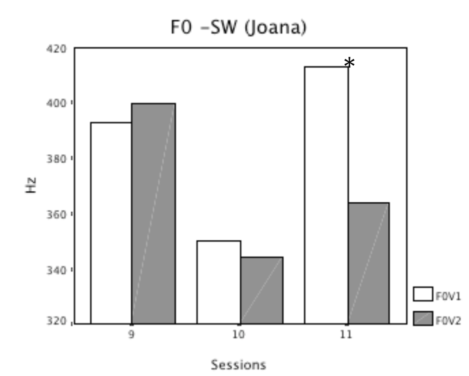

Figure 13. FØ values per session for V1 and V2 in /SW/ (Joana)

Figures 12 and 13 show that, in session 2, /WS/ words are produced with high values in FØ (in V1 the FØ values is nearly 500 Hz, whereas in V2, the FØ is close to 600 Hz). In the following sessions, the average values for FØ decreases dramatically, both for /WS/ and /SW/, to values approximately between 300 and 400 Hz.

From the figures shown above, we also notice that, in session 2, the second vowel was

[142] In following figures (12-23), a star (*) marks a difference statistically significant ($p < .05$).
[143] In session 2, Joana only has 2 tokens.

produced in average with higher FØ values, in target /WS/. However, in the following sessions (sessions 9 and 10), the first vowel was always slightly higher than the second one. Only in the last session (session 11), a significant difference between the first and the second vowel in /WS/ was observed (T = 59, p = .02), with higher values in FØ for V2 (*Mdn*[144] V1 = 350.4; *Mdn* V2 = 389.2). In target /SW/, V1 is produced on average with lower FØ value than V2, in session 9. In session 10, V1 is produced with higher FØ value than V2 (*Mdn* V1 = 350.3; *Mdn* V2 = 344.4), though the difference is not statistically significant (T = 3, p = .11). Only in session 11, V1 is produced with higher FØ value than V2 (*Mdn* V1 = 413.2; *Mdn* V2 = 364.3), and that difference is statistically significant (T= 26, p= .03).

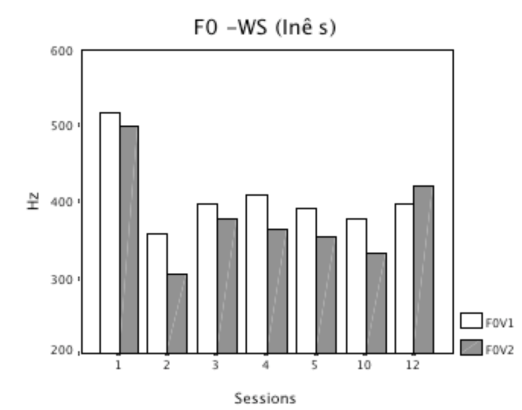

Figure 14. FØ values per session for V1 and V2 in /WS/ (Inês)

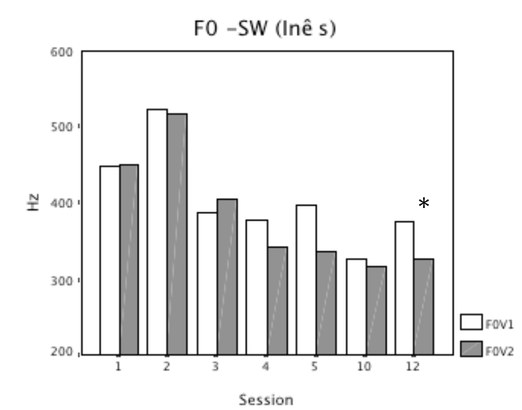

Figure 15. FØ values per session for V1 and V2 in /SW/ (Inês)

Figures 14 and 15 show that, in Inês, the FØ values of the first and the second vowel of Inês' early disyllables (/WS/ and /SW/) are very balanced, except in the last observed session (session 12). Until session 10, either there is almost no noticeable difference between

[144] Non-parametric statistics are computed on the basis of the median, and not the mean.

the two vowels or the first vowel tends to be produced with higher FØ values, regardless of the target form. Only in the last analyzed session (session 12), Inês produces higher FØ values in the second vowel of target /WS/ words, though no significant statistical difference is observed (*Mdn* V1 = 501.6, *Mdn* V2 = 474.6, T = 54, p = .37). In /SW/ words, however, higher statistically significant FØ values in the first vowel are noticeable (*Mdn* V1 = 455.8, *Mdn* V2 = 380.4, T = 20, p = .02).

The general results for FØ suggest that Joana only uses fundamental frequency contrastively in the last session and Inês does not uses fundamental frequency contrastively almost during the entire period under analysis, except for /SW/, in the last session. As referred to in the literature on the target system, fundamental frequency is not a relevant cue for word stress and the results found seem to support this conclusion as well.

4.2.1.2. Intensity

Intensity plays a major role in the production of word stress in EP, as stressed vowels are produced with greater intensity, i.e., louder, than unstressed ones (Delgado-Martins, 1986, 1988). Given its importance in the production of word stress in EP, an analysis on values of intensity in the productions of the two children analyzed was necessary.

In this section we will present the results of the intensity parameter in the disyllabic productions of Joana and Inês.

In Figures 16 and 17 we present the data from Joana and in Figures 18 and 19 we show the results from Inês.

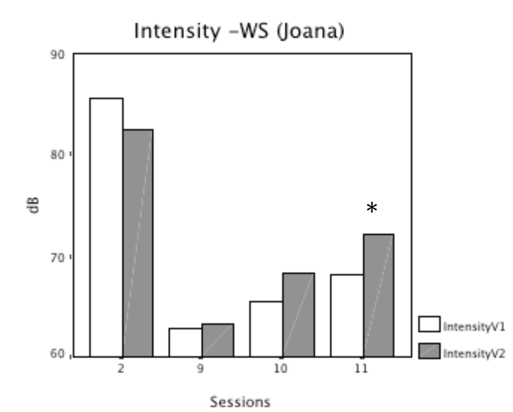

Figure 16. Intensity values per session for V1 and V2 in /WS/ (Joana)

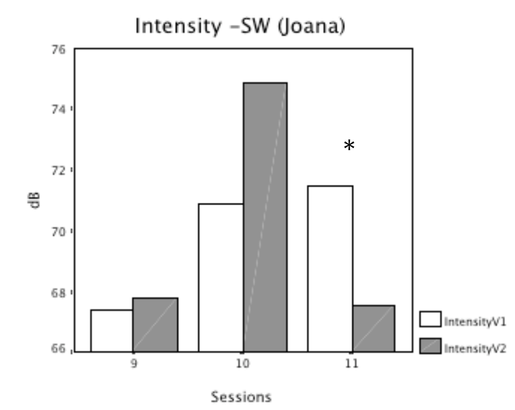

Figure 17. Intensity values per session for V1 and V2 in /SW/ (Joana)[145]

Figure 16 shows that in Joana's target /WS/ there is a sudden decrease in the intensity values from session 2 to session 9. As observed in FØ, Joana has exaggerated values for intensity in target /WS/, in session 2 (between 80 and 90 dB). In session 9 and 10, target /WS/ are balanced in terms of intensity values for V1 and V2. Only in session 11 a statistically significant difference is observed in target /WS/, with greater intensity values in V2 (*Mdn* V1 = 68.2, *Mdn* V2 = 72.2, T = 15, p= .00). In target /SW/ (Figure 17), session 9 has low average values of intensity, both in V1 and V2 (between 66 and 68 dB). In session 10, V2 is produced with much greater intensity, though the values presented are only relative to four tokens. In session 11, V1 is produced with a significantly higher intensity than V2 (*Mdn* V1 = 71.5, *Mdn* V2 = 67.6, T = 25, p = .02).

Figures 18 and 19 present the values of intensity for Inês.

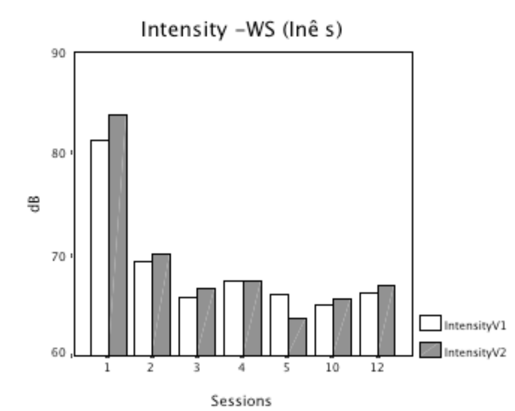

Figure 18. Intensity values per session for V1 and V2 in /WS/ (Inês)

[145] Session 10 with only 4 tokens.

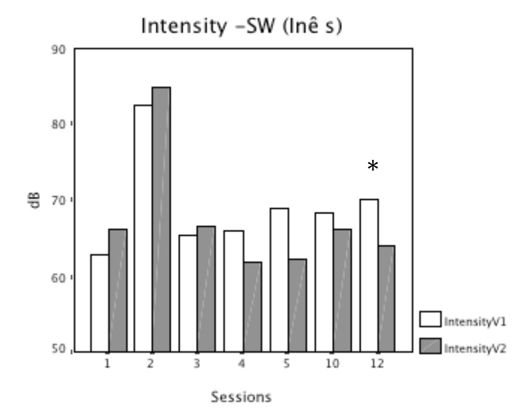

Figure 19. Intensity values per session for V1 and V2 in /SW/ (Inês)[146]

The results for intensity in Inês' productions show that the values are again balanced, both for target /WS/ and /SW/. In target /WS/ words, there is a small difference between the first and the second vowel, along all the sessions. Until the last session, no noticeable differences are observed between V1 and V2. In target /SW/ and until session 3, the last vowel tends to be produced with greater intensity than the initial one. From session 4 onwards, the opposite happens: the first vowel is produced with greater intensity. Again, the differences are not significant until session 10, mainly due to the reduced number of /SW/ tokens per session (cf. Table 7). In the last session, the difference between V1 and V2 becomes statistically significant, with V1 being produced with greater intensity (*Mdn* V1 = 73.2, *Mdn* V2 = 66.2, $T = 4$, $p = .00$).

In sum, intensity does not seem to be an acoustic parameter used to contrast vowels in the onset of word production. Joana contrastively uses intensity, both in /WS/ and /SW/ in the last sessions. Inês contrasts the two vowels with intensity in the last sessions as well, though only in /SW/.

4.2.1.3. Duration

Like intensity (and, especially, with intensity), duration is an acoustic parameter that is crucial to produce (and perceive) stressed vowels, which tends to be *longer* than unstressed ones in EP (Delgado-Martins, 1986, 1988). Often considered, cross-linguistically, as an indicator of phonological length contrast, duration in EP, however, seems to be, as suggested by Mateus & Andrade (2000), longer vowels are, normally, the result of stress, rather than a stress attractor.

In this section, we will present the results for the duration in Joana and Inês'

[146] Sessions 1 and 2 with only 1 token each; session 5 with 3 tokens only.

disyllabic productions.

Figures 20 and 21 refer to the duration values produced by Joana.

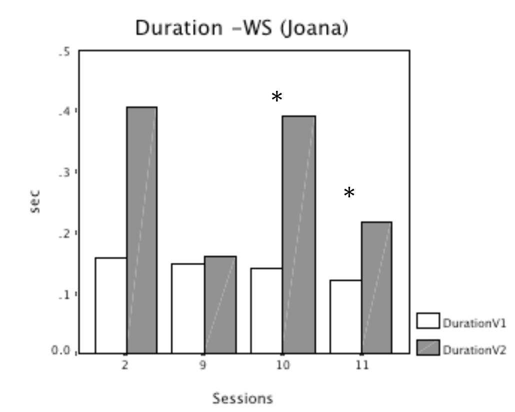

Figure 20. Duration values per session for V1 and V2 in /WS/ (Joana)[147]

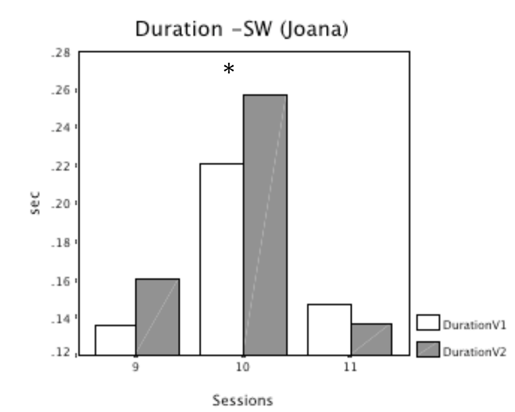

Figure 21. Duration values per session for V1 and V2 in /SW/ (Joana)

Figures 20 and 21 show that, until session 10, the V2 is longer than the first one, regardless of the target stress pattern.

Regarding target /WS/, in session 10 and 11 a significant difference between the duration values in V1 and V2 is observed (T = 0, p = .00 in session 10, T = 1, p = .00 in session 11). In these sessions, V2 is longer than V1 (*Mdn* V1 = .14, *Mdn* V2 = .39, in session 10, *Mdn* V1 = .12, *Mdn* V2 = .21).

The second vowel in target /SW/ tends to be longer than V1, but only in session 10 there is a significant statistical difference. In session 11, however, V2 is, in average, longer, but no statistical difference was observed (*Mdn* V1 = .14, *Mdn* V2 = .13, T = 30, p = .13).

Figures 22 and 23 show Inês' values for duration in /WS/ and /SW/.

[147] Cf. footnote 143.

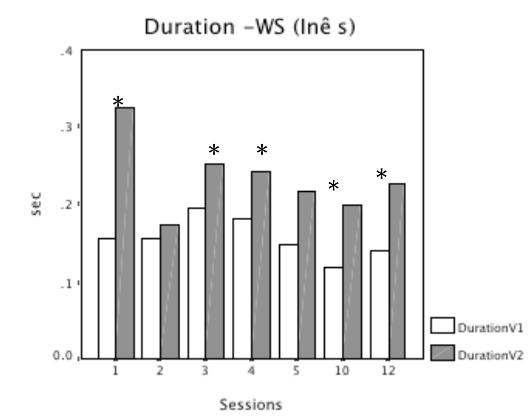

Figure 22. Duration values per session for V1 and V2 in /WS/ (Inês)

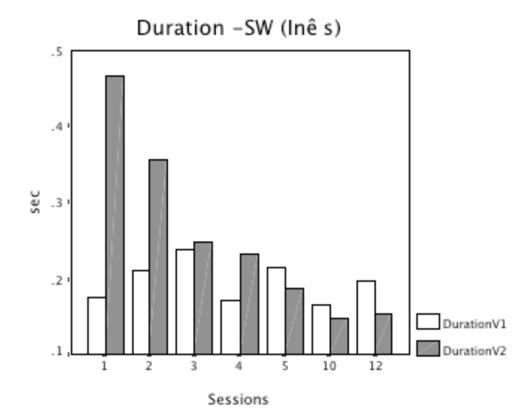

Figure 23. Duration values per session for V1 and V2 in /SW/ (Inês)[148]

Figures 22 and 23 show that, until session 4, the second vowel was in general longer than the first one, irrespectively of the target stress pattern. From session 5 onwards, Inês lengthens the second vowel of target /WS/ and the first vowel of target /SW/. The differences between V1 and V2 are only statistically significant in /WS/, in sessions 1 to 12 (except for session 2 and 5). In target /SW/, the durational values for V1 and V2 are statistically different only in session 12 (*Mdn* V1 = .19, *Mdn* V2 = .15, T = 11, p = .00).

In summary, the two children appear to use more and earlier duration than the other acoustic parameters. Inês, in particular, mainly uses duration in /WS/ to contrast the two vowels in the words. In /SW/, the child only uses duration contrastively in the last sessions. Joana displays a tendency to lengthen the second vowel. Significant differences will be found in the two last sessions in /WS/ and in the penultimate session in /SW/.

[148] In session 1 and 2 Inês has only 1 token (in each session).

4.2.1.4. Summary for the qualitative analysis

The results for the qualitative analysis show that much variability is found in the production of the acoustic parameters for word stress, both between children and within the same child.

Joana has no consistent production in FØ in the early sessions and, later, she is able to use higher FØ in the first vowel in /SW/ and in the second vowel in /WS/ (though contrast between V1 and V2 is higher in /SW/). As for intensity, the child generally uses greater intensity in the second vowel, irrespective of the target form. In the last session however, the difference between the first and the second vowel of /SW/ and /WS/ is significant and the child puts greater intensity in V1, in /SW/, and in V2, in /WS/. As for duration, the child generally uses higher duration in V2, irrespective of the target form (in /WS/, the last sessions are correctly contrasted in terms of duration, i.e., V2 is significantly longer than V1). In /SW/, however, duration does not seem to be used contrastively in the last session of observation.

Inês does not use FØ or intensity to contrast the two vowels in her early productions. Only in the last session the difference between FØ and intensity values in the first and the second vowels is significant, though it only applies to /SW/. Duration, however, is a different matter. This child generally uses longer duration in the V2 of /WS/ across development. In /SW/, duration only becomes contrastive in the last session.

From the results reported in this section, it is hard to defend that, taken separately, the acoustic parameters for word stress are mastered. The variability found, both between-children and within-child, suggests no control over the phonetic parameters relevant to produce word prominence. However, it is noticeable that /WS/ iambs tend to produced with higher values of FØ, intensity and duration, in both children.

4.2.2. Quantitative analysis of the acoustic parameters for EP word stress acquisition

In this section, we will present the results from the standardization task. In this task, we standardized (or normalized) the values of intensity and duration, the relevant acoustic parameters for word stress in EP (Delgado-Martins, 1986, 1988; Frota, 2000), in V1 and in V2, separately. The purpose of standardizing the values of these two parameters was to make them comparable, since the acoustic parameters have different units of measurement (dB in intensity, and seconds in duration). Therefore, we standardized the values of intensity and duration according to the method described in section 4.1., and, afterwards, we summed up the values for intensity and duration in the V1 of each word produced by the child, and the same for V2. This procedure allowed us to have a value for V1 and a value for V2 in each one of the disyllables produced, concerning the amount of 'prominence' (i.e. intensity+duration) put in each of them. The comparison carried out between these two values allowed us to verify which was the most prominent vowel of a disyllable, and, thus, providing acoustic and statistical evidence for an early stress pattern (trochaic, iambic or neutral) in the analyzed speech of Inês and Joana.

Note that, from a perceptive perspective and as suggested by the reports on the acoustic descriptions of word stress in the target system, we assume that EP transcribers are trained to detect word stress based on duration and loudness (intensity) of a given vowel, in relation with the other vowel(s) of the word.

We will first present the results from Joana, session by session, and afterwards we will present the results from Inês, from session 1 to 12.

Table 11 summarizes the results found for the standardization task in Joana, for /WS/ and/SW/[149].

Session	**/WS/**		**/SW/**	
	V1	**V2**	**V1**	**V2**
S9	M = -.78, SE = .62	M = -.002, SE = 1.62	M = .53, SE = .93	M = .89, SE = 1.4
	$t(10) = -.54$, $p = .30$		$t(6) = -.56$, $p = .30$	
S10	M = -.88, SE = .66	M = **.84**, SE = .62	M = 1.79, SE = 1.96	M = 1.25, SE = 1.82
	$t(11) = -2.57$, $p = .01$		$t(3) = .57$, $p = .30$	
S11	M = -1.1, SE = .30	M = **1.47**, SE = .45	M = **.10**, SE = .47	M = -.54, SE = .70
	$t(19) = -4.26$, $p = .00$		$t(13) = .76$, $p = .01$	

Table 11. Standardization results (Joana)[150]

In session 9, Joana's production of vowels in disyllables was not yet contrastive. The results from the standardization suggest that there is no significant difference between the two vowels, both in target /WS/ ($t(10) = -.54$, $p = .30$), and in target /SW/ ($t(6) = -.56$, $p = .30$). In session 10, we found different results for target /WS/ and target /SW/. Target /WS/ were produced with vowel contrast, as the mean of the first vowel was significantly lower (M = -.88, SE = .66) than the last vowel (M = .84, SE = .62) ($t(11) = -2.57$, $p = .01$). Target /SW/, however, did not show significant differences between the two vowels ($t(3) = .57$, $p = .30$).

[149] Relevant results will be marked in bold.
[150] 'M' stands for mean, 'SE' stands for standard error.

Finally, in session 11, both target patterns were contrastive: the second vowel of target /WS/ was significantly higher than the first one (V1 - M = -1.1, SE = .30; V2 - M = 1.47, SE = .45; $t(19) = -4.26$, $p = .00$), and the first vowel of target /-SW/ was significantly higher than the final one (V1 - M = .10, SE = .47; V2 - M = -.54, SE = .70, $t(13) = .76$, $p = .01$).

Table 12 summarizes Joana's production of disyllables in terms of vowel contrast.

	/-WS/	**/-SW/**
Session 9	V1 = V2	V1 = V2
Session 10	V1 < V2	V1 = V2
Session 11	V1 < V2	V1 > V2

Table 12. Summary of the standardization results (Joana)

In Joana's production, she first tends to level the two vowels of the words. Later on, she is able to produce /SW/ and /WS/ accordingly.

Inês' production of vowels in disyllables was contrastive since the beginning, but only in what concerns the values for /WS/[151].

[151] Relevant results will be marked in bold.

Sessions	/WS/		/SW/	
	V1	**V2**	**V1**	**V2**
S1	M = -.42, SE = .27	M = **1.03**, SE = .34	--	--
	t(4) = -4.58, p = .00		--	--
S2	M = -.48, SE = .33	M = .09, SE = .34	--	--
	t(17) = -1.64, p = .06		--	--
S3	M = -.36, SE = .26	M = **.34**, SE = .40	M = -.41, SE = .55	M = .59, SE = .44
	t(22) = -2.82, p = .00		t(3) = -2.05, p = .06	
S4	M = -.29, SE = .31	M = **.44**, SE = .29	M = -.53, SE = .48	M = .07, SE = .68
	t(20) = -2.52, p = .01		t(10) = -1.08, p = .15	
S5	M = -.41, SE = .12	M = **.43**, SE = .22	M = **.41**, SE = .15	M = -.58, SE = .43
	t(25) = -3.42, p = .00		t(2) = 3.1, p = .04	
S10	M = -.06, SE = .31	M = -.007, SE = .31	M = **.03**, SE = .26	M = -.27, SE = .19
	t(13) = -.19, p = .42		t(14) = 2.12, p = .02	
S12	M = -.05, SE = .28	M = **.20**, SE = .27	M = **.21**, SE = .24	M = -.67, SE =.18
	t(14) = -1.91, p = .03		t(13) = 5.31, p = .00	

Table 13. Standardization results (Inês)

The results from the standardization suggest that, in session 1, there is a significant difference between the two vowels in target /WS/[152] (V1 - M = -.42, SE = .27; V2 - M = 1.03, SE = .34, t(4) = -4.58, p = .00). In session 2, target /WS/[153] showed a marginal significant difference between the two vowels, the second vowel being produced, in average, with higher values than the first vowel (V1 - M = -.48, SE = .33; V2 - M = .09, SE = .34, t(17) = -1.64, p = .06). The data from session 3 demonstrated that the second vowel tended to be produced with significantly higher values in target /WS/, as the second vowel was produced with significantly higher values than the first vowel (V1 - M = -.36, SE = .26; V2 - M = .34, SE = .40, t(22) = -2.82, p = .00). In target /SW/, only 4 tokens were observe, which did not allow us to run any robust statistical test. In session 4, no significant difference was found between the vowels in target /SW/ (t(10) = -1.08, p = .15) although in target /WS/ the vowels were contrastive in the expected sense: the second vowel was produced with significant higher vowels than the first one (V1 - M = -.29, SE = .31, V2 - M = .44, SE = .29, t(20) = -2.52, p = .01). In session 5, again, target /WS/ have significantly different vowels, in accordance to the

[152] In Inês' session 1, only one token of target /SW/ was produced.
[153] In Inês' session 2, only one token of target /SW/ was produced.

target (V1 - M = -.41, SE = .12; V2 - M = .43, SE = .22, $t(25) = -3.42$, $p = .00$). In target /SW/, the results point to a statistically significant difference between V1 and V2 ($t(2) = 3.1$, $p = .04$), though only 3 tokens were analyzed. In session 10, only target /SW/ were produced contrastively ($t(14) = 2.12$, $p = .02$). Finally, in session 12, Inês' productions are target-like: in target /WS/ the second vowel is statistically different from the first one (V1 - M = -.05, SE = .28; V2 - M = .20, SE = .27, $t(14) = -1.91$, $p = .03$) and the same occurs in target /SW/ (V1 - M = .21, SE = .24; V2 - M = -.67, SE =.18, $t(13) = 5.31$, $p = .00$). The second vowel in target /WS/ is higher than the first one and the opposite is valid for target /SW/.

Table 14 summarizes Inês' production of disyllables in terms of vowel contrast.

	/-WS/	**/-SW/**
Session 1	V1 < V2	--
Session 2	V1 = V2[154]	--
Session 3	V1 < V2	V1 = V2[155]
Session 4	V1 < V2	V1 = V2
Session 5	V1 < V2	V1 > V2[156]
Session 10	V1 = V2	V1 > V2
Session 12	V1 < V2	V1 > V2

Table 14. Summary of the standardization results (Inês)

Inês follows an early development of word stress where she demonstrates an early mastery of iambs and a later mastery of trochees, by the use of level stress and by making iambs out of trochees. It is worth mentioning, however, that Inês used mainly reduplications, in her initial speech.

4.3. Discussion

In this chapter we have showed the results of a preliminary acoustic analysis carried out on a speech sample of two Portuguese children, Inês and Joana. First, we analyzed the disyllabic productions of the two children, accounting for the mean values of fundamental frequency, intensity and duration, separately. Afterwards, we carried out an analysis aiming at quantifying the amount of prominence put into the two vowels of the disyllables produced

[154] In this session, Joana has only two /WS/ tokens.
[155] In session 3, Inês has only four /SW/ tokens.
[156] In session 5, Inês has only three tokens.

by the two children under observation, considering only the two relevant acoustic parameters for word stress in the target system: intensity and duration.

The investigation of the acoustic parameters used to cue word stress in cross-linguistic acquisition has suggested that, before 2;0, these acoustic parameters might not yet been mastered. We have shown that data from English (Kehoe, Stoel-Gammon & Buder, 1995; Pollock, Brammer & Hageman, 1993), suggesting that children might not use fundamental frequency, intensity or duration in an adult-like manner, in order to contrast the vowels in multisyllables. Similar results were found in Vihman, DePaolis & Davis (1998), where a high degree of variability in the production of the acoustic parameters in English-speaking children observed until the 25 word-point. Studies carried out in older children (2, 3 and 4 year-olds), not only in English but also in other languages (like French and Spanish), however, indicate that the mastery of the acoustic parameters and, consequently, the mastery of word stress, take place later in development (Allen & Hawkins, 1980; Lléo & Arias, 2007; Pollock, Brammer & Hageman, 1993; Rose & Champdoizeau, 2008).

In EP, stressed vowels are produced with higher values of energy than unstressed vowels, energy being the integral of the intensity by the duration. Intensity and duration are, thus, the acoustic parameters relevant for word stress, whereas fundamental frequency is used to cue intonational events and normally cues prominences at higher phonological domains (such as the phonological or the intonational phrase).

From the analysis carried out taking into account a comparison of each acoustic parameter and the computation of intensity and duration, we observed that Inês showed a tendency for higher values in the second vowel of disyllables, but only in /WS/[157]. In target /-SW/, the contrast between the first and the second vowel in the correct direction (V1>V2) occurs later (session 5). Joana mainly used level stress since the early sessions, until session 10. In session 11, she is able to produce /SW/ and /WS/ target-like.

In Table 15, we summarize the results of the acoustic analysis. In this table, '=' stands for level stress.

	Joana		**Inês**	
	/-SW/	*/-WS/*	*/-SW/*	*/-WS/*
Moment 1	V1=V2	V1=V2	V1=V2	[WS]
Moment 2	[SW]	[WS]	[SW]	[WS]

Table 15. Summary of the findings in the acoustic analysis

[157] It is worth remarking that most of Inês' early [WS] words produced are reduplications.

The results summarized in Table 15 suggest that:

(i) at the beginning, different children may use different strategies to deal with prominence in the disyllables;
(ii) at the beginning, word prominence may not exist (as in Joana);
(iii) at the beginning, a tendency for [WS] productions may exist (as in Inês);
(iv) at a later moment, the first vowel in /SW/ words is produced with higher values of the acoustic parameters;
(v) at a later moment, the second vowel in /WS/ words is produced with higher values of the acoustic parameters.

The preliminary study carried out in this chapter indicates that, in one of the two children observed (Inês), the second vowel of /WS/ words was produced with higher values of the relevant acoustic parameters. In /SW/ words, the two vowels of the disyllables analyzed were not generally produced contrastively. In Joana, the absence of contrast between the two vowels of early disyllables was attested, though later, both /SW/ and /WS/ words were produced with higher values in the target stressed vowel. The frequent cases of level stress accounted for in this acoustic analysis have supported the difficulties found in the transcription of the initial speech productions of the two children analyzed.

In Joana's early sessions (until session 10), significant differences between the first and the second vowel were not found in the production of fundamental frequency, intensity and duration. In the last session (session 11), only duration in /SW/ was not produced contrastively. The quantitative analysis confirmed that only in the last observed session Joana produced /SW/ and /WS/ target-like.

In Inês' data, the second vowel was significantly longer than the first vowel, in target iambs. In the last observed session (session 12), Inês used duration contrastively in /SW/ and /WS/ (she lengthens the first vowel in /SW/ and the second vowel in /WS/). She uses fundamental frequency contrastively only in /SW/ (with higher pitch in the first vowel), and incorrectly uses higher intensity in the second vowel of /SW/. The results of the quantitative analysis showed that, in her early sessions, Inês tends to strengthen the last vowel, in both /WS/ and /SW/. In the last observed session, Inês correctly produces /SW/ and /WS/.

If the children observed were mastering prominence within the word domain, then we would expect that the first and the second vowel were produced with acoustic contrast (in each acoustic parameter and in the overall analysis), in the direction of the target prominent vowel. If children had already mastered the acoustic parameters, we would expect them to produce the relevant acoustic parameters for word stress (intensity *and* duration) in the expected direction, considering the stress pattern in the target word (V1>V2 in /SW/, V1<V2 in /WS/). This pattern was observed in Inês, only in target /-WS/. In fact, at the beginning of word production, a great variation was observed: in Inês, /-WS/, but not /-SW/ were produced accordingly; in Joana, level stress was mostly common.

The results found confirm and legitimate the researchers' difficulties in the children's perceptive transcriptions at the early stages of word production. For instance, in Joana, no significant differences were found in the values of the acoustic parameters of the two vowels of disyllables at the beginning (Figure 12, 13, 16, 17, 20 and 22, and Table 11). In Inês, only duration seemed to be contrastive (Figure 22 and 23, and Table 13). The overall findings from this acoustic analysis confirm Bernhardt & Stemberger (1998), according to whom the phonetic transcription of children's early speech may be difficult and inconsistent. Also, the data confirmed what has previously found by Goffman (1985), Pollock *et al.* (1993) and Kehoe *et al.* (1995). The transcriptions of early speech with respect to word stress may only have around 60% of reliability.

Some studies report a high degree of variability in the way children use word stress, namely, in the way children produce the acoustic parameters (namely, Kehoe *et al.*, 1995, for English-speaking children, and Vihman *et al.*, 1998, for English and French-speaking children). Other authors claim that children's early productions are not accurate in their use of the relevant acoustic parameters, though they may correspond to the target language tendency (Lleó & Arias, 2007). Our results confirmed that children do not use the acoustic parameters target-like, as well as they do not necessarily strengthen the correct vowel.

The results brought up by the acoustic analysis suggest that, in the early stages of word production, children might be relying on prosodic domains higher than the foot or even the prosodic word (e.g., the phonological or the intonational phrase). This analysis has been suggested by Vihman *et al.* (1998) to explain the high variability found in the speech productions for English-speaking children. When acoustically analyzing the early speech of American children, the authors found that not always children's utterances had a trochaic shape (Vihman *et al.*, 1998), and suggested that the children observed might not be producing word stress, but rather phrasal stress, based on the high input frequency of iambic phrases in early child-directed speech (*all gone*, *the ball*, etc.).

4.4. Summary

In this chapter we analyzed the early speech of two Portuguese-speaking children from an acoustic perspective.

We carried out a qualitative analysis of the average values of each acoustic parameter (fundamental frequency, intensity and duration) in the first and second vowel of both /SW/ and /WS/ produced by two Portuguese children. Afterwards, we undertook a quantitative analysis, where we considered intensity and duration only, since, according to the target analysis, these are the two relevant acoustic parameters for word stress in EP. In order to compare the strength of each vowel, we standardize the results from intensity and duration and summed up each of them separately. Statistical testing allowed us to observe that, at the beginning, Inês and Joana are not producing word stress adult-like, as the production of the relevant acoustic parameters for words stress are not mastered in the early moment of word production. Our results further confirmed reports on the literature according to which, before 2 years-old, children are not able to correctly differentiate stressed and unstressed vowels in multisyllabic utterances. Our results were consistent with previous findings in studies focusing on the acoustic correlates of word stress during acquisition, which indicate that early speech may not be contrastive in stress terms. The later observation of target-like productions, both in /WS/ and in /SW/ indicates that there might be a moment in the children's productions where word prominence falls into place.

In the following chapter we will analyze the stress patterns produced by the five children present in our *corpus* and confirm that, in fact, a turning point occurs during the acquisition of word shape and stress patterns.

5. The acquisition of stress patterns in EP

In this chapter we will present the results of the acquisition of stress patterns in EP, in the speech of five Portuguese children.

In Chapter 2 we showed that the observation of the stress patterns during early acquisition has been one of the means used by researchers to investigate word stress and word shape acquisition cross-linguistically. Though in most of the literature, the study on the manner how children build feet and words have been mainly used to study the acquisition of word shape (and not necessarily word stress and its algorithm), the observation of the way prosodic words – with their strong and weak syllables – evolve has been an efficient method to study the acquisition of word stress (Fikkert, 1994; Kehoe, 1998, Santos, 2007; Tzakosta, 2004).

In the literature review carried out in Chapter 2, we compared the acquisition of stress patterns across languages. We observed that the development of prosodic words could start with a single syllable (like in Dutch and English - Fikkert, 1994 and Demuth, 1995, respectively) and evolve to larger prosodic units in the course of development. On the contrary, in French, longer words are observed from the beginning of word production (Braud, 2003; Wauquier-Gravelines, 2003). Spanish has an acquisition path similar to other trochaic languages, like Dutch and English, and shows that at the beginning, monosyllables prevail (Lleó & Demuth, 1999). However, longer words may occur earlier than in English, due to language frequency patterns (Spanish has a higher frequency of longer words than English - Roark & Demuth, 2000).

Though some general trends have been observed in the literature reports (for instance, in early acquisition of trochaic languages, children tend to mirror the trochaic tendency of the target), some conflicting results have been reported as well. In many cases, despite some authors claim for a given stress pattern, others investigating the same language claim for a not so clear trend. That is the case of English (Klein, 1984) and Spanish (Hochberg, 1988a) where a neutral start, and not only a trochaic approach has been proposed during acquisition. The case of Portuguese appears as even more complicated, since studies have claimed both for a trochaic (Rapp, 1994) and an iambic tendency (e.g., Santos, 2007; Stoel-Gammon, 1976).

In this chapter, we will examine the development of prosodic words as a window to study the acquisition of word stress in EP. The research questions that we pose, in this chapter, are: what can the development of stress patterns tell us about the acquisition of word stress in EP?

Despite the conflicting results previously found, both cross-linguistically and in

Portuguese, in Chapter 2 we hypothesized that *Portuguese children will display an early trochaic tendency*. Furthermore, we stated that, if our hypothesis is confirmed, we expect to find:

(i) An early production of target trochees;
(ii) Truncation of /WS/ words to [S];
(iii) Truncation of /WSW/ to [SW];
(iv) Later production of /WWS/ and /SWW/ words.

On the basis of the results, the implications on how Portuguese children acquire the stress algorithm of the target language will be addressed, discussing aspects such as the presumed default stress pattern in the process of prosodic acquisition. The implications for a theory of phonological acquisition will also be discussed, namely considering a top-down or a bottom-up approach to phonological acquisition.

This chapter is organized as follows. In section 5.1., we will present the results for the acquisition of stress patterns, based of the speech productions of the five children introduced in Chapter 3. We will present three different types of data analysis: firstly, we will investigate the children's production patterns, irrespective of the target word (section 5.1.1.); secondly, we will account for the children's productions with respect to the target word shapes and stress patterns (/S/, /SW/, /WS/, /WSW/, /WWS/ and /SWW/ - section 5.1.2.). Thirdly, we will investigate the production strategies used by the children in the same target words as mentioned in section 5.1.2., with special attention to reduplication, epenthesis and truncation. In section 5.2., we will discuss the results found. In this section we will first propose a four-stage developmental path for the acquisition of stress patterns in EP (section 5.2.1.); secondly, we will provide empirical and theoretical arguments that disfavor the assumption of a default iambic foot in the acquisition of EP. Thirdly, we will discuss the shape of early words in the five Portuguese children observed, hypothesizing on an interaction between prominence from higher prosodic domains (such as the phonological phrase) and the processing lower prosodic domains (such as the syllable). Finally, in section 5.2.4., we will propose and discuss a neutral start approach for the acquisition of word stress in EP. Section 5.3. will summarize the main findings of this chapter.

5.1. Results

In this chapter we will present the results on the acquisition of word shape and stress patterns[158] in the speech of five Portuguese children. In order to do so, we analyzed (i) children's production patterns (5.2.1), (ii) children's faithful productions (5.2.2.) and (iii) children's production strategies (5.2.3.) regarding word shape and stress patterns. Children's production patterns concerns the children's preferences in production, irrespective of the target form. Faithfulness is relative to the children's target-like production, and the strategies regard the productions of children when target-like forms were not produced. In the results for the production patterns, absolute values will be showed, whereas in the results for faithfulness and strategies the children’s productions will be accounted for in the form of percentages of the structure being analyzed. Even though some overlapping and redundant information can be present in the results for the production patterns and the percentages of faithfulness, we consider that the combination of these two methods accounts more reliably for the development path of children with respect to stress patterns.

5.1.1. Production patterns in early words

In this section, we will present the results for the production patterns with respect to [S], [SW], [WS] and [WSW] word shapes in the speech of the five observed children.

Firstly, we will present the results from the early sessions in the form of adapted Guttman scales[159] (Tables 16-20), since proportional measurements such as percentages do not realistically account for the data in the early stages, when very few types and tokens are produced (5.1.1.1.). Secondly, we will conduct an analysis on the early words produced by the children, by comparing the production of reduplicated and non-reduplicated iambs, as well as productions resulting from the epenthesis, and the other early word shapes produced ([S], [SW]) (5.1.1.2.).

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[158] Since we considered (stressed) monosyllables in our analysis and these are not unanimously considered as 'stress patterns', in the course of this chapter we will refer to 'word shape and stress patterns' everytime we want to include monosyllables in the analyses.
[159] A Guttman scale (from Guttman, 1980) accounts for binary answers, ranked in a table. Here, we used the number of tokens, rather than a binary symbol (yes/no, X/Ø, etc).

5.1.1.1. Word shape preference

The numbers in the cells of the Guttman scales account for the stress patterns actually produced, irrespective of the target form. The purpose of these tables is to show the children's *preference* and not the acquisition of a given word shape, since we assume that, in the early stages of speech production, children's general preference for a specific word shape may indicate which word template or prosodic constituent is being processed.

In the Guttman scales presented below, the cells represent the number of tokens produced by each child per word shape ([S], [SW], [WS] and [WSW][160]). [SWW] and [WWS] forms were not taken into account, due the reduced number of these words shapes in all children's speech, especially before 2;6. These tables include all productions of a given word shape, either that constitutes a target-like production, a truncated form or it is the result of reduplication or epenthesis. Light shaded cells represent the developmental path, after the consistent production of a given word shape. By 'consistent', we mean that the child had to produce, in the course of a minimum of 3 subsequent sessions at least 1 token of a given pattern. Cells with only 1 token of any word shape were never shaded, as it could correspond to a sporadic utterance. The dark shaded column in each table represents the moment when the number of [SW] words surpasses the number of [WS] words produced. This turning point[161] – from a predominance of [WS] words to a predominance of [SW] – appears in the five children[162].

Table 16 represents the number of tokens produced by Clara per word session, per word shape.

	S1	***S2***	***S3***	***S4***	***S5***	***S6***	***S7***	***S8***	***S9***	***S10***
[WSW]	-	-	-	1	-	1	4	-	4	9
[SW]	1	-	3	-	3	4	5	10	11	**61**
[S]	-	1	5	7	6	7	23	14	20	46
[WS]	3	2	3	7	7	10	24	9	15	34

Table 16. Number of tokens per session, per word shape – actual productions (Clara)

In Clara, we observe that, at the beginning, she has a preference for [WS] words. Monosyllables emerge after [WS]. In an early moment (until session 5), Clara produces mostly [WS] and monosyllables. Later (after session 5), [SW] words emerge and in the

[160] In this section, [S] stands for a monosyllable.
[161] This turning point is actually an important moment that we will also observe in the results presented for faithfulness (5.1.2.).
[162] Although in the Guttman scales we can observe a point when trochees surpass iambs, we will see that in the faithful productions (section 5.1.2.), this turning point does not appear, probably due to the fact that Clara's speech is only available until 1;10.

following sessions (6, 7, 8 and 9) they are still less frequent than [WS] and [S]. In session 10, [SW] words become predominant. Session 10 thus represents a potential turning point in the child's speech. [WSW] words emerge in session 9 and are scarce in Clara's speech.

In (112), we present Clara's emergence path for [WS], [S], [SW] and [WSW], in this same order.

(112) Clara – order of emergence of word shapes:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[WS]	*olá*	'hello'	/ɔˈla/	[ɐˈla]	0;11.1 (S1)
	dá	'give imp.'	/ˈda/	[ɐˈda]	1;0.13 (S2)
	bebé	'baby'	/bɛˈbɛ/	[βɨˈβe]/[pɐˈpʷɐ]	1;1.3 (S3)
[S]	*não*	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃w̃]	1;1.3 (S3)
	dá	'give imp.'	/ˈda/	[ˈdə]	
	dá	'give imp.'	/ˈda/	[ˈta]	1;2.22 (S4)
	carro	'car'	/ˈkaʀu/	[ˈka]	1;3.6 (S5)
[SW]	*água*	'water'	/ˈagʷɐ/	[ˈaːβɐ]	
	água	'water'	/ˈagʷɐ/	[ˈabʷɐ]	1;4.19 (S6)
	mano	'brother fam.'	/ˈmɐnu/	[ˈmɐnu]	1;6.6 (S8)
[WSW]	*Aurora*	'name'	/awˈɾɔɾɐ/	[ɐːˈjɔjɐ]	1;7.11 (S9)
	menina	'girl'	/mɨˈninɐ/	[mɐˈɲinɐ]	1;8.20 (S10)
	sapato	'shoe'	/sɐˈpatu/	[tuˈpatu]	

Table 17 summarizes early words' production in Inês, according to the criteria mentioned for Clara's data.

	S1	*S2*	*S3*	*S4*	*S5*	*S6*	*S7*	*S8*	*S9*	*S10*	*S11*	*S12*
[WSW]	-	-	2	3	-	11	3	13	12	50	83	87
[SW]	-	2	5	4	6	2	3	27	99	**198**	**241**	**290**
[S]	3	20	60	63	61	148	139	127	135	219	284	508
[WS]	11	28	36	74	48	137	113	60	117	116	151	139

Table 17. Number of tokens per session, per word shape – actual productions (Inês)

Table 17 indicates that Inês' first words have a [WS] form (cf. sessions 1-9). In session 2, monosyllables emerge and become very frequent in her speech. Monosyllables are the predominant format in 9 out of 12 sessions). [SW] words emerge after monosyllables, but only from session 8 onwards they are produced with higher frequency. In session 10, the number of [SW] tokens surpasses the number of [WS] tokens in Inês's speech (198 words produced as [SW], *contra* 116 words produced as [WS]). Thus, session 10 represents a turning point in the child's speech, with respect to the development of word shapes. Trisyllables emerge in session 6.

In (113) we present Inês' data, concerning the emergence of word shapes. The following order of emergence is attested: [WS] > [S] > [SW] > [WSW].

(113) Inês – order of emergence of word shapes:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[WS]	*Fernanda*	'name'	/fɨɾˈnɐ̃dɐ/	[iˈɐ̃ː]	0;11.14 (S1)
	mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	
	bebé	'baby'	/bɛˈbɛ/	[βəˈβɛ]	
	Inês	'name'	/iˈneʃ/	[neˈne]	
	mamã	'mommy'	/mɐˈmɐ̃/	[ɐˈmɐ̃]	1;0.25 (S2)
	mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	
	dá	'give imp.'	/ˈda/	[aˈdʲa]	
	não	'no'	/ˈnɐ̃w̃/	[ɨˈnɐ̃w̃]	
[S]	*Inês*	'name'	/iˈneʃ/	[ˈɲːe]	1;0.25 (S2)
	toma	'take imp.'	/ˈtɔmɐ/	[ˈtɔ]	
	mamã	'mommy'	/mɐˈmɐ̃/	[ˈmɐ̃]	
	dá	'give imp.'	/ˈda/	[ˈdaː]	
	Mário	'name'	/ˈmariu/	[ˈmɐ]	1;1.30 (S3)
	chupeta	'pacifier'	/ʃuˈpetɐ/	[ˈpe]	
	cão	'dog'	/ˈkɐ̃w̃/	[ga]	
	Isabel	'name'	/izɐˈbɛɫ/	[ˈbɛ]	
[SW]	*chupeta*	'pacifier'	/ʃuˈpetɐ/	[ˈpepe]	1;1.30 (S3)
	Isabel	'name'	/izɐˈbɛɫ/	[ˈβɛβɛ]	
	não	'no'	/ˈnɐ̃w̃/	[ˈɲaɲɐ]	1;3.6 (S4)
	Inês	'name'	/iˈneʃ/	[ˈɲeɲe]	
	papa	'food fam.'	/ˈpapɐ/	[ˈpapa]	1;4.9 (S5)
	Fernanda	'name'	/fɨɾˈnɐ̃dɐ/	[ˈnɐnɐ]	
	pé	'foot'	/ˈpɛ/	[pɛˈpɛpɛ]	1;5.11 (S6)
	girafa	'giraffe'	/ʒiˈɾafɐ/	[ɣaˈɣaɣːa]	
[WSW]	*aqui*	'here'	/ɐˈki/	[ɐˈkʲitʲə]	1;5.11 (S6)
	leitinho	'milk dim.'	/lɐjˈtiɲu/	[ɐˈtʲiɲe]	
	não	'no'	/ˈnɐ̃w̃/	[ɐˈnono]	1;6.11 (S7)
	pé	'foot'	/ˈpɛ/	[pɛˈpɛpɛ]	

Table 18 summarizes João's preferences in the development of [WS], [S], [SW] and [WSW], with this same order of emergence.

	S1	*S2*	*S3*	*S4*	*S5*	*S6*	*S7*	*S8*	*S9*	*S10*	*S11*	*S12*	*S13*	*S14*	*S15*	*S16*	*S17*	*S18*	*S19*	*S20*
[WSW]	-	-	1	-	-	-	-	-	1	1	1	2	-	-	3	33	37	52	48	61
[SW]	1	-	-	5	-	-	4	1	7	7	11	11	8	8	6	**41**	**63**	94	82	101
[S]	-	1	-	3	7	7	33	26	33	35	29	23	37	15	37	52	60	25	67	57
[WS]	-	2	9	4	7	8	6	6	5	31	32	46	55	37	21	41	25	44	32	25

Table 18. Number of tokens per session, per word shapes – actual productions (João)

It is worth noticing that, in João's case, [S] and [WS] words seem to co-occur from the beginning of the observation until session 15. Despite an early emergence of [WS] words (cf. sessions 2 and 3), monosyllables have production rates very close to the production rates of [WS] words, from session 4 to session 6. From session 7 to session 10, monosyllables start being produced in higher rates than [WS]. From session 11 to 14, [WS] words prevail over [S] again. [SW] words emerge in session 7 and have low production rates until session 15. From session 15 onwards, [S] words generally surpass [WS]. In session 16, there is an even amount of [SW] and [WS] but, from session 17 onwards, [SW] words highly surpass the production of [WS] words. Trisyllables only occur later, in session 15.

In (114) we present instances of João's productions for the word shapes under observation ([S], [WS], [SW] and [WSW]). These instances illustrate the following order of emergence: [WS] > [S] > [SW] > [WSW].

(114) João – order of emergence of word shapes:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[WS]	*dá*	'give imp.'	/ˈda/	[ɐˈdɑ]	1;0.28 (S2)
	olá	'hello'	/ɔˈla/	[ɔˈa]	
	água	'water'	/ˈagʷɐ/	[ɐˈwa]	1;1.12 (S3)
	dá	'give imp.'	/ˈda/	[daˈda]/[ɐˈda]	
	olá	'hello'	/ɔˈla/	[ʎɐˈʎa]	
[S]	*mamã*	'mommy'	/mɐˈmɐ̃/	[ˈmɐ]	1;1.28 (S4)
	bola	'ball'	/ˈbɔlɐ/	[ˈbɐː]	1;2.13 (S5)
	bolacha	'cookie'	/buˈlaʃɐ/	[ˈbɐ]	
[SW]	*papa*	'food fam.'	/ˈpapɐ/	[ˈpapɐ]	1;3.21 (S7)
	bolo	'cake'	/ˈbolu/	[ˈbowu]	1;4.17 (S8)
	uva	'grape'	/ˈuvɐ/	[ˈduːdɐ]	1;5.12 (S9)
	bola	'ball'	/ˈbɔlɐ/	[ˈboa]	1;5.26 (S10)
	panda	'panda bear'	/ˈpɐ̃dɐ/	[ˈpapa]	1;7.0 (S13)
	Cidália	'name'	/siˈdaliɐ/	[ˈdajɐ]	1;7.20 (S13)
[WSW]	*Adriana*	'name'	/ɐˈdɾiɐnɐ/	[ɐˈnɐnɐ]	1;8.25 (S15)
	crocodilo	'aligator'	/kɾukuˈdilu/	[diˈlilu]	1;9.25 (S16)
	quentinho	'warm dim.'	/kẽˈtiɲu/	[tiˈtinu]	

In Table 19 we present the results of Joana's development in terms of [S], [WS], [SW] and [WSW] words' production.

	S1	*S2*	*S3*	*S4*	*S5*	*S6*	*S7*	*S8*	*S9*	*S10*	*S11*	*S12*	*S13*	*S14*
[WSW]	-	-	-	-	-	-	-	-	1	5	14	5	14	74
[SW]	-	-	-	-	-	-	-	-	3	9	20	**102**	**90**	**198**
[WS]	-	2	1	-	-	-	1	3	20	15	49	16	24	57
[S]	2	2	4	7	2	2	23	9	35	81	104	105	88	232

Table 19. Number of tokens per session, per word shape – actual productions (Joana)

Joana's data (Table 19) indicate that she has an early preference for monosyllables, and that this preference is maintained until session 8. The first [WS] and [SW] words occur later in development (both word shapes appear consistently in session 8 and 9, respectively). However, the child displays an acquisition path for word shapes similar to the one exhibited by the other children in the sense that she prefers [WS] words over [SW]: [S] > [WS] > [SW] > [WSW]. It is worth noticing, as well, that session 12 represents a turning point in the child's speech, as that is the session where a preference for [SW] over [WS] is observed. The instances in (115) illustrate the above-mentioned order of emergence in Joana's speech ([S] > [WS] > [SW] > [WSW]).

(115) Joana – order of emergence of word shapes:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[S]	*mamã*	'mommy'	/mɐˈmɐ̃/	[ˈmɐ]	1;2.7 (S3)
	meia	'sock'	/ˈmɐjɐ/	[ˈmæ̃]	
	pé	'foot'	/ˈpɛ/	[ˈpɛ]	1;2.29 (S4)
	(não) há	'there is (not)'	/ˈnɐ̃w̃ˈa/	[ˈɲæː]	
	não	'no'	/ˈnɐ̃w̃	[ˈnæw]	1;5.5 (S6)
	gato	'cat'	/ˈgatu/	[ˈka]	1;6.24 (S7)
	Carla	'name'	/ˈkaɾlɐ	[ˈtaː]	
[WS]	*bola*	'ball'	/ˈbɔlɐ	[ɐˈɔ]	1;8.4 (S8)
	há	'there is'	/ˈa/	[aˈa]	
	pato	'duck'	/ˈpatu/	[paˈpa]	1;9.25 (S9)
	Raquel	'name'	/ʀɐˈkɛɫ/	[kɐˈkɛ]	
	sapato	'shoe'	/sɐˈpatu/	[paˈpa]	
	Joana	'name'	/ʒuˈɐnɐ/	[ɨˈɲɐ]	
	escola	'school'	/ʃˈkɔlɐ/	[kɔˈkɔ]	
[SW]	*colo*	'lap'	/ˈkɔlu/	[ˈkɔːu]	1;10.22 (S10)
	papel	'paper'	/pɐˈpɛɫ/	[pɨˈeːu	
	barco	'boat'	/ˈbaɾku/	[ˈmaːku]	
[WSW]	*palitos*	'sticks'	/pɐˈlituʃ/	[pɨˈkika]	
	chapéu	'hat'	/ʃɐˈpɛw/	[ɐˈpʰɛju]	

In Tables 20 and 21, we present Luma's developmental path for [S], [WS], [SW] and [WSW] output forms[163].

	S2[164]	*S3+4*	*S5+6*	*S7+8*	*S9+10*	*S11+12*	*S13+14*	*S15+16*	*S17+18*	*S19+20*	*S21+22*	*S23+24*
[WSW]	-	-	1	4	-	-	-	-	-	2	1	4
[SW]	-	3	2	2	-	3	15	3	-	6	11	2
[WS]	1	9	1	19	2	8	5	40	55	81	85	130
[S]	1	10	13	55	18	7	41	101	28	38	60	38

Table 20. Number of tokens per session, per word shape – actual productions (Luma)

	S25+26	*S27+28*	*S29+30*	*S31+32*	*S33+34*	*S35+36*
[WSW]	-	6	5	45	34	101
[SW]	2	9	62	233	**399**	382
[WS]	117	146	198	292	344	328
[S]	32	115	257	437	387	423

Table 21. Number of tokens per session, per word shape – actual productions (Luma) - Continuation

In Luma, [S] and [WS] seem to emerge simultaneously in her speech (cf. session 2-4). Nevertheless, it is possible to observe that she favors [S] words in the early moments of word production (cf. sessions 5-16). Though [WS] words emerge earlier than [SW] words (in session 2 and 11, respectively), from session 11 to 14, there is an alternating preference for [SW] or [WS] words. From session 15, until session 32, [S] and [WS] words predominate in Luma's speech, though [WS] words are generally produced in higher amounts (cf. sessions 17-28). In session 33, the production rate for [SW] words surpasses the production rate for [WS] (though [S] words are produced in high rates until the end of the observation period). Trisyllables emerge in session 27.

Luma’s early development follows the order of emergence [S] > [WS] > [SW] > [WSW]. Despite the criterion for consistency presented[165] and the observation of a emergence path similar to the one observed in Joana (earlier emergence of and a higher production rate in [S] words than in [WS] and [SW], at the early stages), we are aware that Luma is the less consistent child of the five children oberved.

In (116) we show Luma's emergence path in the following order: [S] > [WS] > [SW] > [WSW].

[163] Often, Luma had sessions where a considerable amount of a specific word shape was produced and in the following session the amount of tokens of that same word shape decreased dramatically. For that reason, in the Guttman scales, we decided to group sessions and sum up the number of tokens of each session.
[164] Session 1 in Luma does not have any of the analyzed word shapes.
[165] Cf. Chapter 3, section 3.3..

(116) Luma – order of emergence of word shapes.

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[S]	*dá*	'give imp.'	/ˈda/	[ˈda]	1;0.13 (S2)
	mamã	'mommy'	/mɐˈmɐ̃/	[ˈnɐ̃]	
	dá	'give imp.'	/ˈda/	[ˈdeː]	1;2.22 (S6)
[WS]	*dá*	'give imp.'	/ˈda/	[aˈtʲa]	1;0.28 (S3)
	Hopla	'name'	/ˈɔplɐ/	[paˈpa]	1;1.10 (S4)
	mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	1;3.5 (S7)
	dá	'give imp.'	/ˈda/	[ɐˈda]	1;3.19 (S8)
	dá	'give imp.'	/ˈda/	[daˈda]	1;4.2 (S9)
[SW]	*banana*	'banana'	/bɐˈnɐnɐ/	[ˈnɐnɐ]	1;5.9 (S11)
	mamã	'mommy'	/mɐˈmɐ̃/	[ˈmɐ̃mɐ]	1;6.20 (S14)
	Susana	'name'	/suˈzɐnɐ/	[ˈnɐnɐ]	1;7.5 (S15)
	Lala	'name'	/ˈlalɐ/	[ˈnɐnɐ]	1;9.29 (S20)
	pato	'duck'	/ˈpatu/	[ˈatu]	1;10.18 (S21)
[WSW]	*Noddy*	'name'	/ˈnɔdi/	[tɔɾˈʎɔɾi]	2;2.4 (S28)
	Francisco	'name'	/fɾɐ̃ˈsiʃku/	[aˈtidɨː]	2;3.26 (S30)
	papéis	'papers'	/pɐˈpɛjʃ/	[pɐˈpejʃi]	2;4.11 (S31)

In sum, our results indicated three different developmental trends in the children's productions for word shape, which we summarize in the following table:

Children	**Developmental path for the word shapes produced**
Clara, Inês and João	[WS] > [S] > [SW] > [WSW]
Joana	[S] > [WS] > [SW] > [WSW]
Luma	[S] ~ [WS] > [SW] > [WSW]

Table 22. Individual developmental path for the word shapes produced

The results of the preference of the five children regarding word shape indicate that, initially, children may favor both [S] and [WS]. [SW] words emerge later than [S] and [WS]. [WSW] words emerge later than all other word shapes in development.

5.1.1.2. The shape of early words

The literature has suggested that the early speech of Portuguese-speaking children displays a heavy tendency for reduplication and epenthesis (Baia, 2006, 2008; Santos, 2001, 2007). It has also been suggested that most of those reduplications normally have an [WS] pattern.

An analysis conducted to account for the amount of iambic or trochaic reduplications observed in speech of the five children observed in this dissertation confirmed a heavy tendency for [WS] reduplications, as shown in Figures 24-28, where the absolute number of [SW] and [WS] reduplications is presented, per child:

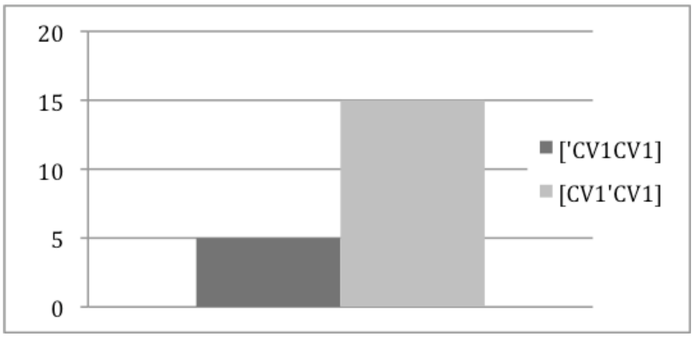

Figure 24. [SW] and [SW] reduplications (Clara)

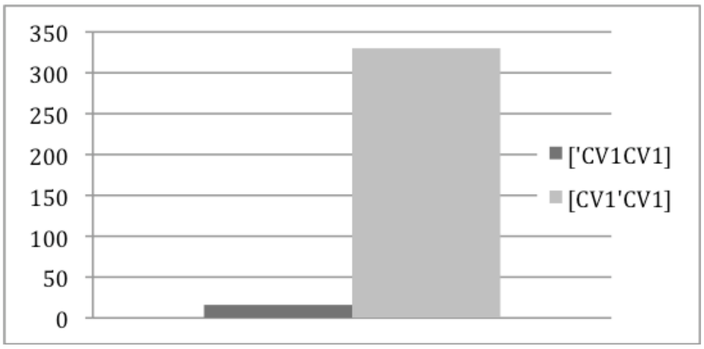

Figure 25. [SW] and [WS] reduplications (Inês)

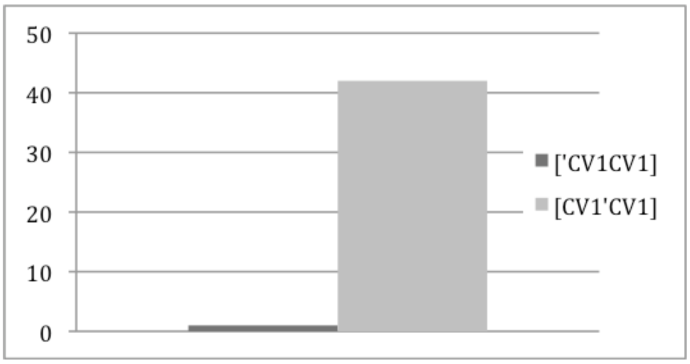

Figure 26. [SW] and [WS] reduplications (Joana)

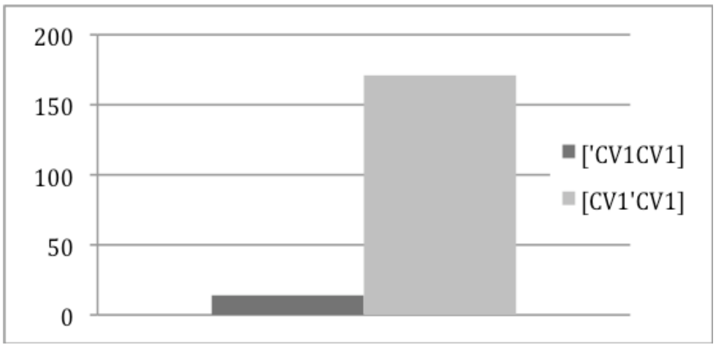

Figure 27. [SW] and [WS] reduplications (João)

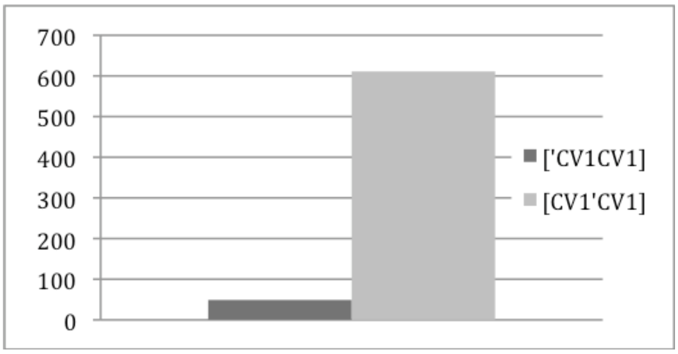

Figure 28. [SW] and [WS] reduplications (Luma)

The figures presented above show a tendency for [WS] reduplications in the speech of the five children observed. Even though some variation in the amount of reduplications is attested between children, and as furthermore demonstrated in the instances for early word shape (cf. examples in (112)-(116)), the five children under observation use reduplications in their speech and they are overwhelmingly [WS].

In order to investigate the nature of the early [WS] words - either these words have the same distribution as the other, non-reduplicated, disyllables - , we carried out an analysis where we zoomed into the early [WS] words produced by the five children under observation. In this analysis we accounted for the amount of [WS] non-reduplicated words, [WS] reduplicated words and cases of epenthesis creating an [WS] pattern, and compared it with both monosyllables and trochees. Therefore, we distinguished:

(i) Monosyllables ([S]);

(ii) Iambs ([WS] – e.g., *o<u>lá</u>* 'hello' /ɔˈla/, *ba<u>lão</u>* 'balloon' /bɐˈlɐ̃w̃/) - here, we exclude all reduplicated words and words resulting from epenthesis at the left edge of words;

(iii) Iambic reduplications ([S^2][166] – e.g., *pa<u>pá</u>* 'daddy' /paˈpa/) - here, non-reduplicated /WS/ words are excluded;

(iv) Iambs 'in disguise' resulting from the circumscription of the stressed syllable preceded by a filler syllable ([fS] – e.g., *<u>cre</u>me* 'lotion' produced as [ɨˈkɛ]);

(v) Trochees ([SW] – e.g., *<u>ca</u>sa* 'house').

In this analysis, we took into account the actual productions and not the faithful ones. Therefore, the words analyzed are irrespective of the target form, either it is reduplicated or not.

We compared data from two different moments: the early sessions of the Guttman scales[167] (designated as 'Early' in the Figures below), and a later session, i.e., the first session after the turning point to a trochaic predominance in the faithful productions (designated as 'Later' in the Figures shown below).

Figure 29 shows the distribution of monosyllabic productions (S), iambic non-reduplicated forms (WS), trochaic forms (SW), syllables preceded by a filler sound (fS) and reduplications (S2), in two observational periods of Clara's speech. In Clara, the 'Early' sessions correspond to her speech productions between sessions 1 and 10. The 'Later' moment corresponds to the productions of session 12.

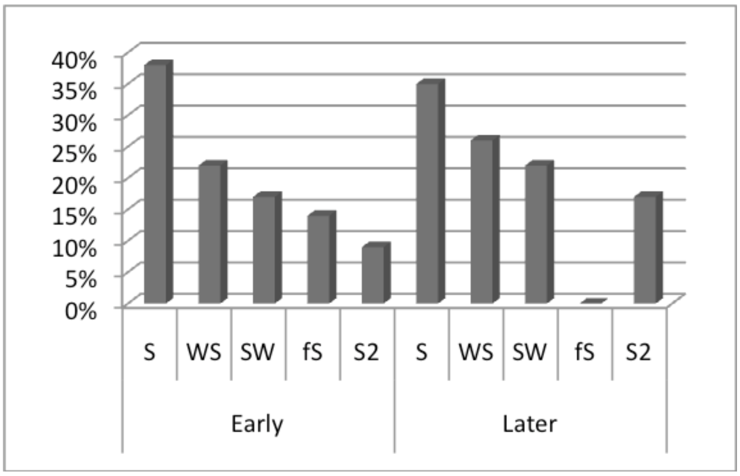

Figure 29. Percentage of word shapes produced - Early vs. later stages (Clara)

In Clara we observe that in the first sessions (Figure 29 'Early') there is a preference for monosyllables (38%). Non-reduplicated iambs are more frequent than trochees (22%

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[166] For space-saving reasons in the figures, in this section reduplications of the type [CV_1CV_1] will be referred to as [S^2].
[167] Cf. section 5.1.1..

contra 17%, respectively). Epenthesis and reduplications resulting in iambic productions are possible in 14% and 9% of the children's productions, respectively.

In the last session (Figure 29 'Later'), monosyllables are still preferred (35%), but epenthesis is no longer a used strategy (0%) and the remaining stress patterns ([WS], [SW] and [S^2]) have increased values (26%, 22% and 17% respectively). In the last session, non-reduplicated iambs, [SW] and [S^2] are still produced in similar amounts, thus suggesting the absence of a preference for any of them.

Examples in (117) illustrate the production of reduplication and epenthesis in Clara's speech in an earlier stage. Note that many produced reduplications are already reduplicated targets.

(117) Clara – early production of reduplicated disyllables and epenthesis:

<table>
<tr><th></th><th>Orthogr.</th><th>Gloss</th><th>Target</th><th>Output</th><th>Age</th></tr>
<tr><td rowspan="8">Redupl.</td><td>bebé</td><td>'baby'</td><td>/bɛˈbɛ/</td><td>[pɐˈpʷɐ]</td><td>1;1.3 (S3)</td></tr>
<tr><td>não</td><td>'no'</td><td>/ˈnɐ̃w̃/</td><td>[nɐˈnɐ̃w̃]</td><td rowspan="4">1;2.22 (S4)</td></tr>
<tr><td>bebé</td><td>'baby'</td><td>/bɛˈbɛ/</td><td>[beˈbe]</td></tr>
<tr><td>está</td><td>'(it) is'</td><td>/ʃˈta/</td><td>[tɐˈta]</td></tr>
<tr><td>papá</td><td>'daddy'</td><td>/pɐˈpa/</td><td>[paˈpa]</td></tr>
<tr><td>não</td><td>'no'</td><td>/ˈnɐ̃w̃/</td><td>[nɐˈnɐ̃w]</td><td rowspan="2">1;3.6 (S5)</td></tr>
<tr><td>bebé</td><td>'baby'</td><td>/bɛˈbɛ/</td><td>[beˈbeː]</td></tr>
<tr><td>bebé</td><td>'baby'</td><td>/bɛˈbɛ/</td><td>[beˈbe]</td><td>1;7.17 (S9)</td></tr>
<tr><td rowspan="8">Epenthesis</td><td>dá</td><td>‘give (me)’</td><td>/ˈda/</td><td>[ɐˈda]</td><td>1;0.13 (S2)</td></tr>
<tr><td>não</td><td>'no'</td><td>/ˈnɐ̃w̃/</td><td>[ɐˈnɐ̃w̃]</td><td rowspan="3">1;3.6 (S5)</td></tr>
<tr><td>pinguim</td><td>'penguin'</td><td>/pĩˈgʷĩ/</td><td>[ɐˈpe]</td></tr>
<tr><td>bebé</td><td>'baby'</td><td>/ bɛˈbɛ /</td><td>[ɐˈβe]</td></tr>
<tr><td>cão</td><td>'dog'</td><td>/ˈkɐ̃w̃/</td><td>[ɨˈkɐ̃w̃]</td><td rowspan="2">1;4.19 (S6)</td></tr>
<tr><td>bebé</td><td>'baby'</td><td>/bɛˈbɛ/</td><td>[ɐˈpe]</td></tr>
<tr><td>pé</td><td>'foot'</td><td>/ˈpɛ/</td><td>[aˈpɛ]</td><td rowspan="2">1;5.16 (S7)</td></tr>
<tr><td>pai</td><td>'father'</td><td>/ˈpaj/</td><td>[æˈpaj]</td></tr>
</table>

In the examples presented above, we observe that both reduplication and epenthesis are strategies used in the production of target reduplicated words or target monosyllables. In Clara's speech, target trochees are not subject to reduplication and/or epenthesis strategies.

In Figure 30, we present Inês' production of monosyllables, iambic non-reduplicated words, trochees, iambic reduplications and epenthesis, in two moments. In Inês' data, the 'Early' stage is comprised between sessions 1 and 4. The 'Later' moment corresponds to her productions in session 10.

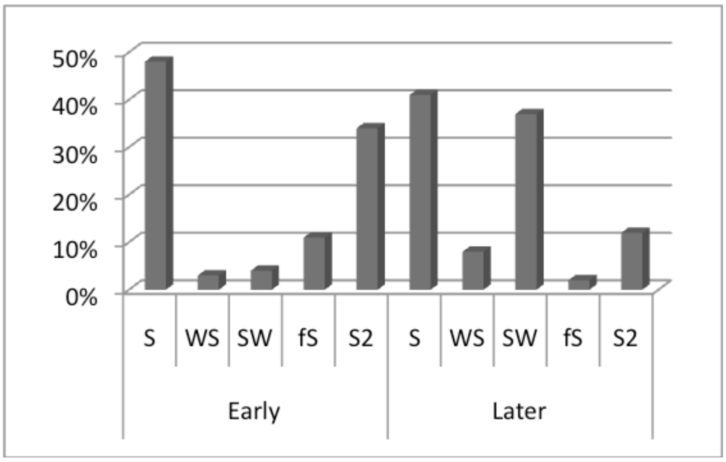

Figure 30. Percentage of word shaped produced - Early vs. later stages (Inês)

Inês is a showcase of the 'disguised iambs' that make Portuguese early word shape acquisition appear iambic. Figure 30 'Early' shows that the percentage of non-reduplicated iambs is hardly traceable (3%). In the early stage of word production, monosyllables prevail (48%), and non-reduplicated iambs and trochees are scarce (3% and 4%, respectively). In Figure 30 'Later', there is a change in the distribution of stress patterns in Inês' speech. Reduplicated disyllables are only 12% and trochees predominate amongst the disyllables (37%). Non-reduplicated iambs are scarce (8%) and monosyllables are still predominant (41%).

In (118), some instances of reduplicated disyllables and epenthesis with a [WS] form are shown in Inês' early speech (until session 4).

(118) Inês – early production of reduplicated disyllables and epenthesis:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Redupl.	*mamã*	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	0;11.14 (S1)
	Inês	'name'	/iˈneʃ/	[neˈne]	
	bebé	'baby'	/bɛˈbɛ/	[βəˈβɛ]	
	mamã	'mommy'	/mɐˈmɐ̃/	[maˈmɐ̃]	1;0.25 (S2)
	má	'bad'	/ˈma/	[mɐˈma]	1;1.23 (S3)
	Inês	'name'	/iˈneʃ/	[niˈni]	
	má	'bad'	/ˈma/	[mɐˈma]	
	babete	'bib'	/bɐˈbɛtɨ/	[baˈbaː]	1;3.6 (S4)
	Teresa	'name'	/tɨˈɾezɐ/	[tiˈtʲi]	
	dá	'give imp.'	/ˈda/	[daˈda]	
	não	'no'	/ˈnɐ̃w̃/	[nɔˈna]	
	bóia	'buoy'	/ˈbɔjɐ/	[βaˈβɐ]	
	Bambi	'name'	/bɐ̃bi/	[mɐˈmɛː]	
	vestido	'dress'	/vɨʃˈtidu/	[tʲiˈtʲi]	1;5.11 (S6)
	cueca	'panties'	/kuˈɛkɐ/	[kɛˈkɛ]	
Epenthesis	*dá*	'give imp.'	/ˈda/	[ʔˈda]	0;11.14 (S1)
	mamã	'mommy'	/mɐ̃ˈmɐ̃/	[ɐˈmɐ̃]	1;0.25 (S2)
	dá	'give imp.'	/ˈda/	[aˈdʲa]	
	não	'no'	/ˈnɐ̃w̃/	[əˈɲə]	
	Mário	'name'	/ˈmaɾiw/	[əˈmɐ]	1;1.30 (S3)
	chupeta	'pacifier'	/ʃuˈpetɐ/	[ɐˈbe]	
	Isabel	'name'	/izɐˈbeɫ/	[ɛˈbe]	
	mais	'more'	/ˈmajʃ/	[æˈma]	
	babete	'bib'	/bɐˈbɛtɨ/	[ɐˈβɛ]	1;3.6 (S4)
	não	'no'	/ˈnɐ̃w̃/	[ɐˈɲɐ]	1;5.11 (S6)
	banho	'bath'	/ˈbɐɲu/	[ɐˈbɐ]	

In Inês' speech, we observe that both /S/, /WS/, /SW/ and even /WSW/ words are prone to reduplication and epenthesis strategies. As demonstrated in Figure 30, non-reduplicated iambs are scarce in this child's early speech.

In Figure 31, we show Joana's productions for monosyllables, non-reduplicated iambs, trochees, a monosyllable preceded by epenthesis and reduplications, in two observation moments: the 'Early' moment corresponds to the speech productions uttered until session 10. The 'Later' moment corresponds to the speech productions uttered in session 12.

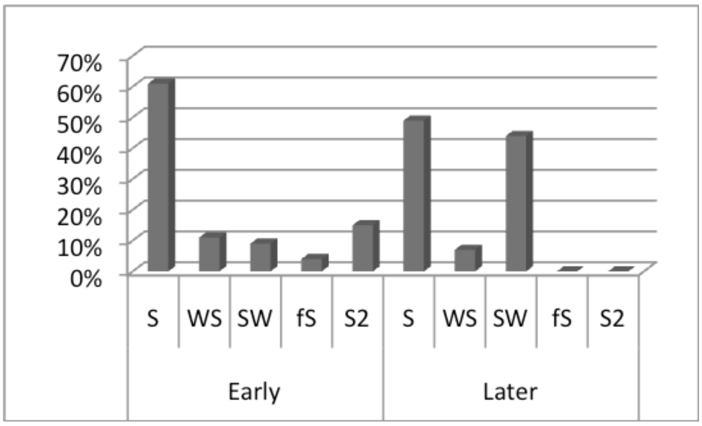

Figure 31. Percentage of word shapes produced - Early vs. later stages (Joana)

In Joana's speech we observe a high predominance of monosyllables in the early sessions (Figure 31 'Early'). Monosyllables are 61% of Joana's early productions, and non-reduplicated iambs and trochees are distributed evenly (11% vs. 9%, respectively). Reduplicated disyllables correspond to 15% of Joana's early productions and are the second most frequent word shape. Session 12 (Figure 31 'Later') marks a clear change in the distribution of stress patterns in Joana's speech. In this session, monosyllables are still predominant (49%), but trochees become more present (44%). Non-reduplicated iambs are scarce (7%) and reduplications and epentheses are no longer produced.

Joana's production of reduplicated disyllables is exemplified in (119).

(119) Joana – early production of reduplicated disyllables and epenthesis:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Redupl.	*mamã*	'mommy'	/mɐ̃ˈmɐ̃/	[mɐ̃ˈmɐ̃]	1;2.7 (S3)
	bebé	'baby'	/bɛˈbɛ/	[bɛˈβiː]	1;6.24 (S7)
	pato	'duck'	/ˈpatu/	[paˈpa]	1;9.25 (S9)
	Raquel	'name'	/ʀɐˈkɛɫ/	[kɐˈkɛ]	
	sapato	'shoe'	/sɐˈpatu/	[paˈpa]	
	Bobby	'name'	/bɔˈbi/	[pɐˈpɛː]	
	padrinho	'godfather'	/pɐˈdɾiɲu/	[paˈpa]	
	popó	'car fam.'	/pɔˈpɔ/	[pɔˈpɔ]	
	chá	'tea'	/ˈʃa/	[taˈðʲa]	
	escola	'school'	/ʃˈkɔlɐ/	[kɔˈkɔː]	1;10.22 (S10)
	bombom	'candy'	/bõˈbõ/	[buˈbũ]	
Epenthesis	*mamã*	'mommy'	/mɐ̃ˈmɐ̃/	[ɐˈmɐ̃]	1;0.25 (S2)
	mamã	'mommy'	/mɐˈmɐ̃/	[ʔˈmɐ̃]	1;2.7 (S3)
	não	'no'	/ˈnɐ̃w̃/	[ɨˈɲɐ̃w̃]	1;1.22 (S10)

The instances from Joana presented in (119) show the same behavior observed in Inês: iambic reduplications and epenthesis may be observed in the production of target monosyllables, target reduplicated iambs, target trochees and longer words.

In Figure 32, we present João's percentages for the different word shapes produced: monosyllables, non-reduplicated iambs, trochees, a monosyllable preceded by a filler sound and reduplications. The first moment of observation was comprised between sessions 1 and 9, whereas the second moment of observation was session 17.

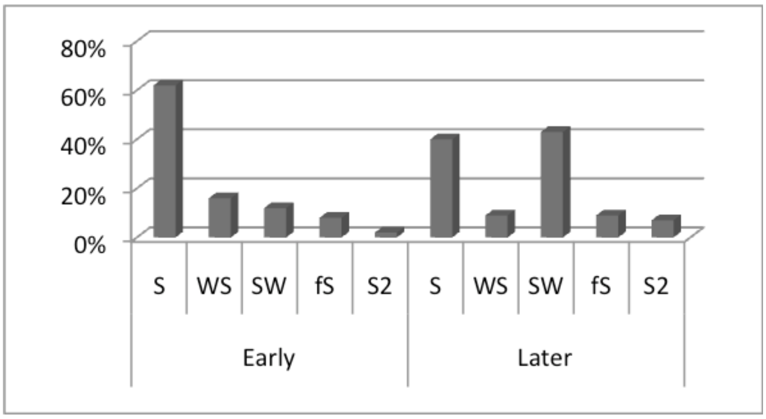

Figure 32. Percentage of word shapes produced - Early vs. later stages (João)

Like Joana, João's early speech (until session 9) is mainly composed of monosyllables (62%). Reduplicated disyllables and epenthesis account for 10% of his speech (2% and 8%, respectively), whereas trochees and non-reduplicated iambs are evenly produced (12% and 16%, respectively). In session 17, the stress pattern distribution changed dramatically: monosyllables are now only 40% of João's speech, and trochees increased significantly (43%), *contra* a low production of non-reduplicated iambs (9%). Epenthesis and reduplicated iambs are scarce (1% and 7%, respectively).

In (120), we present João's renditions of reduplications and cases of epenthesis. We will first present the examples of epenthesis, as this was the strategy mostly used by João (reduplication was rare).

(120) João – early production of reduplication and epenthesis:

	Orthogr.	Gloss	Target	Output	Age
Epenthesis	*dá*	'give imp.'	/ˈda/	[ɐˈda]	1;0.28 (S2)
	dá	'give imp.'	/ˈda/	[aˈda]	1;1.12 (S3)
	água	'water'	/ˈagʷɐ/	[ɨˈwɐ]	
	bolacha	'cookie'	/buˈlaʃɐ/	[ɐˈbwa]	1;2.13 (S5)
	mamã	'mommy'	/mɐˈmɐ̃/	[ɐˈmɐ̃]	1;2.30 (S6)
	bolacha	'cookie'	/buˈlaʃɐ/	[ɐˈbɐ]	
	papa	'food fam.'	/ˈpapɐ/	[aˈpa]	1;3.21 (S7)
Redupl.	*olá*	'hello'	/ɔˈla/	[ʎɐˈʎa]	1;1.12 (S3)
	melão	'mellon'	/mɨˈlɐ̃w̃/	[lɐˈlɐ̃w̃]	1;4.17 (S8)
	maçã	'apple'	/mɐˈsɐ̃/	[mɐːˈmɐ]	
	dá	'give imp.'	/ˈda/	[dɐˈdɐː]	1;5.12 (S9)
	popó	'car fam.'	/pɔˈpɔ/	[paˈpa]	1;5.26 (S10)

In João's speech, the strategies of reduplication and epenthesis mainly occur with iambic target words (though, occasionally, some /-SW/ words like *bolacha* 'cookie' /buˈlaʃɐ/, may be subject to those strategies).

Figure 33 shows the percentage of word shapes produced by Luma in two moments. The first one regards her speech productions until session 30. The second one correspond to Luma's speech productions in session 33. Monosyllables, non-reduplicated iambs, trochees, productions of monosyllables preceded by a filler sound and iambic reduplications were analyzed.

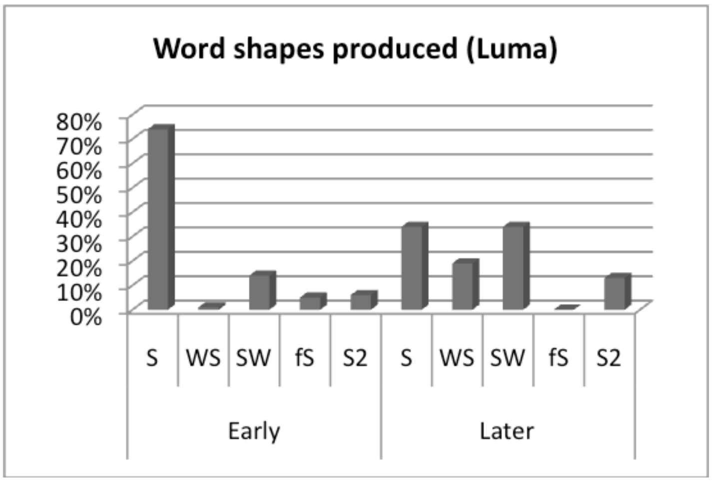

Figure 33. Percentage of word shapes produced - Early vs. later stages (Luma)

Luma is the child who produced more monosyllables in the early stages of word production (74%). She has a higher percentage of production for trochees (14%) than for non-reduplicated iambs (1%). Iambic reduplications and epenthesis account for 11% of

Luma's early productions (6% and 5%, respectively). In session 36 (Figure 33 'Later'), Luma has a more balanced distribution of stress patterns. Monosyllables decrease to 34%, trochees and non-reduplicated iambs increase to 34% and 19%, respectively. Though reduplicated iambs increase (13%), epenthesis is no longer a strategy being used.

In (121) we present Luma's production of reduplicated disyllables and epenthesis.

(121) Luma – early production of reduplication and epenthesis:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Redupl.	*Hopla*	'name'	/ˈɔplɐ/	[paˈpʰa]	1;1.10 (S4)
	bebé	'baby'	/bɛˈbɛ/	[paˈpa]	
	dá	'give imp.'	/ˈda/	[daˈda]	1;4.2 (S9)
	banana	'banana'	/bɐˈnɐnɐ/	[nɐˈnɐ]	1;5.24 (S12)
	mamã	'mommy'	/mɐ̃ˈmɐ̃/	[maˈmɐ̃]	1;7.19 (S16)
	dá	'give imp.'	/ˈda/	[daˈda]	
	bola	'ball'	/ˈbɔlɐ/	[paˈpa]	1;8.2 (S17)
Epenthesis	*dá*	'give imp.'	/ˈda/	[ɐˈda]	1;0.13 (S2)
	mamã	'mommy'	/mɐ̃ˈmɐ̃/	[əˈmɐ̃]	1;3.19 (S8)
	dá	'give imp.'	/ˈda/	[aˈda]	
	bola	'ball'	/ˈbɔlɐ/	[aˈβo]	

5.1.1.3. Summary for the production patterns

The data regarding the amount of monosyllables, non-reduplicated iambs, trochees and 'disguised iambs' ([CV_1'CV_1] and [fS]) produced by the five children under observation indicates that:

(i) The emergence of word shapes in the speech of the five Portuguese children observed varies mostly between [S] > [WS] > [SW] and [WSW] (in Joana), and [WS] > [S] > [SW] and [WSW] (in Clara, Inês and João); Luma has a simultaneous emergence of [S] and [WS], followed by [SW] and, later, [WSW];

(ii) At the early sessions, monosyllabic words prevail, in the speech of all children (the data from Joana, João and Luma illustrate the overwhelming preference for monosyllabic words in the early stages of word production);

(iii) Later, the amount of monosyllables is similar to the one found for trochees;

(iv) Iambic reduplications and epenthesis are very present at the beginning but they tend to disappear;

(v) Children only vary in the preferential use of reduplication or epenthesis: Joana and Inês prefer reduplicated words, João uses mostly epenthesis and Luma uses both in the same amount;

(vi) At the beginning, the percentage of non-reduplicated iambs and trochees is very similar (except in Luma, where the percentage of trochees is higher that the one of iambs);

(vii) Later, the percentage of trochees surpasses the percentage of iambs in four of the five children observed (Clara is the only exception).

5.1.2. Faithfulness to the target

In this section, we will present the results for the acquisition of stress patterns, having in mind the children's *faithfulness* to the target. By 'faithfulness' we mean the target-like production of a word template and not a specific lexical item. Therefore, a [WS] word like *balão* 'balloon' [bɐˈlɐ̃w̃], produced as [bɐˈwɐ̃w̃] or [bɐˈbɐ] will equally be considered as faithful. Information on the contrary will be provided, when necessary. The data for target monosyllables (/S/), target disyllables (/SW/ and /WS/) and target trisyllables (/WSW/, /WWS/ and /SWW/) will be presented.

5.1.2.1. Monosyllables

In this section, we will present the results for target monosyllables produced target-like. We will consider as 'target-like' a target monosyllable that keeps one single syllable in the children's production. Target monosyllables produced non-target-like will be analyzed in section 5.1.3.1..

Tables 23-27 indicate the acquisition path for monosyllabic targets in all children, in the sessions under analysis. Instances in (121)-(125) exemplify children's early faithfulness towards monosyllabic targets.

Table 23 shows Clara's developmental path for target monosyllables.

Session	**/S/**	**[S]**	**%**
S1	-	-	**-**
S2	1	0	**0**
S3	4	4	**100.0**
S4	7	6	**85.7**
S5	7	5	**71.4**
S6	13	6	**46.2**
S7	27	20	**74.1**
S8	17	11	**64.7**
S9	22	15	**68.2**
S10	34	32	**94.1**
S11	100	86	**86.0**
S12	87	82	**94.3**

Table 23. Monosyllables produced target-like (Clara)

In Table 23, we observe that Clara has a target-like rate of monosyllables above the 50% point since session 3. Despite a decreasing target-like rate from session 3 to session 6 to values close to 50%, Clara has a high percentage of monosyllables produced accordingly in almost all sessions until the end of the observation period, despite some instability is observed.

In (122), we exemplify Clara's accuracy in the production of target monosyllables.

(122) Clara – monosyllables produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃w̃]	1;1.3 (S3)
dá	'give imp.'	/ˈda/	[ˈdə]	
não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃w̃]	1;2.22 (S4)
dá	'give imp.'	/ˈda/	[ˈta]	
não	'no'	/ˈnɐ̃w̃/	[ˈɲɔ]	1;4.19 (S6)
cão	'dog'	/ˈkɐ̃w̃/	[ˈkɐ̃w̃]	
mãe	'mother'	/ˈmɐ̃j̃/	[ˈmɐ̃ːj̃]	

Table 24 accounts for Inês' target-like production of target monosyllables.

Session	/S/	[S]	%
S1	1	0	**0**
S2	22	13	**59.1**
S3	68	25	**36.8**
S4	112	45	**40.2**
S5	39	27	**69.2**
S6	129	81	**62.8**
S7	80	54	**67.5**
S8	89	64	**71.9**
S9	97	86	**88.7**
S10	136	119	**87.5**
S11	236	200	**84.7**
S12	410	374	**91.2**
S13	259	239	**92.3**
S14	316	288	**91.1**
S15	226	211	**93.4**
S16	454	416	**91.6**
S17	236	218	**92.4**
S18	428	358	**83.6**

Table 24. Monosyllables produced target-like (Inês)

In this table, we observe three moments: a first moment, between session 2 and 4, in which Inês has a slight decrease in the target-like rate (59.1%, 36.8% and 40%); a second moment, between session 5 and 8, in which the production rates are above 50%, but some instability is still observed (percentage values do not go beyond 75%), and a third moment (from session 9 onwards), in which the child has production values above 75%.

The instances in (123) show that Inês' productions of early monosyllabic words are generally target-like.

(123) Inês – monosyllables produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
dá	'give imp.'	/ˈda/	[ˈdaː]	1;0.25 (S2)
não	'no'	/ˈnɐ̃w̃/	[ˈna]	
já	'now'	/ˈʒa/	[ˈza]	
cão	'dog'	/ˈkɐ̃w̃/	[ˈga]	1;1.20 (S3)
há	'there is'	/ˈa/	[ˈa]	
pé	'foot'	/ˈpɛ/	[ˈpɛ]	
mãe	'mother'	/ˈmɐ̃j̃/	[ˈma]	

In Table 25 we show the developmental path of Joana towards monosyllables.

Session	**/S/**	**[S]**	**%**
S1	2	2	**100**
S2	1	1	**100**
S3	1	1	**100**
S4	8	8	**100**
S5	3	3	**100**
S6	3	2	**66.7**
S7	7	7	**100**
S8	8	7	**87.5**
S9	21	18	**85.7**
S10	62	52	**83.9**
S11	57	48	**84.2**
S12	59	51	**86.4**
S13	55	49	**89.1**
S14	229	181	**74.7**

Table 25. Monosyllables produced target-like (Joana)

We see that this child produces high target-like production of monosyllables from the beginning of word production, until the end of the observation period. In session 6, the child has an occasional decreasing value in the production of target monosyllables (66.7%), but the following sessions all have values of target-like production above 75%[168].

Instances in (124) exemplify Joana's production of monosyllabic targets.

(124) Joana – monosyllables produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
mãe	'mother'	/ˈmɐ̃j̃/	[ˈɐ̃ː]	0;11.26 (S1)
não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃ːw̃]	
há	'there is'	/ˈa/	[ˈa]	1;2.7 (S3)
pé	'foot'	/ˈpɛ/	[ˈpɛ]	
pai	'father'	/ˈpaj/	[ˈpæ]	
pai	'father'	/ˈpaj/	[ˈwɐj]	1;5.5 (S6)
não	'no'	/ˈnɐ̃w̃/	[ˈnæw]	
é	'(it) is'	/ˈɛ/	[ˈɛ]	1;6.24 (S7)
há	'there is'	/ˈa/	[ˈaː]	

Table 26 shows João's acquisition path towards monosyllabic targets.

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[168] As we will show further in this chapter, Joana is a child where monosyllabic words (either produced target-like or as the result of truncations in multisyllabic target words) are frequently produced during the observation period.

Session	/S/	[S]	%
S1	-	-	**-**
S2	4	1	**25**
S3	1	-	**0**
S4	-	-	**-**
S5	-	-	**-**
S6	-	-	**-**
S7	3	2	**66.7**
S8	1	1	**100**
S9	26	16	**61.5**
S10	13	10	**76.9**
S11	26	12	**46.2**
S12	39	13	**33.3**
S13	18	15	**83.3**
S14	12	10	**83.3**
S15	29	27	**93.1**
S16	41	35	**85.4**
S17	72	55	**76.4**
S18	31	25	**80.6**
S19	68	62	**91.2**
S20	52	48	**92.3**
S21	33	26	**78.8**
S22	71	63	**88.7**

Table 26. Monosyllables produced target-like (João)

In this table we observe that from session 1 to session 6, João rarely selects monosyllables. In session 7 and 8, few monosyllables are selected (3 and 1, respectively) but they are mostly produced accordingly. From session 9 to session 12, there is target-like production rate normally above 50% (though in sessions 11 and 12, the production values decrease to 46% and 33%, respectively). After session 13, monosyllables are produced accordingly in rates above 75%.

In (125) we present João's production data for target monosyllables.

(125) João – monosyllables produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
dá	'give (me)'	/ˈda/	[ˈda]	1;0.28 (S2)
pau	'stick'	/ˈpaw/	[ˈpaːj]	1;3.21 (S7)
pau	'stick'	/ˈpaw/	[ˈpɐw]	1;4.17 (S8)
mãe	'mother'	/ˈmɐ̃j̃/	[ˈmɐ̃ːj̃]	1;5.12 (S9)
pá	'shovel'	/ˈpa/	[ˈpʰa]	
dá	'give (me)'	/ˈda/	[ˈda]	1;5.26 (S10)
pá	'shovel'	/ˈpa/	[ˈpa]	

Table 27 summarizes Luma's production towards target monosyllables.

Session	/S/	[S]	%
S1	1	0	**0**
S2	2	1	**50**
S3	-	-	**-**
S4	-	-	**-**
S5	-	-	**-**
S6	13	12	**92.3**
S7	32	28	**87.5**
S8	36	12	**33.3**
S9	4	2	**50.0**
S10	1	1	**100.0**
S11	1	1	**100.0**
S12	5	3	**60.0**
S13	21	20	**95.2**
S14	2	2	**100.0**
S15	41	37	**90.2**
S16	7	2	**28.6**
S17	8	4	**50.0**
S18	7	5	**71.4**
S19	22	11	**50.0**
S20	14	8	**57.1**
S21	7	2	**28.6**
S22	2	1	**50.0**
S23	3	2	**66.7**
S24	6	4	**66.7**
S25	14	10	**71.4**
S26	18	9	**50.0**
S27	53	51	**96.2**
S28	59	52	**88.1**
S29	89	85	**95.5**
S30	149	136	**91.3**
S31	177	168	**94.9**
S32	260	227	**87.3**
S33	168	144	**85.7**
S34	181	147	**81.2**
S35	183	162	**88.5**
S36	216	185	**85.6**
S37	124	115	**92.7**

Table 27. Monosyllables produced target-like (Luma)

Until session 23, Luma has a high rate of target-like production of monosyllables from the beginning, though some inconsistencies might be found, both in percentual and in types/tokens terms. For instance, in session 8, the child has 36 monosyllabic words in her intake, (producing only 33.3% of them accordingly) and in the following session (session 10), she only selects one token for production. From session 25 onwards, the child starts selecting monosyllabic words in higher amounts and she is able to produce them in values above 75%.

The instances presented in (126) illustrate Luma's production of target monosyllables.

(126) Luma – monosyllables produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
dá	'give imp.'	/ˈda/	[ˈda]	1;0.13 (S2)
dá	'give imp.'	/ˈda/	[ˈda]	1;2.22 (S6)
não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃w̃]	1;3.5 (S7)
pau	'stick'	/ˈpaw/	[ˈpa]	1;3.19 (S8)
Po	'name'	/ˈpo/	[ˈpa]	1;4.2 (S9)
dá	'give imp.'	/ˈda/	[ˈda]	1;5.9 (S11)

The results showed in this section indicate that children generally produce monosyllables in high target-like rates (above 50%) from the beginning. However, some variation is found between the five observed children. Joana has a stable production (generally above 75%) of monosyllables from the onset of word production. In Clara, Inês, João and Luma's speech, some instability is normally attested in the first half of the observation period, in which normally production rates between 50% and 75% are noticeable. After that moment, high target-like production rates are observed.

The preference for monosyllables, accounted for in the Guttman scales (section 5.1.1.) for the early stages, is attested by a higher faithfulness rate in all the children observed. As we will see in section 5.1.3., the strategies used by the children when they are not faithful to monosyllables consist in producing di- or polisyllabic words, by means of reduplication or epenthesis.

5.1.2.2. Disyllables

The results in this section account for the production of target disyllabic words and will be presented in terms of target trochees (/SW/) and target iambs (/WS/) produced faithfully.

Given the heavy tendency for reduplicated productions and productions where epenthesis was attested, creating an [WS] pattern, in this section we will account for the acquisition of target trochees and iambs by distinguishing: (i) the general results for faithfulness (including reduplicated words and productions with epenthesis) and (ii), non-reduplicated disyllables and disyllables where no epenthesis is observed.

In Table 28, we show the general results regarding Clara's acquisition path for target troches and iambs.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	1	1	**100**	3	3	**100**
S2	-	-	**-**	1	1	**100**
S3	4	3	**75**	9	3	**33.3**
S4	-	-	**-**	10	6	**60**
S5	4	2	**50**	8	3	**37.5**
S6	4	3	**75**	6	2	**33.3**
S7	5	1	**20**	29	20	**69**
S8	6	6	**100**	10	7	**70**
S9	10	5	**50**	23	10	**43.5**
S10	80	59	**73.8**	35	20	**57.1**
S11	161	103	**64.0**	82	62	**75.6**
S12	146	76	**52.1**	142	110	**77.5**

Table 28. Disyllables produced target-like (Clara)

In Clara's data, we observe an unstable behavior in the production of target trochees and iambs until session 6 and 7, respectively. In session 7, /WS/ words have a target-like rate above 50% and start being produced in higher rates, until the end of the observation. /WS/ words are more frequent in the child's intake. Until session 8, /SW/ words are produced inconsistently. From session 9 onwards, /SW/ words start having higher target-like production rate (above 50%), though some unstabilily is observed in the target-like production values until the end of the observation.

The instances in (127) and (128) illustrate Clara's production of target iambs and target trochees, respectively.

(127) Clara – iambs produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
bebé	'baby'	/bɛˈbɛ/	[beˈbe]	1;2.22 (S4)
pinguim	'penguin'	/pĩˈgʷĩ/	[ɐˈpe]	1;3.6 (S5)
bebé	'baby'	/bɛˈbɛ/	[ɐˈpe]	1;4.19 (S6)
bebé	'baby'	/bɛˈbɛ/	[bɛˈbɛ]	1;5.26 (S7)
João	'name'	/ʒuˈɐ̃w̃/	[zuˈɐ̃w̃]	1;7.11 (S9)
cocó	'poo'	/kɔˈkɔ/	[koˈko]	1;8.20 (S10)
memé	'sheep fam.'	/mɛˈmɛ/	[nɨˈnɛ]	1;9.23 (S11)
aí	'there'	/ɐˈi/	[ɐˈi]	1;9.23 (S11)

(128) Clara – trochees produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
água	'water'	/ˈagʷɐ/	[ˈaːβɐ]	1;3.6 (S5)
água	'water'	/ˈagʷɐ/	[ˈakə]	1;4.19 (S6)
mano	'brother fam.'	/ˈmɐnu/	[ˈmɐnu]	1;5.16 (S7)
mana	'sister fam.'	/ˈmɐnɐ /	[ˈmɐnɐ]	1;7.11 (S9)
pato	'duck'	/ˈpatu/	[ˈpatʲu]	1;8.20 (S10)
chucha	'pacifier fam.'	/ˈʃuʃɐ/	[ˈsüsa]	1;9.23 (S11)
esta	'this fem.'	/ˈɛʃtɐ/	[ˈɛtʰɐ]	1;10.15 (S12)

In the renditions presented above, we observe that Clara normally produces /WS/ words as reduplications or she inserts a filler syllable at the left edge of the circumscribed stressed syllable. Also, we observe that early /WS/ words are often reduplicated in the target (e.g., *mamã* 'mommy', *bebé* 'baby', *cocó* 'poo'). Conversely, when /SW/ start being produced as [SW] they normally correspond to non reduplicated words ([CV_1CV_2]).

Table 29 shows Inês' acquisition path for target trochees and iambs.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	-	-	**-**	19	8	**42.1**
S2	2	0	**0**	41	15	**36.6**
S3	4	0	**0**	64	21	**32.8**
S4	27	1	**3.7**	67	39	**58.2**
S5	27	1	**3.7**	56	30	**53.6**
S6	90	1	**1.1**	110	61	**55.5**
S7	73	3	**4.1**	93	55	**59.1**
S8	39	5	**12.8**	80	35	**43.8**
S9	140	82	**58.6**	113	81	**71.7**
S10	221	166	**75.1**	96	89	**92.7**
S11	238	182	**76.5**	201	124	**61.7**
S12	275	229	**83.3**	254	159	**62.6**
S13	297	256	**86.2**	189	128	**67.7**
S14	249	198	**79.5**	211	147	**69.7**
S15	232	178	**76.7**	133	89	**66.9**
S16	283	215	**76.0**	168	108	**64.3**
S17	154	87	**56.5**	96	45	**46.9**
S18	275	193	**70.2**	150	90	**60.0**

Table 29. Disyllables produced target-like (Inês)

Inês displays a different behavior towards target trochees and target iambs. The first observation that we can draw from her data is that she displays an acquisition path for target trochees (there are clear increasing production values from the early to the later sessions), whereas target iambs have a slow increasing production rate, but no great variation, from the early to the later sessions. In Inês' data, trochees present a low target-like production rate (below 50%) until session 8 and, from session 9 onwards, the production values generally rise to values above 75%. Despite target iambs seem to be acquired earlier than trochees (in session 4, a 58.2% production rate is attested), the target-like production values do not vary much across earlier and later sessions.

In (129) and (130) we present Inês' renditions for target iambs and target trochees, respectively.

(129) Inês – iambs produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	0;11.14 (S1)
Inês	'name'	/iˈneʃ/	[neˈne]	1;1.30 (S3)
chapéu	'hat'	/ʃɐˈpɛw/	[pɛˈpæː]	1;3.6 (S4)
aqui	'here'	/ɐˈki/	[ɐˈtʲi]	1;5.11 (S6)
balão	'balloon'	/bɐˈlɐ̃w̃/	[bɐˈbɐ]	1;6.11 (S7)
popó	'car fam.'	/pɔˈpɔ/	[pɐˈpɔ]	1;8.2 (S9)
bacio	'basin'	/bɐˈsiw	[βiˈbi]	
João	'name'	/ʒuˈɐ̃w̃/	[duˈɐ̃w̃]	1;10.29 (S11)

(130) Inês – trochees produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpatʲɐ]	1;8.2 (S9)
casa	'house'	/ˈkazɐ/	[ˈkata]	1;9.19 (S10)
boa	'good'	/ˈboɐ/	[ˈboɐ]	1;10.29 (S11)
sala	'living room'	/ˈsalɐ/	[ˈtʲalɐ]	
sete	'seven'	/ˈsɛtɨ/	[ˈdɛtɐ]	2;0.11 (S12)
branca	'white'	/ˈbrɐ̃kɐ/	[ˈbɐ̃kɐ]	
Bambi	'name'	/ˈbɐ̃bi/	[ˈbabi]	
banho	'bath'	/bɐɲu/	[ˈbɐju]	2;1.10 (S13)
lobo	'wolf'	/ˈlobu/	[ˈlubu]	
livro	'book'	/ˈlivɾu/	[ˈidi]	
nada	'nothing'	/ˈnadɐ/	[ˈnadɐ]	2;2.1 (S14)
preta	'black'	/ˈpɾetɐ/	[ˈpetʲɐ]	

As for Clara, in the examples presented of Inês's speech, we observe that early iambs tend to be reduplicated words (either from reduplicated target words or not), whereas the trochaic words produced by Inês are normally [CV_1CV_2] words.

In Table 30, we present Joana's acquisition path for target trochees and target iambs.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	-		**-**	-	-	**-**
S2	-	-	**-**	4	0	**0.0**
S3	2	0	**0.0**	3	1	**33.3**
S4	-	-	**-**	3	0	**0.0**
S5	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**
S7	16	0	**0.0**	3	1	**33.3**
S8	4	0	**0.0**	3	0	**0.0**
S9	13	0	**0.0**	29	9	**31.0**
S10	16	2	**12.5**	28	10	**35.7**
S11	45	13	**28.9**	54	32	**59.3**
S12	91	57	**62.6**	34	10	**29.4**
S13	74	44	**59.5**	42	16	**38.1**
S14	163	108	**66.3**	56	28	**50.0**

Table 30. Disyllables produced target-like (Joana)

Table 30 shows that Joana selects and produces target iambs earlier than trochees. In the early sessions (sessions 2-9), target iambs have an early unstable production, whereas target-trochees are not produced. In session 10 and 11, iambs have a higher target-like production rate than trochees (35.7% *vs.* 12.5% in session 10, and 59.3% *vs.* 28.9% in session 11), though the amount of trochees in the child's intake increases in session 10. In session 12, we observe a turning point in the child's speech, as the amount of trochees produced target-like surpasses the iambs. Both target-trochees and target iambs remain below the 75% rate of target-like production until the end of the observation period, in Joana's speech.

Instances in (131) and (132) illustrate Joana's early production of target iambs produced accordingly, from session 2 onwards. Target trochees are mostly produced target-like from session 12 onwards.

(131) Joana – iambs produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
mamã	'mommy'	/mɐˈmɐ̃/	[ɐˈmɐ̃]	1;0.25 (S2)
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	1;2.7 (S3)
bebé	'baby'	/bɛˈbɛ/	[beˈβiː]	1;6.24 (S7)
café	'coffee'	/kɐˈfɛ/	[kiˈkɛ]	1;9.25 (S9)
Raquel	'name'	/ʀɐˈkɛɫ/	[kɛˈkɛː]	1;10.22 (S10)
avó	'grandmother'	/ɐˈvɔ/	[ɐˈbɔː]	
pastor	'shepard'	/pɐʃˈtoɾ/	[pɨˈtʲo]	2;0.9 (S11)
colher	'spoon'	/kuˈʎɛɾ/	[duˈɲɛj]	2;2.19 (S12)
avó	'grandmother'	/ɐˈvɔ/	[ɐˈvɔ]	

(132) Joana – trochees produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Nando	'name'	/ˈnɐ̃du/	[ˈnaɲu]	2;2.19 (S12)
seco	'dry'	/ˈseku/	[ˈtjɛku]	
outra	'other'	/ˈotɾɐ/	[ˈotʲɐ]	
mala	'purse'	/ˈmalɐ/	[ˈmawɐ]	2;4.1 (S13)
pedra	'stone'	/ˈpɛdɾɐ/	[ˈpɛtʰɐ]	
mota	'motorbike'	/ˈmɔtɐ/	[ˈmɔːtʲɐ]	
Paula	'name'	/ˈpawlɐ/	[ˈpawɐ]	2;6.24 (S14)
casa	'house'	/ˈkazɐ/	[ˈkajʒɐ]	
prima	'cousin'	/ˈpɾimɐ/	[ˈpimɐ]	
quadro	'painting'	/ˈkʷadɾu/	[ˈkajdʲu]	

As observed in Inês and Clara, Joana's early iambs tend to be the result of a reduplication strategy (either from reduplicated targets or not) or the result of epenthesis at the left edge of the circumscribed stressed syllable of the target word. When trochees are produced correctly, they are normally produced as [CV_1CV_2].

In Table 31, we present João's development for target trochees and target iambs.

Session	**/SW/**	**[SW]**	**%**	**/WS/**	**[WS]**	**%**
S1	6	1	**16.7**	-	-	**-**
S2	-	-	**-**	1	0	**0.0**
S3	8	3	**37.5**	4	3	**75.0**
S4	6	5	**83.3**	6	4	**66.7**
S5	4	0	**0.0**	-	-	**-**
S6	-	-	**-**	8	2	**25.0**
S7	15	2	**13.3**	22	3	**13.6**
S8	18	1	**5.6**	12	4	**33.3**
S9	13	2	**15.4**	16	2	**12.5**
S10	39	5	**12.8**	30	18	**60.0**
S11	17	3	**17.6**	17	13	**76.5**
S12	12	4	**33.3**	28	17	**60.7**
S13	23	5	**21.7**	54	40	**74.1**
S14	17	8	**47.1**	33	29	**87.9**
S15	7	3	**42.9**	32	17	**53.1**
S16	34	21	**61.8**	44	22	**50.0**
S17	58	49	**84.5**	25	16	**64.0**
S18	67	60	**89.6**	56	37	**66.1**
S19	77	62	**80.5**	37	21	**56.8**
S20	90	71	**78.9**	41	22	**53.7**
S21	86	78	**90.7**	37	24	**64.9**
S22	59	48	**81.4**	42	17	**40.5**

Table 31. Disyllables produced target-like (João)

In Table 31, we observe that, in the early sessions (sessions 1-6), the number of trochees in the child's intake in higher than the number of iambs. At this period, the child has a reduced number of both structures, and a variable target-like production rate is observed in /SW/ and /WS/. Between sessions 7 and 16, the number of /SW/ and /WS/ in the child's intake is very even. At this point, iambs are generally produced with higher rates than trochees. Iambs are produced above the 50% rate in session 10, while trochees remain below the 50% until session 15. However, the target-like production rate in iambs remains below 75% until the end of the observation period[169]. After session 16, a turning point in João's speech is observed and the amount of trochees produced target-like overrides iambs (and the number of trochaic tokens in the child's intake is higher than the number of iambs). In session 17, trochees reach stable production values above the 75%.

In the instances below (133) and (134), we show João's productions for target iambs and trochees.

(133) João – iambs produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
olá	'hello'	/ɔˈla/	[ʎɐˈʎa]	1;1.12 (S3)
mamã	'mommy'	/mɐˈmɐ̃/	[ɐˈmɐ]	1;2.30 (S6)
maçã	'apple'	/mɐˈsɐ̃/	[mɐːˈmɐ]	1;4.17 (S8)
papá	'daddy'	/pɐˈpa/	[pɐˈpaː]	1;5.12 (S9)
popó	'car fam.'	/pɔˈpɔ/	[pɐˈpɐːw]	
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	1;5.26 (S10)
avô	'grandfather'	/ɐˈvo/	[puˈbu]	1;7.0 (S12)
memé	'sheep fam.'	/mɛˈmɛ/	[mɐˈmɐː]	
João	'name'	/ʒuˈɐ̃w̃/	[nũˈɐ̃w̃]	1;8.4 (S14)
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	1;8.25 (S15)
café	'coffee'	/kɐˈfɛ/	[tɐˈtɛ]	1;9.25 (S16)
Jesus	'name'	/ʒɨˈzuʃ/	[juˈju]	
arroz	'rice'	/ɐˈʀoʃ/	[aˈjoː]	
avó	'grandmother'	/ɐˈvɔ/	[ɐˈbɔ]	1;10.11 (S17)
papá	'daddy'	/pɐˈpa/	[pɐˈpaː]	

[169] Session 14 seems to represent an exception.

(134) João – trochees produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
bolo	'cake'	/ˈbolu/	[ˈboʎu]	1;9.25 (S16)
pombo	'pigeon'	/ˈpõbu/	[ˈmɐːmu]	
zebra	'zebra'	/ˈzebrɐ/	[ˈbibɐ]	1;10.11 (S17)
cinco	'five'	/ˈsĩku/	[ˈtitu]	
urso	'bear'	/ˈuɾsu/	[ˈtutu]	1;10.26 (S18)
porta	'door'	/ˈpɔɾtɐ/	[ˈbɔtɐ]	
gato	'cat'	/ˈgatu/	[ˈtɐtu]	1;11.10 (S19)
galo	'rooster'	/ˈgalu/	[ˈaju]	
trinta	'thirty'	/ˈtɾĩtɐ/	[ˈtĩtɐ]	
mano	'brother fam.'	/ˈmɐnu/	[ˈmɐnu]	1;11.19 (S20)
fino	'thin'	/ˈfinu/	[ˈtinu]	
doce	'sweet'	/ˈdosɨ/	[ˈtoti]	
parque	'park'	/ˈpaɾkɨ/	[ˈpaki]	2;0.6 (S21)
porta	'door'	/ˈpɔɾtɐ/	[ˈpɔtɐ]	

João also uses /WS/ reduplications and epenthesis in target iambs. Early target iambs in João's speech are often reduplicated words which the child produces as such (cf. the productions for *papá* 'daddy' /pɐˈpa/, *popó* 'car fam.' /pɔˈpɔ/, *mamã* 'mommy' /mɐˈmɐ̃/, *memé* 'sheep fam.' /mɛˈmɛ/). However, reduplication in non-redupliacted target are possible as well (e.g. *olá* 'hello' /ɔˈla/, produced as [ʎɐˈʎa], *Jesus* 'name' /ʒɨˈzuʃ/ produced as [juˈju]). On the contraray, when trochees are produced target-like, they are produced as non-redupliacted words ([CV_1CV_2]).

In Table 32, we present Luma's acquisition path for target trochees and target iambs.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	1	0	**0**	-	-	**-**
S2	-	-	**-**	-	-	**-**
S3	9	0	**0.0**	-	-	
S4	31	3	**9.7**	7	1	**14.3**
S5	5	0	**0.0**	-	-	**-**
S6	7	2	**28.6**	2	1	**50.0**
S7	22	5	**22.7**	-	-	**-**
S8	26	1	**3.8**	2	0	**0.0**
S9	13	0	**0.0**	-	-	**-**
S10	2	0	**0.0**	2	0	**0.0**
S11	2	0	**0.0**	2	1	**50.0**
S12	2	1	**50.0**	6	2	**33.3**
S13	11	1	**9.1**	3	0	**0.0**
S14	8	0	**0.0**	20	3	**15.0**
S15	16	5	**31.3**	32	5	**15.6**
S16	1	0	**0.0**	69	29	**42.0**
S17	31	0	**0.0**	17	14	**82.4**
S18	14	0	**0.0**	21	17	**81.0**
S19	4	0	**0.0**	15	12	**80.0**
S20	31	2	**6.5**	51	39	**76.5**
S21	21	0	**0.0**	57	46	**80.7**
S22	33	6	**18.2**	30	13	**43.3**
S23	41	0	**0.0**	52	42	**80.8**
S24	34	0	**0.0**	48	46	**95.8**
S25	30	1	**3.3**	21	21	**100.0**
S26	24	0	**0.0**	41	40	**97.6**
S27	18	0	**0.0**	65	54	**83.1**
S28	30	5	**16.7**	61	51	**83.6**
S29	38	8	**21.1**	76	60	**78.9**
S30	122	30	**24.6**	103	67	**65.0**
S31	118	42	**35.6**	89	65	**73.0**
S32	208	97	**46.6**	110	83	**75.5**
S33	215	130	**60.5**	130	87	**66.9**
S34	217	138	**63.6**	142	122	**85.9**
S35	146	101	**69.2**	100	74	**74.0**
S36	231	183	**79.2**	216	157	**72.7**
S37	145	90	**62.1**	123	90	**73.2**

Table 32. Disyllables produced target-like (Luma)

In Table 32, we observe that Luma selects trochees earlier than iambs. However, there is a general higher production of iambs target-like since session from the beginning of word production, until the last session. In the early sessions (until session 27), target trochees are rarely produced accordingly. From session 28 onwards (2;2) an acquisition path for trochees is observed, i.e., trochees start having an increasing target-like production rate.

In (135) and (136) we exemplify Luma's earlier production of iambs and a later production of trochees target-like.

(135) Luma – early iambs produced as iambs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
bebé	'baby'	/bɛˈbɛ/	[paˈpa]	1;1.10 (S4)
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	1;2.22 (S6)
mamã	'mommy'	/mɐˈmɐ̃/	[əˈmɐ̃]	1;3.19 (S8)
balão	'balloon'	/bɐˈlɐ̃w̃/	[βɨˈwɐ]	1;5.9 (S11)
mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈma]	1;5.24 (S12)
Chuchu	'name'	/ʃuˈʃu/	[aˈβu]	1;8.15 (S18)
Totô	'name'	/toˈto/	[toˈto]	1;9.7 (S19)
Pati	'name'	/paˈti/	[tiˈti]	1;9.29 (S20)
aqui	'here'	/ɐˈki/	[ɐˈti]	
Bibi	'name'[170]	/biˈbi/	[βiˈβi]	1;10.18 (S21)
vovô	'grandfather fam.'	/voˈvo/	[toˈto]	
Miguel	'name'	/miˈɡɛɫ/	[niˈɛ]	1;11.15 (S23)
bebé	'baby'	/bɛˈbɛ/	[βɐˈβɛ]	2;0.13 (S25)
chichi	'pee'	/ʃiˈʃi/	[siˈsiː]	2;0.27 (S26)

(136) Luma – trochees produced target-like later:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Tito	'name'	/ˈtitu/	[ˈtitɔ]	2;5.15 (S34)
pedra	'stone'	/ˈpɛdɾɐ/	[ˈpɛdɐ]	
sujo	'dirty'	/ˈsuʒu/	[ˈçuʒu]	2;6.6 (S35)
quatro	'four'	/ˈkʷatɾu/	[ˈkʷatu]	
alto	'tall'	/ˈaɫtu/	[ˈatu]	
arco	'arch'	/ˈaɾku/	[ˈaku]	2;6.20 (S36)
cima	'above'	/ˈsimɐ/	[ˈfimɐ]	
baixo	'below'	/ˈbajʃu/	[ˈbaːʃu]	
brincos	'earings'	/ˈbɾĩkuʃ/	[ˈbĩkũ]	
roxo	'purple'	/ˈʀoʃu/	[ˈʀoçu]	2;6.27 (S37)
fresco	'fresh'	/ˈfreʃku/	[ˈveku]	
circo	'circus'	/ˈsiɾku/	[ˈçiku]	

Luma's renditions clearly confirm what has been previously observed in the other children: early iambs produced target-like are normally reduplicated words (in Luma's case, mostly resulting from reduplicated target iambs). When target trochees are produced as [SW], they are produced as [CV_1CV_2] words.

The data displayed above show that 4 of the 5 children (Inês, Joana, João and Luma) observed have no learning curve for iambs but demonstrate an acquisition path for trochees. Indeed, contrary to iambs, in trochaic target words we observe a gradual, increasing target-

[170] Familiar nickname for *bisavó* 'grand-grandmother'.

like production. The other child, Clara, selects both /SW/ and /WS/ and generally has production rates above the 50% for both structures, since the onset of word production. In Clara, it is not possible to draw any conclusion to the earlier acquisition of /SW/ or /WS/, as she tends to be accurate in her productions from the beginning[171] and her speech after 1;10 is not available.

In sum, the data presented above shows that:

(i) Initially, the percentage of trochees produced target-like is in general low;
(ii) Initially, the percentage of iambs produced target-like is higher than the one of trochees, and does not seem not to be a change in the course of prosodic development for iambic words;
(iii) The percentage of trochees produced target-like increases in the course of language development;
(iv) In Inês, Joana and João's speech, a *turning point* where trochees override iambs is observed in a given time of development.

In Clara, the child whose observations only occurred until 1;10, no turning point is noticed and both /SW/ and /WS/ are produced target-like at the later sessions. In Luma, the target-like production rate is in general higher in iambs, until the end of the observation period.

In the other children, the turning point takes place in the sessions present in Table 33:

Inês	S8 > S9 (1;7-1;8)
Joana	S11 > S12 (2;0-2;2)
João	S15 > S16 (1;8-1;9)

Table 33. Turning point - trochees overriding iambs

The data presented thus far seem to indicate that in their early stages, Portuguese children tend to be more faithful to iambs than to trochees. However, reduplicated words and epenthesis are very frequent in these stages. As shown in Figures 29-33, where the different word shapes, in an early and later point, are accounted for, the frequency of these production patterns tends to decrease, in the course of development.

[171] In fact, Clara is a good example of a child that uses selection strategies in her production, as she appears to select what she is able to produce. As we will observe further in this chapter, this behavior in Clara will be frequent in other target structures.

In order to further show the acquisition path for non-reduplicated iambs and trochees, we present the data concerning the faithful productions of both stress patterns in the speech of the five children observed.

The tables presented below concern the acquisition path for trochees and non-reduplicated iambs[172]. In this analysis, we accounted for non-reduplicated targets and non-reduplicated actual productions only. Therefore, we did not take into account target reduplicated forms (*mamã*, *papá*, etc.) or target non-reduplicated forms that children reduplicated, even though those forms could turn out being iambic (e.g., *Raquel* 'name' /ʀɐˈkɛɫ/ produced as [kɛˈkɛ]). The children's names, which in many cases were also produced in reduplicated forms (*Clara* 'name' /ˈklaɾɐ/ produced as [kaˈka] or *Inês* 'name' /iˈneʃ/ produced as [neˈne]), were also not considered.

Table 34 shows the acquisition path for trochees and non-reduplicated iambs in Clara's speech.

Session	**/SW/**	**[SW]**	**%**	**/WS/**	**[WS]**	**%**
S1	1	1	**100**	3	3	**100**
S2	-	-	**-**	1	1	**100**
S3	4	3	**75**	-	-	**-**
S4	-	-	**-**	-	-	
S5	4	2	**50**	3	2	**66. 7**
S6	4	3	**75**	2	2	**100**
S7	5	1	**20**	23	20	**87**
S8	6	6	**100**	2	1	**50**
S9	10	5	**50**	16	5	**31.3**
S10	80	59	**73.8**	25	20	**80**
S11	161	103	**64**	67	51	**76.1**
S12	146	76	**52.1**	106	80	**75.5**

Table 34. Trochees and non-reduplicated iambs produced target-like (Clara)

In the table presented above, we observe three main phases: (i) first (from sessions 1 to 4), the child rarely selects both /SW/ and /WS/; (ii) from sessions 5 to 9, we observe an unstable production of both structures, though generally high target-like production rates are attested in both target trochees and target iambs (however, a reduced amount of tokens are observed at this point[173]); (iii) from sessions 10 to 12 trochees are still produced with some instability, whilst iambs display a stable behavior. In general, both /SW/ and /WS/ have production values above the 50%. However, the number of trochaic tokens in the target is

[172] Non-reduplicated iambs will be designated as 'iambs' or 'target iambs' hereafter.
[173] In Session 7, the number of tokens presented accounts for 2 types - *olá* 'hello' and *aqui* 'here' -, which were very repeted in that session. The number is, thus, not very indicative of a tendency.

higher in trochees than in iambs. In Clara's early productions, a clear preference for a particular stress pattern is not observed. However, this child consistently[174] reaches the 50% of target-like production in session 9, for /SW/ and in session 11, for /WS/. Despite a similar acquisition path for /SW/ and /WS/, this child acquires /SW/ earlier than /WS/.

The instances in (137) illustrate Clara's production of both trochees and iambs:

(137) Clara – trochees and iambs produced target-like:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Trochees	*água*	'water'	/ˈagʷɐ/	[ˈaːβɐ]	1;3.6 (S5)
	água	'water'	/ˈagʷɐ/	[ˈakə]	1;4.19 (S6)
	mano	'brother fam.'	/ˈmɐnu/	[ˈmɐnu]	1;5.16 (S7)
Iambs	*olá*	'hello'	/ɔˈla/	[ɔːˈja]	1;3.6 (S5)
	aqui	'here'	/ɐˈki/	[aˈkiː]	1;5.16 (S7)

In Table 35, we present the values for the acquisition of trochees and iambs in Inês' speech.

Session	**/SW/**	**[SW]**	**%**	**/WS/**	**[WS]**	**%**
S1	-	-	**-**	-	-	**-**
S2	2	0	**0**	-	-	**-**
S3	4	0	**0**	8	0	**0**
S4	27	1	**3.7**	-	-	**-**
S5	27	1	**3.7**	4	0	**0**
S6	90	1	**1.1**	14	3	**21.4**
S7	73	3	**4.1**	29	0	**0**
S8	39	5	**12.8**	39	11	**28.2**
S9	140	82	**58.6**	44	17	**38.6**
S10	221	166	**75.1**	45	21	**46.7**
S11	238	182	**76.5**	77	35	**45.5**
S12	275	229	**83.3**	155	68	**43.9**
S13	297	256	**86.2**	110	64	**58.2**
S14	249	198	**79.5**	137	84	**61.3**
S15	232	178	**76.7**	98	60	**61.2**
S16	283	215	**76.0**	126	83	**65.9**
S17	154	87	**56.5**	74	43	**58.1**
S18	275	193	**70.2**	115	74	**64.3**

Table 35. Trochees and non-reduplicated iambs produced target-like (Inês)

In Inês's speech, the onset of disyllables (from sessions 1 to 4) is characterized by the scarce selection of both /SW/ and /WS/ (though /SW/ are more often selected). From sessions 5 to 8, /SW/ words start being produced more consistently, whereas /WS/ were

[174] Cf. criteria of acquisition referred to in section 3.3.

emerging. Until session 8, a reduced number of tokens, both in the intake and in the child's productions, is attested. From session 9 onwards, /SW/ performed better than /WS/ and are acquired (they surpass 50% target-like production rate). After session 9, the number of trochees in the child's intake increases dramatically, when compared to the number of iambs. /WS/ are acquired in session 13 and never reach stabilization (≥ 75%). In Inês's speech, trochees are acquired earlier than iambs.

In (138), we illustrate the emergence of both trochees and non-reduplicated iambs in Inês' speech.

(138) Inês – trochees and iambs produced target-like:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Trochees	*minha*	'mine'	/ˈmiɲɐ/	[ˈminə]	1;5.11 (S6)
	pato	'duck'	/ˈpatu/	[ˈpat^{j}u]	1;6.11 (S7)
	copo	'glass'	/ˈkɔpu/	[ˈkot^{j}ɔ]	1;7.2 (S8)
	garfo	'fork'	/ˈgaɾfu/	[ˈgau]	
Iambs	*aqui*	'here'	/ɐˈki/	[ɐˈt^{j}i]	1;5.11 (S6)
	aqui	'here'	/ɐˈki/	[ɐˈki]	1;6.11 (S7)
	avô	'grandfather'	/ɐˈvo/	[ɐˈd^{j}ɔ]	1;7.2 (S8)

In Table 36, we present the values of target-like production for iambs and trochees, in Joana's speech.

Session	**/SW/**	**[SW]**	**%**	**/WS/**	**[WS]**	**%**
S1	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**
S3	2	0	**0**	-	-	**-**
S4	-	-	**-**	-	-	**-**
S5	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**
S7	16	0	**0**	2	0	**0**
S8	4	0	**0**	1	0	**0**
S9	13	0	**0**	14	4	**28.6**
S10	16	2	**12.5**	14	5	**35.7**
S11	45	13	**28.9**	30	11	**36.7**
S12	91	57	**62.6**	30	6	**20**
S13	74	44	**59.5**	27	12	**44.4**
S14	163	108	**66.3**	49	25	**51.0**

Table 36. Trochees and non-reduplicated iambs produced target-like (Joana)

Joana's data also illustrate a neutral emergence of /SW/ and /WS/ and an earlier acquisition of /SW/. From sessions 1 to session 8, we observe that there are some attempts for both stress patterns (SW and WS), although in reduced amounts (trochees are nevertheless earlier selected). From sessions 9 to 11, both /SW/ and /WS/ emerge and, at this point, /WS/ words have a slightly better performance than /SW/. However, in session 12, /SW/ surpass the 50% of target-like production and are acquired, whereas /WS/ words are only acquired in session 14. As in Inês' data, from a given point onwards (in Joana's case, this point is session 12), the number of trochaic tokens increases dramatically and overcomes the amount of iambic tokens. Joana acquires trochees earlier than iambs.

The instances presented in (139) exemplify the acquisition of trochees and iambs in Joana's speech.

(139) Joana – trochees and iambs produced target-like:

<table>
<tr><th></th><th>Orthogr.</th><th>Gloss</th><th>Target</th><th>Output</th><th>Age</th></tr>
<tr><td rowspan="4">Trochees</td><td>pato</td><td>'duck'</td><td>/ˈpatu/</td><td>[ˈpaku]</td><td>1;9.25 (S9)</td></tr>
<tr><td>colo</td><td>'lap'</td><td>/ˈkɔlu/</td><td>[ˈkɔːu]</td><td>1;10.22 (S10)</td></tr>
<tr><td>linda</td><td>'beautiful'</td><td>/ˈlĩdɐ/</td><td>[ˈɲĩɲɐ]</td><td rowspan="2">2;0.9 (S11)</td></tr>
<tr><td>barco</td><td>'boat'</td><td>/ˈbaɾku/</td><td>[ˈmaːku]</td></tr>
<tr><td rowspan="4">Iambs</td><td>João</td><td>'name'</td><td>/ʒuˈɐ̃w̃/</td><td>[uˈaw]</td><td rowspan="2">1;9.25 (S9)</td></tr>
<tr><td>café</td><td>'coffee'</td><td>/kɐˈfɛ/</td><td>[kiˈkɛ]</td></tr>
<tr><td>papel</td><td>'paper'</td><td>/ˈpɐˈpɛɫ/</td><td>[pɨˈeːu]</td><td>1;10.22 (S10)</td></tr>
<tr><td>balão</td><td>'balloon'</td><td>/bɐˈlɐ̃w̃/</td><td>[məˈɲɐ̃w̃]</td><td>2;0.9 (S11)</td></tr>
</table>

Figure 37 represents the number of target iambs and trochees produced target-like, in João's speech.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	6	1	**16.7**	-	-	**-**
S2	-	-	**-**	1	1	**100**
S3	8	3	**37.5**	4	4	**100**
S4	6	5	**83.3**	4	4	**100**
S5	4	0	**0**	-	-	**-**
S6	-	-	**-**	3	3	**100**
S7	15	2	**13.3**	4	3	**75**
S8	18	1	**5.6**	12	2	**16.7**
S9	13	2	**15.4**	12	0	**0**
S10	39	5	**12.8**	11	6	**54.5**
S11	17	3	**17.6**	4	1	**25.0**
S12	12	4	**33.3**	3	0	**0**
S13	23	5	**21.7**	10	0	**0**
S14	17	8	**47.1**	2	1	**50**
S15	7	3	**42.9**	4	2	**50**
S16	34	21	**61.8**	16	9	**56.3**
S17	58	49	**84.5**	10	7	**70**
S18	67	60	**89.6**	30	20	**66.7**
S19	77	62	**80.5**	11	9	**81.8**
S20	90	71	**78.9**	22	10	**45.5**
S21	86	78	**90.7**	12	7	**58.3**
S22	59	48	**81.4**	13	3	**23.1**

Table 37. Trochees and non-reduplicated iambs produced target-like (João)

In João, we observe that, from sessions 1 to 6, an occasional selection and production of both /SW/ and /WS/, though /WS/ have higher target-like production rates. It is worth noticing, however, that the tokens accounted for, from sessions 1 to 6, correspond to a single type, the word *olá* 'hello' /ɔˈla/. From sessions 7 to 15, /SW/ words have an increasing and consistent target-like production rate. /WS/ words have an inconsistent production from sessions 7 to 13. In sessions 14 and 15 are produced with a 50% rate, but these rates correspond to the production of a reduced number of target tokens (2 and 4, respectively), and to 3 types (*olá* 'hello' /ɔˈla/, *Natal* 'Christmas' /nɐˈtał/ and *Jesus* /ʒiˈzuʃ/). From session 16 onwards, both /SW/ and /WS/ are acquired (≥50%), though /SW/ soon reach the stability point (≥75%), whereas /WS/ are still prone to unstable production values (cf. session 20 and 22).

The following examples (140), illustrate João's production of trochees and iambs.

(140) João – trochees and iambs produced target-like:

	Orthogr.	Gloss	Target	Output	Age
Trochees	*bolo*	'cake'	/ˈbolu/	[ˈbowu]	1;4.17 (S8)
	uva	'grape'	/ˈuvɐ/	[ˈdudːɐ]	1;5.12 (S9)
	bola	'ball'	/ˈbɔlɐ/	[ˈbawɐ]	1;6.16 (S11)
	bola	'ball'	/ˈbɔlɐ/	[ˈbɔja]	1;7.0 (S12)
	uva	'grape'	/ˈuvɐ /	[ˈuːɐ]	1;8.4 (S14)
	bola	'ball'	/ˈbɔlɐ/	[ˈβɐjɐ]	1;8.25 (S15)
Iambs	*melão*	'mellon'	/mɨˈlɐ̃w̃/	[məˈwɐ̃w̃]	1;4.17 (S8)
	olá	'hello'	/ɔˈla/	[ɔˈwa]	1;5.12 (S9)
	João	'name'	/ʒuˈɐ̃w̃/	[nũˈɐ̃w̃]	1;8.4 (S14)
	Jesus	'Jesus'	/ʒɨˈzuʃ/	[doˈjuː]	1;8.25 (S15)

Table 38 shows the rate of trochees and iambs produced target-like by Luma.

Session	/SW/	[SW]	%	/WS/	[WS]	%
S1	1	0	**0**	-	-	-
S2	-	-	-	-	-	-
S3	9	0	**0**	-	-	-
S4	31	3	**9.7**	-	-	-
S5	5	0	**0**	-	-	-
S6	7	2	**28.6**	-	-	-
S7	22	5	**22.7**	-	-	-
S8	26	1	**3.8**	-	-	-
S9	13	0	**0**	-	-	-
S10	2	0	**0**	-	-	-
S11	2	0	**0**	1	1	**100**
S12	2	1	**50**	-	-	-
S13	11	3	**27.3**	-	-	-
S14	8	0	**0**	6	0	**0**
S15	16	5	**31.3**	2	0	**0**
S16	1	0	**0**	36	0	**0**
S17	31	0	**0**	-	-	-
S18	14	0	**0**	-	-	-
S19	4	0	**0**	-	-	-
S20	31	2	**6.5**	16	15	**93.8**
S21	21	0	**0**	7	7	**100**
S22	33	7	**21.2**	-	-	-
S23	41	0	**0**	10	4	**40**
S24	34	0	**0**	1	1	**100**
S25	30	1	**3.3**	7	7	**100**
S26	24	2	**8.3**	2	1	**50**
S27	18	0	**0**	1	1	**100**
S28	30	8	**26.7**	13	8	**61.5**
S29	38	9	**23.7**	12	3	**25**
S30	122	30	**24.6**	19	7	**36.8**
S31	118	42	**35.6**	27	16	**59.3**
S32	208	97	**46.6**	50	30	**60**
S33	215	130	**60.5**	46	21	**45.7**

S34	217	138	**63.6**	55	39	**70.9**
S35	146	101	**69.2**	35	19	**54.3**
S36	231	183	**79.2**	100	66	**66**
S37	145	90	**62.1**	49	26	**53.1**

Table 38. Trochees and non-reduplicated iambs produced target-like (Luma)

Table 38 shows a disparate emergence time for /SW/ and /WS/ in Luma's speech. From sessions 2 to 19, trochees are selected in all sessions and occasionally produced, whereas iambs are only selected in sessions 11, 14, 15 and 16 (in session 11, the only token attempted is the word *balão* 'balloon' /bɐˈlɐ̃w̃/). From sessions 20 to 27, iambs are produced with higher target-like production rates than /SW/, though the only three types correspond to the tokens accounted for in these sessions (*aqui* 'here' /ɐˈki/, *avô* 'grandfather' /ɐˈvo/ and *Miguel* 'name' /miˈgɛɫ/). After session 28, /SW/ start having an increasing and consistent production is attested, but stability is never reached. /SW/ acquisition is attained in session 33. From session 28 onwards, /WS/ words have a high target-like production rate in general, but they have an unstable behavior until the end of the observational period (cf. sessions 30 and 34). The acquisition of /WS/ in Luma's speech is reached in session 31. Luma acquires /WS/ earlier than /SW/.

In (141) we present Luma's early productions for target trochees and iambs.

(141) Luma – trochees and iambs produced target-like:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Trochees	*Noddy*	'name'	/ˈnɔdi/	[ˈnɔʎi]	1;11.1 (S22)
	bola	'ball'	/ˈbɔlɐ/	[ˈbowɐː]	2;0.13 (S25)
	lobo	'wolf'	/ˈlobu/	[ˈwobu]	2;2.4 (S28)
	gato	'cat'	/ˈgatu/	[ˈtatu]	2;2.22 (S29)
	parvo	'silly'	/ˈpaɾvu/	[ˈpavu	2;3.6 (S30)
	tinta	'ink'	/ˈtĩtɐ/	[ˈtĩtɐ]	2;4.11 (S31)
	onze	'eleven'	/ˈõzɨ/	[ˈõʒu]	
Iambs	*Pati*	'name'	/paˈti/	[teˈti]	1;9.29 (S20)
	aqui	'here'	/ɐˈki/	[ɐˈti]	
	avô	'grandfather'	/ɐˈvo/	[tɔˈtoː]	1;11.15 (S23)
	Miguel	'name'	/miˈgɛɫ/	[niˈɛ̃]	
	Miguel	'name'	/miˈgɛɫ/	[niˈɛ]	1;11.29 (S24)
	aqui	'here'	/ɐˈki/	[ɐˈki]	2;2.4 (S28)
	sujou	'it got dirt'	/suˈʒo/	[çuˈʒo]	2;2.22 (S29)
	aqui	'here'	/ɐˈki/	[aˈki]	2;3.26 (S30)
	saiu	's/he left'	/sɐˈiw/	[ʃɐˈiw]	2;4.11 (S31)

In summary, the analysis conducted on target disyllables in the speech of the five Portuguese children observed, showed that:

(i) Including reduplicated target words and words produced with epenthesis, an iambic tendency is observed;

(ii) However, non-reduplicated words (/SW/ and /WS/) have a different acquisition path from most of the early words observed (which are, in their vast majority, reduplicated words or word produced with epenthesis creating an iambic pattern).

(iii) Accounting for non-reduplicated words, nor words where filler syllables are inserted, indicates that /SW/ and /WS/ forms emerge approximately at the same time in the speech of Portuguese children.

(iv) From a certain point in development (which we designated 'turning point'), /SW/ generally override /WS/.

In Table 39, we summarize the acquisition of /SW/ and /WS/ in the speech of the five children observed:

Children	**Acquisition path in disyllables**
Clara, Inês, Joana	/SW/ > /WS/
João	/SW/ ~ /WS/
Luma	/WS/ > /SW/

Table 39. Acquisition of disyllables – between-children comparison

In this table, we observe that three children (Clara, Inês and Joana) acquire trochees earlier than iambs, one child (Luma) acquires iambs earlier than trochees and one child has a simultaneous acquisition of both trochees and iambs.

The analysis on /SW/ and /WS/ stress patterns suggests that the 'early iambic tendency' of Portuguese early productions is biased by the high frequency of reduplicated words ([CV_1'CV_1]) and filler sounds ([fS]) and might be only apparent.

5.1.2.3. Trisyllables

In this section, we will present the data for the faithful productions of trisyllables in the five children observed. The faithful productions of /WSW/, /WWS/ and /SWW/ words will be analyzed.

In Table 40, we present Clara's data for faithful /WSW/ and /WWS/ targets. In Clara's productions, target /SWW/ words were not attested.

Session	**/WSW/**	**[WSW]**	**%**	**/WWS/**	**[WWS]**	**%**
S1	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**
S3	-	-	**-**	-	-	**-**
S4	-	-	**-**	-	-	**-**
S5	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**
S7	3	-	**0**	-	-	**-**
S8	-	-	**-**	-	-	**-**
S9	4	2	**50.0**	-	-	**-**
S10	11	4	**36.4**	-	-	**-**
S11	21	12	**57.1**	1	0	**0**
S12	22	8	**36.4**	5	0	**0**

Table 40. Trisyllables produced target-like (Clara)

Clara does not select any trisyllables until session 7. The first trisyllabic forms attempted are /WSW/ words, in session 7. Only in session 9 does she produce /WSW/ trisyllables target-like (50%). Target /WWS/ words are attempted in session 11, but are never produced target-like. The production of trisyllables target-like is maintained in low rates (below 60%) until the last session of observation.

The following instances ((142)) regard Clara's acquisition path for /WSW/ words. In the early sessions (until session 7) no /WSW/ words are attempted. Only in session 9, a few /WSW/ words are produced accordingly.

(142) Clara – /WSW/ produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
menina	'girl'	/mɨˈninɐ/	[mɨɲiˈna]	1;8.20 (S10)
sapato	'shoe'	/sɐˈpatu/	[tuˈpatu]	
menina	'girl'	/mɨˈninɐ/	[mɨˈɲiɲɐ]	1;9.23 (S11)
menino	'boy'	/mɨˈninu/	[mɐˈninu]	
menina	'girl'	/mɨˈninɐ/	[mɐˈninɐ]	1;10.15 (S12)
batata	'potato'	/bɐˈtatɐ/	[bɐtʲaˈta]	

Table 41 shows the acquisition path for target trisyllables (/WSW/, /SWW/ and /WWS/) in Inês' speech.

Session	/WSW/	[WSW]	%	/WWS/	[WWS]	%	/SWW/	[SWW]	%
S1	1	0	**0**	-	-	**-**	-	-	**-**
S2	1	0	**0**	-	-	**-**	-	-	**-**
S3	12	0	**0**	16	0	**0**	7	0	**0**
S4	11	0	**0**	-	-	**-**	1	0	**0**
S5	13	0	**0**	-	-	**-**	2	0	**0**
S6	33	1	**3**	1	0	**0**	-	-	**-**
S7	35	1	**2.9**	-	-	**-**	21	0	**0**
S8	33	7	**21.2**	2	0	**0**	3	0	**0**
S9	28	7	**25**	4	1	**25**	1	0	**0**
S10	77	33	**42.9**	2	0	**0**	-	-	**-**
S11	85	49	**57.6**	11	2	**18.2**	-	-	**-**
S12	112	74	**66.1**	6	1	**16.7**	7	2	**28.5**
S13	125	78	**62.4**	22	9	**40.9**	5	1	**20**
S14	75	53	**70.7**	14	7	**50**	3	0	**0**
S15	112	77	**68.8**	17	8	**47.1**	9	6	**66.7**
S16	106	54	**50.9**	12	6	**50**	5	0	**0**
S17	69	37	**53.6**	12	1	**8.3**	4	0	**0**
S18	79	45	**57**	14	5	**35.7**	3	1	**33.3**

Table 41. Trisyllables produced target-like (Inês)

Despite trisyllabic targets being present since the first session, only from session 8 onwards is there a consistent emergence of trisyllables (/WSW/). Target /WSW/ are the trisyllabic forms earlier acquired by Inês (in session 11), though their production remains unstable until the end of the observation period. /WWS/ emerge consistently after session 11 and the 50% point is surpassed in session 14 for target /WWS/. However, /WWS/ words are prone to instability until the last observed session. Target /SWW/ words are selected in session 3, but they are rarely produced target-like, until the last session. Though there is a clear difference between the acquisition of /WSW/, on the one hand, and /WWS/ and /SWW/, and on the other hand, the stabilization of trisyllables is not attained until the last session. /SWW/ words are subject to a late acquisition.

The instances in (143) exemplify Inês' acquisition path for trisyllables.

(143) Inês – /WSW/ produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
macaco	'monkey'	/mɐˈkaku/	[kaˈkaku]	1;7.2 (S8)
cabelo	'hair'	/kɐˈbelu/	[ɣeɣeˈɣe]	
sapato	'shoe'	/sɐˈpatu/	[baˈpato]	1;8.2 (S9)
boneca	'doll'	/buˈnɛkɐ/	[məˈɲɛkɐ]	1;10.29 (S11)
janelas	'windows'	/ʒɐˈnɛlɐʃ/	[nɐˈnɐlɐʃ]	

Table 42, shows the developmental path for trisyllables in Joana's speech.

Session	**/WSW/**	**[WSW]**	**%**	**/WWS/**	**[WWS]**	**%**	**/SWW/**	**[SWW]**	**%**
S1	-	-	**-**	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**	-	-	**-**
S3	-	-	**-**	-	-	**-**	-	-	**-**
S4	-	-	**-**	-	-	**-**	-	-	**-**
S5	-	-	**-**	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**	-	-	**-**
S7	2	0	**0**	-	-	**-**	-	-	**-**
S8	1	0	**0**	-	-	**-**	-	-	**-**
S9	11	0	**0**	1	0	**0**	-	-	**-**
S10	12	1	**8.3**	3	0	**0**	3	0	**0**
S11	31	5	**16.1**	2	0	**0**	5	0	**0**
S12	42	2	**4.8**	1	0	**0**	2	0	**0**
S13	44	5	**11.4**	1	0	**0**	1	0	**0**
S14	84	39	**46.4**	3	0	**0**	12	1	**8.3**

Table 42. Trisyllables produced target-like (Joana)

In Joana's speech, the acquisition of trisyllables is not reached, until the end of the observation period. Target /WSW/ are attempted in session 7, but only in session 13 there is a increasing rate of target-like production. The highest score (46.4%) is reached in session 14. /WWS/ and /SWW/ words are rarely attempted and produced target-like. /WWS/ are only attempted in session 9. /SWW/ words are attempted in session 10, but the target-like rates do not go beyond the 8.3% until the end of the observation period.

The instances in (144) illustrate Joana's productions of /WSW/ words.

(144) Joana – /WSW/ produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
bigode	'moustache'	/biˈgɔdɨ/	[ˈbiːˈbiβi]	1;6.24 (S7)
leitinho	'milk dim.'	/lɐjˈtiɲu/	[ɐˈkʲiɲɐ]	2;2.19 (S12)
amiga	'friend'	/ɐˈmigɐ/	[ɐˈmigɐ]	2;4.1 (S13)
Joana	'name'	/ʒuˈɐnɐ/	[ʒuˈɐnɐ]	2;6.24 (S14)
aposta	'bet'	/ɐˈpɔʃtɐ/	[ɐˈpʰɔtʲɐ]	

Table 43 summarizes João's acquisition path for trisyllables.

Session	/WSW/	[WSW]	%	/WWS/	[WWS]	%	/SWW/	[SWW]	%
S1	-	-	**-**	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**	-	-	**-**
S3	-	-	**-**	-	-	**-**	-	-	**-**
S4	-	-	**-**	-	-	**-**	-	-	**-**
S5	7	1	**14.3**	-	-	**-**	-	-	**-**
S6	10	0	**0.0**	-	-	**-**	-	-	**-**
S7	-	-	**-**	-	-	**-**	5	0	**0**
S8	5	0	**0.0**	-	-	**-**	-	-	**-**
S9	1	0	**0.0**	2	0	**0**	-	-	**-**
S10	1	0	**0.0**	-	-	**-**	-	-	**-**
S11	8	1	**12.5**	-	-	**-**	3	0	**0**
S12	7	1	**14.3**	1	0	**0**	-	-	**-**
S13	-	-	**-**	-	-	**-**	-	-	**-**
S14	-	-	**-**	1	1	**100**	-	-	**-**
S15	2	0	**0.0**	3	0	**0**	-	-	**-**
S16	48	27	**56.3**	8	1	**12.5**	6	0	**0**
S17	38	26	**68.4**	4	1	**25**	-	-	**-**
S18	62	39	**62.9**	1	0	**0**	2	0	**0**
S19	34	23	**67.6**	9	3	**33.3**	15	3	**20**
S20	49	28	**57.1**	2	1	**50**	8	1	**12.5**
S21	42	15	**35.7**	4	2	**50**	3	1	**33.3**
S22	62	48	**77.4**	12	5	**41.7**	3	0	**0**

Table 43. Trisyllables produced target-like (João)

As Inês, João displays a clear acquisition path for /WSW/ words, on thr one hand, and /WWS/ and /SWW/ words, on the other hand. The former are earlier selected, produced and acquired, whereas the latter have an unstable behavior until the end of the observation period.

The first trisyllables attempted by João are /WSW/ (in session 5), although he keeps a low production rate until session 15. In session 16, the child starts producing /WSW/ words more consistently (the target-like production values surpass the 50% in sesison 16) and the target-like production of /WSW/ is kept constant around 60% until the end of the observation period.

/WWS/ and /SWW/ trisyllables are produced target-like in very low rates, though /WWS/ are earlier and more selected and /WWS/ perform better than /SWW/.

In (145) we show João's production of target /WSW/.

(145) João – /WSW/ produced target-like:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
quentinho	'warm'	/kẽˈtiɲu/	[tiˈtinu]	1;9.25 (S16)
cadeira	'chair'	/kɐˈdɐjɾɐ/	[dɐˈdɐjɾɐ]	1;10.26 (S18)
girafa	'giraffe'	/ʒiˈɾafɐ/	[tɐˈtatɐ]	
cavalo	'horse'	/kɐˈvalu/	[ɐˈjaju]	

In Table 44, we present Luma's target-like production of trisyllables.

Session	/WSW/	[WSW]	%	/WWS/	[WWS]	%	/SWW/	[SWW]	%
S1	-	-	**-**	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**	-	-	**-**
S3	-	-	**-**	-	-	**-**	-	-	**-**
S4	-	-	**-**	-	-	**-**	-	-	**-**
S5	-	-	**-**	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**	-	-	**-**
S7	-	-	**-**	-	-	**-**	-	-	**-**
S8	3	0	**0**	-	-	**-**	-	-	**-**
S9	-	-	**-**	-	-	**-**	-	-	**-**
S10	-	-	**-**	-	-	**-**	-	-	**-**
S11	3	0	**0**	-	-	**-**	1	0	**0**
S12	7	0	**0**	-	-	**-**	1	0	**0**
S13	1	0	**0**	3	0	**0**	7	0	**0**
S14	-	-	**-**	-	-	**-**	-	-	**-**
S15	10	0	**0**	-	-	**-**	1	0	**0**
S16	-	-	**-**	-	-	**-**	2	0	**0**
S17	-	-	**-**	-	-	**-**	-	-	**-**
S18	1	0	**0**	-	-	**-**	4	0	**0**
S19	-	-	**-**	-	-	**-**	-	-	**-**
S20	2	0	**0**	-	-	**-**	-	-	**-**
S21	5	0	**0**	-	-	**-**	2	0	**0**
S22	-	-	**-**	-	-	**-**	-	-	**-**
S23	-	-	**-**	-	-	**-**	2	0	**0**
S24	1	0	**0**	-	-	**-**	1	0	**0**
S25	1	0	**0**	-	-	**-**	2	0	**0**
S26	-	-	**-**	-	-	**-**	-	-	**-**
S27	-	-	**-**	-	-	**-**	-	-	**-**
S28	-	-	**-**	-	-	**-**	-	-	**-**
S29	4	0	**0**	-	-	**-**	-	-	**-**
S30	7	1	**14.3**	1	1	**100**	1	0	**0**
S31	22	6	**27.3**	2	0	**0**	2	0	**0**
S32	63	6	**9.5**	-	-	**-**	-	-	**-**
S33	33	5	**15.2**	-	-	**-**	2	2	**100**
S34	55	9	**16.4**	-	-	**-**	3	0	**0**
S35	84	43	**51.2**	3	0	**0**	3	0	**0**
S36	55	28	**50.9**	11	2	**18.2**	-	-	**-**
S37	64	49	**76.6**	11	2	**18.2**	-	-	**-**

Table 44. Trisyllables produced target-like (Luma)

In Luma's speech, we observe that, from session 1 to session 28, trsyllables are rarely selected. However, during this period, /WSW/ and /SWW/ are more selected than /WWS/, though no cases of target-like production is attested in any of the target forms. The child starts producing /WSW/ words more consistently in session 30 and in session 36 she surpasses the 50% and acquires /WSW/ trisyllables. /SWW/ and /WWS/ words are produced inconsistently until the end of the observation period.

The instances in (146) mostly show Luma's production of /WSW/ trisyllables.

(146) Luma – production of /WSW/ targets:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Susana	'name'	/suˈzɐnɐ/	[ʒuˈʒɐnɐ]	2;6.6 (S35)
sequinho	'dry dim.'	/sɨˈkiɲu/	[siˈkiɲu]	
antigo	'old'	/ɐ̃ˈtigu/	[ɐˈtigu]	
chuchinha	'pacifier dim.'	/ʃuˈʃiɲɐ/	[ʃuˈʃiɲɐ]	2;6.20 (S36)
agora	'now'	/ɐˈgɔrɐ/	[ɐˈgɔa]	
Francisco	'name'	/frɐ̃ˈsiʃku/	[fɐ̃ˈfiχku]	

As for trisyllables, the most straightforward assumption that can be drawn from the data presented above is that EP-speaking children start producing them late in development. /WSW/ are earlier selected by the Portugeuse children under observation, whereas /WWS/ and /SWW/ are produced inconsistently by almost all the children at the beginning.

Furthermore, our results indicate that the acquisition path pursued by the Portuguese children towards trisyllables is /WSW/ > /WWS/ > /SWW/.

5.1.2.4. Summary for the faithfulness to the target

The results from the faithful productions indicate that Portuguese children observed tend to produce monosyllables faithfully first. Faithful disyllables are produced in a second stage and without a preference for [SW] or [WS]. In a third stage, three of the five children (Clara, Inês and Joana) showed higher and earlier faithfulness rates for /SW/ than for /WS/. One child (João) had a simultaneous acquisition path for /SW/ and /WS/ and the other child, Luma, acquires /WS/ earlier than /SW/. In a fourth stage, /WSW/ are produced target-like. Other trisyllables (/WWS/ and /SWW/) have in general an unstable behavior until the end of the observational period.

These data suggest that a categorical iambic or trochaic tendency is hard to be claimed. Instead, these results indicate a neutral start, eventually with a slight trochaic tendency.

In the following section, we will present the strategies from the observed children when they did not produce monosyllables, disyllables and trisyllables target-like.

5.1.3. Production strategies

Since no clear tendency was observed in the data in the target-like productions, a special attention to the strategies used by the observed children must be given, in order to better account for the preferential and tendencial word shapes and stress patterns produced by the children.

In this section we will focus on the strategies undertaken by the children under observation when dealing with word shape development. We will look at monosyllables, disyllables and trisyllables. In monosyllables, we will particularly analyze the strategies implying epenthesis, reduplications and production of [SW] (through ungliding[175]). In disyllables and trisyllables, we will investigate truncation only. In this section, we will only show the results for truncation and not show the results for reduplication and epenthesis for two reasons:

(i) The strategy of truncation is a strategy found in the literature, both in Portuguese and in other languages, to investigate the acquisition of stress patterns (e.g., Baia, 2008; Fikkert, 1994; Kehoe, 1998; Kehoe & Stoel-Gammon, 1997; Rapp, 1996; Santos, 2007; Tzakosta, 2004[176]). In order to compare our results with the results previously found for other languages, this analysis remained as necessary;

(ii) We have shown that disyllables (/SW/, and especially /WS/) might initially be prone to reduplication and epenthesis, and that both of these strategies tended to disappear in the course of development[177].

Results for the strategies used in monosyllables, disyllables and trisyllables (5.1.3.1., 5.1.3.2. and 5.1.3.3., respectively) will be shown in marked line charts, in order to better account for the use of the different strategies across development[178]. Mention to absolute values will be done, when necessary.

In a final section we will present the results for stress shift.

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[175] As we will observe in the five children, this strategy may occur through the production of a diphthong as a hiatus: e.g. *pai* 'father' /'paj/, produced as ['pai].

[176] Cf. section 2.2.2., for a review.

[177] Cf. section 5.1.1.2., Figures 29-30 and instances in (117)-(121).

[178] Cf. Appendix B, for absolute values and percentages.

5.1.3.1. Monosyllables

In this section we will present the strategies children use when they do not produce monosyllables target-like. Despite monosyllables being the least relevant word shape for studying stress patterns acquisition, the strategies used by the children when they do not produce monosyllables target-like may indicate what kind of word shape is being processed. It is important to observe whether children extend the target word shape (namely, via reduplication, epenthesis or ungliding[179]) and, if they do so, what structures do they select.

In target monosyllables, we accounted for the production of [WS] reduplications ([S^2][180]), insertion of a filler sound at the left edge of the circumscribed syllable of the target word ([fS]), multiple reduplications ([CVCV...]) and, finally, the production of a trochee, through ungliding ([SW]).

In Figure 34, we show Clara's strategies towards monosyllables.

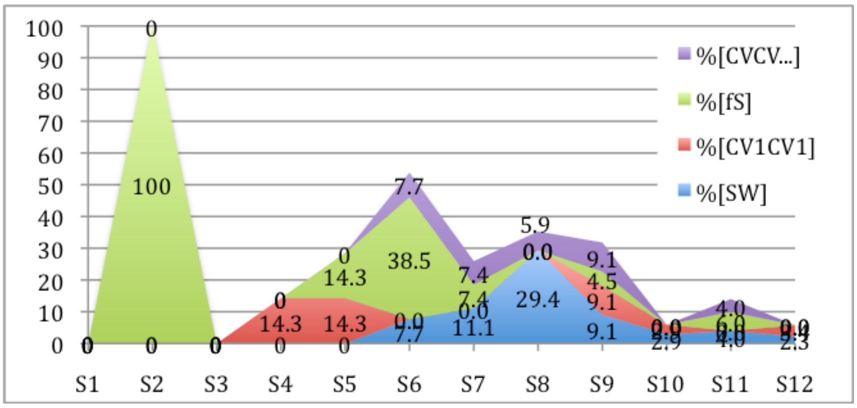

Figure 34. Strategies in early monosyllables (Clara)

We observe that this child does not use many strategies in the production of target monosyllables. In session 2, the only monosyllabic token was produced with epenthesis. In sessions 4 and 5, reduplication was used (14.3% in both sessions). In sessions 5 and 6, epentheses were frequent (14.3% and 38.5%, respectively). In sessions 6, 7, 8 and 9, ungliding was also observed, though in reduced amounts (7.7%, 11.1%, 29.4% and 9.1% respectively), creating a trochaic pattern. Multiple reduplications were not very frequent in Clara's speech (cf. session 6, 7, 8 and 9). From session 9 onwards, we observe that there is a reduced use of all the strategies.

In (147) we will show Clara's renditions of epenthesis and reduplications.

[179] Cf. footnote 175.
[180] Cf. footnote 166.

(147) Clara – epenthesis, reduplications and ungliding:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Epenthesis	*dá*	'give imp.'	/ˈda/	[ɐˈda]	1;0.13 (S2)
	não	'no'	/ˈnɐ̃w̃/	[ɐˈnɐ̃w̃]	1;3.6 (S5)
	cão	'dog'	/ˈkɐ̃w̃/	[ɨˈkɐ̃w̃]	1;4.9 (S6)
	pai	'father'	/ˈpaj/	[æˈpaj]	1;5.16 (S7)
	pé	'foot'	/ˈpɛ/	[aˈpe]	
Redupl.	*não*	'no'	/ˈnɐ̃w̃/	[nɐˈnɐ̃w̃]	1;2.22 (S4)
	não	'no'	/ˈnɐ̃w̃/	[nɐˈnɐ̃w̃]	1;3.6 (S5)
Unglid. [SW]	*cão*	'dog'	/ˈkɐ̃w̃/	[ˈkɐũ]	1;5.16 (S7)
	não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃ũ]	
	mãe	'mother'	/ˈmɐ̃j̃/	[ˈmɐ̃ĩ]	
	cão	'dog'	/ˈkɐ̃w̃/	[ˈkɐ̃ːũː]	1;6.6 (S7)

In Figure 35, we show Inês' strategies regarding monosyllables.

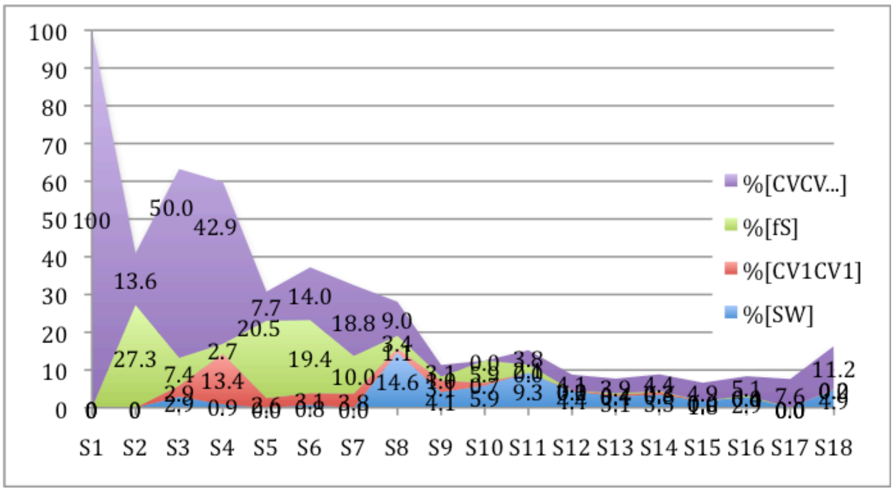

Figure 35. Strategies in monosyllables (Inês)

We observed that in the four initial sessions, longer utterances are frequent (100%, 13.6%, 50% and 42.9%). A few cases of reduplications are also found, but not in great amount (13.4%, in session 4). In sessions 2, 5, 6 and 7, epenthesis is common (27.3%, 20.5%, 19.4% and 10%, respectively). From session 9 onwards, monosyllables are mainly produced target-like.

In (148) we present some renditions of Inês displaying target monosyllables produced with the different strategies.

(148) Inês – reduplications and epenthesis:

	Orthogr.	Gloss	Target	Output	Age
Multipl. redupl.	*dá*	'give imp.'	/ˈda/	[ˈdaˈdaˈdæ]	1;1.30 (S3)
	dá	'give imp.'	/ˈda/	[ˈdaˈdaˈdaː]	
	não	'no'	/ˈnɐ̃w̃/	[nɐˈnɐːnɐnɐnɐ]	1;3.6 (S4)
	põe	'put'	/ˈpõj̃/	[pəˈpəpəj]	
Epenthesis	*dá*	'give imp.'	/ˈda/	[ʔˈda]	0;11.14 (S1)
	dá	'give imp.'	/ˈda/	[əˈdɑ]	1;0.25 (S2)
	dá	'give imp.'	/ˈda/	[ɐˈdɐː]	1;4.9 (S5)
	pé	'foot'	/ˈpɛ/	[ɐˈpɛ]	1;5.11 (S6)
Redupl.	*dá*	'give imp.'	/ˈda/	[ˈdaˈda]	1;1.30 (S3)
	má	'bad'	/ˈma/	[mɐˈma]	
	dá	'give imp.'	/ˈda/	[daˈda]	1;3.6 (S4)
	pé	'foot'	/ˈpɛ/	[pɛˈpɛ]	1;3.6 (S4)
	dá	'give imp.'	/ˈda/	[dæˈdæ]	1;4.9 (S5)

Figure 36 shows the strategies used by Joana in target-monosyllables.

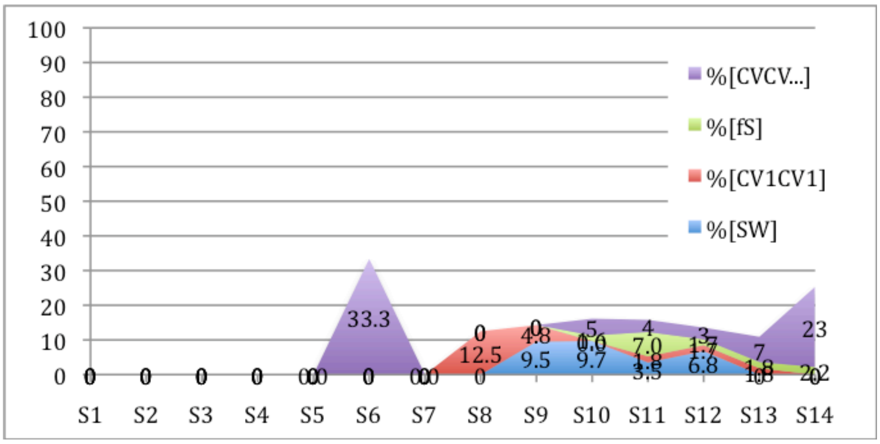

Figure 36. Strategies in monosyllables (Joana)

In Joana, we observed that, in the initial sessions (1-6), very few strategies are produced (until session 5, monosyllables are produced target-like and, in session 6, one monosyllable in three is produced in a multiple reduplication). In session 8, [WS] reduplications are attested (12.5%). After session 9, Joana uses mostly ungliding ([SW]) to deal with target monosyllables, though in very low rates (the higher rate is 9.7% of [SW], in sessions 9 and 10).

In (149) we present some instances of Joana's strategies towards monosyllables.

(149) Joana – epenthesis, ungliding and reduplication:

	Orthogr.	Gloss	Target	Output	Age
Redupl.	*há*	'there is'	/ˈa/	[aˈaː]	1;8.4 (S8)
	chá	'tea'	/ˈʃa/	[taˈðʲa]	1;9.25 (S9)
Unglid. [SW]	*pai*	'father'	/ˈpaj/	[ˈpaːiː]	1;9.25 (S9)
	pai	'father'	/ˈpaj/	[ˈpai]	1;10.22 (S10)
	chão	'floor'	/ˈʃɐ̃w̃/	[ˈtʰɑ̃ːũ]	
Epenthesis	*quer*	'(s/he) wants'	/ˈkɛɾ/	[ɨˈkɛ]	2;0.9 (S11)
	não	'no'	/ˈnɐ̃w̃/	[ɨˈnɐ̃ːũ]	

Figure 37 shows João's strategies for target-monosyllables.

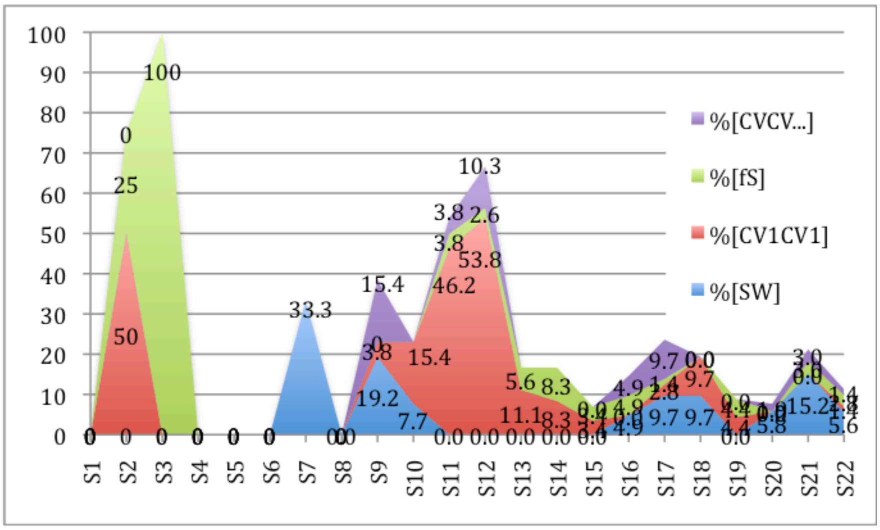

Figure 37. Strategies in monosyllables (João)

João mainly uses epenthesis and reduplications when he does not produce monosyllables target-like. In sessions 2 and 3, very few tokens are selected (4 and 1, respectively) and they are mainly produced with epenthesis (25% and 100% in session 2 and 3, respectively) or reduplication (50% in session 2). In sessions 7 and 9, monosyllables with diphthongs are produced with ungliding, creating a [SW] pattern (33.3% and 19.2%). In sessions 10, 11, 12 and 13, monosyllables are mostly produced as reduplications (15.4%, 46.2%, 53.8% and 11.1%, respectively, in each session). From sessions 16 to 19, reduced percentages of the different strategies are attested, though ungliding ([SW]) has higher values (9.7% in sessions 17 and 18, and 15.2 in session 21) than the other analyzed strategies.

In (150) we exemplify some of João's strategies in target monosylables. We recall that in João, the percentage of each strategy was highly reduced.

(150) João – epenthesis and reduplication in monosyllables:

	Orthogr.	Gloss	Target	Output	Age
Epenthesis	*dá*	'give imp.'	/ˈda/	[ɐˈdɐ]	1;0.28 (S2)
	dá	'give imp.'	/ˈda/	[ɐˈdɐ]	1;1.12 (S3)
Unglid. [SW]	*pau*	'stick'	/ˈpaw/	[ˈpɐu]	1;5.12 (S9)
	mãe	'mother'	/ˈmɐ̃j̃/	[ˈmɐ̃ĩ]	1;9.25 (S15)
	não	'no'	/ˈnɐ̃w̃/	[ˈnɐu]	
	cão	'dog'	/ˈkɐ̃w̃/	[ˈkɐ̃ũ]	1;10.11 (S16)
	meu	'mine'	/ˈmew/	[ˈmeːũ]	
Redupl.	*dá*	'give imp.'	/ˈda/	[dɐˈdɐː]	1;5.12 (S9)
	dá	'give imp.'	/ˈda/	[daˈda]	1;5.26 (S10)
	dá	'give imp.'	/ˈda/	[daˈdəː]	1;6.16 (S11)

Figure 38 shows the strategies used by Luma to deal with target monosyllables.

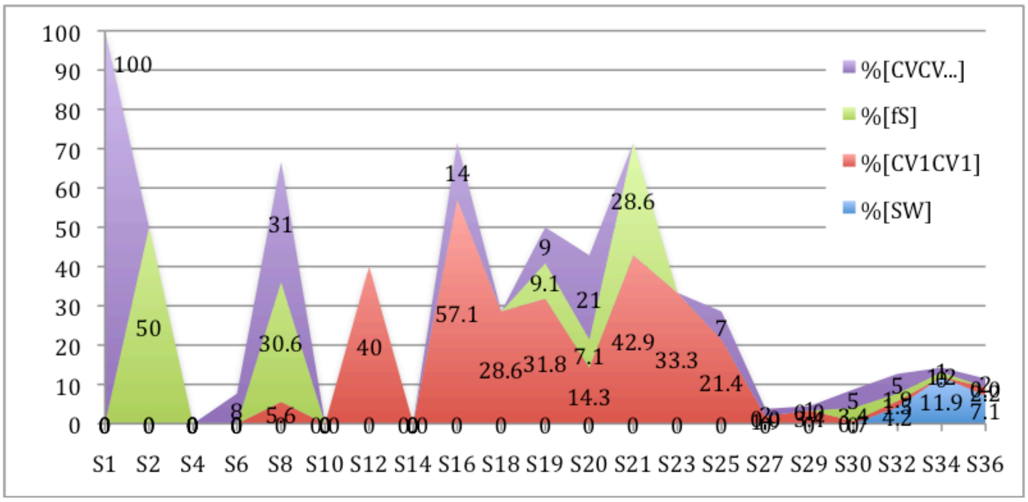

Figure 38. Strategies in monosyllables (Luma)

Luma is a showcase of the strategies that children may use to deal with target monosyllables. Until session 10, the child uses multiple reduplications and epenthesis (in session 8, for instance, the child produces 30.6% of each strategy). From session 10 to session 27, she uses reduplication in higher amounts (in session 16, the child reduplicates 57.1% of the monosyllables selected). Between sessions 19 and 21, epenthesis is a used strategy as well (with production rates of 9.1%, 7.1% and 28.6% in sessions 19, 20 and 21, respectively). From session 27 onwards, the amount of strategies used by Luma decreases significantly.

In (151), the strategies for target monosyllables in Luma's speech are given:

(151) Luma – reduplication in monosyllables (until session 25):

	Orthogr.	Gloss	Target	Output	Age
Redupl.	*não*	'no'	/ˈnɐ̃w̃/	[nɐˈnɐ]	1;3.6 (S4)
	não	'no'	/ˈnɐ̃w̃/	[ɲoˈɲo]	1;5.11 (S6)
	pão	'bread'	/ˈpɐ̃w̃/	[pɐˈpɐ]	
	dá	'give imp.'	/ˈda/	[daˈda]	1;8.2 (S17)
	chá	'tea'	/ˈʃa/	[ˈsʲaˈsʲa]	1;10.8 (S21)
Epenthesis	*não*	'no'	/ˈnɐ̃w̃/	[əˈnɐ]	1;4.9 (S5)
	dá	'give imp.'	/ˈda/	[aˈda]	1;3.19 (S8)
	não	'no'	/ˈnɐ̃w̃/	[ɐˈɲɐ]	1;5.11 (S6)
	dá	'give imp.'	/ˈda/	[ˈʔda]	1;7.5 (S15)

The data presented indicate that the five children use epenthesis, reduplications ([CV_1CV_1]) and longer utterances - [CVCV...] - in target monosyllables.

However, it is worthwhile noticing that some children use production strategies in monosyllables more than others. For instance, Inês and Clara have a great amount of production strategies in monosyllables between sessions 1 and 8, and Luma uses these during the entire observation period. João displays the same behavior from session 1 to 13. On the contrary, Joana has a reduced number of reduplications, epenthesis and ungliding in target monosyllables.

Despite the frequent use of production strategies in target monosyllables, and as furthermore shown in 5.1.2.1., these forms are normally produced target-like in the speech of the five children observed.

5.1.3.2. Truncation in disyllables

Tables 45-49 show the truncation patterns displayed by Portuguese children when dealing with target /SW/ and target /WS/.

In Table 45, we present the percentage of truncation (to [S]) in target disyllables (/SW/ and /WS/) produced by Clara.

Session	/SW/	[S]	%	/WS/	[S]	%
S1	1	0	**0**	3	0	**0**
S2	-	-	**-**	1	0	**0**
S3	4	0	**0**	-	-	**-**
S4	-	-	**-**	-	-	**-**
S5	4	1	**25**	3	0	**0**
S6	4	0	**0**	2	0	**0**
S7	5	0	**0**	23	3	**13.0**
S8	6	0	**0**	2	1	**50**
S9	9	1	**11.1**	16	6	**37.5**
S10	80	4	**5**	25	7	**28**
S11	161	3	**1.9**	67	11	**16.4**
S12	146	7	**4.8**	106	23	**21.7**

Table 45. Truncation of /SW/ and /WS/ (Clara)

In Clara's data, we observe that target iambs are more prone to truncation than target trochees. Until session 6, there is one single case of truncation (in /SW/). From session 7 onwards, target trochees have residual values for truncations, whereas trochees maintain truncation rates higher rates (in sessions 9 and 10, for instance, we observe a truncation rate of 37.5% and 28%, respectively).

Since trochees are mostly produced target-like by Clara, in (152) we exemplify some instances of truncations for target iambs, from session 7 onwards (1;5). In the examples presented, whenever a truncation is produced, the stressed syllable is, in general, the circumscribed syllable.

(152) Clara – truncation in target iambs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
aqui	'here'	/ɐˈki/	[ˈki]	1;5.16 (S7)
chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛj]	1;6.6 (S8)
aqui	'here'	/ɐˈki/	[ˈkiː]	1;7.11 (S9)
João	'name'	/ʒuˈɐ̃w̃/	[ˈjɐ̃w̃]	

Table 46 presents the percentage of truncation in Inês' production of /SW/ and /WS/.

Session	/SW/	[S]	%	/WS/	[S]	%
S1	-	-	**-**	-	-	**-**
S2	2	1	**50**	-	-	**-**
S3	4	4	**100**	8	4	**50**
S4	27	9	**33.3**	-	-	**-**
S5	27	17	**63.0**	4	3	**75**
S6	90	45	**50**	14	7	**50**
S7	73	43	**58.9**	29	14	**48.3**
S8	39	18	**46.2**	39	19	**48.7**
S9	140	20	**14.3**	44	15	**34.1**
S10	221	25	**11.3**	45	18	**40**
S11	238	10	**4.2**	77	18	**23.4**
S12	275	20	**7.3**	155	66	**42.6**
S13	297	14	**4.7**	110	13	**11.8**
S14	249	18	**7.3**	137	23	**16.8**
S15	232	11	**4.7**	98	15	**15.3**
S16	283	25	**8.8**	126	28	**22.2**
S17	154	17	**11.0**	74	10	**13.5**
S18	275	27	**9.8**	115	20	**17.4**

Table 46. Truncation of /SW/ and /WS/ (Inês)

In Inês' data two phases are observed: a first one, until session 8, in which /SW/ and /WS/ are equally prone to truncation. From session 9 onwards, we observe that /SW/ tend to be preserved (the truncation rates are below 15%), whereas /WS/ are still prone to truncation, though, from session 12 onwards, the truncation rates start a decreasing path. From session 13 until the end of the observation period, iambs and trochees both display a low rate of truncation (below 20%).

The instances in (153) and (154) show Inês tendency for [S] truncation, in target trochees (until session 9) and in target iambs (until session 13), respectively. It is worth noticing that truncation in iambs is a strategy kept for longer time by Inês, when compared to trochees.

(153) Inês – truncation in target trochees:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
manta	'blancket'	/ˈmɐ̃tɐ/	[ˈmːɐ̃]	1;3.6 (S4)
banho	'bath'	/ˈbɐɲu	[ˈpɐ]	
pêlo	'hair'	/ˈpelu/	[ˈpe]	1;4.9 (S5)
fralda	'diaper'	/ˈfɾaɫdɐ/	[ˈkaː]	1;5.11 (S6)
cartas	'cards'	/ˈkaɾtɐʃ/	[ˈka]	1;6.11 (S7)
garfo	'fork'	/ˈgaɾfu/	[ˈɣa]	
porta	'door'	/ˈpɔɾtɐ/	[ˈpɔ]	1;7.2 (S8)
tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpa]	1;8.2 (S9)
perna	'leg'	/ˈpɛɾnɐ/	[ˈbɛ]	

(154) Inês – truncation in target iambs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
aqui	'here'	/ɐˈki/	[ˈki]	1;4.9 (S5)
champô	'shampoo'	/ʃɐ̃ˈpo/	[ˈpo]	1;5.11 (S6)
João	'name'	/ʒuˈɐ̃w̃/	[ˈwɐ̃]	
balão	'balloon'	/bɐˈlɐ̃w̃/	[ˈbə]	1;6.11 (S7)
colher	'spoon'	/kuˈʎɛɾ/	[ˈkɛ]	
papel	'paper'	/pɐˈpɛɫ/	[ˈpɛː]	1;7.2 (S8)
chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛw]	1;8.2 (S9)
aqui	'here'	/ɐˈki/	[ˈki]	
abrir	'to open'	/ɐˈbɾiɾ/	[ˈbiɾ]	1;10.29 (S11)
chapéu	'hat'	/ʃɐˈpɛw/	[ˈɛw]	
avó	'grandmother'	/ɐˈvɔ/	[ˈdʲɔ]	2;0.11 (S12)
anões	'dwarfs'	/ɐˈnõȷ̃ʃ/	[ˈnõȷ̃ʃ]	2;1.10 (S13)
nariz	'nose'	/nɐˈɾiʃ/	[ˈdiːʃ]	2;1.10 (S13)

Table 47 shows the percentage rate of truncation for target WS and target SW in Joana's speech.

Session	**/SW/**	**[S]**	**%**	**/WS/**	**[S]**	**%**
S1	-	-	**-**	-	-	**-**
S2	-	-	**-**	-	-	**-**
S3	2	1	**50**	-	-	**-**
S4	-	-	**-**	-	-	**-**
S5	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**
S7	16	16	**100**	2	1	**50**
S8	4	1	**25**	1	1	**100**
S9	13	6	**46.2**	14	3	**21.4**
S10	16	11	**68.8**	14	6	**42.9**
S11	45	24	**53.3**	30	9	**30**
S12	91	20	**22**	30	22	**73.3**
S13	74	11	**14.9**	27	11	**40.7**
S14	163	13	**8**	49	12	**24.5**

Table 47. Truncation of /SW/ and /WS/ to monosyllables (Joana)

In Joana, the truncation rate, for both /SW/and /WS/ is in general high, though, as expected, it decreases in the course of development. In Joana's data, we found two trends, for truncation in disyllables. A first time, in which /SW/ and /WS/ are equally prone to truncation (until session 11), and a second time, in which target trochees show a decreasing path and target iambs have a higher truncation rate (from session 12 to 14).

In the examples below ((155)-(156)), we show Joana's renditions, where we observe the truncation patterns for target trochees (until session 11) and for target iambs (from session 7 until the end of the observation period).

(155) Joana – truncation in target trochees:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Carla	'name'	/ˈkaɾlɐ/	[ˈtaː]	1;6.24 (S7)
Carla	'name'	/ˈkaɾlɐ/	[ˈka]	1;8.4 (S8)
gosto	'I like'	/ˈgɔʃtu/	[ˈgɔ]	1;9.25 (S9)
Paula	'name'	/ˈpawlɐ/	[ˈpa]	1;10.22 (S9)
Nando	'name'	/ˈnɐ̃du/	[ˈɲɐ̃]	2;0.9 (S11)
leite	'milk'	/ˈlɐjtɨ/	[ˈɲɐj]	

(156) Joana – truncation in target iambs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
avó	'grandmother'	/ɐˈvɔ/	[ˈpɔ]	1;9.25 (S9)
cristal	'cristal'	/kɾiʃtaɫ/	[ˈtaw]	2;2.19 (S12)
atrás	'behind'	/ɐˈtɾaʃ/	[ˈtʲaʃː]	
chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛw]	2;4.1 (S13)
bacio	'basin'	/bɐˈsiw/	[ˈʃiw]	
chover	'to rain'	/ʃuˈveɾ/	[ˈvej]	
azul	'blue'	/ɐˈzuɫ/	[ˈdʒow]	2;6.24 (S14)
avô	'grandfather'	/ɐˈvo/	[ˈvo]	

In Table 48, we present the percentages for truncation in /SW/ and /WS/ in João's speech.

Session	/SW/	[S]	%	/WS/	[S]	%
S1	6	0	**0**	-	-	-
S2	-	-	**-**	1	0	**0**
S3	8	0	**0**	4	0	**0**
S4	6	1	**16.7**	4	0	**0**
S5	4	2	**50.0**	-	-	**-**
S6	-	-	**-**	3	0	**0**
S7	15	10	**66.7**	4	1	**25**
S8	18	15	**83.3**	12	5	**41.7**
S9	13	7	**53.8**	12	7	**58.3**
S10	39	18	**46.2**	11	5	**45.5**
S11	17	9	**52.9**	4	1	**25.0**
S12	12	5	**41.7**	3	2	**66.7**
S13	23	6	**26.1**	10	7	**70.0**
S14	17	2	**11.8**	2	1	**50.0**
S15	7	1	**14.3**	4	2	**50.0**
S16	34	5	**14.7**	16	3	**18.8**
S17	58	2	**3.4**	10	3	**30.0**
S18	67	0	**0.0**	30	0	**0.0**
S19	77	1	**1.3**	11	0	**0.0**
S20	90	5	**5.6**	22	2	**9.1**
S21	86	0	**0.0**	12	1	**8.3**
S22	59	1	**1.7**	13	1	**7.7**

Table 48. Truncation of /SW/ and /WS/ to monosyllables (João)

In João, from session 1 to 6, both structures are produced in reduced amounts (however, the selected iambs are never produced with truncation[181], whereas trochees may be subject to this strategy, as shown in sessions 4 and 5). From session 7 to session 11, the truncation rates for trochees tend to be higher than for iambs. In session 12, this tendency is inverted and trochees have a better performance than iambs. From session 12 to session 17, iambs are more prone to truncation than trochees. From session 18 onwards, both structures display reduced amounts of truncation. In João, truncation in trochees has a general decreasing path (from sessions 14/15 onwards, it becomes scarce), whereas truncation in iambs is maintained for a longer period of time (only after session 18 a reduction in the use of this strategy is observed).

In (157) and (158), we illustrate João's truncation patterns in /SW/ and /WS/, respectively.

[181] It is worth saying that the iambic tokens attempted in session 1, 3, 4 and 5 all correspond to a single type, the word *olá* 'hello' /ɔˈla/.

(157) João – truncation in target trochees:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
bola	'ball'	/ˈbɔlɐ/	[ˈbaː]	1;3.21 (S7)
panda	'panda bear'	/ˈpɐ̃dɐ/	[ˈpɐ]	
bola	'ball'	/ˈbɔlɐ/	[ˈbo]	1;4.17 (S8)
mota	'motorbike'	/ˈmɔtɐ/	[ˈta]	1;5.12 (S9)
pato	'duck'	/ˈpatu/	[ˈpɐ]	
mano	'brother fam.'	/ˈmɐnu/	[ˈmɐ]	1;5.26 (S10)
bola	'ball'	/ˈbɔlɐ/	[ˈbɔː]	
mota	'motorbike'	/ˈmɔtɐ/	[ˈta]	1;6.16 (S11)

(158) João – truncation in target iambs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
limão	'lemon'	/liˈmɐ̃w̃/	[ˈmõ]	1;5.12 (S9)
avô	'grandfather'	/ɐˈvo/	[ˈbu]	
limão	'lemon'	/liˈmɐ̃w̃/	[ˈɐ̃ːw̃ː]	1;6.16 (S11)
sofá	'couch'	/suˈfa/	[ˈpɐː]	1;7.20 (S11)
Natal	'Christmas'	/nɐˈtaɫ/	[ˈta]	1;8.4 (S14)
olá	'hello'	/ɔˈla/	[ˈja]	1;8.25 (S15)
João	'name'	/ʒuˈɐ̃w̃/	[ˈjɐw]	

Table 49 shows the percentages for truncation in target /SW/ and /WS/ in Luma's speech.

Session	**/SW/**	**[S]**	**%**	**/WS/**	**[S]**	**%**
S1	1	0	**0**	-	-	**-**
S2	-	-	**-**	-	-	**-**
S3	9	6	**66.7**	-	-	**-**
S4	31	0	**0**	-	-	**-**
S5	5	0	**0**	-	-	**-**
S6	7	1	**14.3**	-	-	**-**
S7	22	9	**40.9**	-	-	**-**
S8	26	5	**19.2**	-	-	**-**
S9	13	9	**69.2**	-	-	**-**
S10	2	1	**50**	-	-	**-**
S11	2	1	**50**	1		**0**
S12	2	1	**50**	-	-	**-**
S13	11	5	**45.5**	-	-	**-**
S14	8	1	**12.5**	6	6	**100**
S15	16	4	**25**	2	2	**100**
S16	1	0	**0**	36	36	**100**
S17	31	6	**19.4**	-	-	**-**
S18	14	2	**14.3**	-	-	**-**
S19	4	0	**0**	-	-	**-**
S20	31	12	**38.7**	16	3	**18.8**
S21	21	9	**42.9**	7	0	**0**

S22	33	17	**51.5**	-	-	**-**
S23	41	12	**29.3**	10	0	**0**
S24	34	12	**35.3**	1	0	**0**
S25	30	7	**23.3**	7	0	**0**
S26	24	1	**4.2**	2	0	**0**
S27	18	1	**5.6**	1	0	**0**
S28	30	1	**3.3**	13	2	**15.4**
S29	38	1	**2.6**	12	7	**58.3**
S30	122	2	**1.6**	19	9	**47.4**
S31	118	1	**0.8**	27	5	**18.5**
S32	208	3	**1.4**	50	19	**38**
S33	215	3	**1.4**	46	22	**47.8**
S34	217	3	**1.4**	55	12	**21.8**
S35	146	2	**1.4**	35	13	**37.1**
S36	231	1	**0.4**	100	21	**21**
S37	145	9	**6.2**	49	8	**16.3**

Table 49. Truncation of WS and SW to monosyllables (Luma)

Luma has an interesting path for truncation in disyllables. In her data, we observe an inversion of the truncation patterns. We observe a higher truncation rate for /SW/ in the beginning (until session 25) and a later higher truncation rate for iambs (after session 28). The apparent tendency for higher truncation rate in target trochees at the beginning, however, is due to the highly reduced number of target iambs in Luma's speech. The truncation rate for target trochees is not higher than for target iambs. It is only the strategy the child uses to deal with the disyllables produced.

The instances in (159) and (160) illustrate Luma's truncation patterns in target trochees and in target iambs, respectively:

(159) Luma – truncation in target trochees (session 20-25):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
olha	'look imp.'	/ˈɔʎɐ/	[ˈa]	1;9.29 (S20)
gata	'cat'	/ˈgatɐ/	[ˈtaː]	1;11.1 (S22)
milho	'corn'	/ˈmiʎu/	[ˈjɔ]	1;11.29 (S24)
gato	'cat'	/ˈgatu/	[ˈta]	
meias	'socks'	/ˈmɐjɐʃ/	[ˈbɛː]	2;0.13 (S25)
polvo	'octopus'	/ˈpoɫvu/	[ˈboː]	2;0.13 (S25)

(160) Luma – truncation in target iambs (session 28-37):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Inês	'name'	/iˈneʃ/	[ˈneː]	2;2.4 (S28)
sofá	'couch'	/suˈfa/	[ˈfaː]	
chinês	'chinese'	/ʃiˈneʃ/	[ˈneː]	2;2.22 (S29)
aqui	'here'	/ɐˈki/	[ˈkiː]	2;3.26 (S30)
ali	'there'	/ɐˈli/	[ˈʎiː]	
azul	'blue'	/ɐˈzuɫ/	[ˈnuː]	2;4.11 (S31)
azul	'blue'	/ɐˈzuɫ/	[ˈnũ]	2;5.20 (S34)
favor	'favor'	/fɐˈvoɾ/	[ˈvo]	
ali	'there'	/ɐˈli/	[ˈnĩ]	
azul	'blue'	/ɐˈzuɫ/	[ˈnũ]	2;6.6 (S35)
adeus	'bye'	/ɐˈdewʃ/	[ˈdew]	
buscar	'to get'	/buʃˈkaɾ/	[ˈka]	2;6.20 (S36)
João	'name'	/ʒuˈɐ̃w̃/	[ˈʒɐ̃w̃]	
avó	'grandmother'	/ɐˈvɔ/	[ˈvɔ]	2;6.27 (S37)

The first observation that we can draw with respect to the strategies used to deal with target disyllables is that, when disyllables are truncated, the circumscribed and preserved syllable is overwhelmingly the stressed syllable. In addition, the tables shown above show that, in the early sessions:

(i) 3 children (Joana, João and Luma) have higher truncation rates in trochees;
(ii) Inês truncates more /WS/;
(iii) Clara displays no tendency to preserve more /SW/ or /WS/.

In the last sessions, iambs are more prone to truncation than trochees in the productions of the five children observed. Trochees will progressively be less truncated to monosyllables and be produced more target-like, while target iambs are still truncated.

The truncation patterns displayed by the Portuguese children observed suggest mixed-interpretations: on the one hand, it is noticeable that three of the children display higher truncation in /SW/, suggesting an iambic tendency. However, on the other hand, this tendency will be inverted and, in the final sessions, iambs are more prone to truncation than /SW/, suggesting that, either there was no iambic tendency at the beginning, or the early tendency for /WS/ changed to /SW/.

5.1.3.3. Truncation in trisyllables

The following charts refer to the truncation patterns for /WSW/, /WWS/ and /SWW/ targets. In each child, we will present the truncation patterns for /WSW/, then /WWS/ and finally /SWW/ targets. The first session displayed in the charts presented below represents the first session in which a trisyllable is attempted in a child's speech[182].

Figures 39 and 40 show the truncation patterns in /WSW/ and /WWS/ for Clara. Clara did not select any /SWW/ target during the observation period.

[182] In order to show the results for the three trisyllabic structures and the truncation patterns produced in each one of them, we present, side by side, the data in charts, with percentage values. For information on the absolute values, cf. Appendix C.

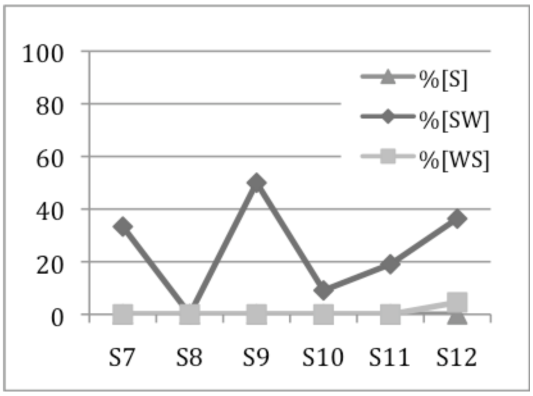

Figure 39. Truncation patterns for /WSW/ (Clara)

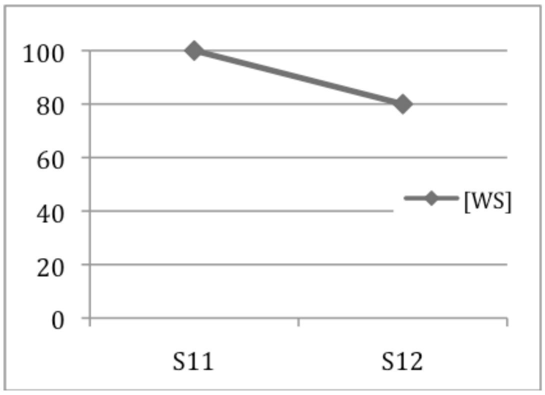

Figure 40. Truncation pattern for /WWS/ (Clara)

Clara selects target /WSW/ only in session 7. In these target forms, the child clearly shows a preference for [SW] truncation, as shown by Figure 39.

Target /WWS/ are attempted later, in session 11 (Figure 40). In session 11 and 12 a very reduced number of target /WWS/ were selected and produced (6 attempted and 5 produced). However, when she first produces these forms, she produces them as [WS].

The instances in (161) and (162), illustrate Clara's truncations for target /WSW/ and /WWS/, respectively.

(161) Clara – truncation in target /WSW/ ([SW]):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Aurora	'name'	/awˈɾɔɾɐ/	[ˈlalɐ]	1;7.11 (S9)
Aurora	'name'	/awˈɾɔɾɐ/	[ˈlɔlɐ]	1;8.20 (S10)
menina	'girl'	/mɨˈninɐ/	[ˈɲiɲɐ]	1;9.23 (S11)
menino	'boy'	/mɨˈninu/	[ˈninu]	
macaco	'monkey'	/mɐˈkaku/	[ˈkaku]	1;10.15 (S12)
sapato	'shoe'	/sɐˈpatu/	[ˈpatu]	
Aurora	'name'	/awˈɾɔɾɐ/	[ˈɔːlɐː]	

(162) Clara – truncation of /WWS/ to [WS]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
acabou	'it finished'	/ɐkɐˈbo/	[kɐˈbo]	1;9.23 (S11)
acabou	'it finished'	/ɐkɐˈbo/	[kaˈbo]	1;10.15 (S12)

Figures 41, 42 and 43 show the percentages for truncation in /WSW/, /WWS/ and /SWW/, respectively, in Inês' speech.

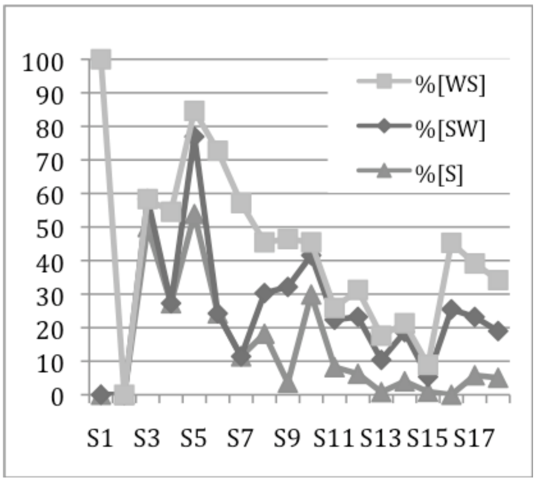

Figure 41. Truncation patterns for /WSW/ (Inês)

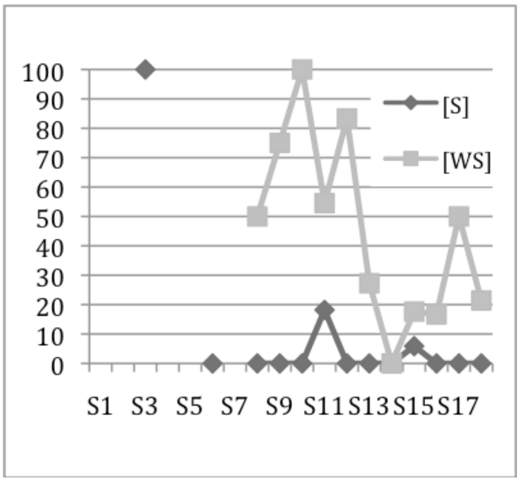

Figure 42. Truncation patterns for /WWS/ (Inês)

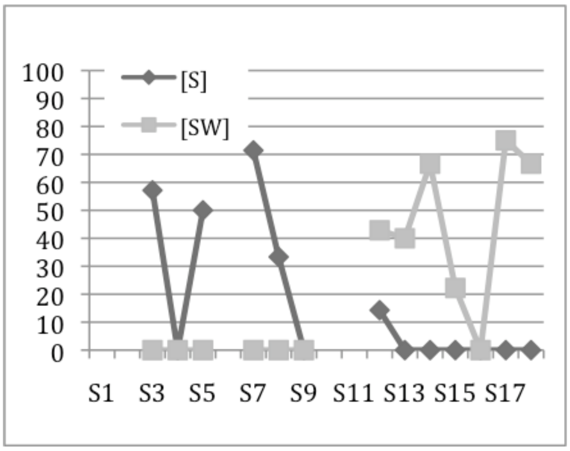

Figure 43. Truncation patterns for /SWW/ (Inês)

In Inês' truncation patterns for /WSW/, we observe an initial neutral production (until session 5). From session 6 to session 9, a preference for [WS] is attested. [SW] and [S] are less produced, but they are nevertheless frequent as well, until session 9. From session 10 to 15, the percentage of [SW] and [WS] truncation is similar and the truncation to [S] is less frequent, though the three patterns have a general decreasing path. Both [SW] and [WS] are possible and [S] becomes rare. In session 16, the number of [WS] truncations increases again, more than [SW]. As we will show in (162), below, the [WS] truncation pattern mostly regards reduplicated forms.

In /WWS/ (Figure 42), Inês also displays a preference for [WS] truncation in all observed sessions. Before session 8, occasional target /WWS/ were produced as monosyllables. The truncation for [S] is very scarce, during the observation period. Between sessions 8 and 12, truncation to [WS] remains high (above 50%). From session 13 onwards, the percentage values for [WS] truncation decreases to values below 50%, and, after this session, the child mostly produces /WSW/ target-like.

In Inês' /SWW/ words (Figure 43), it is possible two observe two distinct phases: a first phase, where the truncation to [S] is more frequent (until session 9), and a second phase, where the truncation to [SW] becomes predominant (from session 12 onwards).

In (163) we present some examples of Inês' truncated productions for /WSW/. We observe that most of the [WS] truncations are, in fact, the result of epenthesis and reduplication.

(163) Inês – truncation in /WSW/ ([WS], [SW] and [S]):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[WS]	*chupeta*	'pacifier'	/ʃuˈpetɐ/	[ɐˈpe]	1;1.30 (S3)
	babete	'bib'	/bɐˈbɛtɨ/	[baˈβæ]	1;3.6 (S4)
	sapato	'shoe'	/sɐˈpatu/	[pɐˈpɐ]	1;4.9 (S5)
	vestido	'dress'	/vɨʃˈtidu/	[tʲiˈtʲi]	1;5.11 (S6)
	chupeta	'pacifier'	/ʃuˈpetɐ/	[beˈbe]	1;6.11 (S7)
	cadeira	'chair'	/kɐˈdɐjɾɐ/	[ɣɛˈɣɛ]	1;7.2 (S8)
	boneca	'doll'	/buˈnɛkɐ/	[meˈɲɛ]	1;9.19 (S10)
[S]	*chupeta*	'pacifier'	/ʃuˈpetɐ/	[ˈpe]	1;1.30 (S3)
	cabelo	'hair'	/kɐˈbelu/	[ˈpɛː]	1;3.6 (S4)
	boneca	'doll'	/buˈnɛkɐ/	[ˈɲɐ]	1;5.11 (S6)
	girafa	'giraffe'	/ʒiˈɾafɐ/	[ˈɣa]	1;6.11 (S7)
	cadeira	'chair'	/kɐˈdɐjɾɐ/	[ˈgɛ]	1;7.2 (S8)
[SW]	*vestida*	'dressed'	/vɨʃˈtidɐ/	[ˈbitɐ]	1;8.2 (S9)
	umbigo	'belly button'	/ũˈbigu/	[ˈbidu]	
	barulho	'noise'	/bɐˈɾuʎu/	[ˈbuju]	

In (164) we show instances of Inês producing target /WWS/ words. As mentioned before, the child produces [WS] but, in their vast majority, these productions are reduplications.

(164) Inês – truncation of /WWS/ as [WS]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
canguru	'kangaroo'	/kɐ̃guˈɾu/	[kaˈkɛː]	1;7.2 (S8)
Leonor	'name'	/liuˈnoɾ/	[ɲoˈno]	1;8.2 (S9)
parabéns	'happy birthday'	/pɐɾɐˈbɐ̃j̃ʃ/	[pɐˈpɐjʃ]	1;9.19 (S10)
parabéns	'happy birthday'	/pɐɾɐˈbɐ̃j̃ʃ/	[βɐˈβɐjs]	1;10.29 (S11)
estragou	'(s/he) spoil'	/ʃtɾɐˈgo/	[tiˈgo]	2;0.11 (S12)
acabou	'it finished'	/ɐkɐˈbo/	[kɐˈbo]	2;1.10 (S13)
cachecol	'scarf'	/kaʃɨˈkɔɫ/	[kaˈkɔj]	2;1.10 (S13)

In (165), below, we illustrate two phases: an initial phase where /SWW/ words are mostly truncated to [S], and a second phase, when [SW] are mainly produced. It is worthwhile recalling that the production of early SWW in Inês is the product of a type repetition, the name '*Mário*'.

(165) Inês – truncation in /SWW/ (early [S] and later [SW]):

<table>
<tr><th></th><th>Orthogr.</th><th>Gloss</th><th>Target</th><th>Output</th><th>Age</th></tr>
<tr><td rowspan="2">[S]</td><td>Mário</td><td>'name'</td><td>/ˈmaɾiu/</td><td>[ˈmɐ]</td><td>1;1.30 (S3)</td></tr>
<tr><td>Mário</td><td>'name'</td><td>/ˈmaɾiu/</td><td>[ˈma]</td><td>1;4.9 (S5)</td></tr>
<tr><td rowspan="7">[SW]</td><td>árvore</td><td>'tree'</td><td>/ˈaɾvuɾɨ/</td><td>[ˈabi]</td><td rowspan="2">2;0.11 (S12)</td></tr>
<tr><td>Bárbara</td><td>'name'</td><td>/ˈbaɾbɐɾɐ/</td><td>[ˈbabɐ]</td></tr>
<tr><td>números</td><td>'numbers'</td><td>/ˈnumɨɾuʃ/</td><td>[ˈnuwoʃ]</td><td rowspan="2">2;1.10 (S13)</td></tr>
<tr><td>médico</td><td>'doctor'</td><td>/ˈmɛdiku/</td><td>[ˈmɛku]</td></tr>
<tr><td>árvore</td><td>'tree'</td><td>/ˈaɾvuɾɨ/</td><td>[ˈabi]</td><td>2;2.1 (S14)</td></tr>
<tr><td>Cláudia</td><td>'name'</td><td>/ˈklawdiɐ/</td><td>[ˈladjɐ]</td><td>2;3.8 (S15)</td></tr>
<tr><td>óculos</td><td>'glasses'</td><td>/ˈɔkuluʃ/</td><td>[ˈɔklu]</td><td>2;5.24 (S16)</td></tr>
</table>

In Figures 44, 45 and 46, we present the percentage of truncation in /WSW/, /WWS/ and /SWW/ in Joana's speech.

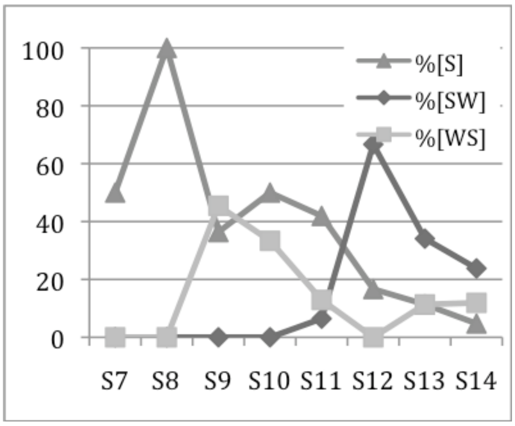

Figure 44. Truncation patterns for /WSW/ (Joana)

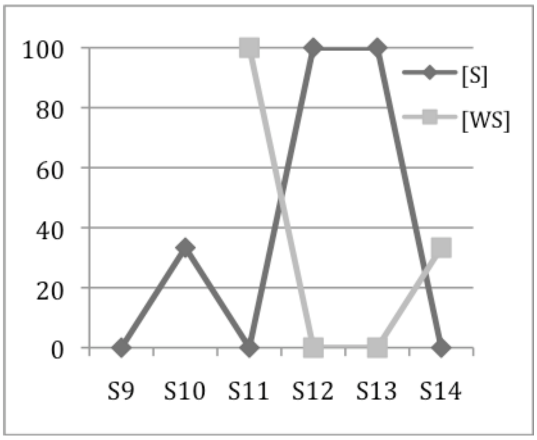

Figure 45. Truncation patterns for /WWS/ (Joana)

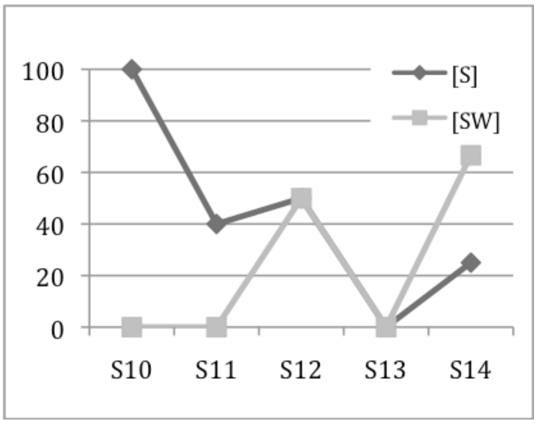

Figure 46. Truncation patterns for /SWW/ (Joana)

In Joana, we observe that there is a preference for [S] truncation in target /WSW/ until session 11. Truncation to [WS] is possible from session 8 to session 11 in low rates, though these rates are higher than the ones attested in [SW] truncation. In session 12, the child favors truncation to [SW] and both [S] and [WS] become less frequent.

The production of target /WWS/ is rare. Joana only has 9 tokens for /WWS/ word, from session 9, until the end of the observation period. When she attempts /WWS/, she mainly truncates them to [S].

/SWW/ words are not attempted until late in Joana's speech. When she selects these words, she uses truncation to [S], though this pattern has a decreasing path, contrary to [SW], which becomes an available strategy used by Joana at the end of the observation period, in /SWW/ words.

In (166) we show Joana's truncations for [S], [SW] and [WS], in this order, along the observation period.

(166) Joana – truncation in /WSW/ ([S], [WS] and [SW]):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[S]	*boneca*	'doll'	/buˈnɛkɐ/	[ˈbʷɐ]	1;6.24 (S7)
	Elvira	'name'	/ɛɫˈvirɐ/	[ˈiː]	1;9.25 (S9)
	coelho	'rabbit'	/kuˈɐʎu/	[ˈɛ]	1;10.22 (S10)
	sapato	'shoe'	/sɐˈpatu/	[ˈpaː]	
	cabeça	'head'	/kɐˈbesɐ/	[ˈme]	2;0.9 (S11)
	camisa	'blouse'	/kɐˈmizɐ/	[ˈmːi]	
	castelo	'castle'	/kɐʃˈtɛlu/	[ˈtɛw]	2;2.19 (S12)
	gelados	'ice creams'	/ʒɨˈladuʃ/	[ˈʒːa]	
[WS]	*Joana*	'name'	/ʒuˈɐnɐ/	[ɨˈɲɐ]	1;9.25 (S9)
	sapato	'shoe'	/sɐˈpatu/	[paˈpa]	
	padrinho	'godfather'	/pɐˈdriɲu/	[paˈpa]	
	gelado	'ice cream'	/ʒɨˈladu/	[piˈjaː]	2;0.9 (S11)
	macaco	'monkey'	/mɐˈkaku/	[pɨˈkaw]	
[SW]	*leitinho*	'milk dim.'	/lɐjˈtiɲu/	[ˈtiɲu]	2;2.19 (S12)
	menina	'girl'	/mɨˈninɐ/	[ˈminɐ]	
	comida	'food'	/kuˈmidɐ/	[ˈmiɲɐ]	2;4;1 (S13)
	bananas	'bananas'	/bɐˈnɐnɐʃ/	[ˈɲɐɲɐʃ]	
	vermelho	'red'	/vɨɾˈmɐʎu/	[ˈmɛju]	2;6.24 (S14)
	baloiço	'swing'	/bɐˈlojsu/	[ˈboːʃu]	

Instances in (167) illustrate Joana's truncation to [S] in target /WWS/.

(167) Joana – truncation of /WWS/ to [S]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
carapau	'mackerel'	/kɐɾɐˈpaw/	[ˈpɔ]	1;10.22 (S10)
Carabás	'name'	/kɐɾɐˈbaʃ/	[ˈbaʃː]	2;4.1 (S13)

The instances below ((168)) illustrate Joana's tendency for [S] and [SW] truncation in the final sessions.

(168) Joana – early truncation of /SWW/ to [S] and later truncation to [SW]:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
[S]	*máquina*	'machine'	/ˈmakinɐ/	[ˈɴa]	1;10.22 (S10)
	óculos	'glasses'	/ˈɔkuluʃ/	[ˈtʲɔ]	
	óculos	'glasses'	/ˈɔkuluʃ/	[ˈdɔʃ]	2;0.9 (S11)
	árvore	'tree'	/ˈaɾvuɾɨ/	[ˈfaː]	
[SW]	*sítio*	'place'	/ˈsitiu/	[ˈtʲiku]	2;2.19 (S12)
	óculos	'glasses'	/ˈɔkuluʃ/	[ˈɔkʰu]	2;6.24 (S14)
	Bárbara	'name'	/ˈbaɾbɐɾɐ/	[ˈbabɐ]	

Figures 47, 48 and 49 show the truncation preferences for /WSW/, /WWS/ and /SWW/ words, in João's speech.

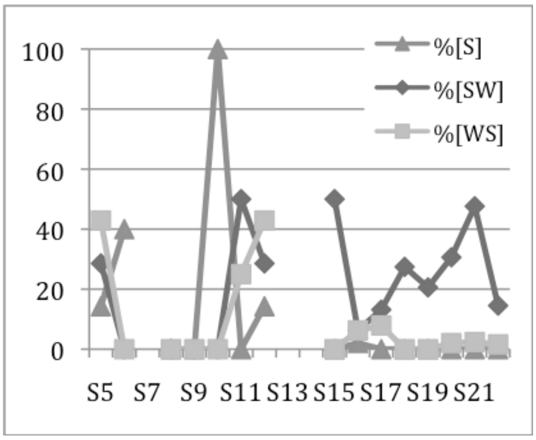

Figure 47. Truncation patterns for /WSW/ (João)

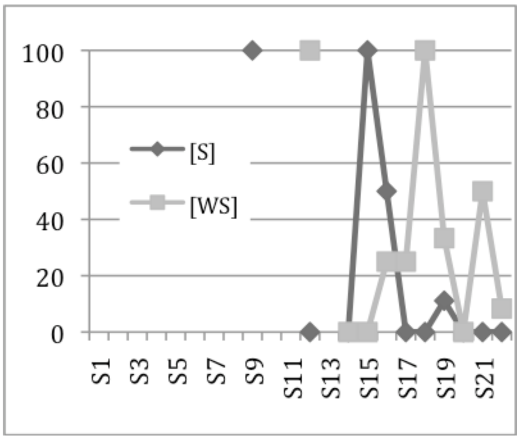

Figure 48. Truncation patterns for /WWS/ (João)

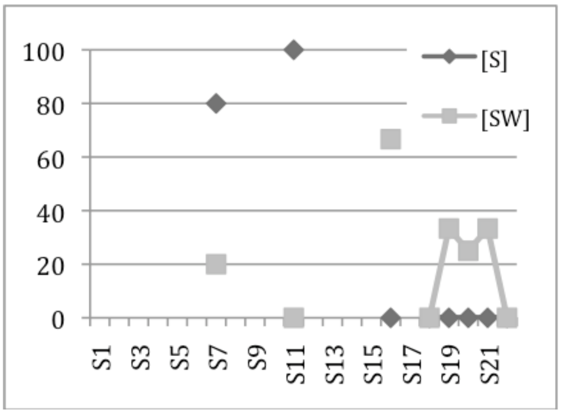

Figure 49. Truncation patterns for /SWW/ (João)

João does not select /WWS/ until session 5. However, from session 5 to session 14, the child does not favor any truncation pattern and produces /WSW/ as [S], [SW] and [WS]. From session 15 onwards, a clear preference for [SW] truncation is observable, though, in these sessions, /WSW/ are mostly produced target-like.

As in the previous children, target /WWS/ are selected late by João. During their emergence, they are produced firstly as [S] (until session 15) and later as [WS] (from session 16 onwards).

/SWW/ words are very scarce in João's speech. When they are selected they are truncated to [S] (until session 16) and to [SW] (from session 16 onwards).

In (169) we show some instances of the production of /WSW/ words in João:

(169) João – truncation in target /WSW/:

	Orthogr.	Gloss	Target	Output	Age
[S]	*bolacha*	'cookie'	/buˈlaʃɐ/	[ˈbwa]	1;2.13 (S5)
	bolacha	'cookie'	/buˈlaʃɐ/	[ˈbu]	1;7.0 (S12)
	comboio	'train'	/kõˈbɔjo/	[ˈbɔ]	1;4.17 (S7)
[WS]	*bolacha*	'cookie'	/buˈlaʃɐ/	[ɐˈbwa]	1;2.13 (S5)
	chupeta	'pacifier'	/ʃuˈpetɐ/	[aˈpa]	1;2.30 (S6)
	bolacha	'cookie'	/buˈlaʃɐ/	[βɐˈwɐ]	1;7.0 (S12)
[SW]	*banana*	'banana'	/bɐˈnɐnɐ/	[ˈnɐnɐ]	1;6.16 (S11)
	bolacha	'cookie'	/buˈlaʃɐ/	[ˈbalɐ]	1;7.0 (S12)
	girafa	'giraffe'	/ʒiˈɾafɐ/	[ˈnɐnɐ]	
	banana	'banana'	/bɐˈnɐnɐ/	[ˈmɐnɐ]	1;8.25 (S15)
	atende	'pick up'	/ɐˈtẽdɨ/	[ˈtẽdɨ]	1;9.25 (S16)
	menina	'girl'	/mɨˈninɐ/	[ˈɲinɐ]	
	artista	'artist'	/ɐɾˈtiʃtɐ/	[ˈtita]	1;10.11 (S17)
	alface	'lettuce'	/aɫˈfasɨ/	[ˈkati]	
	ajuda	'help'	/ɐˈʒudɐ/	[ˈdudɐ]	1;10.26 (S18)
	querido	'dear'	/kɨˈɾidu/	[ˈtidu]	
	barriga	'belly'	/bɐˈʀigɐ/	[ˈbidɐ]	1;11.10 (S20)

In (170) we show some of the few tokens produces by João in target /WWS/.

(170) João – truncation of /WWS/ to [S], [WS]:

	Orthogr.	Gloss	Target	Output	Age
[S]	*avestruz*	'ostrich'	/ɐvɨʃˈtɾuʃ/	[ˈtu]	1;8.25 (S15)
	javali	'wild pig'	/ʒɐvɐˈli/	[ˈdĩ]	
	acabou	'it finished'	/ɐkɐˈbo/	[ˈbo]	1;9.25 (S16)
[WS]	*avestruz*	'ostrich'	/ɐvɨʃˈtɾuʃ/	[tuˈtu]	1;9.25 (S16)
	acabou	'it finished'	/ɐkɐˈbo/	[ɐˈbo]	1;10.11 (S17)
	biberon	'milk bottle'	/bibɨˈɾõ/	[bɐˈbõ]	1;10.26 (S18)

(171) João – truncation of /SWW/ to [SW]:

Orthogr.	Gloss	Target	Output	Age
Fátima	'name'	/ˈfatimɐ/	[ˈpatɐ]	1;11.10 (S20)
Júlia	'name'	/ˈʒuliɐ/	[ˈujɐ]	
nêspera	'medlar'	/ˈneʃpɨɾɐ/	[ˈpebɐ]	2;0.6 (S21)

Figures 50, 51 and 52 show the truncation patterns displayed by Luma in the course of the observation period.

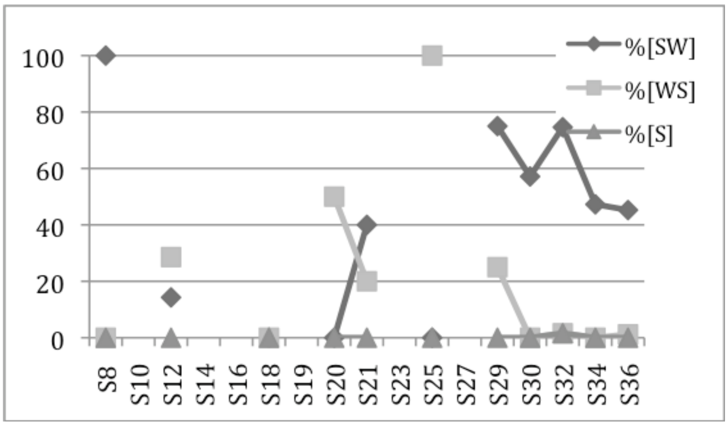

Figure 50. Truncation patterns for /WSW/ (Luma)

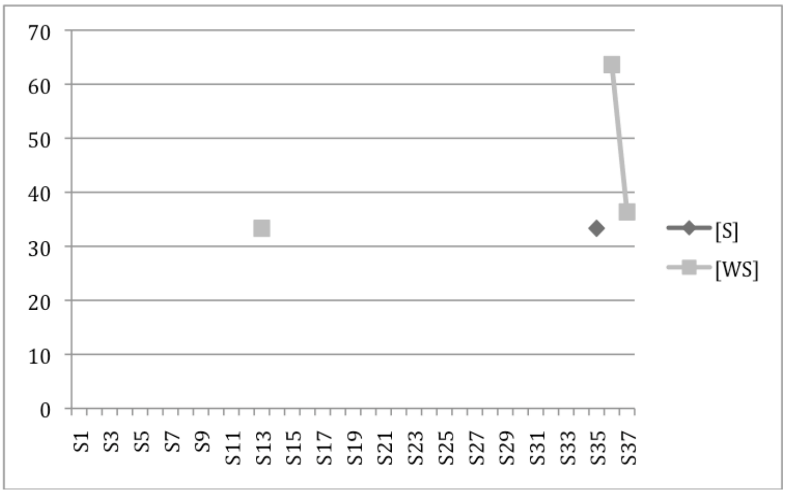

Figure 51. Truncation patterns for /WWS/ (Luma)

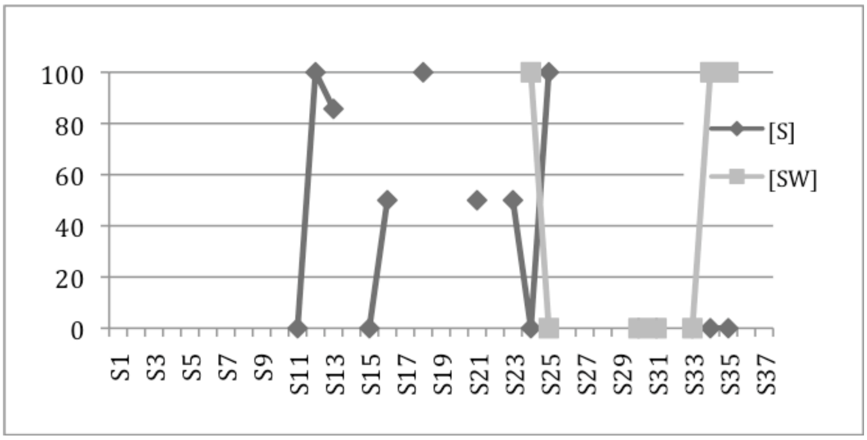

Figure 52. Truncation patterns for /SWW/ (Luma)

Luma also displays a late emergence of trisyllables. Target /WSW/ emerge late in development. They are not selected until session 8 and until session 25, they are mostly produced as [S] and, later (from session 27 onwards), truncated to [WS].

Figure 71 shows that the percentage of /WWS/ in Luma is very scarce. In the last sessions, the child produces /WWS/ targets as [WS]. The data from these words are not sufficient to allow for any robust generalization.

Target /SWW/ words also display unstable behavior in the speech of Luma, until the end of the observation period. However, two moments are observed: first, /SWW/ words are truncated to monosyllables (until session 23); second, /SWW/ words are produced as [SW] (sessions 25, 34 and 35).

As for /WWS/, we reinforce that the results for /SWW/ truncation in Luma's speech have to be interpreted carefully, due to the reduced number of tokens selected.

In (172), instances of truncation in /WSW/ are given:

(172) Luma – truncation in target /WSW/ ([SW]):

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
menina	'girl'	/mɨˈninɐ/	[ˈɲinɐ]	2;2.22 (S29)
Franscisco	'name'	/frɐ̃ˈsiʃku/	[ˈtikuː]	2;3.26 (S30)
menina	'girl'	/mɨˈninɐ/	[ˈninɐ]	2;3.26 (S30)
magoa	'it hurts'	/mɐˈgoɐ/	[ˈgoɐ]	2;4.11 (S31)
festinha	'caress'	/fɨʃˈtiɲɐ/	[ˈtiɲɐ]	2;4.25 (S32)
comando	'remote'	/kuˈmɐ̃du/	[ˈmɐ̃du]	2;5.15 (S33)

In (173) we present some instances of Luma's truncation in target /SWW/.

(173) Luma – truncation of /SWW/ to [S] and [SW]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
pássaro	'bird'	/ˈpasɐɾu/	[ˈbwa]	1;11.15 (S23)
lóbulo	'lobe'	/ˈlɔbulu/	[ˈnou]	1;11.29 (S24)
pássaro	'bird'	/ˈpasɐɾu/	[ˈbʷa]	2;0.13 (S25)
pássaro	'bird'	/ˈpasɐɾu/	[ˈbaː]	2;0.13 (S25)
óculos	'glasses'	/ˈɔkuluʃ/	[ˈɔku]	2;5.20 (S34)
máquina	'machine'	/ˈmakinɐ/	[ˈmakjɐ]	

The results from the truncation patterns observed in the speech of the five children indicates a distinct developmental path for /WSW/, /WWS/ and /SWW/ trisyllables.

Table 50 summarizes the developmental path of truncations for /WSW/, /WWS/ and /SWW/ words, in the speech of the five children under observation.

	/WSW/ >>	/WWS/ >>	/SWW/
Clara	∅ > $_{(S7\text{-}12)}$ [SW]	∅ > $_{(\geq S11)}$ [WS]	∅
Inês	Neutral > $_{(S6\text{-}9)}$ [WS]	∅ > $_{(S8\text{-}12)}$ [WS]	∅ > $_{(S3\text{-}9)}$ [S] > $_{(\geq S13)}$ [SW]
Joana	∅ > $_{(S7\text{-}11)}$ [S] > $_{(S12)}$ [SW]	∅ > $_{(S10\text{-}14)}$ [S]	∅ > $_{(S10\text{-}11)}$ [S] > $_{(S14)}$ [SW]
João	∅ > $_{(S5\text{-}12)}$ Neutral > $_{(\geq S12)}$ [SW]	∅ > $_{(S9\text{-}16)}$ [S]	∅ > $_{(S7\text{-}16)}$ [S] > $_{(\geq S17)}$ [SW]
Luma	∅ > $_{(S8\text{-}29)}$ [S] > $_{(\geq S29)}$ [SW]	∅ > $_{(\geq S36)}$ [WS]	∅ > $_{(S11\text{-}23)}$ [S] > $_{(\geq S34)}$ [SW]

Table 50. Developmental path of truncations in trisyllables (/WSW/, /WWS/ and /SWW/)

From the table presented above, we observe that, in target /WSW/, only Inês favors a [WS] truncation pattern, and when [WS] truncations are produced by this child, reduplication is observed. In the early sessions, children tend to avoid /WWS/ targets. In a second phase of the production of /WSW/, two children use truncation to [S] (Joana and Luma). João displays a neutral truncation preference and Clara favors [SW]. Before /WSW/words are acquired, truncation to [SW] is observed (Joana, João and Luma's speech.

The results for the truncation pattern /WSW/ do not suggest an iambic tendency. Except for Inês, children do not favor an iambic foot. If anything, before the acquisition of /WSW/, the Portuguese children observed display a preference for [SW].

As /WSW/ trisyllables, /WWS/ words are not earlier selected by the children. However, these forms emerge later than /WSW/ (attested in the speech of the five Portuguese children observed). When they are selected, /WWS/ are truncated to [S] (as in Joana and João) or [WS] (Clara, Inês and Luma).

/SWW/ words are selected later by four of the observed children (Inês, Joana, João and Luma). Clara does not select these word forms at all. When /SWW/ words are selected, they are truncated to [S] and only later are they produced as [SW].

Target /WWS/ and /SWW/ are acquired later than /WSW/ and, before that, they are subjected to truncation as well. The former tend to be truncated to [S] or [WS] and the latter to [S] or [SW].

5.1.3.4. Stress shift in disyllables

In this section, we considered stress shift the strategy where children use both syllables of the word, but misplace word stress. For instance, a word like *casa* 'house' /ˈkazɐ/, produced as [kaˈza] would be considered as stress shift, as well as a word like *balão* 'balloon'

/bɐˈlɐ̃w̃/ produces as [ˈbɐlɐ̃w̃]. In this account, only non-reduplicated disyllables were considered.

In Tables 51 and 52, we show Clara's results for stress shift in /SW/ and /WS/.

Session	%/SW/-[WS]
1	0% (0/1)
2	0% (0/0)
3	0% (0/4)
4	0% (0/0)
5	0% (0/4)
6	25% (1/4)
7	0% (0/5)
8	0% (0/6)
9	11.11% (1/9)
10	6.25% (5/80)
11	1.9% (3/158)
12	4.23% (6/142)

Table 51. Percentage of stress shift in /SW/ (Clara)

Session	%/WS/->[SW]
1	0% (0/3)
2	0% (0/1)
3	0% (0/0)
4	0% (0/0)
5	0% (0/3)
6	0% (0/2)
7	0% (0/23)
8	0% (0/2)
9	0% (0/16)
10	8% (2/25)
11	5.9% (4/67)
12	0% (0/106)

Table 52. Percentage of stress shift in /WS/ (Clara)

In target trochees, Clara had a maximum of 16 tokens where stress shift occurred in a total of 413 targets. In target iambs, stress shift occurred 6 times in 248 targets. Clara does not go beyond the 25%, where this value corresponds to 1 mis-stressed word in four targets (in session 6).

In the tables below we show Inês' data for stress shift, in target SW and WS.

Session	%/Sw/-[wS]
1	0% (0/0)
2	0% (0/2)
3	0% (0/4)
4	3.70% (1/27)
5	3.70% (1/27)
6	0% (0/90)
7	0% (0/74)
8	5.13% (2/39)
9	12.23% (17/139)
10	3.64% (8/220)
11	2.53% (6/237)
12	2.18% (6/275)
13	0.34% (1/297)
14	0.40% (1/249)
15	0.86% (2/232)
16	0% (0/283)
17	1.30% (2/154)
18	0.36% (1/275)

Table 53. Percentage of stress shift in /SW/ (Inês)

Session	%/WS/->[SW]
1	0% (0/0)
2	0% (0/0)
3	12.5% (1/8)
4	0% (0/0)
5	25% (1/4)
6	0% (0/14)
7	0% (0/29)
8	0% (0/39)
9	0% (0/44)
10	6.66% (3/45)
11	5.19% (4/77)
12	3.87% (6/155)
13	1.81% (2/110)
14	1.45% (2/137)
15	3.06% (3/98)
16	1.58% (2/126)
17	0% (0/74)
18	0.86% (1/115)

Table 54. Percentage of stress shift in /WS/ (Inês)

Like Clara, Inês has a reduced percentage of stress shift, both in target SW and WS. In a total of 2624 target trochees across sessions, Inês produced 48 tokens with stress shift. In iambs, in a total number of 1075 target words, Inês produced 25 tokens with stress shift.

In the following tables, we show Joana's data for stress shift in /SW/ and /WS/.

Session	%/SW/-[WS]
1	0% (0/0)
2	0% (0/0)
3	0% (0/2)
4	0% (0/0)
5	0% (0/0)
6	0% (0/0)
7	0% (0/16)
8	25% (1/4)
9	7.69% (1/13)
10	0% (0/16)
11	6.67% (3/45)
12	2.2% (2/91)
13	0% (0/74)
14	3.68% (6/163)

Table 55. Percentage of stress shift in /SW/ (Joana)

Session	%/WS/->[SW]
1	0% (0/0)
2	0% (0/0)
3	0% (0/0)
4	0% (0/0)
5	0% (0/0)
6	0% (0/0)
7	0% (0/2)
8	0% (0/1)
9	0% (0/14)
10	7.14% (1/14)
11	3.33% (1/30)
12	0% (0/30)
13	3.7% (1/27)
14	2.04% (1/49)

Table 56. Percentage of stress shift in /WS/ (Joana)

Joana also displays a reduced rate of stress shift, both in target trochees and target iambs. In session 8, Joana has 25% of stress shift but it corresponds to the production of 1 token with stress shift, out of 4 targets. In target iambs, the percentage of stress shift is even more reduced, never surpassing the 8%.

In Tables 57 and 58, we show João's data for stress shift in /SW and /WS/.

Session	%/SW/-[WS]
1	0% (0/6)
2	0% (0/0)
3	50% (4/8)
4	0% (0/6)
5	50% (2/4)
6	0% (0/0)
7	13.33% (2/15)
8	11.11% (2/18)
9	15.38% (2/13)
10	17.99% (7/39)
11	0% (0/17)
12	16.67% (2/12)
13	43.5% (10/23)
14	23.53% (4/17)
15	15.29% (1/7)
16	8.82% (3/34)
17	0% (0/58)
18	0% (0/67)
19	0% (0/77)
20	0% (0/90)
21	1.16% (1/86)
22	5.08% (3/59)

Table 57. Percentage of stress shift in /SW/ (João)

Session	%/WS/->[SW]
1	0% (0/0)
2	0% (0/1)
3	0% (0/4)
4	0% (0/4)
5	0% (0/0)
6	0% (0/3)
7	0% (0/4)
8	0% (0/12)
9	0% (0/12)
10	0% (0/11)
11	25% (1/4)
12	0% (0/3)
13	10% (1/10)
14	0% (0/2)
15	0% (0/4)
16	18.75% (3/16)
17	10% (1/10)
18	10% (3/30)
19	1/11
20	2/22
21	3/12
22	2/13

Table 58 .Percentage of stress shift in /WS/ (João)

João is the only child where the percentage of stress shift may suggest that there is an iambic tendency. If we compare the percentage of stress shift in target trochees and target iambs, we observe that it is higher in target trochees (cf. sessions 3-10 and 12-15). Moreover, the numbers can reach the 50% in the early stages (until session 15, when there is a reduced number of target trochees). Between session 7 and 15 stress shift in target trochees, but not in target iambs, is an available strategy for João, as well. However, from session 16 to session 18, higher values are observed in target /WS/ to [SW].

In (174) we show some instances of stress shift (/SW/ -> [WS]) in João's speech.

(174) João – stress shift /SW/ -> [WS]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
água	'water'	/ˈagʷɐ/	[aˈβa]	1;3.21 (S7)
bolo	'cake'	/ˈbolu/	[boˈu]	1;4.17 (S8)
uva	'grape'	/ˈuvɐ/	[dɐˈduː]	1;5.12 (S9)
bola	'ball'	/ˈbɔlɐ/	[boˈa]	1;5.26 (S10)
bola	'ball'	/ˈbɔlɐ/	[bɐˈwa]	1;7.0 (S12)
bolo	'cake'	/ˈbolu/	[boˈjo]	1;8.4 (S14)

Like João, Luma also uses stress shift. However, contrary to João, Luma prefers to use stress shift in target iambs, therefore producing trochees. This strategy is more common at the end of the observation period (from session 28 to session 31).

Tables 59 and 60 show Luma's data for stress shift in /SW/ and /WS/.

Session	%/SW/-[WS]
1	0% (0/1)
2	0% (0/0)
3	0% (0/9)
4	0% (0/1)
5	0% (0/5)
6	14.29% (1/7)
7	4.54% (1/22)
8	0% (0/26)
9	0% (0/13)
10	0% (0/2)
11	0% (0/2)
12	0% (0/2)
13	0% (0/11)
14	0% (0/8)
15	0% (0/16)
16	0% (0/1)
17	0% (0/31)
18	0% (0/14)
19	0% (0/4)
20	0% (0/31)
21	0% (0/21)
22	0% (0/33)
23	2.44% (1/41)
24	0% (0/34)
25	0% (0/30)
26	8.33% (2/24)
27	38.89% (7/18)
28	10% (3/30)
29	2.63% (1/38)
30	7.38% (9/122)
31	9.32% (11/118)
32	3.37% (7/208)
33	0.93% (2/215)
34	0% (0/217)
35	0% (0/146)
36	0.87% (2/229)
37	2.06% (3/145)

Table 59. Percentage of stress shift in /SW/ (Luma)

Sessions	%/WS/->[SW]
1	0% (0/0)
2	0% (0/0)
3	0% (0/0)
4	0% (0/0)
5	0% (0/0)
6	0% (0/0)
7	0% (0/0)
8	0% (0/0)
9	0% (0/0)
10	0% (0/0)
11	0% (0/1)
12	0% (0/0)
13	0% (0/0)
14	0% (0/6)
15	0% (0/2)
16	0% (0/36)
17	0% (0/0)
18	0% (0/0)
19	0% (0/0)
20	12.5% (2/16)
21	0% (0/7)
22	0% (0/0)
23	0% (0/10)
24	0% (0/1)
25	0% (0/7)
26	0% (0/2)
27	0% (0/1)
28	23.07% (3/13)
29	25% (3/12)
30	31.57% (6/19)
31	25.92% (7/27)
32	2% (1/50)
33	8.69% (4/46)
34	5.45% (3/55)
35	11.42% (4/35)
36	5% (5/100)
37	6.12% (3/49)

Table 60. Percentage of stress shift in /WS/ (Luma)

In (175) we show Luma's renditions of stress shift towards trochees.

(175) Luma – stress shift /WS/ -> [SW]:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Pati	'name'	/paˈti/	[ˈpati]	2;2.4 (S28)
Miguel	'name'	/miˈgɛɫ/	[ˈniɐ̃]	2;2.22 (S29)
Mami	'name'	/maˈmi/	[ˈmami]	2;3.26 (S30)

The first observation that we can draw is that stress shift was an infrequent strategy in all children. However, two children (João and Luma) displayed stress shift in the production of /SW/ and /WS/. Whereas João tends to misstress target /SW/ words, producing them as [WS], Luma displays the opposite behavior, producing [SW] for target /WS/ words. In both children, stress shift is a strategy used before the acquisition of the predominant disyllabic template (/SW/ or /WS/). In João, stress shift to [WS] occurs before the acqusition of /SW/ words and, in Luma, stress shift occurs before the acquisition of /WS/ words. In the remainder children (Clara, Inês and Joana) stress errors are produced in highly reduced percentages.

5.1.3.5. Summary for the production strategies

In this section we analyzed the stratagies used by the five Portuguese children under analysis in target monosyllables, disyllables (/SW/ and /WS/) and trisyllables (/WSW/, /WWS/ and /SWW/).

In target monosyllables, we observed that, when monosyllables were not produced target-like, they were subject to reduplication and epenthesis. Ungliding was also observed, though in smaller amounts. Though all children used these strategies in target monosyllables, Clara, João and Luma used them across the entire observation period (though in a decreasing fashion), Inês used them mainly in the early sessions (until sessions 8-9) and Joana used them in very small amount.

As for target disyllables, our data showed that in the vast majority of the cases, the syllable preserved as the result of truncation is the stressed syllable. In the early sessions, both /SW/ and /WS/ are subject to high rates of truncation. Inês has a preference for truncation in /WS/ at the beginning. Joana, João and Luma have higher truncation rates in trochees, initially, though much variation is found in the early sessions. Clara does not display any tendency. In the last sessions iambs are more prone to truncation than trochees in the productions of the five children observed.

The results found for the strategies in disyllables indicate that, at the beginning, no general preference is attested and, later, all children tend to have higher truncation rates in /WS/.

Trisyllables were not selected in the early sessions in four of the five observed children (Inês was the only child selecting /WSW/ in the onset of word production).

The first trisyllables to emerge in the children's speech were /WSW/ words. At the beginning of /WSW/ selection, children chose variable truncation paths: Clara truncated these word forms to [SW]. Inês and João showed a neutral tendency (both [SW] and [WS] were noticeable) and Joana and Luma had a preference for [S], initially. before /WSW/ were acquired, all children (except for Inês) had a preference for [SW] truncation.

Target /WWS/ were not earlier selected by the children. When they were attempted, they were mainly truncated to [S] (in Joana and João) or [WS] (Clara and Inês). Luma used the truncation to [SW], as well.

Target /SWW/ were the trisyllabic forms later acquired. In the early moments of selection, they were produced as [S] by all children (except Clara, who did not select any /SWW/ word). Later, they were produced as [SW].

Stress shift was not a strategy recursively used by three in the five children observed. João used stress shift in higher amounts in the early sessions, favoring the production of [WS] (/SW/ words were produced as [WS]), whereas Luma displayed the opposite behavior (she produced [SW] in /WS/).

The results from the strategies observed in the speech of the five children under observation do not suggest an iambic tendency.

5.1.4. Summary of results

In this chapter, we analyzed the stress patterns in the productions of five Portuguese children. We investigated (i) the production patterns, (ii) the faithfulness to target words and (iii) the production strategies used in dealing with word stress and word shape.

As far as the production patterns are concerned, the data presented showed that:

(i) At the early stages of word production, there is a general preference for monosyllabic forms (cf. Tables 16-20, Figures 29-33). These monosyllables may result from target monosyllables, but also from the truncation of target trochees and target (cf. instances for [S] in (112)-(116));

(ii) [WS] patterns are produced earlier than [SW] (cf. Tables 16-20);

(iii) At the beginning, [WS] are in greater amounts than [SW] (Tables 16-20);

(iv) From a certain point in development, the amount of [SW] words widely surpasses the amount of [WS] (cf. Tables 16-20);

(v) Most early words are reduplications and words produced with epenthesis, creating [WS] patterns (cf. Figures 29-33);

(vi) The amount of reduplications and epenthesis decreases importantly in the course of development (cf. Figures 29-33).

With respect to the faithfulness to the target, our results enable us to draw the following generalizations:

(vii) If results are analyzed including reduplicated targets (/CV_1CV_1/) and reduplicated productions ([CV_1CV_1]), as well as productions with filler syllables ([fS]), EP word stress acquisition has an clear iambic tendency;

(viii) If non-reduplicated words are considered, i.e., if we consider /SW/ and /WS/ (/CV_1'CV_2/) words and if we do not consider in terms of faithful, the productions where children produce iambic reduplications ([CV_1'CV_1]) for /CV_1'CV_2/ words, no clear tendency is observed, or a slight tendency for trochees is attested (cf. Tables 34-38);

(ix) Three children (Clara, Inês and Joana) have an earlier acquisition of /SW/ than /WS/; one child (João) has a simultaneous acquisition of both structures; one child (Luma) acquires /WS/ earlier than /SW/ (cf. Tables 34-38 and Table 39, for a summary).

The results regarding the production strategies observed in the speech of the five children indicated that:

(x) Disyllables are prone to truncation and the same strategies as monosyllables: reduplication and epenthesis (cf. Table 45-49 and instances (117)-(121));

(xi) When truncations were carried out by the children, the stressed syllable of the target words was overwhelmingly the preserved syllable (cf. instances (152)-(160)).

(xii) Truncation in /SW/ and /WS/ showed an early variable path, both within-child and between-children: in the early sessions, Inês has a preference for truncation in /WS/ (cf. Table 46). Initially, Joana, João and Luma have higher truncation rates in trochees, though some variation is found (cf. Tables 47, 48 and 49, respectively). In Clara no tendency is observed (cf. Table 45).

(xiii) The results found for the strategies in disyllables indicate that, at the beginning, no general preference is attested and, later, all children tend to have higher truncation rates in /WS/ (cf. Tables 44-49).

(xiv) Close to the moment or in the moment in which children acquire /SW/, all children display a preference for [SW] truncation in /WSW/ (cf. Tables 34-38 and Figures 39, 41, 44, 47, 50);

(xv) Only Inês favors [WS] truncated forms in target /WSW/ (cf. Figure 41);

(xvi) In general, target /WWS/ are produced either as [S] (earlier) or [WS] (later) (cf. Figures, 40, 42, 45, 48 and 51);

(xvii) In general, target /SWW/ are earlier produced as [S] and later produced as [SW] (cf. Figure 43, 46, 49 and 52).

(xviii) Stress shift is a strategy used in reduced percentages. Only two children display higher percentages of this strategy: one child favors [WS] (João), the other child favors [SW] (Luma) (cf. Tables 51-60).

It is worth noticing, also, that we found variable behavior with respect to stress patterns and word shape in the early sessions (both within-child and between-children). Later, this variability was neutralized and children appear to have a more common ground in the production of stress patterns.

In sum, the acquisition of stress patterns by the five Portuguese children observed might be sketched as follows: /SW/ (~/WS/[183]) > (/WS/) > /WSW/ > /WWS/ > /SWW/.

In the following section, we will discuss the results found and propose a phonological analysis for the acquisition of stress patterns in EP.

5.2. Discussion

In this section, we will discuss the results found in the acquisition of stress patterns in EP, based on the empirical evidence from the speech productions of five Portuguese children. This discussion will be divided into two parts: in the first part (5.2.1.), we will propose a developmental scale for the acquisition of stress patterns (/SW/, /WS/ and /WSW/) in EP. We will tackle the developmental path proposed, on the light of our results, and compare the acquisition path undertaken by Portuguese children with the descriptions previously conducted on other languages, namely Dutch. In the second part (5.2.2.), we will focus on some aspects related to the production data in the early stages of the acquisition of stress patterns and word shape. We will discuss the apparent early iambic foot and the hypothesis according to which the early acquisition of iambs might be the result of a higher level prominence (specifically, phrasal stress).

5.2.1. Developmental path for the acquisition of word shape and stress patterns in EP

In this section, we will propose a developmental scale for the acquisition of stress patterns and word shape in EP. This scale will be based on the speech productions of the five Portuguese children observed in this project.

As summarized in Table 61, overall results suggest that, despite some language-specific aspects, EP word stress acquisition, proceeds much like many other trochaic languages.

[183] The mark '~' indicates a simultaneous emergence of /SW/ and /WS/ attested, for instance, in João.

	1;0	1;1	1;2	1;3	1;4	1;5	1;6	1;7	1;8	1;9	1;10	1;11	2;0	2;1	2;2	2;3	2;4	2;5	2;6
Clara	σ		$[CV_1CV_2]$ ≥S4				/SW/ (>50%) ≥S9	/WS/ (>50%) ≥S10		/WSW/ (>50%) ≥S11									
Inês	σ					$[CV_1CV_2]$ ≥S4		/SW/ (>50%) ≥S9			/WSW/ (>50%) ≥S11		/WS/ (>50%) ≥S12						
Joana	σ								$[CV_1CV_2]$ ≥S8						/SW/ (>50%) ≥S12		/WS/ (>50%) ≥S13		/WSW/?
João	σ			$[CV_1CV_2]$ ≥S8						/SW/ (>50%) /WSW/ (>50%) /WS/ (>50%) ≥S16									
Luma	σ									$[CV_1CV_2]$ ≥S18							/WS/ (>50%) ≥S31	/SW/ (>50%) ≥S33	/WSW/ (>50%) ≥S36

Table 61. Individual developmental path for word shapes and stress patterns

Table 61 depicts the developmental path pursued by each of the five children observed, with respect to word shapes and stress patterns (/σ/, /SW/, /WS/ and /WSW/). The grey grading indicates the different moments of production and acquisition of the distinct word shapes (/σ/, /SW/, /WS/ and /WSW/). We observe up to five moments of production for word shapes and stress patterns, in the speech of the five children. Notice that not all children go through all moments and, in some children, the production of the different stress patterns may overlap. Therefore, in this discussion we will account for the general path undertaken by the five children observed, based on the maximum number of moments pursued. The five moments in the production of the stress patterns might be described as follows:

1. In the beginning, monosyllables are the predominant word shape in production (cf. section 5.1.1.), therefore, stress contrasts are hard to define. At this point, longer utterances are the product of reduplication of the stressed syllable or the result of epenthesis before the circumscribed stressed syllable. Some children use more reduplication (namely, Inês) and other children prefer vowel epenthesis (namely, Clara), but all children use these strategies at the onset of word production (cf. section 5.1.3.);

2. In a second moment, non-reduplicated disyllables emerge, though in reduced amounts and in an unstable fashion (they can be produced target-like or truncated by the same child - cf. sections 5.1.2.2. and 5.1.3.2.);

3. In a third moment, variable paths among children are attested: in Clara, Inês and Joana, the majority of /SW/ words are produced target-like. João acquires /SW/, /WS/ and /WSW/ stress patterns simultaneously and Luma acquires /WS/ (cf. results in section 5.1.2.2.);

4. The fourth moment is attested in Clara, Inês, Joana and Luma. In Clara and Joana, the majority of /WS/ words are produced target-like. Inês and Luma acquire /WSW/ and /WS/, respectively;

5. The fifth moment is attested in Clara, Inês and Luma and is characterized by the acquisition of /WS/ in Inês, and /WSW/ in Clara and Joana.

The two initial moments were common to all children, though some variation is found in the amount of time spent on it, in each child. As observed in section 5.1.4., Luma is the only child acquiring /WS/ earlier than /SW/.

In the following paragraphs, we will put forward the acquisition stages of stress patterns and word shape, based on the observation of the production data in analyzed in this dissertation.

Stage I

Our findings suggest that, despite the amount of productions larger than a monosyllable, Portuguese children use the syllable to start building words.

The assumption of an early processing of the syllable is borne out from the data. Indeed, three facts motivate the identification and description of this first stage as a stage where the syllable is under the children's attention:

(i) As far as faithfulness productions are concerned, we observed that monosyllables are selected earlier, and they have higher rates of target-like production, than non-reduplicated disyllables (cf. Tables 23-27 and 34-38).

(ii) As far as the production patterns are concerned, monosyllables are the preferred word shape, irrespective of the shape of the target word (cf. Figures 29-33). Even the children who produce [WS] patterns earlier can show greater amounts of [S][184].

(iii) As far as truncations are concerned, trochees and non-reduplicated iambs can equally be truncated to monosyllables (cf. Tables 45-49).

In Stage I of the acquisition of stress patterns, the observed children circumscribe the stressed syllable of the target word and produce it in various manners: either target-like (/S/ -> [S]), with a filler insertion ([fʊ]) or with reduplication ([CV_1CV_1]). These productions were possible both for target monosyllables, and for target disyllables (/SW/ and /WS/), as exemplified in (176).

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[184] See, for instance, the absolute values in [S] and [WS] word shapes in Inês (Table 17).

(176) Production of [S], [fʊ] and [CV$_1$CV$_1$] in /S/, /SW/ and /WS/:

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
/S/	*dá*	'give imp.'	/ˈda/	[ˈdaː]	Inês, 1;0.25 (S2)
	já	'now'	/ˈʒa/	[ˈza]	
	dá	'give imp.'	/ˈda/	[aˈdʲa]	
	cão	'dog'	/ˈkɐ̃w̃/	[ˈga]	Inês, 1;1.20 (S3)
	há	'there is'	/ˈa/	[ˈa]	
	má	'bad'	/ˈma/	[mɐˈma]	
	mãe	'mother'	/ˈmɐ̃j̃/	[ˈɐ̃ː]	Joana, 0;11.24 (S1)
	não	'no'	/ˈnɐ̃w̃/	[ˈnɐ̃ːw̃]	
	pé	'foot'	/ˈpɛ/	[ˈpɛ]	Joana, 1;2.29 (S4)
	pai	'father'	/ˈpaj/	[ˈpa]	Joana, 1;6.24 (S7)
	dá	'give imp'	/ˈda/	[aˈtʲa]	Luma, 1;0.28 (S3)
	dá	'give imp'	/ˈda/	[ˈdæ]	Luma, 1;2.22 (S6)
	dá	'give imp'	/ˈda/	[daˈda]	Luma, 1;4.2 (S9)
/SW/	*toma*	'take imp.'	/ˈtɔmɐ/	[ˈtɔ]	Inês, 1;0.25 (S2)
	água	'water'	/ˈagʷɐ/	[ˈaː]	Inês, 1;1.30 (S3)
	papa	'food fam.'	/ˈpapɐ/	[ˈbaˈba]	
	barco	'boat'	/ˈbaɾku/	[ˈbæː]	Inês, 1;3.6 (S4)
	bóia	'buoy'	/ˈbɔjɐ/	[βaˈβɐ]	
	gato	'cat'	/ˈgatu/	[ˈka]	Joana, 1;6.24 (S7)
	Carla	'name'	/ˈkaɾlɐ/	[ˈtaː]	
	papa	'food fam.'	/ˈpapɐ/	[ˈpaː]	
	Carla	'name'	/ˈkaɾlɐ/	[ˈka]	Joana, 1;8.4 (S8)
	gato	'cat'	/ˈgatu/	[əˈga]	
	gato	'cat'	/ˈgatu/	[ˈta]	Luma, 1;3.5 (S7)
	lua	'moon'	/ˈluɐ/	[ˈnɐ]	
	pato	'duck'	/ˈpatu/	[ˈpa]	
	bola	'ball'	/ˈbɔlɐ/	[ˈpa]	Luma, 1;4.2 (S9)
	bola	'ball'	/ˈbɔlɐ/	[paˈpa]	Luma, 1;8.2 (S17)
/WS/	*chapéu*	'hat'	/ʃɐˈpɛw/	[pɛˈpæː]	Inês, 1;3.6 (S4)
	mamã	'mommy'	/mɐˈmɐ̃/	[ɐˈmɐ̃]	Joana, 1;0.25 (S2)
	mamã	'mommy'	/mɐˈmɐ̃/	[mɐˈmɐ̃]	Joana, 1;2.7 (S3)
	avó	'grandmother'	/ɐˈvɔ/	[ˈa]	Joana, 1;8.4 (S8)

The instances showed above indicate that children correctly produce target monosyllables and that they truncate disyllables (/SW/ and /WS/) into monosyllables. In the case of truncation, children overwhelmingly circumscribe and preserve the stressed syllable.

The instances presented in (176) also show that children use epenthesis and reduplication both in target monosyllables and in target disyllables[185]. Indeed, we observe that children produce both monosyllables and disyllables in the first stage of the acquisition of stress patterns and word shape. The monosyllables produced might be the product of target monosyllables produced target-like (/σ/ -> [σ]), or the result of truncation (/-SW/ -> [σ] or /-WS/ -> [σ]). The disyllables produced might also be the product of target monosyllables being reduplicated (/σ/ -> [CV_1CV_1]) or produced with epenthesis (/σ/ -> [fσ]) or, finally, be the result of target disyllables being reduplicated and produced with epenthesis as well (/CVCV/ -> [CV_1CV_1], [fσ]).

Since both target monosyllables and disyllables are produced in the same manner (they can be produced as a monosyllable, be reduplicated, or be subject to filler insertion), and since the frequency information on the distribution of word shapes in the target (cf. Figure 8) pointed to a majority of disyllables, one might ask why is that the early word shape is a monosyllable, and not a disyllable. Also, since the disyllabic productions have an iambic shape, one might ask why the early word is not a disyllabic iamb. Once again, four facts can be brought up in order to argue against a disyllabic representation on the one hand, and an iambic representation on the other hand, for early words:

(i) Non-reduplicated /WS/ words are not earlier selected or they are selected and produced in small amounts. On the contrary, target monosyllables are produced in high rates. Tables 62 and 63 illustrate this behavior in the first 10 sessions of data collection[186].

[185] As shown in previous sections (cf., in particular, Figures 29-33, in section 5.1.1.2.), productions of larger words (where reduplication and epenthesis are found) mainly have a [WS] shape. The apparent iambic form of Portuguese children's early words will be discussed in the following section (section 5.2.2.).

[186] The values marked with a star, in Clara and João, correspond to the production of one single type (*olá* 'hello' /ɔˈla/). In session 5, Clara also selects one time the word *pinguim* 'penguin' /pĩˈgʷĩ/.

Session	% /WS/				
	Clara	**Inês**	**Joana**	**João**	**Luma**
S1	100*	-	-	-	-
S2	100*	-	-	100*	-
S3	-	0	-	100*	-
S4	-	-	-	100*	-
S5	66. 7*	0	-	-	-
S6	100*	21.4	-	100*	-
S7	87	0	0	75	-
S8	50	28.2	0	16.7	-
S9	31.3	38.6	28.6	0	-
S10	80	46.7	35.7	54.5	-

Table 62. Percentage of target-like non-reduplicated /WS/ words

Session	% /S/				
	Clara	**Inês**	**Joana**	**João**	**Luma**
S1	-	0	100	-	0
S2	0	59.1	100	25	50
S3	100.0	36.8	100	0	-
S4	85.7	40.2	100	-	-
S5	71.4	69.2	100	-	-
S6	46.2	62.8	66.7	-	92.3
S7	74.1	67.5	100	66.7	87.5
S8	64.7	71.9	87.5	100	33.3
S9	68.2	88.7	85.7	61.5	50.0
S10	94.1	87.5	83.9	76.9	100.0

Table 63. Percentage of monosyllables produced target-like

The comparison of the two tables indicates that, indeed, target monosyllables are produced in higher percentages than /WS/. If we assume a disyllabic /WS/ representation for early words, there is no reason for the paucity of non-reduplicated /WS/, especially when compared to the high frequency of reduplicated iambs.

(ii) Non-reduplicated /WS/ are generally subject to truncation for a longer period of time (though not much longer) than /SW/, as demonstrated in section 5.1.3.2. and illustrated in the instances in (177). In these instances we observe that the same child truncates /WS/ for a longer period of time than /SW/.

(177) Later truncation in /WS/ than in /SW/:

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
/SW/	*porta*	'door'	/ˈpɔɾtɐ/	[ˈpɔ]	Inês, 1;7.2 (S8)
	tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpa]	Inês, 1;8.2 (S9)
	perna	'leg'	/ˈpɛɾnɐ/	[ˈbɛ]	
	Paula	'name'	/ˈpawlɐ/	[ˈpa]	Joana, 1;10.22 (S9)
	Nando	'name'	/ˈnɐ̃du/	[ˈɲɐ̃]	Joana, 2;0.9 (S11)
	leite	'milk'	/ˈlɐjtɨ/	[ˈɲɐj]	
	mano	'brother fam.'	/ˈmɐnu/	[ˈmɐ]	João, 1;5.26 (S10)
	bola	'ball'	/ˈbɔlɐ/	[ˈbɔː]	
	mota	'motorbike'	/ˈmɔtɐ/	[ˈta]	João, 1;6.16 (S11)
	gato	'cat'	/ˈgatu/	[ˈta]	Luma, 1;11.29 (S24)
	meias	'socks'	/ˈmɐjɐʃ/	[ˈbɛː]	Luma, 2;0.13 (S25)
	polvo	'octopus'	/ˈpoɫvu/	[ˈboː]	Luma, 2;0.13 (S25)
/WS/	*papel*	'paper'	/pɐˈpɛɫ/	[ˈpɛː]	Inês, 1;7.2 (S8)
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛw]	Inês, 1;8.2 (S9)
	aqui	'here'	/ɐˈki/	[ˈki]	
	abrir	'to open'	/ɐˈbɾiɾ/	[ˈbiɾ]	Inês, 1;10.29 (S11)
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈɛw]	
	avó	'grandmother'	/ɐˈvɔ/	[ˈdʲɔ]	Inês, 2;0.11 (S12)
	cristal	'crystal'	/kɾiʃtaɫ/	[ˈtaw]	Joana, 2;2.19 (S12)
	atrás	'behind'	/ɐˈtɾaʃ/	[ˈtʲaʃː]	
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛw]	Joana, 2;4.1 (S13)
	bacio	'basin'	/bɐˈsiw/	[ˈʃiw]	
	chover	'to rain'	/ʃuˈveɾ/	[ˈvej]	
	limão	'lemon'	/liˈmɐ̃w̃/	[ˈɐ̃ːw̃ː]	João, 1;6.16 (S11)
	sofá	'couch'	/suˈfa/	[ˈpɐː]	João, 1;7.20 (S11)
	Natal	'Christmas'	/nɐˈtaɫ/	[ˈta]	João, 1;8.4 (S14)
	Inês	'name'	/iˈneʃ/	[ˈneː]	Luma, 2;2.4 (S28)
	sofá	'couch'	/suˈfa/	[ˈfaː]	
	chinês	'Chinese'	/ʃiˈneʃ/	[ˈneː]	Luma, 2;2.22 (S29)
	aqui	'here'	/ɐˈki/	[ˈkiː]	Luma, 2;3.26 (S30)
	ali	'there'	/ɐˈli/	[ˈʎiː]	

(iii) In four of the five observed children, stress shift in /SW/ to [WS] is very scarce and one child show higher values in stress shift for [SW] (cf. Tables 51-60).

According to the data, we claim that, in the early stages of word production in EP, the children's prosodic representation consists in a syllable and there is no complex organization within the word domain. The circumscribed syllable is the target stressed syllable and it can be used in a reduplicated production or be subject to epenthesis at the left-edge.

In (178), we represent the child's output form in Stage I. We will follow the representation proposed by Demuth (2001b:8)[187], for early reduplicated iambs[188] produced by Spanish children. Demuth's motivation for the representation presented in (178) is the alternating production of trisyllabic /WSW/ words as [SW] and [WSW]. However, in Stage I, we do not find this alternation in Portuguese-speaking children. Trisyllables are selected and produced later and, when they are attempted in the beginning, they tend to be truncated[189]. Therefore, the assumption of a position at the left-edge of the prosodic word motivated by alternating early productions of [SW] and [WSW] does not hold for EP. Instead, we motivate the structure representing early words in Portuguese children (in (178)) on three empirical facts:

(i) Early words consist mostly in monosyllables, reduplications of the syllable circumscribed from the target word or productions of the circumscribed syllable preceded by a filler sound, the latter (reduplications and epenthesis) resulting in iambic forms;

(ii) The unstressed syllable found in these early structures (i.e., the initial syllable of a /WS/ reduplication or a filler syllable) is not mapable onto the unstressed syllable of the target prosodic word (cf., for instance, the instances in (116)-(120));

(iii) EP is a proclitic language[190] - there is a much higher tendency in the language to place unstressed words *at the left of* a Prosodic Word than to place it *at the right of* a Prosodic Word.

Since the initial unstressed syllable (either a filler sound or the initial syllable within a /WS/ reduplication) does not correspond to the unstressed syllable of the target lexical item[191] and given the language's tendency to place clitics at the left edge of the Prosodic Word, we assume that unstressed syllables are occupying a position at the left of the target stressed syllable in order to match the Prosodic Word template. Since we are assuming the syllable as the target of children's attention, in this stage, any elements preceding the circumscribed syllable are optional.

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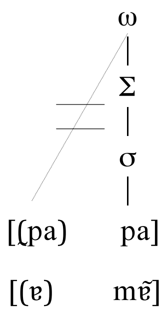
[187] Cf. Chapter 2, section 2.2.2..
[188] In fact, the early reduplicated words with a [WS] shape are not iambic feet, as the representation proposed by the author suggest.
[189] Cf. section 5.1.3.3., and Stage IV further in this section.
[190] Frota, Vigário & Martins (2006:2227) state that in EP "[o]f all clitics, 97% are proclitics and only 3% are enclitics."
[191] As we will observe further in Stage III, expectedly, disyllables will be produced with the two syllables of the target word.

(178) **Child's output form – Stage I**

Optional syllables are marked with ()

e.g. [ˈpa]/[paˈpa] *<u>bo</u>la* 'ball'

[ɐˈmɐ̃] *ma<u>mã</u>* 'mommy'



The representation presented in (178) for the child's output form in Stage I predicts that Portuguese children pick the stressed syllable from the target form (e.g., [ˈkɛ] and [ˈpɐ] from the words *<u>cre</u>me* 'lotion' and *so<u>fá</u>* 'sofá', respectively). This circumscribed syllable can surface as a reduplicated production (e.g., [kɛˈkɛ], [mɐˈmɐ]) or be preceded by a filler sound (e.g., [ɨˈkɛ], [ɐˈpɐ]). Multiple reduplications (e.g., [ˈkɛˈkɛˈkɛ]) are also accounted for by this representation, as any syllable might be optionally preceded by any other (stressed or unstressed) syllable.

The preference for monosyllabic words, the high production of target-like monosyllables and the high frequency of reduplication and epenthesis seem to indicate that Portuguese children are circumscribing the stressed syllable, interpreting it as a Prosodic Word.

Stage II

In the second stage of word stress acquisition children realize that words can be longer than a monosyllable and they start producing non-reduplicated disyllables ([CV_1CV_2] - /SW/ – e.g., *<u>pa</u>to* 'duck' [ˈpatʲu], Inês, 1;6, - and /WS/ – e.g. *a<u>vô</u>* 'grandfather' [ɐˈdʲɔ], Inês, 1;7). In this stage, very few types and tokens of each word type are targeted and produced, in general.

In (179) and (180), respectively, we illustrate the stage where /SW/ and /WS/ are produced target-like, though truncation to monosyllables is still a frequent strategy, in the same session of the child.

(179) Productions of /SW/ (truncated and target-like):

	Orthogr.	Gloss	Target	Output	Child, Age
Truncated	*carro*	'car'	/ˈkaʀu/	[ˈka]	Clara, 1;3.6 (S5)
	pêlo	'hair'	/ˈpelu/	[ˈpe]	Inês, 1;4.9 (S5)
	fralda	'diaper'	/ˈfraɫdɐ/	[ˈkaː]	Inês, 1;5.11 (S6)
	cartas	'cards'	/ˈkaɾtɐʃ/	[ˈka]	Inês, 1;6.11 (S7)
	garfo	'fork'	/ˈgaɾfu/	[ˈɣa]	
	Carla	'name'	/ˈkaɾlɐ/	[ˈka]	Joana, 1;8.4 (S8)
	luva	'glove'	/ˈluvɐ/	[ˈbuː]	Joana, 1;10.22 (S10)
	grande	'big'	/ˈgɾɐ̃dɨ/	[ˈgɑ̃]	Joana, 2;0.9 (S11)
	bola	'ball'	/ˈbɔlɐ/	[ˈbo]	João, 1;4.17 (S8)
	mano	'brother fam.'	/ˈmɐnu/	[ˈmɐ]	João, 1;5.26 (S10)
	pato	'duck'	/ˈpatu/	[ˈpɐ]	João, 1;6.16 (S11)
Target-like	*água*	'water'	/ˈagʷɐ/	[ˈaːβɐ]	Clara, 1;3.6 (S5)
	água	'water'	/ˈagʷɐ/	[ˈakə]	Clara, 1;4.19 (S6)
	mano	'brother fam.'	/ˈmɐnu/	[ˈmɐnu]	Clara, 1;5.16 (S7)
	bóia	'buoy'	/ˈbɔjɐ/	[ˈbɨə]	Inês, 1;4.9 (S5)
	minha	'mine'	/ˈmiɲɐ/	[ˈminə]	Inês, 1;5.11 (S6)
	pato	'duck'	/ˈpatu/	[ˈpaːtʲu]	Inês, 1;6.11 (S7)
	pato	'duck'	/ˈpatu/	[ˈpaku]	Joana, 1;9.25 (S9)
	colo	'lap'	/ˈkɔlu/	[ˈkɔːu]	Joana, 1;10.22 (S10)
	linda	'beautiful'	/ˈlĩdɐ/	[ˈɲĩɲɐ]	Joana, 2;0.9 (S11)
	bolo	'cake'	/ˈbolu/	[ˈbowu]	João, 1;4.17 (S8)
	bola	'ball'	/ˈbɔlɐ/	[ˈboɐ]	João, 1;5.26 (S10)
	mota	'motorbike'	/ˈmɔtɐ/	[ˈtadɐ]	João, 1;6.16 (S11)

(180) Production of /WS/ (truncated and target-like):

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
Truncated	*aqui*	'here'	/ɐˈki/	[ˈki]	Clara, 1;5.16 (S7)
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛj]	Clara, 1;6.6 (S8)
	aqui	'here'	/ɐˈki/	[ˈi]	Inês, 1;4.9 (S5)
	João	'name'	/ʒuˈɐ̃w̃/	[ˈdʲaːwː]	
	champô	'shampoo'	/ʃɐ̃ˈpo/	[ˈpo]	Inês, 1;5.11 (S6)
	colher	'spoon'	/kuˈʎɛɾ/	[ˈkɛ]	Inês, 1;6.11 (S7)
	Raquel	'name'	/ʀɐˈkɛɫ/	[ˈkɛ]	Joana, 1;9.25 (S9)
	avó	'grandmother'	/ɐˈvɔ/	[ˈfɔ]	Joana, 1;10.22 (S10)
	Jesus	'name'	/ʒɨˈzuʃ/	[ˈðʲu]	Joana, 2;0.9 (S11)
	limão	'lemon'	/liˈmɐ̃w̃/	[ˈmõ]	João, 1;5.12 (S9)
	Natal	'Christmas'	/ˈnɐˈtaɫ/	[ˈtɐː]	João, 1;7.20 (S13)
	olá	'hello'	/ɔˈla/	[ˈja]	João, 1;8.25 (S15)
Target-like	*olá*	'hello'	/ɔˈla/	[ɔːˈja]	Clara, 1;3.6 (S5)
	aqui	'here'	/ɐˈki/	[ɐˈki]	Clara, 1;5.16 (S7)
	aqui	'here'	/ɐˈki/	[ɐˈtʲi]	Inês, 1;5.11 (S6)
	avô	'grandfather'	/ɐˈvo/	[ɐˈdʲɔ]	Inês, 1;7.2 (S8)
	café	'coffee'	/kɐˈfɛ/	[kiˈkɛ]	Joana, 1;9.25 (S9)
	avó	'grandmother'	/ɐˈvɔ/	[ɐˈbɔː]	Joana, 1;10.22 (S10)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[məˈɲɐ̃w̃]	Joana, 2;0.9 (S11)
	olá	'hello'	/ɔˈla/	[ɔˈwa]	João, 1;5.26 (S10)
	João	'name'	/ʒuˈɐ̃w̃/	[nũˈɐ̃w̃]	João, 1;8.4 (S14)

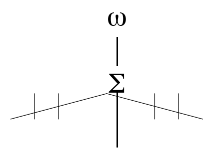
In Stage II, reduplications are still present but are becoming less frequent, and non-reduplicated disyllables, on the contrary, are increasingly produced. The onset of non-reduplicated disyllables is characterized by the simultaneous emergence of both target trochees and target iambs.

The beginning of disyllabic productions ([CV_1CV_2]) is, presumably, a transitional stage that some children go through from the final phase of Stage I to the activation of Stage III, where children will show a preference for /SW/. Since no hierarchy is stabilized in the children's prosodic template in this period, no fixed word prominence is yet assigned.

(181) **Child's output form – Stage II**

Optional syllables are marked with ()

e.g. [ˈpatʲu] *<u>pa</u>to* 'duck', [ɐˈdʲɔ] *a<u>vó</u>* 'grandmother'



(σ_W)	σ_S	(σ_W)
	[ˈpa	tʲu]
[ɐ	ˈdʲɔ]	

The representation in (181) shows that, in Stage II, both /SW/ and /WS/ words may be attempted, as children are still deciding what the language rhythm at the word level is. This representation predicts that children try disyllabic words ([CV_1CV_2]), which can surface as [SW], non-reduplicated [WS] or a syllable predeceded by a filler sound ([fS]), and can also be truncated to a monosyllable (both target /SW/ and /WS/). Due to the fact that disyllables are only emerging and that it is not possible to predict any preference for any foot shape at this stage (both absolute values and percentages show similar values and these are particularly low for both templates), we claim that no default foot is set at this stage of word production in EP.

Stage III

In Stage III of word stress acquisition, Portuguese children realize that EP has a trochaic rhythm and that syllables are organized into a disyllabic /SW/ foot. In this stage:

(i) the amount of [SW] productions overwhelmingly surpasses the amount of [WS] (cf. Tables 16-20);

(ii) in general, /SW/ have higher target-like rates than /WS/ (cf. Tables 34-38);

(iii) the truncation rate in non-reduplicated /WS/ is higher than in /SW/ (cf. Tables 45-49);

(iv) reduplications and epenthesis are almost inexistent (cf. Figures 29-33);

(v) the preferential truncation pattern in /WSW/ is [S] or [SW], rather than [WS] (cf. Figures 39, 41, 44, 47, 50).

In Stage III, prominence is assigned and the trochaic foot is being processed. Examples in (182) illustrate the children's production of the trochaic foot, as /SW/ words are produced target-like and /WSW/ are truncated to [SW]. In (183), we present renditions where /WS/ words are truncated to [S], in the same sessions, where we observe that children simultaneously produce /WSW/ and /SW/ as [SW], but truncate /WS/ into [S].

(182) Production of [SW] in target /SW/ and /WSW/:

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
/SW/	*mana*	'sister fam'	/ˈmɐnɐ/	[ˈmɐnɐ]	Clara, 1;7.11 (S9)
	Noddy	'name'	/ˈnɔdi/	[ˈnɔtʰi]	Clara, 1;8.20 (S10)
	pato	'duck'	/ˈpatu/	[ˈpatʲu]	Clara, 1;923 (S11)
	isto	'this'	/ˈiʃtu/	[ˈitʲu]	Inês, 1;8.2 (S9)
	tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpatʲɐ]	
	sete	'seven'	/ˈsɛtɨ/	[ˈdɛtɐ]	Inês, 2;0.11 (S12)
	flores	'flowers'	/ˈflorɨʃ/	[ˈtoləʃ]	
	Nando	'name'	/ˈnɐ̃du/	[ˈnaɲu]	Joana, 2;2.19 (S12)
	mota	'motorbike'	/ˈmɔtɐ/	[ˈmɔːtʲɐ]	Joana, 2;4.1 (S13)
	mala	'purse'	/ˈmalɐ/	[ˈmawɐ]	
	brinca	'play'	/ˈbɾĩkɐ/	[ˈmĩkɐ]	Luma, 2;4.25 (S32)
	Noddy	'name'	/ˈnɔdi/	[ˈnɔdi]	Luma, 2;5.20 (S34)
	queijo	'cheese'	/ˈkɐjʒu/	[ˈkeçu]	
/WSW/	*Aurora*	'name'	/awˈɾɔɾɐ/	[ˈlalɐ]	Clara, 1;7.11 (S9)
	menina	'girl'	/mɨˈninɐ/	[ˈɲiɲɐ]	Clara, 1;9.23 (S11)
	vestida	'dressed'	/vɨʃˈtidɐ/	[ˈbitɐ]	Inês, 1;8.2 (S9)
	umbigo	'belly button'	/ũˈbigu/	[ˈbidu]	
	barulho	'noise'	/bɐˈɾuʎu/	[ˈbuju]	
	leitinho	'milk dim.'	/lɐjˈtiɲu/	[ˈtʲiɲu]	Joana, 2;2.19 (S12)
	bonito	'pretty'	/buˈnitu/	[ˈnitʰu]	
	menina	'girl'	/mɨˈninɐ/	[ˈɲinɐ]	Luma, 2;4.25 (S32)
	Susana	'name'	/suˈzɐnɐ/	[ˈdɐnɐ]	Luma, 2;5.15 (S33)
	comando	'remote'	/kuˈmɐ̃du/	[ˈmɐ̃du]	Luma, 2;5.20 (S34)

(183) Truncation of /WS/:

Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
João	'name'	/ʒuˈɐ̃w̃/	[ˈwɐ̃w̃]	Clara, 1;7.11 (S9)
avô	'grandfather'	/ɐˈvo/	[ˈvːu]	Clara, 1;8.20 (S10)
aqui	'here'	/ɐˈki/	[ˈki]	Clara
abrir	'to open'	/ɐˈbɾiɾ/	[ˈbiɾ]	Inês, 1;10.29 (S11)
chapéu	'hat'	/ʃɐˈpɛw/	[ˈɛw]	
avó	'grandmother'	/ɐˈvɔ/	[ˈdʲɔ]	Inês, 2;0.11 (S12)
anões	'dwarfs'	/ɐˈnõȷ̃ʃ/	[ˈnõȷ̃ʃ]	Inês, 2;1.10 (S13)
nariz	'nose'	/nɐˈɾiʃ/	[ˈdiːʃ]	
anão	'dwarf'	/ɐˈnɐ̃w̃/	[ˈɲɐ̃ːw̃]	Joana, 2;2.19 (S12)
maçã	'apple'	/mɐˈsɐ̃/	[ˈʃɐ̃]	
chapéu	'hat'	/ʃɐˈpɛw/	[ˈpɛw]	
Manel	'name'	/mɐˈnɛɫ/	[ˈɲɛw]	

In the third stage, Portuguese children realize that their language has a trochaic rhythm and that feet are /SW/. Therefore, in Stage III of EP word stress acquisition, children's word representation is a disyllabic trochee.

(184) **Child's output form – Stage III**

e.g., [ˈpatʲɐ] *tam<u>pa</u>* 'lid', [ˈbidu] *um<u>bi</u>go* 'belly button', [ˈɛw] *cha<u>péu</u>* 'hat' (WS)

ω
|
Σ

σ_S σ_W
[ˈpa tʲɐ]
[ˈbi du]
[ˈɛw]

The template presented in (184) accounts for the production of both /SW/ and /WWS/ as [SW] in Stage III. Target /WS/ words are mapped into a trochaic template and the initial unstressed syllable is deleted. In this stage children realize that the domain for stress is a disyllabic foot and that it is left-headed. Also, since children overwhelmingly circumscribe the right-most foot of the target words (cf. children's productions for /WSW/ in (161), (163), (166), (169) and (172)), that is an evidence for children to assume that feet are built from the right, within words.

Stage IV

In the fourth stage for the acquisition of stress in EP, children realize that prosodic words in the language can be larger than a disyllabic foot. In the fourth stage of the acquisition of stress patterns, both /WS/ and /WSW/ are acquired.

Note, however, that Clara, Joana and Luma acquire /WS/ before /WSW/ but Inês acquires /WSW/ before /WS/ (cf. Table 61). This alternating developmental path suggests that the initial syllables in /WS/ and /WSW/ words are prosodically equivalent, i.e., they are not part of the trochaic foot. However, as soon as a prosodic position outside the trochaic foot is licensed, both /WS/ and /WSW/ may be acquired. Some children (Clara, Joana and Luma) produce the smaller form (the disyllable) earlier and later the larger one (the trisyllable). Inês is able to produce larger target words (/WSW/), though disyllables where no disyllabic trochaic foot is found (/WS/) might still be truncated.

In Stage IV, /SW/, /WS/, /WSW/, /WWS/ and /SWW/ words are mapped into a $[W[SW]_{\Sigma}]_{PW}$ template. The target-like production of /WS/, and /WSW/ is now noticeable in high percentages, though /WWS/ and /SWW/ are not yet acquired.

In (185) and (186), we illustrate the target-like production of /WS/ and /WSW/ words and the truncated forms in /WWS/ and /SWW/, respectively, in the same child and in the same sessions.

(185) Target-like production of /WS/ and /WWS/

	Orthogr.	*Gloss*	*Target*	*Output*	*Child, Age*
/WS/	*João*	'name'	/ʒuˈɐ̃w̃/	[duˈɐ̃w̃]	Clara, 1;9.23 (S11)
	avô	'grandfather'	/ɐˈvo/	[ɐˈvo]	
	aqui	'here'	/ɐˈki/	[ɐˈki]	Clara, 1;10.15 (S12)
	anão	'dwarf'	/ɐˈnɐ̃w̃/	[ɐˈnɐ̃w̃]	Inês, 2;0.11 (S12)
	bater	'to hit'	/bɐˈteɾ/	[bɐˈteɾ]	
	café	'coffee'	/kɐˈfɛ/	[kɐˈpɛ]	Inês, 2;1.10 (S13)
	chapéu	'hat'	/ʃɐˈpɛw/	[tɐˈpɛw]	
/WSW/	*menina*	'girl'	/mɨˈninɐ/	[mɨˈninɐ]	Clara, 1;9.23 (S11)
	menino	'boy'	/mɨˈninu/	[mɐˈninu]	
	vermelho	'red'	/vɨɾˈmɐʎu/	[diˈmæju]	Inês, 2;0.11 (S12)
	menino	'boy'	/mɨˈninu/	[miˈninu]	
	bonecos	'toys'	/buˈnɛkuʃ/	[buˈnɛkuʃ]	Inês, 2;1.10 (S13)
	pantufa	'slipper'	/pɐ̃ˈtufɐ/	[pɐˈdotɐ]	
/WWS/	*acabou*	'it finished'	/ɐkɐˈbo/	[kɐˈboː]	Clara, 1;9.23 (S11)
	acabou	'it finished'	/ɐkɐˈbo/	[kaˈbo]	Clara, 1;10.15 (S12)
	Isabel	'name'	/izɐˈbɛɫ/	[bɐˈbɛ]	Inês, 2;0.11 (S12)
	cachecol	'scarf'	/kaʃɨkɔɫ/	[kaˈkɔj]	Inês, 2;1.10 (S13)
	biberon	'milk bottle'	/bibɨˈɾõ/	[biˈbõ]	
/SWW/	*árvore*	'tree'	/ˈaɾvuɾɨ /	[ˈabi]	Inês, 2;0.11 (S12)
	Bárbara	'name'	/ˈbaɾbɐɾɐ/	[ˈbabɐ]	
	números	'numbers'	/ˈnumɨɾuʃ/	[ˈnuwoʃ]	Inês, 2;1.10 (S13)

It is worth noticing that, contrary to main word stress, secondary stress in EP is not assigned at the lexical component (Pereira, 1999; Vigário, 2003). Therefore, we consider that, at the lexical level, feet in EP are not iterative and, in the representation in (185), all pre-tonic syllables are not part of any foot structure.

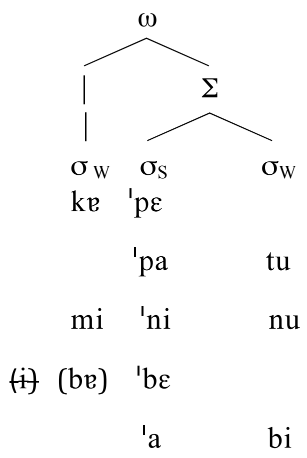
From the data presented in section 5.1.2.3., we might conclude that trisyllables acquisition in EP occurs late. At the early stages (Stage I, II and III), trisyllables are not generally selected. In Stage IV of the acquisition of stress patterns in EP, only /WSW/ are produced adult-like, but not in all children (Joana is the exception). This child does not produce /WSW/ target-like and tends to truncate them to [S] or [SW] (i.e., her productions for /WSW/ are consistent with the prosodic template presented in Stage III).

In all children, /WWS/ and /SWW/ are produced with great instability and with low rates of faithfulness until the end of the observational period. /WWS/ tend to be earlier truncated to [S] and later to [WS]. /SWW/ are mainly produced as [SW] (cf. section 5.1.3.3.), as shown below.

(186) **Child's output form – Stage IV**

Optional syllables are marked with ()

e.g., [kɐˈpɛ] *ca<u>fé</u>* 'coffee', [ˈpatu] *<u>pa</u>to* 'duck', [miˈninu] *me<u>ni</u>no* 'boy', [bɐˈbɛ] *Isa<u>bel</u>* 'name' and [ˈabi] *<u>ár</u>vore* 'tree'



In Stage IV of the acquisition of stress patterns, Portuguese children map their productions into a prosodic word larger than a foot ($[W[SW]_{\Sigma}]_{PW}$), as illustrated in the representation above. This representation shows that target iambs, target trochees and /WSW/ might be produced accordingly. In order to match the $[W[SW]_{\Sigma}]_{PW}$ prosodic template, /WWS/ words are still truncated to [S] or [WS][192]. The initial unstressed syllable is not mapped onto the template and is, therefore, erased. The preferred stress pattern at this stage is still /SW/, as suggested by the production of /SWW/ targets as [SW] (e.g., *números* 'numbers' [ˈnumɨɾuʃ] - > [ˈnuwoʃ], Inês, 2;1.10).

The developmental path presented for the stress patterns found in EP is partly comparable to the ones found in other trochaic languages, like Catalan (Prieto, 2006), Dutch (Fikkert, 1994), English (Demuth, 1995, 1996a,b,c,d; Gerken, 1994, 1996; Kehoe, 1998) and Spanish (Demuth, 2001; Lleó & Demuth, 1999). Indeed, as early as disyllables emerge, a trochaic foot is the most frequently observed stress pattern in languages with a trochaic rhythm[193]. However, it is worth mentioning that, despite general regularities accounted for in a cross-linguistic analysis on the acquisition of word shape and stress patterns in some

[192] It is worth noting, at this point, that one child, Luma, tended to add a final vowel to the circumscribed stressed of /WWS/ words, thus creating a [SW] pattern. However, this process was only noticeable in words ending in a sonorant consonant (/l,ɾ/). This process has already been observed in other data on EP (cf. Freitas, 1997). We believe, nevertheless, that this process is motivated by syllable structure requirements (namely, word-final sonorants occupying the onset of an empty-headed syllable), rather than by the foot structure.

[193] Cf. Chapter 2, section 2.2.2..

languages, it is true that the acquisition of stress patterns in non-Germanic languages has been the subject of a much greater debate (cf. Hochberg, 1988a,b, on Spanish, and Tzakosta, 2004, on Greek, who claim for a neutral start, and Adam & Bat-El, 2009, for a trochaic tendency in Hebrew, an iambic language). BP data have contributed towards the debate, for its unclear - and sometimes intriguing - developmental path.

Analyzing the truncation patterns of BP-speaking children, Rapp (1994) found that trochees were favored, whereas Baia (2006), Santos (2001, 2007) and Stoel-Gammon (1976) found an iambic tendency in spontaneous speech productions, also during BP acquisition. Bonilha (2005) did not claim for an iambic tendency, though the results demonstrate a higher tendency of preservation of initial and stressed syllables (/<u>S</u>W/ and /<u>WS</u>/). Baia (2008) concluded that, indeed, reduplications very much contributed for the early iambic tendency found in BP. The conflict between an early trochaic or iambic tendency thus seems to be highly dependent on the assumption of reduplications as iambs or not.

From the comparison between the results now found in EP and Dutch, a typical Germanic language, we observe that some differences are noticeable. As referred to in Chapter 2, Dutch is one of the languages extensively described from the word stress acquisition point of view (Fikkert, 1994). Therefore, we will take Dutch as a showcase of a trochaic language being acquired. We recall, below, the description for the acquisition of word stress conducted by Fikkert (1994) for Dutch, summarized in Chapter 2:

Stage 0:	$/S/_{PW} \rightarrow$	The word consists of one core syllable. E.g., *klaar* /klaːr/ -> [kaː], [kɑ] (J., 1;4-1;5) *dit* /dɪt/ -> [tiː], [tɪ] (J., 1;4-1;5)
Stage 1:	$/SW/_{PW} \rightarrow$	Children realize that the words might be disyllabic and a trochaic foot is processed - /WS/ are truncated into [S], whereas /SW/ do not undergo any developmental pattern[194]; /WSW/ are truncated into [SW] and not [S]. E.g., *banan* /baːˈnaːn/ -> [ˈnaːm] (N., 2;3.7) *konijn* /koːˈnɛin/ -> [ˈkɛin] (N., 2;3.23)
Stage 2:	$/SW/_{PW} \rightarrow$	/SW/ -> [SW] and /WS/ -> [SW]: This stage is different from stage 1 in the sense that /WS/ do not become [S] anymore but [SW] instead (through the addition of a syllable). Metathesis and reduplications support the claim that the syllable, and not the foot, is being processed. E.g., *konijn* /koːˈnɛin/ -> [ˈkɪnaː] (C., 1;10.11) *guitar* /χiːˈtaːr/ -> [ˈhiːtaː] (C., 1;10.11)
Stage 3:	$/\sigma_\Sigma\sigma_\Sigma/_{PW} \rightarrow$	In /WS/ - the 2 syllables are perceived as belonging to two different feet and both vowels are prominent (level stress). Children realize that the word can be longer than one foot. E.g., *David* /ˈdaːvɪt/ -> [ˈtɑˈfuːn] (R., 2;1.26) *tractor* /ˈtrɛktɔr/ -> [ˈtɑkˈtɔɹ] (R., 2;2.37)
Stage 4:	$/\text{-}SW/_{PW}$ and $/\text{-}WS/_{PW} \rightarrow$	Target-like production. E.g., *microfoon* /ˌmiːkroːˈfoːn/ -> [ˈmiːkəˌsoːn] (T., 2;0.5)

Figure 53. Developmental stages for word stress acquisition in Dutch (Fikkert, 1994)

194 Cf. footnote 86, on the absence of examples for /SW/ in Fikkert (1994).

From the table presented above, it is possible to observe an initial stage where the syllable is under the Dutch children's attention, as observed in EP. In this stage, Dutch speaking-children mainly produce CV monosyllables, or monosyllables where vowel length contrast is not yet mastered. In EP, the majority of children's productions in Stage I also consist in a monosyllable. At this stage, both [CV] and other syllable types are possible[195]. Also, both in EP and Dutch, the early foot form conforms to a trochee (though it happens at Stage I in Dutch, and at Stage III in EP). Despite important similarities, three striking differences distinguish Dutch and EP acquisition of stress:

(i) Firstly, according to Fikkert (1994), reduplications are rare in Dutch and mainly occur in Stage II, when children are still circumscribing the syllable from the target form. In EP, reduplications are very frequent, especially in the early stages of word production;

(ii) Secondly, in Dutch, epenthesis is observable at the right edge of the circumscribed syllable of a target prosodic word (/WS/), favoring [SW]; Portuguese children, on the contrary, insert a filler sound at the left edge of the circumscribed syllable, favoring [WS];

(iii) Thirdly, whereas in Dutch a clear truncation preference in /WS/ is noticeable, in EP truncation of both /SW/ and /WS/ is observable, at the early stages of word production;

(iv) Finally, Dutch /WS/ words are acquired in the last stage of word stress acquisition. In the Portuguese children observed, the moment of acquisition of iambs was, in general, very close in time with the moment of acquisition of trochees.

Based on the reports from other trochaic languages, at the beginning of this chapter we hypothesized that, *given the trochaic tendency of the adult language, a trochaic tendency will be found*. In line with this hypothesis, we would expect that trochees appear earlier than iambs. Also, truncations and a tendency for stress errors were expected to favor trochees.

Given the results found, our hypothesis was partly confirmed. From a general developmental perspective, we found that word stress acquisition in EP had a similar path as

[195] In this project, no systematic analysis on the syllable structure was carried out. For a complete description on the acquisition of the syllable structure in EP, cf. Freitas (1997).

the one observed for other trochaic languages. We found an early processing of the syllable, followed by a trochaic tendency and, finally, the production of longer words.

As showed in the developmental scale presented in this section (Table 61), summarizing the findings for the acquisition of stress patterns, the developmental path proposed in this dissertation was observed in other trochaic languages, namely English, Dutch, Spanish and Catalan (Demuth, 1996a,b; Fikkert, 1994; Demuth, 2001; Prieto, 2006, respectively).

As additionally observed in other trochaic languages (e.g. Fikkert, 1994, on Dutch; Lléo & Demuth, 1999, on German and Spanish), from a certain point onwards, target iambs were more prone to truncation than target trochees in EP word stress acquisition (cf. Tables 45-49), and /WSW/ were preferably truncated to [SW] (Cf. Figures 39, 41, 44, 47, 50). The truncation patterns favoring trochees have supported the cross-linguistic claim of an early preference for the trochaic foot during prosodic acquisition. The data found in this dissertation also confirmed this tendency.

However, our results were not as categorical as the results found in other languages, where a clear trochaic tendency was found (namely Dutch and English). In fact, at the early stages of word stress acquisition in EP:

(i) Reduplications favored an iambic word shape;
(ii) Epenthesis occurred at the left edge of prosodic words, favoring an iambic word shape;
(iii) Neither trochees nor iambs were categorically favored in truncations.

Given the results found, we defend that the early disyllables in EP have a trochaic form, though, at the beginning, no clear tendency is observed. Therefore, and following previous analysis on Spanish (Hochberg, 1988a) and Greek (Tzakosta, 2004), we claim for a neutral start in the acquisition of stress patterns in EP, with an early processing of the syllable, a subsequent processing of a disyllable without fixed prominence and a later processing of the trochaic foot and the production of longer words.

5.2.2. On the early stages - the apparent iambic tendency

In this section we will discuss the early word shape in the speech of the Portuguese children analyzed. We will provide empirical and theoretical arguments aiming at showing that there is no 'early iambic tendency' in EP word stress acquisition. We will also demonstrate that the early iambic tendency postulated for BP is biased by the heavy tendency for reduplications and filler insertion, which do not need to be analyzed as a product of foot shape requirements.

The literature review carried out in Chapter 2 on Portuguese word stress acquisition[196] pointed to a number of works on BP indicating that, at the early stages, the early speech of Brazilian children displayed an unexpected [WS] pattern (Bonilha, 2005; Santos, 1995; 2001; Stoel-Gammon, 1976). Santos (2007) clearly suggests that the early words produced by the Brazilian children observed conform an iambic foot. The author assumes that Brazilian children apply the morphology-based stress algorithm for the target language, according to which stress generally falls on the last syllable of the stem (Lee, 1995). Following Lee's (1995) analysis for word stress in adult language, Santos (2007) provides evidence for the analysis of word stress in the target language according to which the stem is the domain for stress, and the basic foot is an iamb (in non-verbs)[197]. Since the information outside the stress domain is considered extrametrical (Lee, 1995), Brazilian children produce [SW] nouns only when morphological contrasts are mastered and the parameter for extrametricality, accounting for the production of syllables that are outside the stress domain, is set to [Yes].

It is worth mentioning, however, that the authors who observed an iambic tendency in Portuguese (Baia, 2006; Baia, 2008b; Santos, 2007; Stoel-Gammon, 1976) always took reduplications into account and considered children's reduplications (either resulting from target reduplications or not), as well as productions with filler syllables at the same level as non-reduplicated words. However, since those productions tend to disappear in the course of development, often being replaced by productions where both syllables are mapable into the target syllables of the target word, one might ask whether these productions have the same prosodic and lexical status as typical 'prosodic words' attempted by the children[198]. We believe they do not, and we will explain why in the following paragraphs.

The data found in EP were similar to the ones found in BP, namely with respect to the early (apparent) iambic tendency. As we observed in this and in previous sections of this dissertation, one of the more intriguing aspects of the acquisition of word stress in Portuguese (both EP and BP) was the high frequency of reduplicated words and epenthesis, favoring [WS] surface forms. Indeed, if we consider early reduplications produced by the children and the words produced with filler insertion, EP has a heavy iambic tendency (cf. Tables 28-32).

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[196] Cf. Chapter 2, section 2.5.

[197] Lee (1995) claims that the default foot in non-verbs is an iamb and the default foot in verbs is a trochee. In this paragraph we focus only on the non-verbs system. In the following chapter we will compare the verb's and the non-verb's system with respect to word stress.

[198] The iambic form of these early productions will be discussed in section 5.2.2.2..

In fact, the presence of reduplicated forms in child language is documented in the literature (Fee & Ingram, 1982; Ferguson, 1983; Ferguson & Macken, 1983; Klein, 2005; Leroy & Morgenstern; 2005; Lleó, 1990; Moskowitz, 1973; Schwartz, Leonard, Wilcox & Folger, 1980; Schwartz & Leonard, 1983; Veneziano, Sinclair & Berthoud, 1990; Waterson, 1971; Wauquier-Gravelines, 2003), though in general these forms do not favor a stress pattern that is contrary to the stress pattern observed in the target language. French is one of the languages where reduplications - namely with a [WS] format - are attested (Braud, 2003; Rose, 2000; Wauquier-Gravelines, 2003). In (187) we show some examples of reduplication in French data.

(187) Reduplications in early French data:

<table>
<tr><th>Orthogr.</th><th>Gloss</th><th>Target</th><th>Output</th><th>Child, Age</th><th>Study</th></tr>
<tr><td>coucou</td><td>'peeck-a-boo'</td><td>/kuku/</td><td>[guˈgu]</td><td rowspan="2">Théo, 1;10.27</td><td rowspan="2">Rose (2000)</td></tr>
<tr><td>pain</td><td>'bread'</td><td>/bobo/</td><td>[boˈbo]</td></tr>
<tr><td>pupée</td><td>'doll'</td><td>/pupe/</td><td>[pepe]</td><td>1;3</td><td rowspan="5">Demuth & Johnson (2003)</td></tr>
<tr><td>chapeau</td><td>'hat'</td><td>/ʃapo/</td><td>[popo]</td><td rowspan="3">1;4</td></tr>
<tr><td>pelle</td><td>'shovel'</td><td>/pɛl/</td><td>[pepe]</td></tr>
<tr><td>canne</td><td>'stick'</td><td>/kan/</td><td>[tata]</td></tr>
<tr><td>oeuf</td><td>'egg'</td><td>/œf/</td><td>[toto]</td><td>1;5</td></tr>
<tr><td>os</td><td>'bone'</td><td>-----</td><td>[ɛ̃nonos]</td><td>3;0</td><td>Wauquier-Gravelines (2003)</td></tr>
</table>

Despite the similarity between EP and French data, conclusions comparing Portuguese with French claiming that both are iambic might be premature, since French is a language where feet are not relevant for stress purposes, and where stress is, instead, phrase-final.

As shown in this discussion, we have reasons to believe that early words are not, in fact, disyllabic iambic feet, as non-reduplicated /WS/ are scarce or inexistent at the beginning, contrary to reduplicated /WS/. A cross-linguistic comparison conducted in Chapter 2 of this dissertation further suggested that, if a target language is not iambic, an iambic tendency in the child's system was never attested.

Although previous works on BP have demonstrated that iambs can be preferred over trochees during Portuguese acquisition (Baia, 2006; Santos, 2001, 2007; Stoel-Gammon, 1976), an early iambic tendency is hard to argue for in the EP acquisition data, due to several aspects mentioned in our review and which we now recall:

(i) An initial iambic tendency is very hard to explain in a language with a heavily trochaic rhythm, like Portuguese[199]. Even considering that the algorithm for stress assignment entails an underlying iambic foot, we have to consider that children are provided with strong evidence for stress in the penultimate syllable and, thus, for a trochaic rhythm.

(ii) The morphology-based algorithm, which predicts, by default, a domain-final stress position (i.e., stress the last vowel of the stem)[200], considers the word marker as extrametrical, marked or 'invisible' for stress assignment. As observed in the developmental path proposed in section 5.2.1., as soon as non-reduplicated disyllables emerge, the word marker was produced. An early production of the word marker is inconsistent with its extrametrical and marked character.

(iii) Target iambs have been clearly disfavored in the path of acquisition, as showed in Tables 2 and 4.

In a more detailed analysis, where productions with reduplication and epenthesis are not accounted for as iambs, the heavy iambic tendency tends to disappear, as shown in Tables 64, 65 and 66, below. In these tables, we plot together the values for /SW/, the values for the disguised iambs – here simplified to /CV_1'CV_1/ – and the values for target non-reduplicated iambs (/CV_1'CV_2/), in Inês, Joana and João's speeches. We show the number of targets selected by each child, as well as the number of tokens produced and the corresponding percentages.

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[199] Cf. Chapter 1, section 1.2.4., Figures 9 and 10.

[200] Cf. Chapter 1, section 1.2.3. and references therein to Andrade (1992), Andrade & Laks (1992), Lee (1995), Mateus & Andrade (2000) and Pereira (1999).

Session	/SW/	[SW]	%	/CV$_1$'CV$_1$/	[CV$_1$'CV$_1$]	%	/CV$_1$'CV$_2$/	[CV$_1$'CV$_2$]	%
S1	-	-	**-**	19	8	**42.1**	-	-	**-**
S2	2	0	**0**	41	15	**36.6**	-	-	**-**
S3	4	0	**0**	64	21	**32.8**	8	0	**0**
S4	27	1	**3.7**	67	39	**58.2**	-	-	**-**
S5	27	1	**3.7**	56	30	**53.6**	4	0	**0**
S6	90	1	**1.1**	110	61	**55.5**	14	3	**21.4**
S7	73	3	**4.1**	93	55	**59.1**	29	0	**0**
S8	39	5	**12.8**	80	35	**43.8**	39	11	**28.2**
S9	140	82	**58.6**	113	81	**71.7**	44	17	**38.6**
S10	221	166	**75.1**	96	89	**92.7**	45	21	**46.7**
S11	238	182	**76.5**	201	124	**61.7**	77	35	**45.5**
S12	275	229	**83.3**	254	159	**62.6**	155	68	**43.9**
S13	297	256	**86.2**	189	128	**67.7**	110	64	**58.2**
S14	249	198	**79.5**	211	147	**69.7**	137	84	**61.3**
S15	232	178	**76.7**	133	89	**66.9**	98	60	**61.2**
S16	283	215	**76.0**	168	108	**64.3**	126	83	**65.9**
S17	154	87	**56.5**	96	45	**46.9**	74	43	**58.1**
S18	275	193	**70.2**	150	90	**60.0**	115	74	**64.3**

Table 64. Percentage of target-like /SW/ and /WS/ words, considering reduplications and epenthesis (/CV$_1$'CV$_1$) or not (/CV$_1$'CV$_2$/) - Inês

Session	/SW/	[SW]	%	/CV$_1$'CV$_1$/	[CV$_1$'CV$_1$]	%	/CV$_1$'CV$_2$/	[CV$_1$'CV$_2$]	%
S1	-		**-**	-	-	**-**	-	-	**-**
S2	-	-	**-**	4	0	**0.0**	-	-	**-**
S3	2	0	**0.0**	3	1	**33.3**	-	-	**-**
S4	-	-	**-**	3	0	**0.0**	-	-	**-**
S5	-	-	**-**	-	-	**-**	-	-	**-**
S6	-	-	**-**	-	-	**-**	-	-	**-**
S7	16	0	**0.0**	3	1	**33.3**	2	0	**0**
S8	4	0	**0.0**	3	0	**0.0**	1	0	**0**
S9	13	0	**0.0**	29	9	**31.0**	14	4	**28.6**
S10	16	2	**12.5**	28	10	**35.7**	14	5	**35.7**
S11	45	13	**28.9**	54	32	**59.3**	30	11	**36.7**
S12	91	57	**62.6**	34	10	**29.4**	30	6	**20**
S13	74	44	**59.5**	42	16	**38.1**	27	12	**44.4**
S14	163	108	**66.3**	56	28	**50.0**	49	25	**51.0**

Table 65. Percentage of target-like /SW/ and /WS/ words, considering reduplications and epenthesis (/CV$_1$'CV$_1$) or not (/CV$_1$'CV$_2$/) - Joana

Session	/SW/	[SW]	%	/CV_1'CV_1/	[CV_1'CV_1]	%	/CV_1'CV_2/	[CV_1'CV_2]	%
S1	6	1	**16.7**	-	-	**-**	-	-	**-**
S2	-	-	**-**	1	1	**100.0**	1	1	**100**[201]
S3	8	3	**37.5**	4	4	**100.0**	4	4	**100**
S4	6	5	**83.3**	6	4	**66.7**	4	4	**100**
S5	4	0	**0.0**	-	-	**-**	-	-	**-**
S6	-	-	**-**	8	3	**37.5**	3	3	**100**
S7	15	2	**13.3**	22	3	**13.6**	4	3	**75**
S8	18	1	**5.6**	12	4	**33.3**	12	2	**16.7**
S9	13	2	**15.4**	16	2	**12.5**	12	0	**0**
S10	39	5	**12.8**	30	18	**60.0**	11	6	**54.5**
S11	17	3	**17.6**	17	13	**76.5**	4	1	**25.0**
S12	12	4	**33.3**	28	17	**60.7**	3	0	**0**
S13	23	5	**21.7**	54	40	**74.1**	10	0	**0**
S14	17	8	**47.1**	33	29	**87.9**	2	1	**50**
S15	7	3	**42.9**	32	17	**53.1**	4	2	**50**
S16	34	21	**61.8**	44	22	**50.0**	16	9	**56.3**
S17	58	49	**84.5**	25	16	**64.0**	10	7	**70**
S18	67	60	**89.6**	56	37	**66.1**	30	20	**66.7**
S19	77	62	**80.5**	37	21	**56.8**	11	9	**81.8**
S20	90	71	**78.9**	41	22	**53.7**	22	10	**45.5**
S21	86	78	**90.7**	37	24	**64.9**	12	7	**58.3**
S22	59	48	**81.4**	42	17	**40.5**	13	3	**23.1**

Table 66. Percentage of target-like /SW/ and /WS/ words, considering reduplications and epenthesis (/CV_1'CV_1) or not (/CV_1'CV_2/) - João

The tables presented above show that, disregarding reduplications, only João has higher target-like rates in /WS/, but that seems to be the result of a type repetition (the word *olá* 'hello'). If we do not take reduplications into account, João has a simultaneous emergence of both /SW/ and /WS/ (/CV_1'CV_2/). Also, disregarding reduplications, the apparent iambic tendency in Inês disappears and, in Joana, we observe that /SW/ are selected and are acquired earlier than /WS/. In addition, we observe that the number of /SW/ tokens selected is higher than the number of /CV_1'CV_2/ tokens in these children, but, in the early stages the number of /CV_1'CV_1/ tends to be higher than the number of /SW/.

From the data analyzed, it was also noticeable that the production of both reduplications and fillers tends to decrease and, sometimes, disappear in the course of development (cf. Figures 29-33). Additionally, productions with reduplication and epenthesis have a distinct emergence time when compared to target iambs that were not reduplicated or subject to filler insertion. In fact, if only target iambs are taken into account, no clear tendency for iambs or trochees is observed (though trochees are, in general, earlier acquired - cf. Tables 34-38). Our results where no reduplications and filler sounds were considered

[201] It is worth noticing that, in João, the only non-reduplicated /WS/ type produced from session 1 to 6 is the word *olá* 'hello'.

indicated that (i) three of the observed children acquired trochees earlier than iambs (Clara, Inês and Joana) and (ii) at the early stages, truncation in target disyllables did not favor any stress pattern, but later trochees tended to be less prone to truncation than iambs (cf. Tables 45-49). Moreover, stress shift of the type /SW/->[WS] was only observed in one child (João), being very scarce in the speech of three children (Clara, Inês and Joana). Luma had a higher stress shift rate of the type /WS/->[SW] (cf. Tables 51-60).

The findings summarized above suggest that there is no categorical iambic tendency in our data. Indeed, the distinct behavior demonstrated by all children with respect to the early words (where reduplication and epenthesis is mostly found, but which tend to disappear in the course of development) and later words (trochees and iambs), lead us to consider that, eventually, early words do not have the same prosodic status as target trochees and iambs and that the early iambic tendency seems to be only apparent. The assumption of an early iambic foot would not account for our data in three different manners:

(i) On the one hand, the assumption of an early iambic foot in early word's representation in EP would have to account both for the production of the 'disguised iambs' (reduplications and product of epenthesis) and for the production of non-reduplicated target iambs. However, we observed that, at the beginning, iambs that were not the product of reduplication and epenthesis were not selected (by Joana and Luma) or they were very scarce (in Clara, Inês and João).

(ii) On the other hand, the results from the faithful productions and the production strategies (truncation and stress shift) used in target /SW/ and in non-reduplicated /WS/ words indicated that target /SW/ and /WS/ tend to have a similar behavior. The emergence of both words is simultaneous, iambs and trochees are equally prone to truncation in the early stages and stress shift does not favor either trochees or iambs. This behavior was also observed in Greek children in Tzakosta (2004), leading the author to claim for a neutral start in Greek word shape acquisition. In (188), we present some instances showing that truncation, in Greek early prosodic acquisition, does not favor either /SW/ or /WS/.

(188) Neutral tendency in Greek (Tzakosta, 2004b:103[202]):

Gloss	*Target*	*Output*	*Chid, Age*
'fig'	/ˈsiko/	[ko]	B., 1;10
'those'	/aˈfta/	[ta]	B., 1;11
'to play'	/ˈpezi/	[pe]	F., 1;11
'carriage'	/kaˈrotsi/	[jo]	
'from'	/aˈpo/	[po]	Ma., 2;8.7

(iii) Finally, on the assumption of an iambic foot which would be earlier acquired since no word marker (which is extrametrical, according to a morphology-based stress algorithm[203]) is present in these words, two points are yet to be clarified:

a. First, the assumption that children produce iambs earlier because they are stems and do not bear morphological information, on the one hand, and do not produce trochees because they bear morphological information which is extrametrical is circular. In fact, the absence of the word marker might be explained in terms of the circumscription of the target stressed syllable.

b. Secondly, as observed in section 5.2.1. and further mentioned in this discussion, as soon as non-reduplicated disyllables emerge, the word marker is produced. An early production of the word marker is inconsistent with its extrametrical and marked character.

In fact, the earlier production of /SW/ words (bearing morphological contrasts and extrametricality) is not consistent with the much later production of /SWW/ words, which, according to the literature on the target system (Lee, 1995; Mateus & Andrade, 2000; Pereira, 1999; among others), also bear word marker and extrametrical syllables.

On the assumption of an early iambic foot motivated by a morphology-based stress algorithm, the later production of [SW] stress patterns (at Stage III) would mean that children had mastered morphological contrasts and acquired extrametricality (as suggested by Santos, 2007, for BP). However, the explanation according to which Portuguese-speaking children have an earlier acquisition for iambs than for trochees due to (i) an earlier acquisition of an

[202] Instances were taken from Tzakosta (2004b). No orthographic transcription is provided.

[203] Cf. Chapter 1, section 1.2.3., and the references to Lee (1995) and Pereira (1999) therein. According to these authors, stress falls on the last syllable of the stem. Therefore, the stress would be domain-final ([WS]) and the theme vowel in /SW/ words would be extrametrical.

unmarked stress rule in non-verbs (stem-final stress) and due to (ii) the unmastery of extrametricality does not seem to hold for EP data.

Our findings on the acquisition of /SW/ and /SWW/ non-verbs seem to indicate that /SWW/ are acquired much later than /SW/. According to our data, word markers are produced as soon as non-reduplicated trochaic words emerge[204], and extrametrical elements (in /SWW/ non-verbs) are not mastered until the end of the observation period[205]. In fact, the data from the acquisition of /SWW/ words in EP confirmed that /SWW/, but not /SW/, are marked structures and are acquired late. Hence, it is not plausible that children are able to master extrametricality, producing trochees, but are not able to produce /SWW/ non-verbs target-like, especially when other trisyllabic words are already acquired.

Assuming that nouns constitute the vast majority of Portuguese children's early words[206] and most /SW/ nouns in Portuguese have a final extrametrical element (Lee, 1995) that children acquire later than iambs (Santos, 2007), it remains unexplained why children produce /SW/ with the word marker as soon as they acquire non-reduplicated disyllables but do not produce the extrametrical syllable in SW<u>W</u> words.

Given the three reasons presented above, we have to take seriously the hypothesis according to which early iambs are not, in fact, iambic feet. These findings are consistent with cross-linguistic information on the acquisition of stress patterns and with the fact that iambs are disfavored in the general path of language acquisition. Only in French, a language where feet organization is irrelevant for prominence (as, in fact, the language does not have word stress), the production of long utterances, with final prominence was also noticed in the children's speech (Braud, 2003; Wauquier-Gravelines, 2003). Reduplications are frequent in French and they are not motivated by feet constraints, but required by the larger prosodic structure instead. French-speaking children are sensitive to the rhythmic and prosodic properties of the language and attempt to fulfill a larger prosodic unit, the relevant unit for prominence purposes in French, the Phonological Phrase. The fact that French, a language without word stress, but with phrase-final accent, has an alternation between mono- and disyllabic productions and a great amount of reduplications and multisyllabic utterances in the early stages of acquisition allow us to hypothesize that early reduplications and fillers in EP might not be part of the foot structure and might be due to the processing of higher prosodic domains.

[204] Empirical evidence for this observation will be provided with further detail in Chapter 6, section 6.1.1.1..
[205] Cf. section 5.1.2.3.
[206] In the following chapter, we will confirm this information, by showing the distribution of the morphosyntactic categories in the data.

Indeed, the early [WS] productions in the Portuguese-speaking children might be due to the production of phrasal prominence, with higher levels of the prosodic hierarchy (namely, the Phonological Phrase) interacting with the syllable level in production.

The data found in this dissertation concerning the acquisition of stress patterns in EP suggest that children start building words from a syllable, the stressed syllable. As observed in other languages, like English and Dutch (Demuth, 1995; Fikkert, 1994, respectively), the frequent monosyllabic productions in the early stages of word stress acquisition, along with a subsequent complexification of the prosodic structure (Syllable > Foot > Prosodic Word), have provided evidence for a bottom-up model of prosodic acquisition. Assuming this model, from the beginning, children would process and produce the syllable of the target form. After that, children would process and produce feet, and so forth, in a path from simpler (lower) to more complex (higher) prosodic constituents, in a gradual fashion. However, children acquiring other languages did not necessarily follow this path and, apparently, the results found in EP are contradicting. On the one hand, we observed a great amount of monosyllabic forms in EP early speech, suggesting that the syllable is being the target of children's attention. On the other hand, monosyllabic utterances were frequently extended to di- and multisyllabic utterances, suggesting that higher prosodic constituents could be under processing by the children. Additionally, we observed that, at the early stages of word production a heavy tendency for [WS] consisting in reduplications and sequences with fillers were noticed.

Based on these facts (tendency for monosyllabicity, with recursion to di- and multisyllabic productions, normally with a [WS] format), we hypothesize that:

(i) in the early stages, the prominence being targeted by the Portuguese children is not word prominence, but, instead, phrasal prominence and;
(ii) in the early stages, lower levels (the syllable) of the prosodic hierarchy are interacting with higher levels (namely, the Phonological Phrase).

Specifically, we defend that the reasons that may contribute for an early right-headed prominence in Portuguese may be related to nuclear accent.

Peters (2001a,b) and Veneziano (2001) suggest that filler sounds are initially prosodic extenders and prosodic placeholders. Filler sounds do not necessarily extend children's productions to the foot level but, depending on the prosodic properties of the language, they may match a phrase template (as proposed by Gennari & Demuth, 1997 and Lleó, 1990, for Spanish).

Since EP, contrary to English and German, is a proclitic language, it is likely that the initial syllable of an early iamb - as well as the initial syllable of a reduplication - is processed as an unstressed element being placed at the left of the Prosodic Word (Vigário, 2003).

Our results partly confirmed Fikkert (1994) and Demuth's (1995) findings in the sense that prosodic acquisition and, in particular, word stress acquisition in trochaic languages starts at the syllable level and goes up in the prosodic hierarchy, from syllable to feet, and from feet to prosodic words. From this perspective, the acquisition of word prominence, thus, proceeds bottom-up in EP. This directionality, however, is not clear-cut, as there appears to be an interaction between lower and higher prosodic levels, in the early stages of word production, namely, it appear to be an interaction between the syllable level and the phonological phrase level. This interaction is noticeable in:

(i) the majority of monosyllabic productions (target-like and as a result of truncation) in the speech of Portuguese children, along with the observed strategies of reduplication and epenthesis;

(ii) the tendency to stress the final syllable in early utterances.

Additionally, in Chapter 4 we have shown that, at the onset of word production, Joana and Inês did not correctly assign word prominence. Our results suggested that, at the beginning, children might not be producing word prominence and confirmed previous research showing that higher levels of the prosodic structure, like the phonological or the intonational phrase, might be influencing children's production of rhythm in the early stages (Kehoe *et al.*, 1995; Pollock *et al.*, 1993; Vihman *et al.*, 1998).

Though Portuguese children were not able to produce longer target words (for instance, trisyllables had a late emergence and acquisition), it was observed that, indeed, they were able to produce utterances larger than a syllable, contrary to Dutch and English-speaking children. Utterances longer than a syllable in the early speech of Brazilian children were also observed (Santos, 1995; Scarpa, 1998, Scarpa & Santos, 2005), suggesting that structural properties common to both varieties, such as phrasal stress directionality (right-to-left), might be at stake as far as early [WS] words are concerned. The authors suggested that reduplications and epenthesis occurring at the left edge of the words at the onset of word are due to rhythmic constraints at higher prosodic levels, namely at the Phonological Phrase level, and claim for a top-down processing in BP prosodic acquisition. Therefore, before children are aware of word stress, other (higher) prosodic domains might be under children's attention.

Frota & Vigário (2008), studying the acquisition of intonational and durational patterns of one EP-speaking child, L.[207], observed many cases of stress shift in the early stages and that early prominence was mainly final. The authors argue that phrasal stress is right-headed in Portuguese and, thus, the child was not processing word stress, but rather prominence in higher prosodic domains (like the phonological and intonational phrase). Frota & Matos (2009) supported the findings from Frota & Vigário (2008) and found that, at the beginning, L.'s speech showed a strong correlation between the duration of syllables and the number of syllables in higher prosodic domains (namely, at the prosodic word and intonational phrase level). These findings suggest that early prosodic acquisition in EP does not start exclusively bottom-up and that lower and higher levels of the prosodic hierarchy may provide cues to the acquisition of word stress algorithm.

Interestingly, English, Dutch and German also have left-to-right phrasal stress and children acquiring those languages undoubtedly start with trochees, as soon as disyllables emerge (Fikkert, 1994; Demuth, 1995, 1996a,b,c). The important difference between Germanic languages like Dutch, English or German (Goedemans, van der Hulst & Visch, 1996; Kager, 1989; Roca, 1999), and a language like EP is that, in Germanic languages the evidence for trochees is overwhelming, namely, through the application of the major generalizations underlying word stress assignment.

One of the main generalizations of word stress in Dutch predicts that "primary stress is directly before a schwallable - if the schwa is preceded by a consonant" (Kager, 1989:227). The author further states that "disyllabic words with schwallables are quite frequent. Such words will have stress on their initial (or penultimate) syllable". Moreover, the author adds, "The force of the schwallable restriction is clear from rightward stress shifts to match the pattern, both in mispronunciations and in imported words [e.g., *katálogus* -> *katalógus*, *nótulen* -> *notúlen*]".

Also contrary to EP, Dutch feet are built iteratively, within a /SW/ alternation. In fact, both primary and secondary stress in Dutch are assigned on the basis of the SW rhythmic repetition (e.g., *macaroni* /ˌmaːkaːˈroːni/, *limonade* /ˌliːmoːˈnaːdə/, *televisie* /ˌteːləˈviːsiː/).

In EP, apart from stress assignment itself, there is weak evidence for the foot in general[208], and for the trochaic foot in particular, which may cause children to rely on other prosodic domains such as the syllable, the prosodic word or the Phonological Phrase, while processing prominence.

The stress algorithm in those languages is very clear (a weight-based one) to children: contrary to EP, weight is undoubtedly relevant for stress purposes (e.g., in Dutch,

[207] L. is Luma. Cf. footnote 120.
[208] Both the Spondaic and the Dactylic Lowering refer to other feet types, respectively the spondee and the dactyl (Wetzels, 1992, 1995, 2006).

superheavy syllables - VVC - attract stress almost without exception[209]), and both Dutch and English have vowel length contrast which counts for syllable weight (Kager, 1989). Finally, in English and Dutch underived words, morphological constituency does not play a role in primary stress assignment (Kager, 1989).

Contrary to what occurrs in many Romance languages (Roca, 1999), word stress in Germanic languages is not under debate. In fact, clear evidence, both for the word stress algorithm and the trochaic foot, may overrule right-to-left phrasal stress.

Based on the arguments presented in section 5.2.2.1. and in this section, we believe that EP word stress acquisition does not start with an iambic foot. It starts with a monosyllable. For the reasons presented above, we claim that early [WS] words frequently found in the speech of Portuguese-speaking children are not iambs and that there is an apparent iambic tendency in the acquisition of stress patterns in EP, caused by reduplication and epenthesis strategies.

5.3. Summary

In this chapter, we analyzed:

(i) the children's production patterns for word shape;
(ii) the children's faithfulness towards stress patterns;
(iii) the strategies used by the children to deal with stress patterns in a given moment of phonological acquisition.

We presented the results for monosyllables, trochees, iambs and trisyllables (/WSW/, /WWS/ and /SWW/) in EP, both in the target and in the children's actual productions.

The results from the children's production patterns and faithfulness indicate that in the early stages, Portuguese children seem to favor monosyllables and [WS] words. Only later Portuguese children come up with [SW] words and later they produce [WSW] words. Monosyllables are produced and mastered from the beginning of production in Portuguese children's linguistic development, though they might be subject to the same strategies as disyllables and trisyllables, i.e., simple or multiple reduplications, and filler insertion, and /SW/ are produced target-like later than /WS/. Trisyllables are acquired later than disyllabic

[209] Though only superheavy syllables are considered as heavy in adult Dutch, Dutch children seem to be sensitive to syllable weight in any closed syllables: "(...) children seem to regard any closed syllable as heavy, independently of the vowel and independently of the nature of the final consonant, since all closed syllables are now stressed in the child's output forms." (Fikkert, 1994:286).

words. The first trisyllable acquired is /WSW/ and both /WWS/ and /SWW/ are not acquired until the end of the observational period in the five children. The later acquisition of /WWS/ and, especially, /SWW/ provided evidence for the marker character of these structures, with respect to the acquisition of stress patterns.

In this chapter we discussed the acquisition of word stress in EP. Our results demonstrated that EP acquisition follows an acquisition path with four stages for the acquisition of word stress:

Stage I: $/\sigma/_{PW}$ - children mainly produce a syllable (they circumscribe the stressed syllable for a target word and might produce it in variable manner: as a monosyllable, using a reduplication strategy or epenthesis);

Stage II: $/CV_1CV_2/_{PW}$ - non-reduplicated disyllabic words emerge (both /SW/ and /WS/ are possible, though in small amounts);

Stage III: $/SW/_{\Sigma}$ - A trochaic foot is processed;

Stage IV: $[W[SW]_{\Sigma}]_{PW}$ - Words larger than a disyllabic foot are acquired (both /WS/ and /WSW/ are produced).

This developmental path is similar to the pattern found for other languages, namely with respect to the processing of directionality during prosodic acquisition. Portuguese children start with a syllable and use it to fulfill higher prosodic templates. The majority of children's productions is monosyllabic, monosyllables are produced adult-like from the beginning and, otherwise, they are subject to reduplication and filler insertion. These strategies are, in fact, frequent in the production of /S/, but also /SW/ and /WS/, and contribute for an 'apparent' iambic tendency. After this stage, disyllables emerge and both [SW] and [WS] are possible. At this point, no word prominence is yet assigned, as many disyllables are prone to truncation. Afterwards, children prefer a [SW] pattern: /WS/ are still truncated to [S] but /SW/ are produced adult-like. /WSW/ words are truncated to [SW]. At this step of the development, it appears that children have already realized that feet are [SW] in their language and that word trees are built from Right-to-Left. Trisyllables are not selected until late in development but, when they emerge, children select mostly /WSW/. The target-like production of trisyllables occurs in the fourth stage, when children realize that prosodic words can be larger than a disyllabic foot.

Our proposal partly confirms a bottom-up approach to prosodic acquisition (Fikkert, 1994 and Demuth, 1995), in the sense that Portuguese children start producing a syllable, then a disyllabic trochee and later a word longer than a disyllabic foot. However, the data also provided evidence supporting previous studies arguing for an early processing of higher prosodic domains in children's early productions (Scarpa, 1998; Scarpa & Santos, 2005), given that early di- and multisyllabic utterances were found, mostly having a [WS] shape, in the early speech of Portuguese children.

Before the turning point towards a trochaic tendency, Portuguese children are not processing word prominence and mainly process a syllable, with which they fulfill a larger prosodic template, by means of reduplication and filler insertion. An interplay between lower (syllable and foot) and higher (phonological phrase) was suggested by the data.

According to our proposal, early iambs can be interpreted as monosyllables or 'iambs in disguise' (reduplications and syllables preceded by a filler, with a [WS] form), which are produced, not to fulfill feet requirements, but rather requirements from higher prosodic domains. Under this perspective, EP acquisition data do not confirm the existence of an early iambic tendency. Our results further suggest that the domain for stress rules in EP is the lexical word. If the lexical word is the domain for stress assignment, the assumption of a morphology-based stress algorithm remains arguable. That is, if acquisition data provide evidence for the lexical word, and not morphemes, as the domain for stress, the interaction between word stress and morphology, both in phonological acquisition and in the adult speech, begins to fall apart. In the following chapter, we will investigate the results from our data analysis on the interaction of morphology and weight on word stress acquisition.

In summary, the general path pursued by all the children analyzed, taking into account real iambs, and not the 'disguised iambs', indicate that there is a neutral start in the acquisition of stress patterns in EP.

6. Testing target analyses on word stress with acquisition data

In this chapter we will discuss the target analyses on word stress, based on the observation of Portuguese children's developmental patterns for word stress, in relationship with morphological information and syllable weight. We aim at testing weight sensitivity or morphology dependence of word stress in Portuguese and, additionally, we intend to discuss the analyses for word stress in EP on the basis of new empirical data on child language acquisition.

In Chapter 1[210], we observed that word stress in Romance languages – and in Portuguese in particular – has been widely discussed (e.g., Bisol, 1993, 1999; Carvalho, 1987, 1988; Lee, 1995, 2001, 2006, 2007; Mateus, 1983, 2000, Pereira, 1999; Roca, 1999; Wetzels, 2002, 2006). In Portuguese (EP and BP), several analyses have been purported aiming to explain how word stress works in the language, all of them agreeing in the fact that stress assignment in this system is the result of an interaction between rhythmic and morphological properties. The two disputed approaches accounting for word stress in Portuguese have defended, on the one hand, that stress is assigned on the basis of syllable weight (Bisol, 1993, 1999; Carvalho, 1987, 1988; Wetzels, 2002, 2006) and, on the other hand, that morphological constituency governs stress assignment (Andrade 1988/1992; Andrade & Laks, 1992; Lee, 1995; Mateus, 1983; Mateus & Andrade, 2000; Pereira, 1999).

In Chapter 1, we listed the facts indicating that weight, on the one hand, and morphology, on the other, play a role in Portuguese word stress assignment. We will recall them below:

A. Evidences for weight in Portuguese word stress assignment (Bisol, 1993, 1999; Carvalho, 1987, 1988; Wetzels, 2002, 2006; Lee, 2001, 2006, 2007):

(i) EP has full stressed vowels and full unstressed vowels, suggesting that full unstressed vowels might be the result of a coalescence phenomenon and therefore be complex (heavy) segments - e.g., *s*[ɛ]*lvágem* 'wild', *c*[a]*ixóte* 'box', *séni*[ɔ]*r* 'senior', *c*[ɔ]*rar* 'to blush'.

[210] Cf. Chapter 1, section 1.2..

(ii) In the nouns' system, *heavy* syllables, i.e., syllables ending in a consonant (/ɾ, l, s[211]/) or a glide overwhelmingly bear stress. Syllable weight counts for stress assignment directly and indirectly at the Rhyme level (i.e., syllables are *heavy* at the level of the Rhyme and at the level of the Nucleus - /VC, VG, VN, VNC, VGC, VGN, VGNC/) - e.g., *balão* 'balloon', *carapáu* 'mackerel', *rapáz* 'boy', *amór* 'love', *anél* 'ring'.

(iii) In Portuguese, antepenultimate syllables are never stressed when the penultimate syllable is *heavy* ('CV.CVC.CV) - e.g., *cérebro* 'brain' and *cadastro* 'criminal record' but **cádastro*.

(iv) Stressed mid vowels in prefinal syllables followed by a final *heavy* syllable are neutralized (Spondaic Lowering) - e.g., *m*[ˈɔ]*vel*/**m*[ˈo]*vel* 'desk', [ˈɔ]*rfão*/'*[ˈo]*rfão* 'orphan'.

B. Evidence for morphology playing a role in Portuguese word stress assignment (Andrade, 1988/1992; Andrade & Laks, 1992; Lee, 1995, 2001, 2006, 2007; Mateus, 1983; Mateus & Andrade, 2000; Pereira, 1999):

(i) Non-verbs and verbs are subject to different word stress algorithms.

(ii) In non-verbs, stress generally falls on the last syllable of the stem - e.g., *gát*]*o* 'cat', *rapáz*] 'boy'.

(iii) Non-verbs' rule derives oxytonic athematic words without final consonant or glide - e.g., *café]* 'coffee', *chaminé]* 'chimney', *sofá]* 'couch', *champô]* 'shampoo'.

(iv) In verbs, regularities as to stress assignment in morphological constituents, and not as referring to word position or syllable weight (namely theme vowels and tense and mood suffixes) are observable - e.g., *calará* 's/he will shut up', *calaríamos* 'we will shut up'.

[211] Cf. footnote 73.

In sum, both analyses supporting weight-sensitivity and morphology-dependence are able to describe and account for word stress assignment in the language[212] and, simultaneously, they both raise a number of problems. The approach defending weight-sensitivity does not explain stressed light syllables in word-final position (e.g., *café* 'coffee'), or, instead, postulates the presence of a final extrametrical consonant, which is not realized phonetically (e.g., *café(C)* 'coffee' - Bisol, 1993, 1999), to explain stressed light syllables in word-final position. The approach supporting morphology-dependence neglects the fact that final heavy syllables crucially attract stress, as shown in (189):

(189) a. Word-final /CVs/ - e.g., *rapaz* 'boy' [ʀɐˈpaʃ]

b. Word-final /CVɾ/ - e.g., *amor* 'love' [ɐˈmoɾ]

c. Word-final /CVl/ - e.g., *hotel* 'hotel' [ɔˈtɛɫ]

d. Word-final /CVN/ - e.g., *patim* 'skate' [pɐˈtĩ]

e. Word-final /CVGN/ - e.g., *sabão* 'soap' [sɐˈbɐ̃w̃]

f. Word-final /CVG/- e.g., *carapau* 'mackerel' [kɐɾɐˈpaw]

The cases shown in (185) opposed to infrequent and marked cases like the ones in (190), where a final closed syllable is unstressed:

(190) a. *lápis* 'pencil' [ˈlapiʃ]

b. *túnel* 'tunel' [ˈtunɛɫ]

Additionally, the approach defending a morphology-based word stress does not take into account that whenever a penultimate syllable is heavy (CV.'CVC.CV), stress never withdraws one syllable back (e.g., Andrade, 1988/1992, 1996, 1997; Andrade & Laks, 1992; Pereira, 1999).

Data on word stress acquisition, both in Portuguese and in other languages, has been mostly focusing on the acquisition of stress patterns[213] and rarely focused on the relationship between word stress assignment and morphological information, especially in languages where morphological constituency might be relevant for stress purposes (like Spanish and Italian).

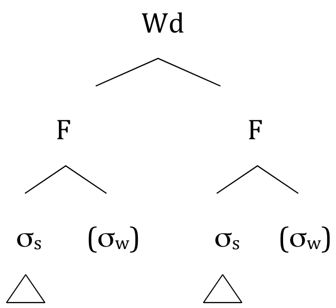
The acquisition of stress patterns and the observation of stress patterns across development may indicate what is the rhythmic character of the language (either trochaic or

[212] Cf. Chapter 2, section 1.2.3..
[213] Cf. Chapter 2, section 2.2..

iambic), what is the domain for stress, as well as it may provide evidence for both word stress and foot directionality in a given language. It might furthermore indicate how and when children acquire weight.

Fikkert (1994) proposed that Dutch children start with a CV monosyllable (Stage 0) and soon start producing [SW] words (Stage I and II)[214]. Until Stage II, Dutch children mainly learn that stress in their language is at the rightmost edge of words and that feet are binary and left-headed. Quantity-sensitivity, weight and directionality are acquired later, in Stage III. The child then realizes that there are two types of words in her language - /SW/ and /WS/ -, whose prominences are assigned on the basis of syllable weight. At this stage, /SW/ words are produced correctly but /CV.'CVC/ and /'CV.CVC/ words are produced with level stress (['CV.'CVC]). The child knows that closed syllables (VC) count as heavy and that feet in his/her language are quantity-sensitive. Since feet are left-headed in the target language, children realize that words might have two feet (in WS words), and produce /CV.'CVC/ words with level stress, as shown in (191).

(191) Representation for level stress in /WS/ words in stage III of word stress acquisition in Dutch (Fikkert, 1994:215):



ballon /bɑˈlɔn/ -> [ˈbɑn ˈdɔn]

The words like /'CV.CVC/ are not produced target-like, but with level stress (['CV.'CVC]), since the final syllable of these words is extrametrical and extrametricality is not yet acquired. Therefore, children do not produce stress shift in target /CV.'CVC/ words ([CV.'(C)VC]), but, instead, put the same amount of prominence in both syllables.

However, as referred in Chapter 5[215], Dutch provides stronger evidence for syllable weight as a relevant cue to word stress (Kager, 1989) than EP, as the former has superheavy

[214] For a detailed description on Dutch word stress acquisition (Fikkert, 1994), cf. Chapter 2, section 2.2..
[215] Cf. Chapter 5, section 5.2.2..

syllables - VVC - that attract stress almost without exception[216]. Also, Dutch has vowel length contrast which counts for syllable weight (Kager, 1989).

As far as Portuguese (BP) is concerned, the work from Bonilha (2005) and Santos (2001, 2007) have shed some light on the (still) controversial issue of word stress and word stress acquisition in Portuguese, as both works described the acquisition path undertaken by Brazilian children with respect to word stress, suggesting an iambic tendency in a language with a trochaic rhythm (BP).

According to Santos (2001)[217], at an early stage, Brazilian children do not distinguish between accent and word stress, as they are able to produce utterances larger than a syllable or a foot. At this stage, children are dealing with several intonational contours. Afterwards, Brazilian children establish one single intonational contour (LH*L%) and fulfill it with segmental and syllabic material. In a third stage, Brazilian children realize disyllabic words and produce both [SW] and [WS] words. At this stage, they still do not distinguish between word and phrasal stress (lexical stress and accent, respectively), since they still use both types of words to fulfill the basic intonational contour (LH*L%), as shown in (192).

(192) Disyllabic ([SW] and [WS]) words mapped onto a LH*L% intonational contour (Santos, 2005:81):

L	H*	L	%	-> intonational pattern
(w	s)		#	-> iambic pattern
	(s	w)	#	-> trochaic pattern

When SWW words are acquired, at a fourth stage, Brazilian children focus their attention on word stress and learn the stress algorithm of the language. The author argues that the acquisition of phonological aspects such as extrametricality, and the acquisition of morphological aspects such as the word marker, interact in the acquisition of word stress in BP, since the speech productions of the two Brazilian children observed showed that they were able to decompose words (namely, by producing derived words) and correctly assign stress. Furthermore, the author found no evidence for weight sensitivity in the Brazilian children observed. Below, we list the facts that lead the author to consider that weight does not play a role in word stress acquisition in BP:

[216] Cf. Chapter 5, section 5.2.2..
[217] For a more detailed description on the studies mentioned in the following paragraphs, cf. Chapter 2, section 2.5..

(i) Words with final heavy stressed and unstressed syllables (/'CV.CVC/ - e.g. *lápis* 'pencil' /ˈlapiʃ/ - and /CV.'CV(C)/ - e.g., *café* 'coffee' /kɐˈfɛ/, *calor* 'heat' /kɐˈloɾ/) were produced correctly since the beginning of stress acquisition, suggesting that children did not distinguish between heavy and light syllables;

(ii) Stress shift was not found in /'CV.CVC/ words (e.g., *lápis* 'pencil' /ˈlapiʃ/), showing that heavy syllables do not necessarily attract stress.

Supporting Lee's (1995) analysis for Portuguese word stress, Santos (2007) argues that children are sensitive to the fact that word stress relies on morphological constituency and that the domain for stress in non-verbs is the stem (Lee, 1995). Initially, Brazilian children produce [WS] words where no word marker is realized, providing evidence for the early sensitivity to the domain for word stress (stems in non-verbs and the lexical word in verbs), on the one hand, and for the extrametrical status of the word marker in /-SW/ non-verbs. The final syllable in [+nouns] with word marker is extrametrical and that the early foot in BP acquisition is an iamb (*sapát*]~~ʊ~~ 'shoe'). In verbs, Santos (2007) found a similar tendency as the one found in nouns, i.e., Brazilian children tended to produce /WS/ forms (mainly Infinitives) earlier than /SW/. As far as verb forms are concerned, Santos (2007) did not support Lee (1995), who defends that the stress domain is the lexical word and the default foot is a trochee, since in most verb forms stress falls on the penultimate syllable of the lexical word.

As discussed in Chapter 5, both from a cross-linguistic perspective and from a target frequency perspective, the assumption of an iambic default foot for Portuguese [+nouns], which would motivate an early iambic tendency, is hard to explain. As demonstrated in Chapter 1 (section 1.2.4.), Portuguese has an overwhelming trochaic rhythm. Nearly 75% of the disyllabic words bear stress in the penultimate syllable. In trisyllables, the percentage of words with stress in the penultimate syllable increases to 80%. Even if structural properties may provide the children with different cues (assuming Lee's, 1995, 2006, 2007 proposals), the rhythmic structure heard by Portuguese children is overwhelmingly trochaic. Additionally, as shown in Table 2[218], a tendency for iambic feet in the early speech of children was not observed in any trochaic language.

Contrary to Santos (2007), Bonilha (2005) defends that word stress is acquired since the beginning of word production. The author found a reduced number of filler sounds, especially in verbs, which seemed to indicate that the child observed was not paying

[218] Cf. Chapter 2, section 2.2.2..

attention to the intonational patterns of the language. Both iambs and trochees were produced in the early stages, though stressed and initial syllables (/<u>S</u>W/ and /<u>WS</u>/) were normally maintained, indicating a slight tendency for iambs. Contrary to Santos (2001), Bonilha (2005) found evidence for weight-sensitivity in the speech of the Brazilian child observed. The author supported her claim for weight-sensitivity in the following empirical evidences:

(i) Words with final stressed heavy syllable (/CV.'CVG/ words - e.g., *papai* 'daddy' /paˈpaj/) were produced correctly from the beginning;

(ii) Words with penultimate stress (/'CV.CV/), words with a final stressed heavy syllable (/CV.'CVG/) and words with a final stressed light syllable (/CV.'CV/) - e.g., *pato* 'duck /ˈpatu/, *papai* 'daddy' /paˈpaj/ and *café* 'coffee' /kaˈfɛ/, respectively - were acquired earlier than words with penultimate stress but with final heavy syllables (/'CV.CVC/ - e.g., *lápis* 'pencil' /ˈlapis/) and before words with antepenultimate stress (/'CV.CV.CV/ - e.g., *música* 'song' /ˈmuzika/).

The author empirically supports the analysis of Bisol (1992) for word stress in Portuguese, according to whom Portuguese is weight-sensitive. Bisol (1992) defends the unmarked character of penultimate stress and final stress in heavy syllable. Final stress in light syllable is due to a final abstract consonant fulfilling a syllable-final position. Based on Gordon (2002) and Kenstowicz (1994, 1996), Bonilha (2005) proposes that the sonority prominence of Coda consonants, as well as mid low vowels[219] should activate weight-sensitivity in Portuguese. On this assumption, children would earlier acquire unmarked stress positions (penultimate stress - /'CV.CV/ - and final stress in heavy syllable - /CV.'CV(G/C)/) and would later acquire marked stress positions (penultimate stress with final heavy syllable -/'CV. CVC/ - and antepenultimate stress - /'CV.CV.CV/).

Despite the valuable contribution of both Santos (2001, 2007) and Bonilha (2005) to the issue of the acquisition of word stress in Portuguese (particularly BP), many question are still pending, namely those regarding:

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[219] Notice, however, that this proposal does not account for final stress in words with a word-final high vowel: *aqui* 'here' [ɐˈki], *rubi* 'ruby' [ʀuˈbi], *peru* 'turkey' [pɨˈɾu].

(i) the role of syllable weight in stress assignment - are children sensitive to heavy syllables while acquiring word stress?

(ii) the role of morphology in stress assignment - do children display different behavior towards stress assignment in non-verbs and in verbs and, within each morphosyntactic category, do children display a different behavior towards words with different morphological constituency?

(iii) the domain for word stress in the language - do children's productions suggest that the lexical word or morphological constituents, such as stems, might be the domain for word stress?

Specifically, the research question that we aim to address in this chapter is: given the controversial status of word stress in Portuguese, what can the children's data say about word stress in this system?

The hypotheses that we pose are:

A. Given the results found in previous analyses on the adult language (Andrade, 1988/1992; Andrade & Laks, 1992; Mateus, 1983; Mateus & Andrade, 2000; Pereira, 1999) and on word stress acquisition in Portuguese (Santos, 2007), we hypothesize that morphological acquisition interacts with word stress and word shape acquisition in EP.

B. Given the results found in the previous chapter and on previous analyses for the child data and for adult Portuguese (e.g., Bonilha, 2005, Bisol, 1993, 1999; Wetzels, 2002, 2006), we hypothesize that word stress in EP acquisition relies on a weight-based algorithm.

If Portuguese word stress is morphology-dependent (e.g., Lee, 1995; Pereira, 1999), and assuming that the word-final information in /SW/ [+nouns], but not in [+verbs], is extrametrical (as proposed by Lee, 1995 and supported by Santos, 2007 with BP acquisition data), then we would expect that children start with [WS] in [+nouns] and [SW] in [+verbs].

If, otherwise, Portuguese is weight sensitive, it is expected that children obey the general weight-based rule for stress assignment (Bisol, 1992, 1994; Wetzels, 2006): stress the penultimate syllable of the lexical word, or the final syllable if it is heavy). Evidence for stress-attraction in heavy syllables would be found, through earlier acquisition of the unmarked stress pattern (penultimate stress, or final stress if the last syllable is heavy) and a later acquisition of the marked stress pattern (penultimate stress if the final syllable is heavy and antepenultimate stress).

In the following section (section 6.1.), we will present the results of the analyses on the morphology-dependence and weight-sensitivity in the speech of the five Portuguese children observed.

In section 6.1.1., we will show the results for the interaction of morphological information (both in the noun and in the verbs paradigm). We will compare the intake distribution (in terms of types and tokens) in the speech of the five children under observation, with special attention to the distribution of word classes ([+nouns] and [+verbs]) per stress pattern (monosyllabic, /-SW/ and /-WS/), across sessions (section 6.1.1.1.). In section 6.1.1.2., we will look to the morphology-dependence hypothesis in [+nouns], by comparing the acquisition of trochees with the production and acquisition of the word marker. In section 6.1.1.3., we will show the results for verbs, looking at the acquisition path undertaken by the children towards verbs tenses and the strategies carried by the children in /-SW/ and /-WS/ verbs.

In section 6.1.2., we will show the results for weight-sensitivity in the data of EP-speaking children. We will look at the deletion of unstressed light and heavy syllables (section 6.1.2.1.), to the developmental path for words with heavy stressed and heavy unstressed syllables (/CV.'CV/, /CV.'CVC/ and /'CV.CVC/ - section 6.1.2.2.) and, finally, we will look at stress shift in these same words (section 6.1.2.3.). In section 6.1.3. we will present the summary of the main findings.

In section 6.2., we will discuss the results found, both for the interaction of morphology and the role of syllable weight during word stress acquisition in EP.

Finally, in section 6.3, we will summarize the main findings of this chapter.

6.1. Results

In this section, we will show the results for morphology-dependence and weight-sensitivity in the observed children's speech.

This section will be divided into two parts: firstly, we will analyze the role of morphological interaction in the acquisition of words stress (6.1.1.); secondly, we will investigate the role of syllable weight in the acquisition of word stress. (6.1.2.).

6.1.1. On the interaction of morphology in the acquisition of word stress

In this section we aim at showing whether morphological information is relevant for stress assignment in Portuguese, from the language acquisition point of view. We will examine the distribution of word shapes and stress patterns (target monosyllables, /SW/ and /WS) per word class (non-verbs and verbs) in the children's intake (6.1.1.1.)., we will investigate the relationship between word stress and morphological constituents such as the word marker in non-verbs (6.1.1.2.) and tense/mood and person suffixes in verbs (6.1.1.3.).

6.1.1.1. The distribution of word classes per word shape

In the following tables we will show the number of targets selected by the children (i.e., word in the intake) with respect to word classes (mainly [+nouns] and [+verbs]), and word shapes (monosyllables, /-WS/ and /-SW/). With this data, we intend to investigate children's sensitivity for word class during word stress acquisition.

When compared to [+nouns], multisyllabic verbs in general are rare at the beginning and trisyllabic ones are very scarce, as we will observe, further in this section. Since verbs were very few in some children's speech, we plotted together -SW and -WS, that is, all multisyllabic words ending in SW or WS (e.g., *deixa* 'leave it' [ˈdɐjʃɐ] and *aperta* 's/he ties up' [ɐˈpɛɾtɐ] belong to the -SW paradigm, whereas *deixar* 'to wash' [dɐjˈʃaɾ] and *apertar* 'to tie up' [ɐpɨɾˈtaɾ] belong to the -WS paradigm).

Tables 67-71 depict the word shape of target [+verbs] and [+nouns] *selected* by each of the children analyzed with respect to word shapes (monosyllabic, trochaic and iambic verbs). A black stripe indicates the turning point towards a trochaic tendency. The number of tokens and the number of types will be provided in these tables. Types will appear between brackets. Table 67 presents the data from the word shapes selected by Clara.

	Monosyllables		-SW		-WS	
	+Verbs	**+Nouns**	**+Verbs**	**+Nouns**	**+Verbs**	**+Nouns**
S1				1 (1)		
S2	2 (2)					
S3	1 (1)		1 (1)	3 (1)		9 (1)
S4	3 (2)					10 (2)
S5				4 (2)		6 (3)
S6		9 (2)		4 (1)		4 (1)
S7	4 (2)	18 (4)		8 (4)		6 (2)
S8	6 (2)	13 (2)		6 (1)		10 (3)
S9	2 (1)	18 (3)		13 (4)		17 (2)
S10	6 (2)	18 (4)		90 (14)		23 (3)
S11	31 (7)	50 (7)	10 (3)	173 (29)	2 (2)	35 (7)
S12	34 (4)	43 (5)	21 (2)	143 (22)	5 (1)	50 (11)

Table 67. Distribution of word classes per stress pattern (Clara)

In Table 67 we observe that [+nouns] are the majority in Clara's speech at the beginning of word production (until session 10). Only monosyllabic verbs are produced until session 10 (mainly *é*/*está* '(it) is', *dá* 'give (imp.)' *tem* 's/he has' and *há* 'there is'). After session 11, verbs are produced consistently, especially /-SW/.

In Table 68, we show the distribution of the word classes in Inês' speech.

	Monosyllables		-SW		-WS	
	+Verbs	**+Nouns**	**+Verbs**	**+Nouns**	**+Verbs**	**+Nouns**
S1	1 (1)			1 (1)		19 (4)
S2	22 (2)		2 (1)	1 (1)		41 (3)
S3	31 (3)	16 (6)		16 (3)		60 (8)
S4	31 (6)	17 (4)	1 (1)	38 (16)		67 (7)
S5	23 (2)	5 (4)	1 (1)	39 (14)		53 (6)
S6	18 (3)	52 (5)	2 (1)	124 (31)	1 (1)	99 (11)
S7	20 (4)	18 (6)		108 (28)	1 (1)	81 (10)
S8	8 (4)	28 (7)	4 (4)	69 (24)	1 (1)	73 (14)
S9	31 (6)	36 (11)	8 (5)	159 (50)	8 (6)	87 (16)
S10	61 (9)	19 (11)	29 (8)	274 (68)	7 (6)	89 (12)
S11	112 (10)	46 (16)	43 (18)	297 (94)	15 (8)	136 (21)
S12	176 (14)	53 (15)	29 (11)	338 (104)	32 (17)	128 (21)
S13	120 (21)	54 (17)	75 (32)	360 (127)	53 (25)	106 (25)
S14	171 (14)	43 (16)	60 (25)	271 (105)	34 (18)	89 (17)
S15	136 (17)	46 (13)	53 (24)	287 (101)	41 (25)	50 (16)
S16	201 (24)	99 (15)	80 (30)	293 (102)	49 (20)	60 (19)
S17	103 (15)	43 (16)	51 (20)	196 (81)	42 (16)	25 (15)
S18	175 (24)	123 (29)	82 (53)	261 (110)	36 (26)	56 (25)

Table 68. Distribution of word classes per stress pattern (Inês)

In Table 68, we observe that, like Clara, the majority of the child's speech at the beginning (until session 7) consists in [+nouns]. Monosyllabic, but not multisyllabic, verbs are present from the beginning. Trochaic verbs are selected before (in session 2) iambic verbs (in session 6) and initially the number of types is highly reduced in both structures.

Table 69 presents the distribution of stress patterns per word class in Joana's speech.

	Monosyllables		-SW		-WS	
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns
S1		1 (1)				
S2						4 (1)
S3	2 (2)			2 (1)		3 (1)
S4	4 (1)	2 (2)				3 (2)
S5	2 (2)					
S6		2 (1)				
S7	4 (2)	1 (1)		18 (5)		2 (2)
S8	4 (1)	2 (2)		6 (4)		2 (2)
S9	2 (2)	17 (5)	1 (1)	23 (12)		27 (13)
S10	8 (3)	43 (12)		29 (19)	1 (1)	27 (14)
S11	16 (4)	24 (15)	1 (1)	87 (55)	1 (1)	50 (21)
S12	14 (5)	23 (8)	4 (1)	145 (79)	2 (2)	32 (19)
S13	16 (5)	24 (9)	7 (6)	112 (79)	8 (5)	27 (15)
S14	147 (11)	31 (17)	43 (13)	242 (129)	10 (9)	31 (22)

Table 69. Distribution of word classes per stress pattern (Joana)

In Joana's speech a monosyllabic tendency is noticeable, both in [+nouns] and [+verbs]. Words longer than one syllable are scarce until session 7 and only multisyllabic [+nouns] are selected until that period. Multisyllabic verbs are selected in session 9 (trochees), but only from session 10 onwards multisyllabic verbs (both /-SW/ and /-WS/) are selected.

Table 70 shows the distribution of [+nouns] and [+verbs] per word shape in João's speech.

	Monosyllables		-SW		-WS	
	+Verbs	**+Nouns**	**+Verbs**	**+Nouns**	**+Verbs**	**+Nouns**
S1				6 (1)		
S2	4 (1)					
S3	1 (1)			8 (1)		
S4				6 (2)		2 (1)
S5				14 (3)		
S6				10 (2)		5 (2)
S7		3 (1)		15 (4)		18 (2)
S8		1 (1)		23 (6)		11 (5)
S9	5 (2)	20 (3)		14 (6)	2 [1)	14 (6)
S10	3 (1)	10 (3)		39 (6)	1 (1)	23 (8)
S11	15 (1)	7 (1)		35 (6)		17 (6)
S12	20 (2)	18 (4)		20 (7)	1 (1)	26 (7)
S13	8 (2)	11 (1)		23 (3)		54 (7)
S14	2 (1)	4 (3)		17 (6)	1 (1)	31 (6)
S15	4 (2)	12 (3)	1 (1)	10 (7)		30 (5)
S16	9 (4)	17 (7)	9 (3)	87 (31)	6 (1)	34 (17)
S17	3 (1)	56 (10)	1 (1)	109 (45)	3 (3)	22 (8)
S18	5 (2)	21 (3)	22 (5)	104 (46)	3 (1)	50 (14)
S19	19 (5)	22 (9)	9 (3)	117 (54)	5 (4)	28 (14)
S20	6 (1)	28 (8)	9 (4)	139 (52)	1 (1)	35 (15)
S21	1 (1)	16 (8)	3 (3)	135 (53)		35 (15)
S22	20 (5)	30 (5)	10 (4)	117 (46)	2 (2)	38 (19)

Table 70. Distribution of word classes per stress pattern (João)

In Table 70, we observe that, contrary to Joana, João has a small amount of monosyllabic words, being either [+nouns] or [+verbs]. Multisyllabic /-SW/ and /-WS/ are selected from the beginning, though /-SW/ [+nouns] are more frequent than /-WS/. Verbs are very scarce until session 15. In session 9, João selects his first multisyllabic verb form (-

WS/) but he keeps the same type (*acabou* 'it finished') until late. Multisyllabic/-SW/ are produced consistently and more frequently from session 15 onwards.

Table 71 shows the distribution of stress patterns per word class in Luma's speech.

	Monosyllables		-SW		-WS	
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns
S1	1 (1)			1 (1)		
S2	2 (1)					
S3	1 (1)			9 (1)		
S4				31 (2)		7 (2)
S5				5 (3)		
S6	13 (1)			7 (3)		2 (1)
S7	30 (1)	1 (1)		22 (6)		
S8	35 (1)	1 (1)		29 (5)		2 (1)
S9	8 (2)	1 (1)		13 (3)		
S10	1 (1)			2 (1)		2 (1)
S11	1 (1)			5 (4)		2 (2)
S12	5 (1)			9 (2)		6 (1)
S13	21 (1)			12 (5)		3 (1)
S14				8 (4)	6 (1)	14 (2)
S15	41 (1)			28 (8)	3 (1)	29 (3)
S16	8 (2)			1 (1)	36 (1)	33 (2)
S17	8 (1)			11 (3)		17 (2)
S18	7 (2)			15 (4)		21 (3)
S19	22 (1)			4 (2)		15 (3)
S20	12 (2)		12 (1)	22 (7)		49 (5)
S21	3 (2)	5 (3)	7 (1)	19 (6)		57 (5)
S22	2 (1)		14 (1)	26 (7)		30 (2)
S23	2 (1)	1 (1)	13 (1)	30 (3)		52 (4)

S24	2 (1)		3 (1)	29 (7)		48 (3)
S25	5 (1)	9 (2)		31 (10)		21 (7)
S26	1 (1)	14 (14)	2 (1)	23 (6)		41 (8)
S27	2 (1)	10 (5)	1 (1)	19 (8)		65 (5)
S28	1 (1)	14 (4)		30 (6)		60 (9)
S29	13 (2)	17 (7)		46 (10)	1 (1)	75 (10)
S30	6 (3)	18 (11)	8 (3)	119 (33)		86 (14)
S31	10 (7)	22 (12)	11 (7)	134 (48)	3 (2)	71 (13)
S32	32 (10)	36 (11)	96 (29)	166 (33)		59 (5)
S33	48 (9)	22 (13)	41 (20)	203 (63)	4 (3)	94 (14)
S34	48 (8)	41 (14)	50 (17)	220 (69)	27 (11)	108 (10)
S35	60 (9)	29 (10)	52 (19)	184 (73)	17 (8)	68 (8)
S36	122 (12)	23 (9)	54 (17)	224 (76)	29 (24)	116 (19)
S37	70 (12)	12 (8)	26 (17)	207 (69)	23 (15)	81 (15)

Table 71. Distribution of word classes per stress pattern (Luma)

In Luma we observed the same trend already observed in the other children. In the beginning, she mainly produces monosyllabic words ([+nouns] and [+verbs]) and multisyllabic [+nouns]. Until session 30, the child does not select verbs and when she does so (session 14), she repeats the same type (the /WS/ verb *marchar* 'to march') in the three following sessions. In session 20, Luma produces the /-SW/ verb form *olha* 'look!' and that is the only /-SW/ verb form produced until session 27. After session 30, she produces /-SW/ verb forms consistently and from session 33 onwards, the same applies to /-WS/ verb forms.

The distribution of [+nouns] and [+verbs] across sessions in all children indicates that, at the early stages, a comparison between the two types of word classes ([+nouns] and [+verbs]) per stress pattern is not possible, since multisyllabic verbs are very scarce.

The distributional information on word classes and stress patterns presented indicates that multisyllabic verbs are selected later than monosyllabic verbs in the speech of the five children observed. Monosyllabic verbs are produced from the early stages, as well as multisyllabic nouns.

In Table 72, we represent the developmental path for mono- and multisyllabic non-verbs and verbs in the children's intake:

	Monosyllables		Multisyllables	
	[+Nouns]	[+Verbs]	[+Nouns]	[+Verbs]
Moment I				
Moment II				

Table 72. Development for the distribution of word classes per word shape and stress pattern in the children's intake.

Also, the results of this section showed that three children more and earlier select /-WS/ [+Nouns] and two children earlier selected /-SW/ [+Nouns]. Note, however, that in these tables the entire intake (including reduplicated targets) was taken into account.

In the following sections we will show results from the analyses on two stress-related aspect: (i) the relationship between the acquisition of /SW/ [+nouns] and the production of the word marker, (ii) verbs production and strategies in the children observed, looking closer at the verb tenses produced.

6.1.1.2. Looking closer at the noun paradigm

In this section we will investigate the children's production of /SW/ and the production of the word marker in /SW/.

In Chapter 5 (section 5.1.1.2.), we showed that the early production of Portuguese children mostly had a [WS] shape. However, we also showed that these iambs were mainly produced as reduplications or resulted from epenthesis on the left of the circumscribed syllables from the target word.

As already mentioned in this dissertation[220], Santos (2007) defends that early words in BP conform to an iambic foot. The author supports her claim in the fact that children are obeying the morphology-based stress algorithm in the target language, i.e., stress falls on the last syllable of the stem (Lee, 1995). Since trochees, but not iambs, bear a final word marker that, according to the target description followed by the author (Lee, 1995), is extrametrical, Brazilian children were not producing early trochees due to the unmastery of morphological contrasts (mainly, gender contrasts), on the one hand, and due to the unmastery of extrametricality.

Following Santos (2007), the prediction for this section is that, since the word marker bears morphological and extrametrical information, morphological contrasts, in this case,

[220] Cf. review on the acquisition of word stress in BP, in Chapter 2, section 2.5., and the discussion in Chapter 5, section 5.2..

gender contrast (masculine and feminine), will not be noticed before trochees are acquired. Trochees without the word marker, which are scarce in the target language, however, will not be produced as trochees either, and will preferably be produced as iambs (e.g., *Noddy* 'name' /ˈnɔdi/ -> [nɔˈdi], *lápis* 'pencil' /ˈlapiʃ/ -> [laˈpiʃ]).

In Tables 73, 75, 77, 79 and 81, we will consider the correct production of the word marker in [+nouns] (di-, tri- and polisyllables). In Tables 74, 76, 78, 80 and 82, we accounted for the production of trochees, irrespective of the morphosyntactic category, in order to describe the acquisition of trochees in general and not only trochaic nouns. We took into account the correct production of the word marker, the production of trochees target-like (/ˈkazɐ̠/ -> [ˈkazɐ̠]), cases of stress shift (/ˈkazɐ̠/ -> [kaˈza̠]), or cases in which the truncated syllable was the final one ([ˈza̠]). We consider that the word marker was not produced whenever children used truncation or reduplication (/ˈkazɐ̠/ -> [ˈka] or /ˈkazɐ̠/ -> [ˈkaka]/[kaˈka]). A grey stripe indicates the session in which the trochaic foot predominated (>50%) in each child's speech.

In Table 73 and 74, we show Clara's results for the production of the word marker and trochees respectively[221].

[221] A higher number of targets in the production of the word marker than in the production of /SW/ is due to the fact that we are considering, not only disyllabic trochees, but also all the words with word marker. A higher number of targets in the table regarding the production of /SW/ than in the word marker production is due to the fact that we are considering /SW/ in general (verbs included), and not only /SW/ nouns.

	WM Production	%
S3	3/3	100
S4	-	-
S5	2/4	50
S6	4/4	100
S7	6/8	75
S8	6/6	100
S9	12/13	92.30
S10	72/90	80
S11	103/173	59.53
S12	80/143	55.94

Table 73. Word marker production (Clara)

	Production of /SW/	%
S3	3/4	75
S4	-	0
S5	2/4	50
S6	3/4	75
S7	1/5	20
S8	6/6	100
S9	5/9	55.55
S10	59/80	73.75
S11	103/161	63.97
S12	76/146	52.05

Table 74. Production of /SW/ (Clara)

Clara is accurate from the beginning both in the production of word markers and in the production of trochees. Though she has few tokens from both trochaic and disyllabic words with the word marker in the early sessions (until Session 8), a high rate of production in both structures is observable in Clara. The tables above indicate that Clara masters the word marker and gender contrasts and she is able to correctly produce trochees, from the beginning of word production.

In (193) we present instances of Clara's production of trochees where the word marker is observed.

(193) Clara's accuracy in early trochees and the word marker

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
papa	'food fam.'	/ˈpapɐ /	[ˈtatɐ̃]	0;11.1 (S1)
papa	'food fam.'	/ˈpapɐ/	[ˈpæpa]	1;1.3 (S3)
água	'water'	/ˈagʷɐ/	[ˈaːβɐ]	1;3.6 (S5)
água	'water'	/ˈagʷɐ/	[ˈakə]	1;4.19 (S6)
mano	'brother fam.'	/ˈmɐnu/	[ˈmanu]	1;5.16 (S7)

In Tables 75 and 76, we show the word marker production and the production of disyllabic trochees, respectively, in Inês' speech.

	WM Production	%
S3	0/3	0
S4	2/26	7.69
S5	3/26	11.53
S6	6/87	6.89
S7	2/72	2.77
S8	1/34	2.9
S9	66/101	65.34
S10	151/187	80.74

Table 75. Word marker production (Inês)

	Production of /SW/	%
S3	0/4	0
S4	1/27	3.70
S5	1/27	3.70
S6	1/90	1.11
S7	3/73	4.10
S8	5/39	12.82
S9	82/140	58.57
S10	166/221	75.11

Table 76. Production of /SW/ (Inês)

In Tables 75 and 76, we observe that the percentage rates in the word marker production and in the production of /SW/ is very similar across sessions. In session 9, Inês is able to produce the majority of word markers and trochees target-like.

In (194) we present Inês' production of /SW/, before and after the mastery of the trochaic foot. The instances below show that, initially (until session 8), Inês truncates /SW/ into [S], she reduplicates the stressed syllable or she adds a filler sound before the stressed syllable, thus generally creating, not [SW], but [S] or [WS] words.

(194) Inês – production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
manta	'blanket'	/ˈmɐ̃tɐ/	[ˈmɐ̃]	1;3.6 (S4)
barco	'boat'	/ˈbaɾku/	[ˈbæ:]	
carro	'car'	/ˈkaʀu/	[ˈkaˈka]	1;4.9 (S5)
meia	'sock'	/ˈmɐjɐ/	[ˈmɛ]	1;5.11 (S6)
banho	'bath'	/ˈbɐɲu/	[ɐˈbɐ]	
balde	'bucket'	/ˈbaɫdɨ/	[ˈpa]	1;6.11 (S7)
água	'water'	/ˈagʷɐ/	[ˈa:]	1;7.2 (S8)
banho	'bath'	/ˈbɐɲu/	[ɐˈba]	
boa	'good'	/ˈboɐ/	[ˈboɐ]	1;8.2 (S9)
tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpata]	
casa	'house'	/ˈkazɐ/	[ˈkatʲɐ]	1;9.19 (S10)
banho	'bath'	/ˈbɐɲu/	[ˈbaju]	
bolos	'cakes'	/ˈboluʃ/	[ˈboluʃ]	

The instances presented above show that, in the early sessions (until session 8), Inês mainly truncates target /SW/, deleting the final syllable, reduplicates the stressed syllable or uses a filler sound before the truncated stressed syllable. From session 9 onwards, the child produces /SW/ target-like.

Tables 77 and 78 show the production values for the word marker production and the production rates in /SW/ by Joana.

	WM Production	%
S7	0/16	0
S8	0/4	0
S9	1/12	8.33
S10	4/16	25
S11	15/43	34.88
S12	53/76	69.73
S13	37/53	69.81
S14	73/98	74.48

Table 77. Word marker production (Joana).

	Production of /SW/	%
S7	0/16	0
S8	0/4	0
S9	0/13	0
S10	2/16	12.5
S11	13/45	28.88
S12	57/91	62.63
S13	44/74	59.45
S14	108/163	66.25

Table 78. Production of disyllabic trochees (Joana).

In Tables 77 and 78, we observe that there are simultaneous production rates for both the word marker and trochees. Joana overcomes the 50% of target-like production of both trochees and the word marker approximately in the same session, which indicates that she does not acquire the word marker before trochees or vice-versa. Also, it is noticeable that until session 7, there are no /SW/ and, until session 9, Joana is not able to correctly produce any /SW/ target-like.

The examples in (195) illustrate Joana's production of trochees, before and after their acquisition.

(195) Joana – production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Carla	'name'	/ˈkaɾlɐ/	[ˈka]	1;8.4 (S8)
escola	'school'	/ʃˈkɔlɐ/	[ˈkɔ]	
pato	'duck'	/ˈpatu/	[paˈpa]	1;9.25 (S9)
escola	'school'	/ʃˈkɔlɐ/	[kɔˈkɔ]	
sapato	'shoe'	/sɐˈpatu/	[paˈpa]	
luva	'glove'	/ˈluvɐ/	[ˈbuː]	1;10.22 (S10)
Nando	'name'	/ˈnɐ̃du/	[ˈɲɐ̃]	2;0.9 (S11)
seco	'dry'	/ˈseku/	[ˈtjɛku]	2;2.9 (S12)
outra	'other'	/ˈotrɐ/	[ˈotʲɐ]	
mota	'motorbike'	/ˈmɔtɐ/	[ˈmɔːtʲɐ]	2;4.1 (S13)
fralda	'diaper'	/ˈfɾaɫdɐ/	[ˈfawdɐ]	
pedra	'stone'	/ˈpedrɐ/	[ˈpɛdɐ]	
quadro	'picture'	/ˈkʷadɾu/	[ˈkajdʲu]	2;6.24 (S14)
pato	'duck'	/ˈpatu/	[ˈpatʲu]	

In the instances above, we observe that truncation and reduplication are the strategies mostly used by Joana to deal with target trochees. In an early period (until session 11), the final syllable in /SW/ is deleted. Later on (from session 12 onwards), trochees are produced target-like.

Tables 79 and 80 show the production values of João for the word marker in /SW/ and the target-like rate in /SW/.

	WM Production	%
S7	2/15	13.33
S8	4/18	22.22
S9	6/13	46.15
S10	24/39	61.53
S11	3/17	17.64
S12	7/13	53.84
S13	18/23	78.26
S14	14/17	82.35
S15	4/7	57.14

Table 79. Word Marker production (João)

	Production of /SW/	%
S7	2/15	13.33
S8	1/18	5.55
S9	2/13	15.38
S10	5/39	12.82
S11	3/17	17.64
S12	4/12	33.33
S13	5/23	21.73
S14	8/17	47.05
S15	3/7	42.85

Table 80. Production of /SW/ (João)

In these tables, we did not reach the session in which João acquires trochees (Session 16, at 1;9.25), as João reached the point above 50% in the word marker production before that point (in session 12). In João, the mastery of the word marker is attained before (in session 12) the acquisition of trochees (in session 16).

In the following examples, we will show João's productions for /SW/.

(196) João – production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
água	'water'	/ˈagʷɐ/	[aˈbaː]	1;3.21 (S7)
bola	'ball'	/ˈbɔlɐ/	[ˈbɐːw]	
panda	'panda bear'	/ˈpɐ̃dɐ/	[ˈpa]	
bolo	'cake'	/ˈbolu/	[boˈu]	1;4.17 (S8)
patu	'duck'	/ˈpatu/	[ˈpa]	1;5.12 (S9)
uva	'grape'	/ˈuvɐ/	[dɐˈdu]	
meia	'sock'	/ˈmɐjɐ/	[ˈmɐˈmɐ]	1;5.26 (S11)
bola	'ball'	/ˈbɔlɐ/	[buˈlaː]	
bola	'ball'	/ˈbɔlɐ/	[ˈβɐjɐ]	1;8.25 (S15)
Guida	'name'	/ˈgidɐ/	[ˈdita]	1;9.25 (S16)
bolo	'cake'	/ˈbolu/	[ˈboʎu]	
panda	'panda bear'	/ˈpɐ̃dɐ/	[ˈmɐnɐ]	
pombo	'pigeon'	/ˈpõbu/	[ˈmɐːmu]	
chicha	'meat fam.'	/ˈʃiʃɐ/	[ˈtitɐ]	1;10.11 (S17)
zebra	'zebra'	/ˈzebrɐ/	[ˈbibɐ]	

João correctly produces the word marker, but incorrectly produces trochees as iambs, and truncates /SW/ to monosyllables (until session 15). These strategies (stress shift, along with truncation) are abandoned in the course of development and the child will later produce the word marker and disyllabic trochees target-like (from session 16 onwards). However, it is worthwhile mentioning that this child is able to produce the word marker when he does not produce disyllabic trochees target-like, because he used stress shift in early trochees. The data from this child suggest that the acquisition of trochees is not dependent on the acquisition of the word marker, as he can produce the word marker and still use stress shift of the type /SW/ -> [WS].

In (197) we provide some instances of stress shift in the early sessions of João's speech.

(197) Stress shift in João

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
água	'water'	/ˈagʷɐ/	[ɐˈβɐ]	1;1.12 (S3)
água	'water'	/ˈagʷɐ/	[ɐˈβɐ]	1;2.13 (S5)
água	'water'	/ˈagʷɐ/	[aˈbaː]	1;3.21 (S7)
bolo	'cake'	/ˈbolu/	[boˈu]	1;4.17 (S8)
água	'water'	/ˈagʷɐ/	[ɐˈwa]	
uva	'grape'	/ˈuvɐ/	[dũˈa]	1;5.12 (S10)
bola	'ball'	/ˈbɔlɐ/	[boˈa]/[buˈlaː]	1;5.26 (S12)

Tables 81 and 82 show Luma's production values for the word marker and trochees, respectively.

	WM Production	%
S25	1/30	3.22
S26	2/22	9.09
S27	9/17	52.94
S28	6/19	31.57
S29	18/36	50
S30	49/87	56.32
S31	58/103	56.31
S32	42/101	41.58
S33	88/161	54.65
S34	80/147	54.42
S35	75/115	65.21

Table 81. Word marker production (Luma)

	Production of /SW/	%
S25	1/30	3.33
S26	2/24	8.33
S27	0/18	0
S28	8/30	26.66
S29	9/38	23.68
S30	30/122	24.59
S31	42/118	35.59
S32	97/208	46.63
S33	130/215	60.46
S34	138/217	63.59
S35	101/146	69.17

Table 82. Production of /SW/ (Luma)

Luma takes a pattern similar to João's, as she is able to produce the word marker before the acquisition of disyllabic trochees, since this child also uses some instances of stress shift of the type /SW/ -> [WS]. However, the percentages of stress shift of the type /SW/ -> [WS] in Luma are more reduced than the ones observed in stress shift of the type /WS/ -> [SW] (cf. Table 60[222]).

Luma has a rate higher than 50% for the word marker production in Session 30 and in Session 33 for the production of trochees, which constitutes an approximate interval of one month. As João, Luma is able to produce the word marker before trochees are acquired,

[222] In Chapter 5, section 5.1.3.4..

further suggesting that the acquisition of trochees might not be dependent of the acquisition of the word marker.

The examples in (198) show the production of /SW/ where truncation to monosyllables and stress shift are observable, until session 30. From session 31 onwards, we observe that /SW/ are produced target-like.

(198) Luma – production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
gato	'cat'	/ˈgatu/	[ˈtaː]	2;0.13 (S25)
meias	'socks'	/ˈmɐjɐʃ/	[ˈnɐj]	
polvo	'octopus'	/ˈpoɫvu/	[boˈbo]	
Tito	'name'	/ˈtitu/	[tiˈto]	2;0.27 (S26)
carro	'car'	/ˈkaʀu/	[kɑˈʀo]	2;1.10 (S27)
casa	'house'	/ˈkazɐ/	[ˈka]	2;3.26 (S30)
tinta	'ink'	/ˈtĩtɐ/	[ˈtĩtɐ]	2;4.11 (S31)
linda	'beautiful'	/ˈlĩdɐ/	[ˈnĩdɐ]	
alto	'tall'	/ˈaɫtu/	[ˈatu]	
sapo	'frog'	/ˈsapu/	[ˈfapu]	
outro	'other'	/ˈotɾu/	[ˈotu]	2;4.25 (S32)
pedra	'stone'	/ˈpɛdɾɐ/	[ˈpɛdɐ]	2;5.15 (S33)

Like João, Luma presents a period of word production where stress shift is found (until session 30). In an early period (until session 30, at 2;3.26), Luma does not have a consistent production of /SW/[223], she has mostly target trochees truncated to monosyllables[224], reduplicated [WS] words or stress shift in non-reduplicated words (until session 30). After this period (from session 31 onwards), Luma correctly produces the word marker and target trochees.

The observation of the developmental path pursued by the five children analyzed with respect to the acquisition of /SW/ and the word marker indicates that both appear to be related. However, two of the children (João and Luma) could productively produce the word marker before the acquisition of trochees, through the recursion to stress shift of the type /SW/ -> [WS]. Despite the fact that two of the children observed display stress shift towards iambs (see, for instance, João's renditions shown in (174)), it is worth saying that stress shift (/SW/->[WS]) in non-reduplicated forms was not common in the speech productions of Portuguese children in general[225].

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[223] Cf. Chapter 5, Table 32, for the percentage of faithful /SW/ in Luma.
[224] Cf. Chapter 5, Table 49 for the percentage of truncation of /WS/ and /SW/ to monosyllables (Luma).
[225] Cf. Chapter 5, section 5.1.3.4..

In order to further investigate the existence of a relationship between the acquisition of trochees and the acquisition of gender contrasts in an early stage, we additionally provide information on the strategies used by the observed children towards target trochees not bearing the word marker. Notice that the frequency of target trochaic words without the word marker forms in child speech (as in the adult language) is scarce, as attested by the reduced number of words showed in the tables below. Recall, also, that in the assumption of an early iambic foot and in the assumption of a late mastery of trochees due to morphological interaction (namely, to the late mastery of gender contrasts), we would expect that /SW/words without gender marker were produced as iambs.

In the following tables, we will show all the early productions of target trochaic words without word marker in the five children observed. In (199), we show Clara's renditions for the only target trochee without word marker selected by the child, *Noddy*.

(199) Clara – production of /SW/ without word marker:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Noddy	'name'	/ˈnɔdi/	[ˈnɔt^{h}i] [mɨˈnɔti]	1;8.20 (S10)
			[nɐˈnɔ] [nɐˈnɔti] [ˈnɔti] [ˈnɔki] [nɔˈnɔ]	1;9.23 (S11)
			[noˈnow] [nɔˈnɔ] [ˈɔti]	1;10.15 (S12)

In Clara's speech, we observe that, until the end of the observation period (session 12), there is an unstable production of the word *Noddy* /ˈnɔdi/ 'name'. It is produced target-like ([ˈnɔt^{h}i], in session 10), as a reduplicated iamb ([nɔˈnɔ], in session 11 and 12) or even as a trisyllable ([mɨˈnɔti], in session 10). Clara's productions for /SW/ non-verbs without word marker is very variable across the observation period.

The examples in (200) show the production of *Bambi* /ˈbɐ̃bi/ 'name' and *lápis* /ˈlapiʃ/ 'pencil', the only two trochaic words without word marker selected by Inês.

(200) Inês – production of /SW/ without word marker:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Bambi	'name'	/ˈbɐ̃bi/	[ˈbabaˈba] [βɐˈbɐ] [ˈbab] [ɛˈbe] [ˈbi] [peˈbe] [beˈbɛ]	1;3.6 (S4)
Bambi	'name'	/ˈbɐ̃bi/	[bɐ] [ɐˈbɐ] [ɨˈbɐ] [ˈbaˈaˈba]	1;4.9 (S5)
Bambi	'name''	/ˈbɐ̃bi/	[ˈβɐ]	1;6.11 (S7)
lápis	'pencil'	/ˈlapiʃ/	[ˈpatʰ] [æbaˈtu] [ˈpatu] [ˈbato]	1;8.2 (S9)
Bambi	'name'	/ˈbɐ̃bi/	[ˈbabi]	1;10.29 (S11)
Bambi	'name'	/ˈbɐ̃bi/	[ˈbabi]	2;0.11 (S12)
lápis	'pencil'	/ˈlapiʃ/	[ˈapi]	2;0.11 (S12)

In Inês' speech, we observe that, until session 7, trochaic words without word marker are either truncated to monosyllables (e.g., *Bambi* produced as [ˈbi], in session 4, or [bɐ], in session 5), reduplicated (e.g., *Bambi* produced as [ˈbabaˈba] or [βɐˈbɐ], in session 4), or produced with circumscription of the stressed syllable preceded by a filler sound (e.g., [ɐˈbɐ] and [ɨˈbɐ], in session 5). From session 9 onwards, /-SW/ words without word marker are produced as trochees and the strategies used before are no longer observed. As in Clara, in Inês we observe that /SW/ non-verbs without word marker go through an initial moment where no fixed shape is produced (they can take the form of a monosyllable, a [WS] reduplication, be produced with a filler sound at the left-edge or, yet, as a multiple reduplication). Later (after session 9), they are produced target-like.

In (201), we show Joana's early renditions for /SW/ words without word marker. The words attempted by this child were *Dinky*/ˈdĩki/ 'name', *César*/ˈsɛzaɾ/ 'name', *Heidi*/ˈɐjdi/ 'name' and *Barbie* /ˈbaɾbi/ 'name'.

(201) Joana – production of /SW/ without word marker:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Dinky	'name'	/ˈdĩki/	[ˈkĩː] [ˈdĩ]	1;9.25 (S9)
César	'name'	/ˈsɛzaɾ/	[ˈtʃɛ]	2;0.9 (S11)
Heidi	'name'	/ˈɐjdi/	[ˈatʃ] [ˈadʰə]	2;4.1 (S13)
César	'name'	/ˈsɛzaɾ/	[ˈʃɛ]	2;4.1 (S13)
César	'name'	/ˈsɛzaɾ/	[ˈçezɐ̰]	2;6.24 (S14)
Barbie	'name'	/ˈbaɾbi/	[ˈpabi]	2;6.24 (S14)

The first /SW/ word without word marker is selected in session 9, by Joana (*Dinky* /ˈdĩki/ 'name'). In session 9 and 11, these words are mainly truncated to a monosyllable. From session 13 onwards, we observe that Joana is able to produce /SW/ words without word marker maintaining the target stress pattern (e.g., *Heidi* /ˈɐjdi/ 'name' produced as [ˈadʰə], in session 13, *César* /ˈsɛzaɾ/ 'name' produced as [ˈçezɐ̰] and *Barbie* /ˈbaɾbi/ 'name' produced as [ˈpabi], in session 14). In Joana, /SW/ non-verbs without word marker are never produced as iambs.

In (202), we present João's renditions for the /SW/ words without word marker.

(202) João – production of /SW/ without word marker:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Noddy	'name'	/ˈnɔdi/	[ˈdidi] [diˈdi]	1;9.25 (S16)
Noddy	'name'	/ˈnɔdi/	[aˈdidi] [ˈdiˈdi] [diˈdi]	1;10.11 (S17)
táxi	'taxi'	/ˈtaksi/	[ˈtati]	1;10.26 (S18)
Noddy	'name'	/ˈnɔdi/	[ɐˈdɔdi]	1;10.26 (S18)
Noddy	'name'	/ˈnɔdi/	[ɐˈdadi] [ˈdadi] [ˈdɔdi]	1;11.10 (S19)
táxi	'taxi'	/ˈtaksi/	[ˈtati]	1;11.10 (S19)
ténis	'snicker'	/ˈtɛniʃ/	[ˈtɛni]	1;11.10 (S19)

Like Joana, João selects /SW/ words without word marker later in development. The first word form of this type occurs in session 17 (*Noddy* /ˈnɔdi/ 'name'). In session 16 and 17, João shows an unstable production of trochees without word marker, producing it as trochaic or an iambic reduplications (e.g., [ˈdidi] or [diˈdi], in session 16), as a disyllable preceded by a filler sound ([aˈdidi], in session 17) or with level stress (e.g., [ˈdiˈdi] in session 17). From session 18 onwards, the three /SW/ types without word marker selected by João (*Noddy* /ˈnɔdi/ 'name', *táxi* /ˈtaksi/ 'taxi' and *ténis* /ˈtɛniʃ/ 'snicker') keep the target stress pattern, though they can be preceded by a filler sound (e.g., [ɐˈdɔdi] and [ɐˈdadi], in sessions 18 and 19, respectively). As in the children previously observed, João does not display an initial clear preference for an iambic shape in /SW/ non-verbs without word marker.

The examples in (203) show Luma's production of target trochaic words without word marker.

(203) Luma – production of /SW/ without word marker:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Noddy	'name'	/ˈnɔdi/	[ˈɨˈɲɐˈʎi] [tɔˈtɔɾʎi] [ˈnɔʎi] [ˈnɐn] [ˈnɐˈɲi] [ˈnɐne] [ˈɲɐɲeː] [ˈnɐni]	1;11.1 (S22)
Noddy	'name'	/ˈnɔdi/	[ttɑɾˈʎi] [tɐɾˈʎɔʎi]	1;11.15 (S23)
Noddy	'name'	/ˈnɔdi/	[tɔˈtɔɾʎiː] [doɾˈʎoɾi]	1;11.29 (S24)
Noddy	'name'	/ˈnɔdi/	[toɾˈʎoɾi]	2;0.13 (S25)
Heidi	'name'	/ˈɐjdi/	[ˈaˈdi] [ˈadi]	2;2.4 (S28)
Noddy	'name'	/ˈnɔdi/	[tɔɾˈʎɔɾiː] [tɔɾˈdɔɾi] [nɔɾˈʎɔɾi]	2;2.4 (S28)
Noddy	'name'	/ˈnɔdi/	[toɾˈʎoɾi]	2;2.22 (S29)
Goldy	'name'	/ˈgoɫdi/	[ˈdodi] [ˈdodiː] [ˈgiː]	2;3.26 (S30)
Noddy	'name'	/ˈnɔdi/	[tɔɾʎɔˈɾi] [tɔɾʎɔɾˈʎi] [doɾʎoˈɾiː] [ˈɲɔˈdiː] [ˈdɔˈdiː]	2;3.26 (S30)
Noddy	'name'	/ˈnɔdi/	[ˈnɔdiː]	2;4.25 (S32)

			[ˈnɔdi]	
Noddy	'name'	/ˈnɔdi/	[ˈnɔdi]	2;5.15 (S33)
Noddy	'name'	/ˈnɔdi/	[ˈnɔdi]	2;6.6 (S35)

In Luma's speech, /SW/ words without word marker are selected late in development (like in Joana and João). At the beginning, when the child attempts those words, variable productions are observed (e.g., *Noddy* 'name' produced as [ˈnɐˈɲi], [ˈnɐne] or [tɔˈtɔɾʎi], in session 22). The word *Heidi* /ˈɐjdi/ 'name is produced accordingly or with level stress in session 28 (e.g., [ˈadi] and [ˈaˈdi]). The word *Noddy* /ˈnɔdi/ 'name' is subject to a great variation until session 32. Until this session, Luma produces it as a trisyllable, with final or penultimate stress (e.g., [tɔɾʎɔɾˈʎi] or [toɾˈʎoɾi]). In session 32, the child consistently produced /SW/ words without word marker target-like.

In sum, the observation of target trochees with the word marker suggests that, in fact, the acquisition of trochees might be related to the acquisition of the word marker. However, the results are not clear-cut:

(i) Clara has an initial accurate production of both /SW/ non-verbs and the word marker;
(ii) Inês and Joana have a simultaneous acquisition path for both structures;
(iii) João and Luma acquire the word marker before /SW/ non-verbs.

These findings suggest that the observation of the acquisition of the gender contrast and the acquisition of trochees is related. From the tables and instances presented, we observed that the word marker could be initially produced, though, in some children (mainly Inês, Joana, João and Luma), their production was not necessarily within a trochaic word ([SW]).

Despite the relationship that can be established between the acquisition of trochaic target words and the word marker, however, any causality between the acquisition of one and the other should not be presumed, as /SW/ non-verbs without the word marker (i.e. words that are themselves stems) displayed the same production strategies and acquisition path than /SW/ non-verbs with word marker (i.e., words that are composed by a stem+word marker). The results from the analysis on /SW/ non-verbs without word marker indicated that there are no differences in the word shapes and stress patterns produced by the children for the two structures. In both, truncation to monosyllables, reduplication (as [WS]), target-like productions ([SW]) and stress shift are possible. Additionally, /SW/ non-verbs without word marker were not systematically produced as iambs in the beginning, especially as [CV_1'CV_2] (e.g., *Noddy* 'name' /ˈnɔdi/ -> [nɔˈdi]).

In sum, these results are consistent with an initial stage where no clear tendency is observed and a later stage where a trochaic foot is under children's attention. Despite an apparent acquisition of trochees interacting of morphology (i.e., trochees are acquired when the word marker is acquired), the earlier deviant production of trochees with and without word marker suggests that the late acquisition of trochees is irrespective of the mastery of morphology.

6.1.1.3. Looking closer at the verb paradigm

In this section, we will mainly focus on the developmental path undertaken by the five children observed towards stress patterns in different verb tenses.

An analysis on the verb tenses is necessary, since the verb's system in Portuguese has been analyzed differently from the non-verb's system. Due to the reduced number of tokens of verb forms and, especially, due to the reduced number of verb forms per verb tense, we will present the emergence of verbs tenses only. We will consider that a verb tense has emerged when it is produced target-like at least 2 times in one session, with continuity on the following sessions. Since the number of tokens per child is sometimes too scarce, the results must, therefore, be interpreted cautiously.

According to the properties of the target language (Lee, 1995; Bisol, 1992, 1993; Wetzels, 2006), we expect that verbs forms that conform to a trochaic foot and are constituted by a stem + a theme vowel are earlier acquired. First, because they have the unmarked stress pattern for verb forms in the target language and, secondly, because they are less complex from a morphological constituency point of view (especially when compared to verb forms that are composed by the stem+theme vowel+tense/mood suffix person/number suffix - e.g., *fal*]*á*]*va*]*mos* 'we spoke, past imp.' /fɐˈlavɐmuʃ/). The earlier verb form should, therefore, be 3rdp.sg. of the Present, which coincides with the verb form of the Imperative[226].

Despite non-finite forms (Infinitive) were earlier observed in previous works on BP (Kato, 1998; Santos, 2007) we do not expect to find these structures, as they conform to the marked stress pattern assumed for verbs, i.e., they conform to an iambic foot.

In the following tables (83-87), we will show the emergence of verb tenses in the observed children. We will take into account the verb form and its stress pattern. We will

[226] Cf. Appendix A.

consider as 'correct production', a production where the tense marker is recognizable and the stress pattern is kept. Reduplications will be considered as incorrect productions.

First, we will show the rates of production according to the target, as far as the target stress patterns are concerned and, later in this section, we will further show the strategies used by the children when they do not produce the verb forms target-like.

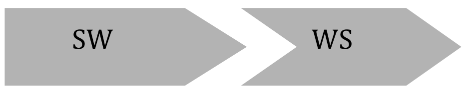
In Table 83, we present Clara's results for the emergence of verbs tenses:

Session	Present Indicative (3rdp.sg.)/ Imperative - /SW/	Types	Simple Past (3rdp.sg) - /WS/	#Types
S1	-	-	-	-
S2	-	-	-	-
S3	0% (0/1)	1	-	-
S4	-	-	-	-
S5	-	-	-	-
S6	-	-	-	-
S7	-	-	-	-
S8	-	-	-	-
S9	-	-	-	-
S10	-	-	-	-
S11	90% (9/10)	3	100% (2/2)	2
S12	100% (21/21)	2	80% (4/5)	1

Table 83. Emergence of verb tenses (Clara)

Clara's speech was only analyzed until 1;10 (session 12). For that reason, the description of results for Clara's speech regarding the emergence of verb tenses is inconclusive. However, it is possible to observe that Present (/-SW/), Imperative (/-SW/) and Simple Past forms (/-WS/) seem to emerge simultaneously (in session 11), as summarized in the scheme below.

(204) Order of emergence of verb tenses in Clara's speech:



Pres. Ind. (3rdp.sg.)/Imp. ~ Simp. Past (3rdp.sg)

The instances in (205) illustrate the developmental path for verb tenses and stress patterns undertaken by Clara (3rdp.sg. of the Present/Imperative and the 3rdp.sg. of the Simple Past).

(205) Clara – production of verbs tenses (per order of emergence):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
a. Present (3rdp.sg.)/Imp. - /SW/	*abre*	'open'	/ˈabɾɨ/	[ˈaˈbɨː]	1;1.3 (S3)
	olha	'look!'	/ˈɔʎɐ/	[ˈɔːla]	1;9.23 (S11)
	gosta	's/he likes'	/ˈgɔʃtɐ/	[ˈgɔːtɐ]	
	abre	's/he opens'	/ˈabɾɨ/	[ˈaβi]/[aːˈbi]	
	abre	's/he opens'	/ˈabɾɨ/	[ˈaːbi]	1;10.15 (S12)
b. Simple Past (3rdp.sg.) - /WS/	*acabou*	'it finished'	/ɐkɐˈbo/	[kɐˈboː]	1;9.23 (S11)
	mordeu	's/he bit'	/muɾˈdew/	[muˈɲew]	
	acabou	'it finished'	/ɐkɐˈbo/	[kɐˈbo]	1;10.15 (S12)

In Clara's verbs production, we observe that, initially (cf. session 3 and 11), the child mainly selects the 3rdp.sg. of the Present (/-SW/). Regarding the stress pattern, the child has an unstable production of the target word and alternates between a target-like production (in session 11 and 12), level stress (in session 3) and iambic productions (in session 11). From session 11 onwards, the 3rdp.sg. of the Simple Past (/-WS/) emerges and she produces [WS] verb forms. Though trisyllabic targets may not be produced as such, the disyllabic outputs carry the tense marker (e.g., /ɐkɐˈbo/ produced as [kɐˈbo̲]), providing evidence for the acquisition of tense inflection.

In Table 84, we present the order of emergence of verb tenses in Inês' speech.

Session	Present Indicative (3rdp.sg.)/ Imperative - /SW/	Types	Infinitive - /WS/	Types	Simple Past (3rdp.sg) - /WS/	Types	Past Imperfect (3rdp.sg.) - /SW/	Types
S1	-	-	-	-	-	-	-	-
S2	0% (0/2)	1	-	-	-	-	-	-
S3	-	-	-	-	-	-	-	-
S4	0% (0/1)	1	-	-	-	-	-	-
S5	0% (0/1)	1	-	-	-	-	-	-
S6	0% (0/3)	1	0% (0/1)	1	-	-	-	-
S7	-	-	0% (0/1)	1	-	-	-	-
S8	0% (0/2)	2	0% (0/1)	1	-	-	-	-
S9	71.43% (5/7)	4	100% (2/2)	2	66.67% (4/6)	4	-	-
S10	66.67% (18/27)	6	60% (3/5)	5	-	-	-	-
S11	87.7% (30/35)	13	41.67% (5/12)	6	100% (3/3)	2	-	-
S12	79.2% (19/24)	9	36.36% (8/22)	12	90% (9/10)	5	100% (2/2)	2
S13	82.45% (47/57)	21	59.25% (16/27)	15	92% (23/25)	10	100% (6/6)	3
S14	63.63% (28/44)	12	50% (9/18)	10	93.75% (15/16)	7	100% (4/4)	2
S15	78.13% (25/32)	11	57.14% (16/28)	17	100% (8/8)	6	100% (5/5)	2
S16	69.04% (29/42)	12	67.64% (23/34)	11	83.33% (5/6)	5	88.89% (8/9)	3
S17	65.38% (17/26)	10	27.58% (8/29)	8	100% (8/8)	4	100% (1/1)	1
S18	78.26% (18/23)	15	45.83% (11/24)	17	50% (1/2)	2	86.67% (13/15)	5

Table 84. Emergence of verb tenses (Inês)

In Inês's speech, we observe that, though the form of the 3rdp.sg. of the Present (/-SW/) and the form of the Imperative (/-SW/) are selected before the form of the Infinitive (/-WS/). From session 2 until session 8, Inês attempts the forms of the Present tense, but she does not produce them adult-like[227]. The same occurs from session 6 to session 8, in Infinitive forms. The emergence of target-like productions for Present and Infinitive forms is simultaneous in Inês' speech, and occurs in session 9. The 3rd p.sg. of the Simple Past (/-WS/) emerges in session 11, though it is selected before, in session 9. The forms of the 3rd p.sg. of the Past Imperfect (/-SW/) are the latest to emerge (in session 12), until the end of the observational period of Inês' speech.

The scheme in (206) summarizes Inês' emergence path for verbs tenses.

[227] Further in this section we will analyze the children's strategies in verbs with the different stress patterns.

(206) Order of emergence of verb tenses in Inês' speech:

Pres. Ind. (3rdp.sg.)/Imp. ~ Infinitive >> Simp. Past (3rdp.sg.) >> Past. Imperf. (3rdp.sg.)

The instances in (207) show Inês' renditions, mirroring the order of emergence of the different verb tenses and stress patterns (3rdp.sg. of the Present and Imperative, Infinitive, 3rdp.sg. of the Simple Past and 3rdp.sg. of the Past Imperfect).

(207) Inês – production of verbs tenses (per order of emergence):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
a. Present (3rdp.sg.)/Imp. - /SW/	*toma*	'take imp.'	/ˈtɔmɐ/	[ˈtɔ]/[ˈaˈdʲɔ]	1;0.25 (S2)
	tapa	'cover imp.'	/ˈtapɐ/	[ˈpaˈpa]	1;3.6 (S4)
	mostra	'show imp.'	/ˈmɔʃtɾɐ/	[ˈmɔ]	1;4.9 (S5)
	ajuda	'help imp.'	/ɐˈʒudɐ/	[ˈdʲudʲɐ]	1;8.2 (S9)
	anda	'come on'	/ˈɐ̃dɐ/	[ˈɐtɐ]	
	olha	'look imp.'	/ˈɔʎɐ/	[ˈɔjɐ]	
	tira	'take (it) off'	/ˈtiɾɐ/	[əˈtiɐ]	1;9.19 (S10)
	tira	'take (it) off'	/ˈtiɾɐ/	[ˈtiɾɐ]	1;10.29 (S11)
b. Infinitive - /WS/	*cortar*	'to cut'	/kuɾˈtaɾ/	[kɐˈka]	1;5.11 (S6)
	limpar	'to clean'	/lĩˈpaɾ/	[paˈpa]	1;6.11 (S7)
	tirar	'to take off'	/tiˈɾaɾ/	[ˈtʲæ]	1;7.2 (S8)
	cantar	'to sing'	/kɐ̃ˈtaɾ/	[kɐˈβa]	1;9.19 (S10)
	tomar (banho)	'to have (a shower)'	/tuˈmaɾ/	[pəˈta]	
c. Simple Past (3rdp.sg.) - /WS/	*caiu*	's/he fell off'	/kɐˈiw/	[ˈkiw]/[tɐˈkʲiw]	1;8.2 (S9)
	vestiu	's/he dressed'	/vɨʃˈtiw/	[ɐːbɨˈtiw]	
	fugiu	's/he ran away'	/fuˈʒiw/	[iˈdi]	
	partiu	's/he broke'	/pɐɾˈtiw/	[təˈiw]	1;10.29 (S11)
d. Past Imperfect (3rdp.sg.) - /SW/	*estava*	's/he was'	/ʃˈtavɐ/	[ˈtabɐ]	2;4.18 (S16)
	tinha	's/he had'	/ˈtiɲɐ/	[ˈtiɐ]	2;7.16 (S18)

The instances presented above illustrate the earlier election and emergence of verb forms of the 3rdp.sg. of the Present and Imperative (/-SW/). In the beginning (session 2, 4 and 5), however, these forms are not produced target-like (they are mostly truncated to a monosyllable or they are reduplicated and produced with level stress). From session 9 onwards, they tend to be produced target-like.

The second verb form to be selected and to emerge is the Infinitive (/-WS/), in session 6. At the beginning, these verb forms are produced with the target stress pattern ([WS]), but they mostly consist in reduplicated productions (cf. sessions 6 and 7). After session 10, they tend to be produced with the target stress pattern and non-reduplicated syllables.

The other /-WS/ verb form (the 3rdp.sg. of the Simple Past) is selected in session 9. When they are attempted, at the beginning, these verb forms might be truncated to monosyllables (cf. session 9), but the target stress pattern is mostly produced target-like.

Inês is the only child productively selecting and producing the 3rdp.sg. of the Past Imperfect (/-SW/). When the child selects these forms, she mostly produces them accordingly.

In the following table (Table 85), we will show Joana's emergence of verbs tenses.

Session	**Present Indicative (3rdp.sg.)/ Imperative. - /SW/**	**Types**	**Simple Past (3rdp.sg) - /WS/**	**Types**	**Infinitive - /WS/**	**Types**
S1	-	-	-	-	-	-
S2	-	-	-	-	-	-
S3	-	-	-	-	-	-
S4	-	-	-	-	-	-
S5	-	-	-	-	-	-
S6	-	-	-	-	-	-
S7	-	-	-	-	-	-
S8	-	-	-	-	-	-
S9	-	-	-	-	-	-
S10	-	-	-	-	-	-
S11	-	-	100% (1/1)	1	-	-
S12	100% (4/4)	1	0% (0/1)	1	100% (1/1)	1
S13	100% (4/4)	3	50% (2/4)	2	0% (0/3)	2
S14	67.64% (23/34)	10	75% (3/4)	2	57.14% (4/7)	7

Table 85. Emergence of verb tenses (Joana)

In Joana's speech, we observe that the 3rdp.sg. of the Present tense (/-SW/) is the first verb form to emerge (in session 12) and the first productions are faithfully produced, though in the last session a decreasing in the target-like production rate is observed (67.64%). The forms of the 3rdp.sg. of the Simple Past (/-WS/) emerge in session 13, but the rate of production and the absolute values are reduced, until the end of the observational period (there is a maximum of 4 tokens and 2 types per session). The last verb form to emerge in Joana's speech is the Infinitive (/-WS/). The Infinitive is selected in session 12, but in the following session no Infinitive targets are attempted. Infinitive forms are not produced target-like until session 14.

The scheme in (208) summarizes the emergence of verb tenses in Joana's speech.

(208) Order of emergence of verb tenses in Joana's speech:

SW → WS → WS

Pres. Ind. (3rdp.sg.)/Imp. >> Simp. Past (3rdp.sg) >> Infinitive

In (209), we present Joana's renditions for verb tenses with reference to stress patterns, in the order of emergence of each paradigm (3rdp.sg. of the Present/Imperative, 3rdp.sg. of the Simple Past and Infinitive).

(209) Joana – production of verbs tenses (per order of emergence):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
a. Present (3rdp.sg.)/Imp. - /SW/	*olha*	'look!'	/ˈɔʎɐ/	[ˈɔjɐ]	2;2.19 (S12)
	pode	's/he can'	/ˈpɔdɨ/	[ˈpɔdɨ]	2;4.1 (S13)
	anda	'come on!'	/ˈɐ̃dɐ/	[ˈɐ̃dɐ]	
b. Simple Past (3rdp.sg.) - /WS/	*fugiu*	's/he ran away'	/fuˈʒiw/	[fuˈʒiw]	2;4.1 (S13)
c. Infinitive - /WS/	*limpar*	'to clean'	/lĩˈpaɾ/	[ẽˈpaj]	2;6.24 (S14)
	filmar	'to film'	/fiɫˈmaɾ/	[fũˈaj]	
	brincar	'to play'	/bɾĩˈkaɾ/	[pĩˈkaj]	

In Joana's speech, despite the earlier selection of /-WS/ verb forms (3rdp.sg. of the Simple Past), the /-SW/ verbs forms of the 3rdp.sg. Present and Imperative have a consistent production according to the target than the former. When the child selects the Present forms (/-SW/), she produces them with the correct stress pattern (in session 12). The Simple Past and the Infinitive forms (/-WS/) might be selected first (in session 11 and 12, respectively), but their emergence and target-like production only occurs later (in session 13 and 14, respectively). It is worth mentioning that Joana replaces the Infinitive marker (/-ɾ/) with the glide [j][228].

Table 86 shows the results for the production and emergence of verbs tenses in João's speech.

[228] This strategy is a common strategy used by the children in the production of target word-final liquids. For a description on the segmental processes implied in the acquisition of EP, cf. Freitas (1997) and Costa (in prep.).

Session	Present Indicative (3p.sg.)/ Imperative - /SW/	Types	Simple Past (3p.sg.) - /WS/	Types	Infinitive - /WS/	Types
S1	-	-	-	-	-	-
S2	-	-	-	-	-	-
S3	-	-	-	-	-	-
S4	-	-	-	-	-	-
S5	-	-	-	-	-	-
S6	-	-	-	-	-	-
S7	-	-	-	-	-	-
S8	-	-	-	-	-	-
S9	-	-	0% (0/2)	1	-	-
S10	-	-	0% (0/1)	1	-	-
S11	-	-	-	-	-	-
S12	-	-	100% (1/1)	1	-	-
S13	-	-	-	-	-	-
S14	-	-	100% (1/1)	1	-	-
S15	0% (0/1)	1	-	-	-	-
S16	44.44% (4/9)	3	0% (0/6)	1	-	-
S17	100% (1/1)	1	100% (1/1)	1	100% (2/2)	2
S18	95.45% (21/22)	5	-	-	100% (3/3)	1
S19	77.78% (7/9)	2	83.33% (5/6)	5	-	-
S20	87.5% (7/8)	3	-	-	100% (1/1)	1
S21	100% (3/3)	3	-	-	-	-
S22	87.5% (7/8)	2	0% (0/1)	1	0% (0/1)	1

Table 86. Target-like production of verb tenses (João)

The emergence of verb tenses in João's speech is slightly different from the one observed in the other children, as the child selects and produces the Past form (/-WS/) rather earlier than Present and Imperative forms (/-SW/). João attempts the 3rdp.sg. of the Simple Past (/-WS/) in session 9, though he does not produce them target-like. In session 12 he is able to produce Past verb forms target-like, though inconsistently across the following sessions. Until the end of the observation period the child has very few tokens (and types) in the Past tense, thus being inconclusive to draw a robust conclusion on the emergence of these structures. The same applies to Infinitive forms (/-WS/). The child attempts Infinitive forms in session 17 but there is an inconsistent production of these structures across sessions, until the end of the observation period. In João, only the 3rdp.sg. of the Present tense emerges and is acquired. João selects Present and Imperative forms (/-SW/) in session 15 but only in session 16 he is able to produce them target-like. When he starts producing forms of the Present and Imperative tense and mood, he does it with high percentages (cf. rate values in sessions 17-22).

In (210) we present the scheme that summarizes the emergence of the verb tenses in João's speech.

(210) Order of emergence of verb tenses in João's speech:

Pres. Ind. (3rdp.sg.)/Imp. >> Infinitive ~ Simp. Past (3rdp.sg.)

The renditions in (211) illustrate the emergence of verbs tenses in João (3rdp.sg. of the Present, Imperative, Infinitive and 3rdp.sg. of the Simple Past), with reference to the target stress patterns.

(211) João – production of verbs tenses (per order of emergence):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
a. Present (3rdp.sg.)/ Imp. - /SW/	*atende*	'pick up'	/ɐˈtẽdɨ/	[ˈtẽdɨ]	1;9.25 (S16)
	dança	'dance'	/ˈdɐ̃sɐ/	[ˈkatɐ]	1;10.11 (S17)
	olha	'look'	/ˈɔʎɐ/	[ˈaʎɐ]	
	ajuda	'help'	/ɐˈʒudɐ/	[ˈdudɐ]	
	toma	'take it'	/ˈtɔmɐ/	[ˈpɔmɐ]	1.10.26 (S18)
b. Infinitive - /WS/	*trabalhar*	'to work'	/tɾɐbɐˈʎaɾ/	[bibiˈja]	1;10.11 (S17)
	limpar	'to clean'	/lĩˈpaɾ/	[tɨˈtaː]	1;11.19 (S19)
	papar	'to eat (fam.)'	/pɐˈpaɾ/	[pɐˈpa]	
	trabalhar	'to work'	/tɾɐbɐˈʎaɾ/	[bɐbɐˈja]	
c. Simple Past (3rdp.sg.) - /WS/	*saltou*	's/he jumped'	/saɫˈto/	[tɐˈto]	1;11.10 (S19)
	pulou	's/he jumped'	/puˈlo/	[puˈjo]	
	parou	's/he stopped'	/pɐˈɾo/	[pɐˈjo]	

The instances presented in (211) show that, when the forms of the Present and Imperative (/-SW/) are selected (mostly, from session 16 onwards), they are mostly produced with the correct stress pattern ([SW], though they might be truncated if they correspond to a /WSW/ trisyllable (e.g., *atende* 'pick up' /ɐˈtẽdɨ/ produced as [ˈtẽdɨ], and *ajuda* 'help' /ɐˈʒudɐ/ produced as [ˈdudɐ]).

In session 17, the Infinitive (/-WS/) verb forms are selected and produced with the target stress pattern, though no mood marker is attested. The forms of the Simple Past (/-

WS/) are also produced with the target stress pattern but, in this case, the tense marker is noticeable (e.g., *pulou* /puˈl<u>o</u>/ produced as [puˈj<u>o</u>], in session 19).

In Table 87, we show the percentage of target-like productions in the different verb tenses in the speech of Luma.

Session	Present Indicative (3p.sg.)/ Imperative - /SW/	Types	Simple Past (3p.sg.) - /WS/	Types	Infinitive - /WS/	Types
S1-13	-	-	-	-	-	-
S14	-	-	-	-	0% (0/6)	1
S15	-	-	-	-	0% (0/3)	1
S16	-	-	-	-	0% (0/36)	1
S17-S19	-	-	-	-	-	-
S20	0% (0/12)	1	-	-	-	-
S21	0% (0/7)	1	-	-	-	-
S22	0% (0/14)	1	-	-	-	-
S23	0% (0/13)	1	-	-	-	-
S24	0% (0/3)	1	-	-	-	-
S25	-	-	-	-	-	-
S26	0% (0/2)	1	-	-	-	-
S27	0% (0/1)	1	-	-	-	-
S28	-	-	-	-	-	-
S29	-	-	100% (1/1)	1	-	-
S30	37.5% (3/8)	3	-	-	-	-
S31	45.45% (5/11)	7	33.3% (1/3)	2	-	-
S32	76.04% (73/96)	29	-	-	-	-
S33	87.80% (36/41)	20	100% (4/4)	3	-	-
S34	98% (49/50)	17	95.83% (23/24)	9	100% (3/3)	3
S35	55.76% (29/52)	19	84.62% (11/13)	5	100% (4/4)	3
S36	83.33% (45/54)	17	75% (6/8)	6	30% (6/20)	17
S37	69.23% (18/26)	17	66.67% (4/6)	3	55.56% (10/18)	12

Table 87. Target-like production of verb tenses (Luma)

In the table above we observe that Luma selects Infinitive forms (/-WS/) earlier (in sessions 14, 15 and 16) than Present (/-SW/) or Past forms (/-WS/). However, in that period, they are not with the target stress pattern. Verb forms in the Imperative are selected in session 20 but they are not produced with the target stress pattern until session 30. Both Infinitive and Imperative early verbs forms are the product of the production of one simple token across the session: *marchar* /ˈmaɾʃaɾ/ 'to march' and *olha* /ˈɔʎɐ/ 'look', respectively. The forms of the 3rdp.sg. of the Simple Past are selected in session 29. When verb forms are produced consistently we observe that the forms of the Present (/-SW/) are produced faithfully earlier (in session 30) than the remainder verb forms. Verb forms of the Simple Past

(/-WS/) are produced consistently and faithfully in session 33 and Infinitive forms (/-WS/) are produced correctly in session 34.

The scheme in (212) accounts for the emergence of verb forms in Luma's speech.

(212) Order of emergence of verb tenses in Luma's speech:

Pres. Ind (3^{rd}p.sg.) >> Simp. Past (3^{rd}p.sg.) >> Infinitive

In (213) we present Luma's renditions for the different verb forms, in the order of emergence accounted for in Table 87.

(213) Luma – production of verbs tenses (per order of emergence):

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
a. Present (3^{rd}p.sg.)/Imp. - /SW/	*anda*	'come on'	/ˈɐ̃dɐ/	[ˈɐ̃dɐ]	2;4.11 (S30)
	toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐː]	
	toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐ]	
	passa	's/he passes'	/ˈpasɐ/	[ˈpaçɐ]	2;4.25 (S31)
	toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐ]	
c. Simple Past (3^{rd}p.sg.) - /WS/	*saiu*	's/he left'	/sɐˈiw/	[ʃɐˈiw]	2;4.11 (S30)
	caiu	's/he fell off'	/kɐˈiw/	[kɐˈiw]	2;5.15 (S33)
	chocou	's/he hit'	/ʃuˈko/	[çuˈkoː]	
	fugiu	's/he ran away'	/fuˈʒiw/	[fufuˈʒiw]	
b. Infinitive - /WS/	*morder*	'to bite'	/muɾˈdeɾ/	[muˈde]	2;5.20 (S34)
	chover	'to rain'	/ʃuˈveɾ/	[fuˈve]	2;6.6 (S35)
	andar	'to walk'	/ɐ̃ˈdaɾ/	[ɐ̃ˈda]	
	brincar	'to play'	/bɾĩˈkaɾ/	[bĩˈkɐj]	2;6.20 (S36)
	chover	'to rain'	/ʃuˈveɾ/	[çuˈve]	2;6.27 (S37)

In Luma, we observe that, form session 30 onwards, the Present and Imperative verb forms (/-SW/) are selected and the stress pattern is produced target-like.

In session 33, the Simple Past verb forms (/-WS/) are produced with the target stress pattern and the inflection marker is noticeable. Likewise, from session 34 onwards, the Infinitive forms are produced with the target stress pattern consistently, although the mood marker /-ɾ/ is still not produced (it can be replaced by the glide /j/ or not have any realization at all).

In sum, the emergence of inflected di- or polisyllabic verb forms occurs late in the five observed children. Verb forms of the 3rdp.sg. of the Present tense and the Imperative verb forms (/-SW/) are the first to emerge in all children. However, some variation is attested in the emergence of the Simple Past (/-WS/) and Infinitive (/-WS/) verb forms. Inês, Joana and Luma have an earlier emergence of the 3rdp.sg. of the Simple Past, whereas João has an earlier emergence of the Infinitive. Note, however, that the number of di- and polisyllabic verb forms is reduced (much more reduced than non-verbs) in all children.

Recall that the production of the 2ndp.sg. or the 2ndp.pl. was very infrequent in all children and does not allow for the establishment of an acquisition path[229]. The 2ndp.sg. has mainly a /-SW/ stress pattern (e.g., *amas* 'you love' /ˈɐmɐʃ/, *comeste* 'you ate' /kuˈmeʃtɨ/, *dormias* 'you slept, Past Imperf.' /duɾˈmiɐʃ/), but are have a more complex morphological structure as a final person and number suffix is added to the verb theme (-/s/). The 2ndp.pl. might have a /-SW/ or a /-SWW/ stress pattern, depending on the verb tense (e.g., *fazemos* 'we do' /fɐˈzemuʃ/ but *fizéssemos* 'we did, Subj.' /fiˈzɛsɨmuʃ/[230]). As described by the analyses on stress in the verb paradigm and supported by the data now found, the forms of the 2ndp.pl. with a /-SWW/ stress pattern are considered as marked (Andrade, 1988/1992; Bisol, 1992; 1993).

Thus far we have shown the emergence of di- and polisyllabic verb forms in the speech of the five children observed and related it with the emergence of stress patterns. In the following paragraphs, we will demonstrate the strategies that children use in the production of verb forms with /-SW/ and /-WS/ stress patterns.

Data from Clara will not be presented, as they are not conclusive with respect to verb inflection, which she first attempts in Session 3 (cf. Table 83). Though Clara is able to select verb forms in session 3, she only produces verbs consistently in the two last observation sessions. She only has polisyllabic verb forms from Session 11 onwards. However, when she starts producing di- and trisyllabic verbs, she produces them accordingly.

The tables below (88 and 89) are relative to Inês' productions of trochaic and iambic target verbs, respectively. Given the reduced number of tokens at the beginning, we decided to present the absolute number of tokens per word shape (target trochees and target iambs) and highlight the important results with a grey vertical column[231].

[229] Cf. Appendix D.
[230] Cf. Appendix A.
[231] This method will be used in the tables concerning the other children as well.

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-SW/
S2		1 (filler)	1				2
S3							-
S4				1			1
S5			1				1
S6		1 (filler)	1				2
S7	-	-	-	-	-	-	-
S8	**3**		1				4
S9	**7**		1				8
S10	**22**	1	2		1	3	29
S11	**33**	2	2	1	2	3	43
S12	**22**	2	2			3	29
S13	**70**	1	2			2	75
S14	**60**						60
S15	**52**					1	53
S16	**77**		3				80
S17	**48**		3				51
S18	**76**		6				82

Table 88. /-SW/ verbs production (Inês)

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-WS/
S6		1 (redupl.)					1
S7		1 (redupl.)					1
S8			1				1
S9		4	2		2		8
S10	4 (ep.)[232]	3					7
S11	5 (ep.)	7	2			1	15
S12	8 (ep.)	18	4			2	32
S13	13 (ep.)	37	1			2	53
S14	11 (ep.)	22			1		34
S15	11 (ep.)	28	2				41
S16	4 (ep.)	33	6			5	49
S17	11 (ep.)	26				5	42
S18	10 (ep.)	17	4			5	36

Table 89. /-WS/ verbs production (Inês)

In Tables 88 and 89, it is noticeable that /-SW/ appears earlier than /-WS/ in Inês' speech. Both seem to be earlier interpreted as /S/ (until session 8) and later they are produced target-like (from session 9 onwards). In /-WS/ verbs, epenthesis can occur, creating an apparent trochaic ([-SW]) pattern, after session 10. Notice that the Infinitive verb forms (which are /-WS/) crucially have a word-final /-ɾ/ in Portuguese (e.g., *cortar* 'to cut' [kuɾˈtaɾ], *comer* 'to eat' [kuˈmeɾ], *dormir* 'to sleep' [duɾˈmiɾ]). As we will see further in this chapter, Inês is the only child systematically using an epenthetic vowel in word-final C_{Liq}.

[232] Epenthesis in Inês is prosodically conditioned (always after a word-final liquid consonant, at the end of Phonological Phrase or Utterance), and it is not exactly stress shift, as stress is maintained in the same syllable but an additional syllable, at the right edge of the word, is produced.

These results are consistent with Freitas (1997), according to which word-final epenthesis was possible in the acquisition path of word-final liquids in EP. Word-final sonorant consonants in Portuguese may surface as the onset of an empty-headed syllable (/.-VC$_{Son}$#/ -> [V.C$_{Son}$V]). It is worth notice, however, that the output of the application of this strategy creates a different stress pattern. Since word-final liquids tend to be present in stressed syllables, iambic targets such as /CV.'CVC$_{Liq}$/ are realized as trochaic words (/CV.'CV.C$_{Liq}$V/).

In (214) and (215), we will present Inês' productions of /-SW/ and /-WS/ verbs, respectively.

(214) Inês – production of /-SW/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
toma	'take (it)'	/ˈtɔmɐ/	[ɐˈdʲɔ]	1;0.25 (S2)
tapa	'cover (it)'	/ˈtapɐ/	[ˈpaˈpa]	1;3.6 (S4)
mostra	'show (me)'	/ˈmɔʃtɾɐ/	[ˈmɔ]	1;4.9 (S5)
corta	'cut (it)'	/ˈkɔɾtɐ/	[əˈko]	1;5.11 (S6)
acho	'I think'	/ˈaʃu/	[ˈatʲi]	1;8.2 (S9)
ouviste	'you heard'	/oˈviʃtɨ/	[ˈtitiʃ]	1;9.19 (S10)
queres	'you want'	/ˈkɛɾɨʃ/	[ˈɛdisʲ]	

(215) Inês – productions of /-WS/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
cortar	'to cut'	/kuɾˈtaɾ/	[kaˈka]	1;5.11 (S6)
limpar	'to clean'	/lĩˈpaɾ/	[paˈpa]	1;6.11 (S7)
vestiu	's/he dressed'	/vɨʃˈtiw/	[ɐːβɨˈtiw]	1;8.2 (S9)
caiu	's/he fell off'	/kɐˈiw	[tɐˈkiw]	
fugiu	's/he ran away'	/fuˈʒiw/	[iˈdi]	
limpar	'to clean'	/lĩˈpaɾ/	[geˈpa]	
cair	'to fall off'	/kɐˈiɾ/	[ˈkiɾɨ]	1;9.19 (S10)
cantar	'to sing'	/kɐ̃ˈtaɾ/	[kɐˈβa]	
guardar	'to keep'	/gʷaɾˈdaɾ/	[ɣɐˈdaɾi]	
tomar (banho)	'to have (a shower)'	/tuˈmaɾ/	[pəˈta]	
beber	'to drink'	/bɨˈbeɾ/	[ˈbediː]	

Early verbs in Inês are reduplicated or truncated and preceded by filler sounds (until session 9), either they have a /-SW/ or a /-WS/ stress pattern. Later (from session 9 onwards), the child produces target-like verbs with occasional recursion to epenthesis in target /-WS/ (e.g., *guardar* 'to keep'/gʷaɾˈdaɾ/ produced as [ɣɐˈdaɾi]).

In Tables 90 and 91, we will show Joana's acquisition strategies in /-SW/ and /-WS/ verbs.

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-SW/
S9			1				1
S10	-	-	-	-	-	-	-
S11			1				1
S12	4						4
S13	6		1				7
S14	34		7			2	43

Table 90. /-SW/ verbs production (Joana)

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-WS/
S10			1				1
S11		1					1
S12		1	1				2
S13		2	5			1	8
S14	3	7					10

Table 91. /-WS/ verbs production (Joana)

As shown in Tables 90 and 91, verbs are very scarce in Joana's early speech. /-SW/ and /-WS/ verbs only appear in session 9 and 10, respectively. Like Inês, Joana truncates early /-SW/ to monosyllables (until session 11) and realizes them accordingly, in a later period (from session 12 onwards). In session 11 Joana produces one /-WS/ verb form target-like and, in the following session, the child is able to correctly produce these verb forms more productively.

The instances in (216) and (217) illustrate Joana's production of /-SW/ and /-WS/ verbs forms, respectively.

(216) Joana – production of /-SW/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
gosto	'I like'	/ˈgɔʃtu/	[ˈgɔ]	1;9.25 (S9)
gosto	'I like'	/ˈgɔʃtu/	[ˈgɔ]	2;0.9 (S11)
olha	'look'	/ˈɔʎɐ/	[ˈɔjɐ]	2;2.19 (S12)
pode	's/he can'	/ˈpɔdɨ/	[ˈpɔdɨ]	2;4.1 (S13)
deixas	'you leave'	/ˈdɐjʃɐʃ/	[ˈdɐjsɐsː]	
anda	'come on'	/ˈɐ̃dɐ/	[ˈɐ̃dɐ]	

(217) Joana – production of /-WS/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
ouvi	'I heard'	/oˈvi/	[ˈβiː]	1;10.22 (S10)
acabou	'it is over'	/ɐkaˈbo/	[kɨˈbo]	2;0.9 (S11)
caiu	's/he fell off'	/kɐˈiw/	[ˈkiw]	2;2.19 (S12)
lavar	'to wash'	/lɐˈvaɾ/	[gɐˈva]	
caiu	's/he fell off'	/kɐˈiw/	[ˈkiw]	2;4.1 (S13)
fugiu	's/he ran away'	/fuˈʒiw/	[fuˈʒiw]	
chover	'to rain'	/ʃuˈveɾ/	[ˈvej]	

In these examples we see that, at the beginning (until session 11), the child mostly truncates the verb forms to monosyllables. Early verbs forms consist in 3p.sg. of the Present Tense or Imperative inflected words, though few forms from the Simple Past are observed (until session 12). After session 12, Joana produces Simples Past (3p.sg.) and Infinitive forms more productively. Contrary to /-SW/, /-WS/ verb forms are truncated to [S] until late in development.

Tables 92 and 93 summarize João's productions for /-SW/ and /-WS/ verbs, respectively.

	[SW]	**[WS]**	**[S]**	**[SS]**	**[WSW]**	**Other**	**TOTAL /-SW/**
S15				1			1
S16	4			5			9
S17	1						1
S18	22						22
S19	8		1				9
S20	9						9
S21	3						3
S22	10						10

Table 92. /-SW/ verbs production (João)

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-WS/
S9			2				2
S10			1				1
S11	-	-	-	-	-	-	-
S12		1					1
S13	-	-	-	-	-	-	-
S14		1					1
S15	-	-	-	-	-	-	-
S16	2 (hiatus)	4					6
S17		3					3
S18		3					3
S19		3	1			1	5
S20	1						1
S21	-	-	-	-	-	-	-
S22	1 (hiatus)		1				2

Table 93. /-WS/ verbs production (João)

Target /-WS/ verbs are earlier selected than /-SW/ in João's speech, though in a reduced number. In João's speech, trochaic verbs were almost absent in early sessions (until session 15). When he starts producing /-SW/ verb forms (from session 15 onwards), he produces them accordingly. /-WS/ verbs are truncated to [S] or produced target-like in early production (until session 16). After session 16, they are consistently produced target-like.

In (218) and (219), we show João's rendition of /-SW/ and /-WS/ verb forms, respectively.

(218) João – production of /-SW/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
ajuda	'help (me)'	/ɐˈʒudɐ/	[ˈduˈa]	1;8.25 (S15)
atende	'pick up (the phone)'	/ɐˈtẽdɨ/	[ˈtẽdɨ]	1;9.25 (S16)
dança	'dance'	/ˈdɐ̃sɐ/	[ˈkatɐ]	
olha	'look'	/ˈɔʎɐ/	[ɔˈaʎɐ]	
ajuda	'help'	/ɐˈʒudɐ/	[ˈdudɐ]	1;10.11 (S17)
senta	'sit down'	/ˈsẽtɐ/	[ˈtẽtɐ]	1;10.26 (S18)
ajuda	'help'	/ɐˈʒudɐ/	[ɐˈdudɐ]	
toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐ]	
adora	's/he adores'	/ɐˈdɔrɐ/	[ˈdɔjɐ]	

(219) João – production of /-WS/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
acabou	'it is over'	/ɐkɐˈbo/	[ˈboːw]	1;5.12 (S9)
acabou	'it is over'	/ɐkɐˈbo/	[ˈbo]	1;5.26 (S10)
acabou	'it is over'	/ɐkɐˈbo/	[bɐˈwoː]	1;7.0 (S12)
acabou	'it is over'	/ɐkɐˈbo/	[ɐ̃buˈbo]	1;8:24 (S14)
acabou	'it is over'	/ɐkɐˈbo/	[ˈbo]/[ˈboo]	1;9.25 (S16)
acabou	'it is over'	/ɐkɐˈbo/	[ɐˈbo]	1;10.11 (S17)
trabalhar	'to work'	/tɾɐbɐˈʎaɾ/	[bibiˈja]	
limpar	'to clean'	/lĩˈpaɾ/	[tiˈtaː]	
papar	'to eat (fam.)'	/pɐˈpaɾ/	[pɐˈpa]	

Tables 94 and 95 show the production values for /-SW/ and /-WS/, respectively, in Luma. The numbers marked with a star (*) correspond to productions of one single type, the word *olha* 'look' /ˈɔʎɐ/, in target /SW/, and the word *marchar* 'to march' /mɐɾˈʃaɾ/, in target /WS/.

	[SW]	**[WS]**	**[S]**	**[SS]**	**[WSW]**	**Other**	**TOTAL /-SW/**
S20			12				12*
S21			7				7*
S22			14				14*
S23			13				13*
S24			3				3*
S25	-	-	-	-	-	-	-
S26			2				2*
S27			1				1*
S28	-	-	-	-	-	-	-
S29	-	-	-	-	-	-	-
S30	5	2		1			8
S31	5	6					11
S32	87	4	2			3	96
S33	37		4				41
S34	46	2	1			1	50
S35	46	2	1			3	52
S36	53	1					54
S37	24	1		1			26

Table 94. /-SW/ verbs production (Luma)

	[SW]	[WS]	[S]	[SS]	[WSW]	Other	TOTAL /-WS/
S14			5	1			6*
S15			3				3*
S16			35	1			36*
S17-S28	-	-	-	-	-	-	-
S29		1					1
S30							-
S31	2	1					3
S32	-	-	-	-	-	-	-
S33		4					4
S34	2	25					27
S35		15	1			1	17
S36	10	17	1	1			29
S37	10	13					23

Table 95. /-WS/ verb production (Luma)

Luma appears to select both /-WS/ and /-SW/ verbs forms at the onset of word production. /-SW/ and /-WS/ are truncated to [S] until late in development (around session 30). From session 30 onwards, both [SW] and [WS] are produced for /-SW/ and /-WS/.

Instances in (220) and (221) refer to the production of /-SW and /-WS/ verbs, respectively, in Luma's speech.

(220) Luma – production of /-SW/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
olha	'look'	/ˈɔʎɐ/	[ˈa]	1;9.29-2;1.10 (S20-S27)
abre	'open (it)'	/ˈabɾɨ/	[aˈbi]	2;3.26 (S30)
anda	'come'	/ˈɐ̃dɐ/	[ˈɐ̃dɐ]	
toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐː]	
ajuda	'help (me)'	/ɐˈʒudɐ/	[zʲuˈda]	2;4.11 (S31)
salta	'jump'	/ˈsaɫtɐ/	[ʃɐˈta]	
toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐ]	
magoa	'it hurts'	/mɐˈgoɐ/	[ˈgoɐ]	
tira	'take it'	/ˈtiɾɐ/	[ˈtiɐ]	
passa	's/he passes'	/ˈpasɐ/	[ˈpaçɐ]	
toma	'take (it)'	/ˈtɔmɐ/	[ˈpɔmɐ]	2;4.25 (S32)
manda	'throw it'	/ˈmɐ̃dɐ/	[ˈmɐ̃dɐ]	

(221) Luma – production of /-WS/ verbs:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
marchar	'to march'	/mɐɾˈʃaɾ/	[ˈʃa]	1;6.20-1;7.19 (S14-S16)
sujou	's/he made dirty'	/suˈʒo/	[çuˈʒo]	2;2.22 (S29)
saiu	's/he left'	/sɐˈiw/	[ʃɐˈiw]	2;4.11 (S31)
empurrou	's/he pushed'	/ẽpuˈʀo/	[ɐˈpʀoɐ]/[ˈpʀoɐ]	
caiu	's/he fell off'	/kɐˈiw/	[kɐˈiw]	2;5.15 (S33)

Both /-SW/ and /-WS/ verbs are mostly truncated to [S] at the beginning (before approximately session 30). From session 20 to 27, /-SW/ verbs concern one single type, *olha* 'look', which is produced in a doubtful manner: [ˈa][233]. The high frequency of /-WS/ verbs is only apparent as well, as it is relative to one single type too (*marchar* 'to march'). In session 30-32, /-SW/ and /-WS/ verbs can be produced as [SW] or [WS]. From session 33 onwards, they are consistently produced target-like.

Table 96 summarizes the observed children's behavior towards stress patterns and verb inflection in the observed children's speech. In this table, '>>' marks a subsequent emergence path and '~' means the simultaneous emergence of a given structure.

[233] In Table 94, these instances are marked with a star (*).

	Emergence of verb tenses/stress patterns	*Strategies*
Clara	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) ~ Past Perf. (3rdp.sg) (/WS/)	/-SW/: not analyzed (insufficient data) /-WS/: not analyzed (insufficient data)
Inês	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) ~ Infinitive (/WS/) >> Past Perf. (3rdp.sg.) (/WS/) >> Past. Imper. (3rdp.sg.) (/WS/)	**/-SW/**: [S] >> [WS] (redupl.) **/-WS/**: [WS] (redupl.) >> [WS] >> [SW]
Joana	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) >> Past Perf. (3rdp.sg) (/WS/) >> Infinitive (/WS/)	**/-SW/**: [S] >> [SW] **/-WS/**: [S] ~ [WS]
João	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) >> Infinitive (/WS/) ~ Simp.Past (3rdp.sg.) (/WS/)	**/-SW/**: [SW] **/-WS/**: [S] >> [WS]
Luma	Pres. Ind. (3rdp.sg.) (/SW/) >> Past Perf. (3rdp.sg.) (/WS/) >> Infinitive (/WS/)	**/-SW/**: [S] >> [SW]~[WS] >> [SW] **/-WS/**: [S] >> [WS] >> [SW]

Table 96. Summary for the emergence of verb inflection and stress patterns in verbs

The analysis conducted on the speech productions of the children in /-SW/ and /-WS/ verbs showed that:

(i) In the speech of the children observed, the Imperative and Present forms, namely 3rdp.sg. of the Pres. Ind., which display a /-SW/ pattern and where a stem+theme vowel is observable, emerged earlier than the Infinitive or Simple Past (Inês is exceptional, as Simple Present and Infinitive emerged simultaneously);

(ii) The forms from the Simple Past (3rdp.sg.) and from the Infinitive, which display a /-WS/ pattern and a person/number and tense/mood suffix, respectively, may be selected earlier than the Present verb forms (as in João and Luma), but their emergence only occurred after the acquisition of the Present forms;

(iii) Initially, children generally truncated /-SW/ to [S] and produce /-WS/ as [S] or [WS], though the reduced number of tokens at the beginning does not allow us to draw a clear tendency;

(iv) Later, children tend to produce /-SW/ and /-WS/ verbs target-like.

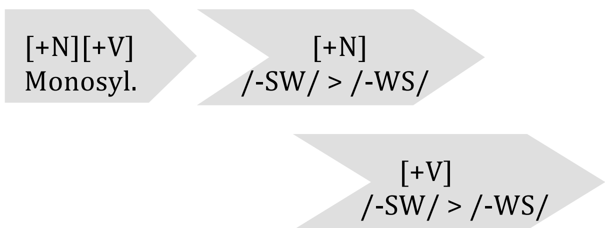
Also, the results found in this section indicated that the verb forms with a marked stress pattern (namely, the 3rdp.sg. of the Simple Past or the Infinitive, which bear stress in the last syllable - in the person/number and the tense/mood suffix, respectively) are acquired later.

From the results presented in this section, we conclude that, though verbs are selected and produced later than [+nouns], until the end of the observation period, stress acquisition in verbs seems to be governed by the same metric principles observed in Chapter 5: S >> SW, WS >> SW.

6.1.1.4. Summary for morphology interaction

In this section we analyzed both noun and verb inflection. First, we showed the distribution of word classes (non-verbs and verbs) per stress pattern (monosyllables /-SW/ and /-WS/). We observed a heterogeneous distribution of word classes per stress pattern across development in the children's intake. At the beginning, all children mainly select monosyllabic words (either non-verbs and verbs), and di- and polisyllabic non-verbs. Polisyllabic verbs, on the contrary, emerged later in the children's intake, as illustrated in the scheme presented below.

(217) Development of word classes per word shape and stress pattern:



These findings suggest that prosodic constraints, namely, the unmastery of the algorithm for word stress, rather than morphosyntactic ones, might be preventing children from producing polisyllabic verb forms. The fact that children are able to produce monosyllabic and polisyllabic non-verbs and monosyllabic, but not polisyllabic verb forms (either /SW/ and /WS/), might indicate that, in fact, word stress is sensitive to word classes.

After that, we accounted for the acquisition of the word marker in target trochees, aiming at investigating whether morphological information was playing a role in the acquisition of trochees. We analyzed the acquisition of target trochees with and without word marker and found that at the beginning, trochees with word marker were not produced accordingly (confirming the general results found in Chapter 5, for /SW/ words). Truncation, reduplications (both to [WS] and multiple reduplications) and epenthesis on the left were strategies observed in the deviant productions of /SW/ non-verbs with word marker. However, when analyzing the production of /SW/ without word marker, where we expected to find a tendency for [WS], no such tendency was observed. At the early stages, the observed children used the same strategies used with /SW/ with word marker and also target-like productions were noticed. In the early stages, the results pointed to a great variability. These findings suggest that morphological contrasts such as the acquisition of the gender contrast might not be preventing trochees from being acquired, but instead, children might not yet have learned the word stress algorithm.

In the last part of this section, we investigated the acquisition of stress patterns in verb forms. We analyzed the verb forms uttered productively by the observed children (3rdp.sg. of the Present, Imperative, 3rdp.sg. of the Simple Past, Infinitive and 3rdp.sg. of the Past Imperfect[234]). The results indicated that the early verbs were unmarked forms, i.e., they mainly consisted in verb forms which conform to a trochaic foot and which only bear a stem, plus a theme vowel. These forms are the 3rdp.sg. of the Present and the Imperative, which have a /-SW/ stress pattern. Later, the verbs forms with a /-WS/ stress pattern emerged, namely the 3rdp.sg. of the Simple Past and the Infinitive.

At the beginning, when verb forms we not produced target-like, the strategies used were mainly truncation to [S] and reduplication. Later, all verb forms were produced accordingly.

6.1.2. On the role of weight in the acquisition of word stress

In the present section we will present the results for the role of weight in the acquisition of word stress in EP. Two aspects are worth analyzing, as far as weight-sensitivity is concerned in Portuguese acquisition. The first is to investigate whether children show weight-sensitivity in their productions. The second (depending on the former) is to know when do they learn weight.

Branching Nuclei and Branching Rhymes (/VN/, /VC/, /VNC/, /VG/ and /VGN/[235]) are normally considered heavy cross-linguistically. In (52)[236], below, we recall the frequency

[234] The 3rdp.sg. of the Past Imperfect was only found productively in Inês' speech. Cf. Appendix D.
[235] Here we disregard syllable types where the /-s/ plural marker is present.
[236] Chapter 1, section 1.2.4..

values for stressed and unstressed types of Rhymes for the target language, presented in Chapter 1, where we observe that the syllable types .

(52) Distribution of Rhymes (%) per stress position (adapted from Vigário, Martins & Frota, 2006):

Rhyme structure	**Stressed**	**Unstressed**	**TOTAL**
(C)V	19.1	**45.26**	64.36
(C)VC	4.87	**9.16**	14.03
(C)VN	**5.31**	2.71	8.02
(C)VGN	**4.36**	1.26	5.62
(C)VG	**3.43**	0.74	4.17
(C)VGC	**1.20**	0.01	1.21
Other			2.59

The data showed above suggest that syllables with nasal vowels (VN), Branching Nuclei (VG, VGN) and simultaneous Branching Rhyme and Branching Nucleus (VGC) tend to be stressed. Despite the higher frequency values for VC Rhymes in unstressed than in stressed position, it is worth noticing that no distinction between the morphological Coda and the lexical Coda /s/ was considered in this account[237]. However, the frequency study conducted in Bisol (1992) indicated that 78% of the words ending in a consonant are oxytonic and 22% are paroxytonic.

Specifically, we will test whether syllables that tend to be considered as heavy cross-linguistically and in Portuguese (/VN/, /VNC/, /VG/, /VGC/, /VGN/ and /VGNC/ - (Bisol, 1992, 1993 and Wetzels, 2006) behave as heavy and are stressed in the Portuguese children's productions. We will evaluate the potential role of weight in stress assignment during acquisition, which contrasts heavy syllable types with light syllable types.

Since syllable weight might only be relevant for non-verbs (Wetzels, 2006[238]) and verb form in the early speech of Portuguese children were scarce, we did not take into account any verb forms in this section. Any conclusions as to weight-sensitivity in the Portuguese children observed should apply to non-verbs only.

In the target words under analysis in this section no word class and number markers are present, and they all consist in stems (e.g., *café*] 'coffee', *canal*] 'channel', *lápis*] 'pencil').

[237] Cf. footnote 63.
[238] Cf. Chapter 1, section 1.2.5.2.

Therefore, words such as *casas* 'houses' [ˈkazɐʃ] will not be considered within the /'CV.CVC/ paradigm, since they are composed by a stem (*cas*-), a word marker (-*a*-), and a number marker (-*s*).

We will consider as 'correct' a target-like production in which the number of syllables, the stress pattern and syllable heaviness are maintained. In the /CV.'CV/ pattern, the word *olá* [ɔˈla] 'hello', reduplications and the children's nicknames which are reduplicated forms were disregarded. *Olá* is a word that is frequently imitated from the adult speech and child-directed speech and it tends to disappear, both from the child and the child-directed speech after the initial sessions[239]. Since we are testing weight sensitivity in children acquiring Portuguese as the target language, reduplications and children's reduplicated nicknames were disregarded for three main reasons:

(i) the unstressed syllable of a reduplication is not mapable onto the unstressed syllable of the target word;
(ii) reduplicated words in the lexicon of the target system are very infrequent;
(iii) reduplicated words might be interpreted as a repetition of a syllable (cf. Chapter 5), and not as words.

In the following tables, and since both closed syllables and syllables ending in a diphthong tend do attract stress in the target language, we will represent final heavy syllables as 'CVC', irrespective of the syllable structure therein. Therefore, /CV.'CVC/ words will account for /CV.'CVN/ (e.g., *patim* 'skate' /pɐˈtĩ/), /CV.'CVC/ (e.g. *rapaz* 'boy' /ʀɐˈpaʃ/), /CV.CVG/ (e.g., *chapéu* 'hat' /ʃɐˈpɛw/) and /CV.CVGN/ (e.g., *balão* 'balloon' /bɐˈlɐ̃w̃/) words.

In addition, since information in the onset is irrelevant for syllable weight purposes, /'CV.CVC/ words might correspond to /'V.CVC/ (e.g., *hábil* 'skillful' /ˈabiɫ/) and /CV.'CVC/ might correspond to /V.'CVC/ (e.g., *anis* 'anise' /ɐˈniʃ/).

In order to provide evidence for weight-sensitivity, we will investigate whether:

(i) Unstressed light syllables are more prone to deletion than unstressed heavy syllables (assuming that stressed syllables are rarely prone to deletion in the acquisition data) (section 6.2.2.1.). If syllable preservation in unstressed heavy syllables is higher than in unstressed light syllables, then we will provide evidence for syllable weight during EP acquisition;

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[239] Cf., for instance, João's lexicon in Appendix D.

(ii) /CV.'CVC/ and /CV.'CV/ words are produced correctly earlier than /'CV.CVC/ (section 6.2.2.2.). If heavy unstressed syllables are acquired later than heavy stressed syllables, then evidence for its marked character will be provided;

(iii) Stress shift occurs in the direction of heavy syllables (/'CV.CVC/ -> [CV.'CVC]) (section 6.2.2.3.). If this pattern of stress shift is found, evidence for stress attraction to heavy syllables is provided.

6.1.2.1. Deletion of unstressed syllables

Given the infrequent and potentially marked status of unstressed complex Rhymes and Complex Nuclei in the target language, the expectancy of finding these syllable types in unstressed position, in the early speech of Portuguese children's speech, will be low. Additionally, if light unstressed light syllables are more prone to deletion than heavy unstressed syllables, then, evidence for weight sensitivity will be provided.

In the following table (Table 97), we will show the general results for the percentage of deletion of heavy and light syllables in unstressed position. We do not present the results for Clara, since the only relevant token produced of an unstressed heavy syllable was in the word *pinguim* 'penguin' /pĩˈgʷĩ/. With one single token with unstressed heavy syllables, any comparison as to weight sensitivity through the observation of deletion in unstressed heavy and light syllables (in /SW/ and /WS/) would not be clarifying.

	Light /SW/ e.g., [ˈkazɐ]	**Heavy /SW/** e.g., [ˈlapiʃ]	**Light /WS/** e.g., [bɐˈlɐ̃w̃]	**Heavy /WS/** e.g., [pĩˈgʷĩ]
Inês	43.9% (101/230)	11.5% (3/26)	39.6% (19/48)	3.85% (1/26)
Joana	43.9% (54/123)	50% (2/4)	43.8% (28/64)	33.3% (2/6)
João	41.8% (69/165)	0% (0/0)	43.3% (26/60)	14.3% (1/7)
Luma	19% (58/313)	100% (1/1)	43% (19/44)	0% (0/6)

Table 97. Percentage of deletion of heavy and light syllables in unstressed position (/SW/ and /WS/)

From the data shown in Table 97, we observe that:

(i) In Inês and João's speech, light syllables are more prone to deletion in unstressed position;

(ii) Joana and Luma have higher percentage rates of deletion in unstressed heavy syllables than in unstressed light syllables (in /SW/ only), but that seems to be mostly due to the reduced number of tokens with heavy unstressed syllables selected in /SW/;

(iii) The number of unstressed heavy syllables selected by the four children under analysis is reduced.

The higher tendency to preserve unstressed heavy syllables than unstressed light syllables and the reduced number of tokens with unstressed heavy syllables in the children's intake suggest, one the one hand, that Portuguese children might be sensitive to syllable weight and, on the other hand, it might indicate that unstressed heavy syllables have a marked character during prosodic acquisition in EP.

6.1.2.2. Words with heavy stressed and heavy unstressed syllables: emergence path

In this section we will investigate the developmental path for words with final heavy stressed and unstressed syllables (/CV.'CVC/ and /'CV.CVC/, respectively). We will also present the results for final stressed light syllables (/CV.'CV/). An earlier production and acquisition of /CV'CV/ (e.g., *café* [kɐˈfɛ] 'coffee') and /CV.'CVC/ (e.g., *canal* [kɐˈnaɫ] 'channel', than /'CV.CVC/ (e.g., *lápis* [ˈlapiʃ] 'pencil'), will provide evidence for weight-sensitivity. Conversely, if /'CV.CVC/ (e.g., *lápis*) words are produced and acquired earlier than /CV.'CVC/ (e.g., *canal*), evidence against weight-sensitivity is given.

In Tables 98 and 99, we account for the developmental path undertaken by Clara in the production of for /CV.'CVC/ and /CV.'CV/, respectively. /'CV.CVC/ words were never selected by this child, until the end of the observation period.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	77.8% (7/9)	1
Session 8	-	-
Session 9	25% (1/4)	1
Session 10	40% (4/10)	2
Session 11	71.11% (32/45)	3
Session 12	75.6% (65/86)	3

Table 98. Percentage of /CV.'CV/ words produced target-like (Clara)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	0% (0/1)	1
Session 6	-	-
Session 7	-	-
Session 8	0% (0/1)	1
Session 9	50% (5/10)	1
Session 10	82.35% (14/17)	1
Session 11	85.71% (18/21)	1
Session 12	75% (12/16)	2

Table 99. Percentage of /CV.'CVC/ words produced target-like (Clara)

In Table 98, we observe that /CV.'CV/ words are selected are produced target-like in session 7, though in session 8 no targets are selected, and in session 9 and 10 lower values (25% and 40%, respectively) are observed. From session 11 onwards, higher target-like (>75%) rates are detected. /CV.'CVC/ words (Table 99) are earlier selected (in session 5) but they are not produced target-like until session 9. In session 9, /CV.'CVC/ words are produced with a 50% rate of target-like production and in the following sessions higher values (between 75% and 85%) are found. The number of types of the CV.'CV and CV.'CVC forms is very reduced in Clara's speech.

In (218), we present Clara's renditions of /CV.'CV/ and /CV.'CVC/ words, across sessions.

(218) Clara – production of /CV.'CVC/ and /CV.'CV/ words:

	Orthogr.	Gloss	Target	Output	Age
/CV.'CVC/	*João*	'name'	/ʒuˈɐ̃w̃/	[zuˈɐ̃w̃]/[juˈɐ̃w̃]	1;7.11 (S9)
	João	'name'	/ʒuˈɐ̃w̃/	[duˈɐ̃w̃]/[doˈɐ̃w̃]	1;8.20 (S10)
	João	'name'	/ʒuˈɐ̃w̃/	[buˈɐ̃w̃]	1;9.23 (S11)
	João	'name'	/ʒuˈɐ̃w̃/	[zuˈɐ̃w̃]	1;10.15 (S12)
/CV.'CV/	*aqui*	'here'	/ɐˈki/	[ɐˈki]/[aˈkiː]	1;5.16 (S7)
	aqui	'here'	/ɐˈki/	[ˈki]/[ɐˈki]	1;8.20 (S10)
	avô	'grandfather'	/ɐˈvo/	[ɨˈvo]/[ˈu]/[ˈvːu]	
	aqui	'here'	/ɐˈki/	[ɐˈki]	1;9.23 (S11)
	avô	'grandfather'	/ɐˈvo/	[ɐˈvo]/[ˈvo]	
	aqui	'here'	/ɐˈki/	[ɐˈki]	
	avô	'grandfather'	/ɐˈvo/	[aˈbo]	1;10.15 (S12)

In these productions we observe that, in /CV.'CVC/ words, the heavy character of the final syllables is preserved from the beginning.

In Tables 100, 101 and 102, we show Inês' percentage rates for /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words, respectively.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	0% (0/4)	2
Session 4	-	-
Session 5	0% (0/3)	2
Session 6	9.09% (1/11)	2
Session 7	9.09% (1/11)	1
Session 8	38.46% (10/26)	4
Session 9	55.55% (10/18)	2
Session 10	36.67% (11/30)	1
Session 11	61.22% (30/49)	3
Session 12	44.03% (48/109)	4
Session 13	64.29% (27/42)	7
Session 14	68.29% (56/82)	5
Session 15	56.74%% (21/37)	4
Session 16	56.6% (30/53)	5
Session 17	46.15% (12/26)	5
Session 18	57.44% (27/47)	6

Table 100. Percentage of /CV.'CV/ words produced target-like (Inês)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	0% (0/19)	2
Session 4	0% (0/1)	1
Session 5	0% (0/1)	1
Session 6	0% (0/3)	2
Session 7	0% (0/11)	2
Session 8	0% (0/12)	4
Session 9	40% (8/20)	5
Session 10	72.7% (8/11)	5
Session 11	46.2% (12/26)	9
Session 12	35% (7/20)	8
Session 13	48.3% (14/29)	17
Session 14	33.3% (7/21)	9
Session 15	65% (13/20)	11
Session 16	37.5% (12/32)	12
Session 17	47.4% (9/19)	12
Session 18	68.4% (26/38)	17

Table 101. Percentage of /CV.'CVC/ words produced target-like (Inês)

Tables 100 and 101 show that /CV.'CV/ and /CV.'CVC/ words are acquired by Inês in session 9 and 10, respectively, though they are selected from session 3 onwards. We see, however, that the percentages of both structures do not go beyond 70%. The late stabilization of /CV.'CV/ and /CV.'CVC/, however, seems to be only apparent.

On the one hand, the percentages in /CV.'CV/ are highly influenced by the frequency of the word *aqui* [ɐˈki] 'here', which is often preceded by *olha* [ˈɔʎɐ] 'look imp.' or *está* [ʃˈta] 'it is'. The child's output of the word *aqui* in this context is repeatedly a 'pseudo-truncated' form, resulting from the apocope: *olha aqui* [ˈɔjaˈki] 'look at here' or *está aqui* [ˈtaˈki] 'it is here'. Though it was coded as truncation, this output form is consistent with spontaneous adult speech.

On the other hand, /CV.'CVC/ words frequently have a word-final -ɾ or -l (e.g., *doutor* [doˈtoɾ] 'doctor', *hospital* [ɔʃpiˈtaɫ] 'hospital'). Inês mainly produces these forms with final epenthesis (e.g., [ˈtoli], [piˈtalɨ]). As seen in the previous section, the strategy of epenthesis in Inês was previously observed in the /-WS/ forms of the Infinitive, which crucially end in [-ɾ] in Portuguese. Inês' data suggest that final epenthesis is independent from stress assignment and morphosyntactic aspects, but rather it seems related to the syllable and the segmental structure, namely with the process of word-final epenthesis after a word-final sonorant (cf., for instance, the examples in (220), below, where simultaneous productions with word-final epenthesis after a sonorant, but not after the obstruent, are observed).

In (219) we present Inês' rendition for /CV.'CV/ and /CV.'CVC/ words.

(219) Inês – production of /CV.'CV/ and /CV.'CVC/ words:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
/CV.'CV/	*aqui*	'here'	/ɐˈki/	[ɐˈki]	2;0.1 (S9)
	ali	'there'	/ɐˈli/	[aˈli]/[aˈdi]	
	café	'coffee'	/kɐˈfɛ/	[kɐˈpɛ]	2;1.10 (S10)
	aqui	'here'	/ɐˈki/	[ɐˈkiː]	
	sofá	'couch'	/suˈfa/	[tuˈta]	
	daqui	'from here'	/dɐˈki/	[dɐˈki]	2;2.1 (S11)
	café	'coffee'	/kɐˈfɛ/	[gɐˈpɛ]	
	boné	'hat'	/bɔˈnɛ/	[bɔˈnɛ]	2;5.24 (S17)
/CV.'CVC/	*chapéu*	'hat'	/ʃɐˈpɛw/	[peˈpɛw]	1;9.19 (S10)
	leão	'lion'	/liˈɐ̃w̃/	[iˈɐ̃w̃]	
	João	'name'	/ʒuˈɐ̃w̃/	[duˈɐ̃w̃]	1;10.29 (S11)
	jardim	'garden'	/ʒɐɾˈdĩ/	[dɨˈdĩ]	
	balão	'balloon'	/bɐˈlɐ̃w̃/	[bɐˈlɐ̃w̃]	2;0.11 (S12)
	chapéu	'hat'	/ʃɐˈpɛw/	[tɐˈpɛw]	
	também	'also'	/tɐ̃ˈbɐ̃j̃/	[tɐˈmɐ̃j̃]	2;1.10 (S13)

In (219), we observe that /CV.'CV/ words are produced target-like in session 9, though they are mostly restricted to two types: *aqui* 'here' and *ali* 'there'. From session 10 onwards, both /CV'CV/ and /CV.'CVC/ words are produced accordingly, including their final heavy syllable, which is produced as heavy. It is worth noticing that the child was able to keep, both the stress pattern, the number of syllables of the target form and syllable structure.

In Table 102, we present the percentage of target-like production of /'CV.CVC/ words in Inês' speech.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	0% (0/7)	1
Session 10	-	-
Session 11	-	-
Session12	0% (0/2)	1
Session 13	18.2% (2/11)*	2
Session 14	0% (0/1)	1
Session 15	100% (2/2)	2
Session 16	0% (0/1)*	1
Session 17	-	-
Session 18	50% (1/2)	1

Table 102. Percentage of /'CV.CVC/ words produced target-like (Inês)

In Inês' speech, the number of /'CV.CVC/ word is significantly reduced, both taking into account the number of types and the number of tokens per session. In all sessions, three types with the structure /'CV.CVC/ were selected: *lápis* [ˈlapiʃ] 'pencil', *açúcar* [ɐˈsukaɾ] 'sugar' and *Mickey* [ˈmikɐj] 'name'. When these forms were attempted, they were prone to great instability, until the end of the observational period.

In (220), we present Inês' renditions for /'CV.CVC/ words.

(220) Inês – /'CV.CVC/ words:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
lápis	'pencil'	/ˈlapiʃ/	[ˈpatʰ]/[æˈbatu]	1;8.2 (S9)
lápis	'pencil'	/ˈlapiʃ/	[ˈpatu]	
lápis	'pencil'	/ˈlapiʃ/	[ˈapi]	2;0.11 (S12)
açúcar	'sugar'	/ɐˈsukaɾ/	[ɐˈtukɐli]	2;1.10 (S13)
Mickey	'name'	/ˈmikɐj/	[ˈmikɐj]	
lápis	'pencil'	/ˈlapiʃ/	[ˈlapi]	2;2.1 (S14)
lápis	'pencil'	/ˈlapiʃ/	[ˈlapiʃ]	2;3.8 (S15)
Mickey	'name'	/ˈmikɐj/	[ˈmikɐj]	
açúcar	'sugar'	/ɐˈsukaɾ/	[ɐˈtukɐli]	2;4.18 (S16)
lápis	'pencil'	/ˈlapiʃ/	[ˈlapiʃ]	2;7.16 (S18)

In the instances above we show that, when /'CV.CVC/ words are selected (in session 9), they are initially produced as [SW] words, with a final light syllable. Until session 12, the child does not produce the target syllable-final consonant, but she correctly produced the target stress pattern. From session 13 onwards, *açúcar* 'sugar' is produced with word-final epenthesis, creating a different stress pattern - /'CV.CVC/ -> ['CV.CV.CV]. Though the use of this strategy (final epenthesis) might indicate that the child was changing the stress pattern, the correct production of other /'CV.CVC/ words, like *lápis* 'pencil' and *Mickey* 'name', with the target stress pattern indicates that that is not the case. In session 15, Inês is able to correctly produce a /SW/ pattern with a final heavy syllable. However, the reduced number of selected targets and the variability found in the production of these structures seems to reflect: (i) their infrequent status in the target system and (ii) the marked character of these structures in the child system.

In Tables 103 and 104, we show Joana's developmental path for /CV.'CV/ and /CV.'CVC/ words, respectively.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	100% (1/1)	1
Session 8	0% (0/1)	1
Session 9	33.3% (1/3)	2
Session 10	57.1% (4/8)	1
Session 11	33.3% (2/6)	3
Session 12	10% (1/10)	3
Session 13	76.92% (10/13)	3
Session 14	37.5% (6/16)	4

Table 103. Percentage of /CV.'CV/ words (Joana)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	10% (1/10)	2
Session 10	11.1% (1/9)	6
Session 11	13% (3/23)	10
Session 12	21.4% (3/14)	13
Session 13	10% (1/10)	5
Session 14	54.2% (13/24)	15

Table 104. Percentage of /CV.'CVC/ words (Joana)

Table 103 indicates that /CV.'CV/ words are prone to some instability across all sessions, alternating between high and low percentages of target-like production along the observation period. /CV.'CVC/ words (Table 104) were selected later than /CV.'CV/ words (in session 9), and they go through a gradual increasing target-like production path until the end of the observation period. As in Inês, the unstable behavior of /CV.'CV/ words is only apparent, since one of the types of these structures is the word *aqui* [ɐˈki] 'here', which tends to be truncated in spontaneous speech (both in child and in adult one).

In (221), we show instances of /CV.'CV/ and /CV.'CVC/ words, from Joana.

(221) Joana – production of /CV.'CV/ and /CV.'CVC/ words:

	Orthogr.	Gloss	Target	Output	Age
/CV.'CV/	*avó*	'grandmother'	/ɐˈvɔ/	[aˈβo]	1;6.24 (S7)
	café	'coffee'	/kɐˈfɛ/	[kiˈkɛ]	1;9.25 (S9)
	avó	'grandmother'	/ɐˈvɔ/	[ɐˈbɔː]/[ɐˈvɔː]/[ˈfɔ]	1;10.22 (S10)
	avô	'grandfather'	/ɐˈvo/	[ˈvo]	2;2.19 (S12)
	avó	'grandmother'	/ɐˈvɔ/	[ˈvɔ]/[ɐˈvɔ]	
	avô	'grandfather'	/ɐˈvo/	[ɐˈvo]	2;4.1 (S13)
	aqui	'here'	/ɐˈki/	[ɐˈki]	
/CV.'CVC/	*avião*	'plane'	/ɐviˈɐ̃w̃/	[ɐˈwɐ̃w̃]	1;10.22 (S10)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[məˈɲɐ̃w̃]	2;0.9 (S11)
	caracóis	'snails'	/kɐɾɐˈkɔjʃ/	[kɔˈkɔːʃ]	
	nariz	'nose'	/nɐˈɾiʃ/	[ɐˈɾiʃ]	2;2.19 (S12)
	papéis	'papers'	/pɐˈpɛjʃ/	[bɛˈbɛjʃ]	
	Jesus	'name'	/ʒɨˈzuʃ/	[ʒuˈʒuʃ]	2;4.1 (S13)
	prisão	'prison'	/pɾiˈzɐ̃w̃/	[piˈʒɐw]	2;6.24 (S14)
	chapéu	'hat'	/ʃɐˈpɛw/	[ʒəˈpɛw]	

In (221), we observe instances of target-like and truncated forms for /CV.'CV/ words, produced by Joana. Truncated forms are possible until late in Joana's speech. When /CV.'CVC/ words are selected, the final heavy syllable is produced as heavy (i.e., either with Branching Rhyme and/or Branching Nucleus) and the stress pattern might be preserved.

Table 105 shows the percentage of target-like production of /'CV.CVC/ words in Joana's speech.

Session	**% (absolute values)**	**Types**
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	-	-
Session 10	-	-
Session 11	0% (0/1)	1
Session 12	-	-
Session 13	0% (0/1)	1
Session 14	0% (0/2)	2

Table 105. Percentage of /'CV.CVC/ words (Joana)

The values in Table 105 indicate that /'CV.CVC/ words are rarely selected by Joana, until the end of the observation period. The number of both types and tokens with the /'CV.CVC/ structure is somewhat reduced as well. Until the end of the observation period, Joana does not correctly produce the /'CV.CVC/ words, as shown in (222).

(222) Joana – production of /'CV.CVC/ words:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
César	'name'	/ˈsɛzaɾ/	[ˈtʃɛ]	2;0.9 (S11)
César	'name'	/ˈsɛzaɾ/	[ˈʃɛ]	2;4.1 (S13)
pónei	'poney'	/ˈpɔnɐj/	[ˈpɔɲi]	2;6.24 (S14)
César	'name'	/ˈsɛzaɾ/	[ˈçezɐ̥]	

In (222), we see that Joana initially truncates /'CV.CVC/ words to [S] (session 11 and 13) and later produces them as [SW] words (session 14), with a final light syllable. As in Inês' speech, the heavy character of the final syllables is not preserved.

Tables 106 and 107 show João's acquisition path for /CV.'CV/ and /CV.'CVC/ words.

Session	**% (absolute values)**	**Types**
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	25% (1/4)	2
Session 9	0% (0/2)	2
Session 10	-	-
Session 11	-	-
Session 12	100% (1/1)	1
Session 13	0% (0/2)	2
Session 14	-	-
Session 15	0% (0/1)	1
Session 16	50% (3/6)	4
Session 17	62.5% (5/8)	2
Session 18	83.3% (5/6)	3
Session 19	75% (3/4)	2
Session 20	80% (8/10)	5
Session 21	100% (4/4)	2
Session 22	70% (7/10)	5

Table 106. Percentage of /CV.'CV/ words (João)

Session	**% (absolute values)**	**Type s**
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	42.9% (3/7)	3
Session 9	0% (0/10)	2
Session 10	0% (0/3)	2
Session 11	0% (0/4)	2
Session 12	0% (0/2)	2
Session 13	0% (0/8)	2
Session 14	0% (0/1)	1
Session 15	25% (1/4)	2
Session 16	38.5% (5/13)	10
Session 17	33.3% (1/3)	2
Session 18	63.6% (14/22)	5
Session 19	30% (3/10)	5
Session 20	23.1% (3/13)	8
Session 21	63.6% (7/11)	7
Session 22	33.3% (3/9)	8

Table 107. Percentage of /CV.'CVC/ words (João)

In Tables 106 and 107, we observe that both /CV.'CV/ and /CV.'CVC/ words are acquired in session 16, though they are earlier selected. /CV.'CV/ words are selected in session 8, though they are intermittently attempted until session 16, with low target-like production rates. /CV.'CVC/ words are selected in session 8 as well, and are attempted in all sessions with low target-like production rates until session 16. Both structures reach high target-like production rates after session 16, and /CV'CVC/ words become more frequent, in terms of types and tokens.

In (223), we present João's renditions of /CV.'CV/ and /CV.'CVC/ words.

(223) João – /CV.'CV/ and /CV.'CVC/ words:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
/CV.'CV/	*avó*	'grandmother'	/ɐˈvɔ/	[ɐˈbɑ]	1;4.17 (S8)
	avô	'grandfather'	/ɐˈvo/	[puˈbu]	1;7.0 (S12)
	café	'coffee'	/kɐˈfɛ/	[tɐˈtɛ]	1;9.25 (S16)
	avó	'grandmother'	/ɐˈvɔ/	[ɐˈbɔ]	1;10.11 (S17)
	café	'coffee'	/kɐˈfɛ/	[peˈtʰɛ]	
	kiwi	'kiwi'	/kiˈvi/	[biˈbi]	1;10.26 (S18)
	kiwi	'kiwi'	/kiˈvi/	[diˈdi]	
	ali	'there'	/ɐˈli/	[ɐˈdi]	1;11.19 (S19)
	kiwi	'kiwi'	/kiˈvi/	[tiˈni]	2;0.20 (S22)
/CV.'CVC/	*Jesus*	'name'	/ʒɨˈzuʃ/	[juˈju]	1;9.25 (S16)
	avestruz	'ostrich'	/ɐvɨʃˈtɾuʃ/	[tuˈtu]	
	pinguim	'penguin'	/pĩˈgʷĩ/	[iˈdĩ]	
	arroz	'rice'	/ɐˈʀoʃ/	[aˈjoː]	
	balão	'balloon'	/bɐˈlɐ̃w̃/	[ɐˈlaw]	
	avião	'plane'	/ɐviˈɐ̃w̃/	[tiˈjɐ̃ːw̃]	1;10.11 (S17)
	maçã	'apple'	/mɐˈsɐ̃/	[ɐˈtɐ̃]	1;10.26 (S18)
	limão	'lemon'	/liˈmɐ̃w̃/	[miˈmɐ̃w̃]	
	biberon	'milk bottle'	/bibɨˈɾõ/	[biˈbõ]	1;11.20 (S19)
	pinhais	'pine tree field'	/piˈɲajʃ/	[piˈajʃ]	1;11.29 (S20)
	jardim	'garden'	/ʒɐɾˈdĩ/	[dɐˈdĩ]	

The instances above show that João is able to simultaneously produce both /CV.'CV/ and /CV.'CVC/. Most of the /CV.'CVC/ words produced are heavy at the Nucleus level.

João does not select any /'CV.CVC/ words until the last observed session.

In Tables 108 and 109, we present Luma's target-like production rates for /CV.'CV/ and /CV.'CVC/ words.

Session	% (absolute values)	Types
Session 1-19	-	-
Session 20	100% (17/17)	2
Session 21	100% (7/7)	1
Session 22	-	-
Session 23	0% (0/11)	2
Session 24	-	-
Session 25	83.3% (5/6)	2
Session 26	0% (0/2)	2
Session 27	0% (0/2)	1
Session 28	75% (9/12)	3
Session 29	0% (0/2)	2
Session 30	43.8% (7/16)	4
Session 31	76.9% (10/13)	2
Session 32	60.4% (29/48)	2
Session 33	18.2% (6/33)	4
Session 34	33.3% (2/6)	2
Session 35	30.8% (4/13)	2
Session 36	56.1% (23/41)	2
Session 37	30.8% (4/10)	3

Table 108. Percentage of /CV.'CV/ words (Luma)

Session	% (absolute values)	Types
Session 1-10	-	-
Session 11	0% (0/1)	1
Session 12-22	-	-
Session 23	50% (2/4)	1
Session 24	0% (0/1)	1
Session 25	100% (2/2)	1
Session 26	100% (1/1)	1
Session 27	100% (1/1)	1
Session 28	-	-
Session 29	11.1% (1/9)	2
Session 30	50% (1/2)	2
Session 31	25% (3/12)	8
Session 32	66.7% (2/3)	1
Session 33	30.8% (4/13)	7
Session 34	45.5% (10/22)	7
Session 35	14.3% (1/7)	3
Session 36	66.7% (18/27)	10
Session 37	76.9% (10/13)	7

Table 109. Percentage of /CV.'CVC/ words (Luma)

In Tables 108 and 109, we observe that /CV.'CV/ and /CV.'CVC/ words are acquired approximately in the same session: /CV.'CV/ words go beyond 50% of target-like production rate in session 31, whereas in /CV.'CVC/, that value is reached in session 30. Both structures were attempted before. /CV.'CV/ words were first selected and produced in session 20 with high target-like percentages. However, great percentage variability in the production of these forms is observed up until session 30. /CV.'CVC/ words are first produced target-like in session 11, but they are not selected until session 23. From session 23 to session 29, high percentages are observed in the production of /CV.'CVC/ words, though there is a reduced number of tokens (and types) per session. Until the last observed session, both /CV.'CV/ and /CV.'CVC/ words are produced with variable high and low percentages.

In (224), we show Luma's renditions of /CV.'CV/ and /CV.'CVC/ words.

(224) Luma – /CV.'CV/ and /CV.'CVC/ words:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
/CV.'CV/	*Pati*	'name'	/paˈti/	[teˈti]	1;9.29 (S20)
	Pati	'name'	/paˈti/	[taˈti]	1;10.18 (S21)
	avô	'grandfather'	/ɐˈvo/	[toˈto]	1;11.15 (S23)
	Pati	'name'	/paˈti/	[paˈtiː]	2;0.13 (S25)
	Soni	'name'	/sɔˈni/	[fɔˈni]	2;3.26 (S30)
	sofá	'couch'	/suˈfa/	[fuˈfa]	2;5.15 (S33)
/CV.'CVC/	*Miguel*	'name'	/miˈgeɫ/	[niˈɐ̃]	1;11.15 (S23)
	Miguel	'name'	/miˈgeɫ/	[niˈɛː]	2;0.13 (S25)
	avião	'plane'	/ɐviˈɐ̃w̃/	[ɨviˈɐ̃w̃]	2;3.26 (S30)
	andor	'walk'	/ɐ̃ˈdoɾ/	[ɐ̃ˈdoj]	2;5.15 (S33)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[bũˈɐ̃w̃]	
	balão	'balloon'	/bɐˈlɐ̃w̃/	[bɐˈʎɐ̃w̃]	2;5.20 (S34)
	chapéu	'hat'	/ʃɐˈpɛw/	[tɐˈpɛw]	2;6.20 (S36)

As for /'CV.CVC/ words, Luma only selects one word with this structure, *íris* [ˈiɾiʃ] 'iris', in session 33. She truncated the word to [ˈli].

Table 110 summarizes the emergence path for /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words in all children:

	Stage I	**Stage II**	**Stage III**
Clara	/CV.'CVC/	/CV.'CV/	
Inês	/CV.'CV/	/CV.'CVC/	/'CV.CVC/
Joana	/CV.'CV/	/CV.'CVC/	/'CV.CVC/
João	/CV.'CV/	/CV.'CVC/	
Luma	/CV.'CVC/ ~/CV.'CV/		/'CV.CVC/

Table 110. Summary of the emergence of /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words

The comparative results of /CV'CV/, /CV.'CVC/ and /'CV.CVC/ words indicated that:

(i) Clara and Luma acquired /CV.'CVC/ before /CV.'CV/;
(ii) Inês, Joana and João acquire /CV.'CV/ words before /CV.'CVC/;
(iii) The final heavy syllable of /CV.'CVC/ words is normally produced as heavy by all children;
(iv) The emergence of /'CV.CVC/ words is only observed in Inês, Joana and Luma;
(v) The acquisition of /'CV.CVC/ words is not attested in any of the children's speech;

(vi) When children select /'CV.CVC/ words, which occurrs late in development, they might truncate them to a monosyllable or produce them with a final light syllable;

The alternative path undertaken by Clara and Luma, on the one hand (they acquired /CV.'CVC/ before /CV.'CV/), and Inês, Joana and João, on the other hand (they first acquired /CV.'CV/ before /CV.'CVC/), as well as the data presented in this section showing that /CV.'CV/ and /CV.'CVC/ words are acquired approximately in the same session by all children indicate that these structures might be interpreted by children as similar prosodic structures.

Our analysis on /'CV.CVC/ words also showed that these structures were rarely selected and produced in the speech of the five children observed. Clara and João did not select any /'CV.CVC/ words and only in Inês and Joana's speeches was it possible to observe the behavior of these structures but no correct production was attested. In Inês, we observed a very unstable behavior in the production of /'CV.CVC/ forms, which were either produced with final epenthesis or with a final light syllable. In Joana's speech, the selection of /'CV.CVC/ words was very rare and no correct production was attested, mostly because these words were truncated or produced with a final light syllable. Contrary to what occurred in /CV.'CVC/ words, whose final heavy syllable was produced as heavy from the beginning, Inês and Joana produced /'CV.CVC/ words with a final light syllable. Luma produced one /'CV.CVC/ word in the later sessions (in session 33), but she truncated it to a ['CV] word.

In all children /'CV.CVC/ words showed a clear distinct behavior from both /CV.'CV/ and /CV.'CVC/ words, which might indicate that the former have a marked status, when compared to the latter.

6.1.2.3. Words with heavy stressed and heavy unstressed syllables: stress shift

In the present section we will show the results for stress shift in /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words in the speech of the five observed children.

Recall that, based on previous reports in the literature on Portuguese acquisition (Bonilha, 2005; Santos, 2001, 2007) we predicted that:

(i) Stress shift of the type /<u>'CV</u>.CVC/ -> [CV.<u>'CVC</u>] would provide evidence for weigh-sensitivity;

(ii) Stress shift of the type /CV.<u>'CVC</u>/ -> [<u>'CV</u>.CVC] will indicate that heavy syllables are irrelevant for stress purposes, thus providing evidence for syllable weight in word stress;

Stress shift of the type /CV.'CV/ -> ['CV.CV] alone does not make any prediction for weight-sensitivity but it should, nevertheless, be compared with the two previous structures, in order o verify whether the patterns observed are similar to the ones of /CV.'CVC/ or /'CV.CVC/ words. If /CV.'CV/ words behave like /CV.'CVC/, evidence for a similar structure might be provided (namely, for a final heavy syllable and, thus, weight-sensitivity), and the same is valid if /CV.'CV/ displays a behavior similar to /'CV.CVC/ in stress shift (in this case, no weight-sensitivity might be assumed).

In the following tables we will present the percentage rates for stress shift in /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words. We will show the tables for all children all together, since similar results were found for all the children. It is worth noticing that Clara and João did not select any /'CV.CVC/ words and Luma had only one word with this structure.

Tables 111 and 112 present Clara's results for stress shift in /CV.'CV/ and /CV.'CVC/ words.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	0% (0/9)	1
Session 8	-	-
Session 9	0% (0/4)	1
Session 10	10% (1/10)	2
Session 11	2.22% (1/45)	3
Session 12	0% (0/85)	3

Table 111. Stress shift in /CV.'CV/ words (Clara)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	0% (0/1)	1
Session 6	-	-
Session 7	-	-
Session 8	0% (0/1)	1
Session 9	10% (1/10)	1
Session 10	5.88% (1/17)	1
Session 11	9.52% (2/21)	1
Session 12	0% (0/16)	2

Table 112. Stress shift in /CV.'CVC/ words (Clara)

In Clara, we observe a reduced percentage of stress shift in both /CV.'CV/ and /CV.'CVC/ words until the last observed session. It is also noticeable that the child selected few types of these structures.

Tables 113, 114 and 115 depict Inês's results for stress shift in /CV.'CV/, /'CV.CVC/ and /CV.'CVC/ words, respectively. In these tables, '*' stands for epenthesis after word-final sonorant.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	25% (1/4)	2
Session 4	-	-
Session 5	33.33% (1/3)	2
Session 6	0% (0/11)	2
Session 7	0% (0/11)	1
Session 8	7.69% (2/26)	4
Session 9	0% (0/18)	2
Session 10	0% (0/30)	1
Session 11	6.12% (3/49)	3
Session 12	0% (0/109)	4
Session 13	0% (0/42)	7
Session 14	0% (0/82)	5
Session 15	0% (0/37)	4
Session 16	0% (0/53)	5
Session 17	0% (0/26)	5
Session 18	0% (0/47)	6

Table 113. Stress shift in /CV.'CV/ words (Inês)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	0% (0/19)	2
Session 4	0% (0/1)	1
Session 5	0% (0/1)	1
Session 6	0% (0/3)	2
Session 7	0% (0/11)	2
Session 8	8.33% (1/12)	4
Session 9	0% (0/20)	5
Session 10	16.67% (1/6)*	5
Session 11	15.38% (4/26)*	9
Session 12	10% (2/20)	8
Session 13	34.48% (10/29)*	17
Session 14	38.1% (8/21)*	9
Session 15	0% (0/20)	11
Session 16	15.53% (5/32)*	12
Session 17	31.58% (6/19)*	12
Session 18	21.05% (8/38)*	17

Table 114. Stress shift in /CV.'CVC/ words (Inês)

In Inês' data, we observe that stress shift is rare in /CV.'CV/ words. In /CV.'CVC/, stress shift is scarce as well, until session 12. When a difference in the stress pattern occurs in /CV.'CVC/ (mainly after session 13), it is the product of vowel epenthesis at the right-edge of words ending in a sonorant.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	14.29% (1/7)	1
Session 10	-	-
Session 11	0% (0/1)	1
Session12	0% (0/2)	1
Session 13	63.64% (7/11)*	2
Session 14	0% (0/1)	1
Session 15	0% (0/2)	2
Session 16	100% (1/1)*	1
Session 17	-	-
Session 18	0% (0/3)	2

Table 115. Stress shift in /'CV.CVC/ words (Inês)

Table 115 indicates that /'CV.CVC/ words are rarely selected and, when a difference in the target stress pattern occurs, it is the also result of vowel epenthesis. In fact, these productions are not instances of stress shift, but rather the result of a change in the target stress pattern.

In Tables 116, 117 and 118, we present the results for Joana with respect to stress shift in /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words, respectively.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	0% (0/1)	1
Session 8	0% (0/1)	1
Session 9	0% (0/3)	2
Session 10	0% (0/8)	1
Session 11	0% (0/6)	3
Session 12	0% (0/10)	3
Session 13	0% (0/13)	3
Session 14	0% (0/16)	4

Table 116. Stress shift in /CV.'CV/ words (Joana)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	0% (0/10)	2
Session 10	22.2% (2/9)	6
Session 11	8.7% (2/23)	10
Session 12	0% (0/14)	13
Session 13	10% (1/10)	5
Session 14	12.5% (3/24)	15

Table 117. Stress shift in /CV.'CVC/ words (Joana)

In Joana's speech, stress shift was inexistent in /CV.'CV/ words. In /CV.'CVC/, stress shift was more frequent than in /CV.'CV/ words, but it was not very common, until the end of the observation period.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	-	-
Session 9	-	-
Session 10	-	-
Session 11	0% (0/1)	1
Session 12	-	-
Session 13	0% (0/1)	1
Session 14	0% (0/2)	2

Table 118. Stress shift in /'CV.CVC/ words (Joana)

/'CV.CVC/ words were selected late and in produced in very reduced amounts (they were selected in session 11). No stress shift was observed in /'CV.CVC/ words in Joana's speech.

Tables 119 and 120 show the percentage of stress shift in /CV.'CV/ and /CV.'CVC/ words, in João's speech, respectively. João did not select any /'CV.CVC/ words.

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	0% (0/4)	2
Session 9	0% (0/2)	2
Session 10	-	-
Session 11	-	-
Session 12	0% (0/1)	1
Session 13	0% (0/2)	2
Session 14	-	-
Session 15	0% (0/1)	1
Session 16	16.7% (1/6)	4
Session 17	0% (0/8)	2
Session 18	0% (0/6)	3
Session 19	0% (0/4)	2
Session 20	0% (0/10)	5
Session 21	0% (0/4)	2
Session 22	30% (3/10)	5

Table 119. Stress shift in /CV.'CV/ words (João)

Session	% (absolute values)	Types
Session 1	-	-
Session 2	-	-
Session 3	-	-
Session 4	-	-
Session 5	-	-
Session 6	-	-
Session 7	-	-
Session 8	0% (0/7)	3
Session 9	0% (0/10)	2
Session 10	0% (0/3)	2
Session 11	25% (1/4)	2
Session 12	0% (0/2)	2
Session 13	12.5% (1/8)	2
Session 14	0% (0/1)	1
Session 15	0% (0/4)	2
Session 16	7.7% (1/13)	10
Session 17	33.3% (1/3)	2
Session 18	18.2% (4/22)	5
Session 19	0% (0/10)	5
Session 20	61.5% (8/13)	8
Session 21	27.3% (3/11)	7
Session 22	22.2% (2/9)	8

Table 120. Stress shift in /CV.'CVC/ words (João)

In João's speech, the percentage of stress shift in /CV.'CV/ words is reduced (16.7% in session 16 and 30% in session 22). /CV.'CVC/ words are, in general, more subject to stress shift than /CV.'CV/. However, in the early sessions (until session 16), stress shift is rare (3 productions in 53 tokens). From session 17 onwards, the percentages are higher than the ones observed until then, but can be mostly biased by the reduced number of targets (for instance, in session 17, the 33% correspond to 1 production of stress shift in 3 tokens). In session 20, the child has a high rate of stress shift (61.5%), but that values decrease in the following sessions (session 21 and 22) to 27.3% and 22.2%.

In Tables 121 and 122, we show Luma's results for stress shift in /CV.'CV/ and /CV.'CVC/ words.

Session	% (absolute values)	Types
Session 1-19	-	-
Session 20	0% (0/17)	2
Session 21	0% (0/7)	1
Session 22	-	-
Session 23	9.1% (1/11)	2
Session 24	-	-
Session 25	0% (0/6)	2
Session 26	0% (0/2)	2
Session 27	0% (0/2)	1
Session 28	16.7% (2/12)	3
Session 29	0% (0/2)	2
Session 30	6.3% (1/16)	4
Session 31	0% (0/13)	2
Session 32	0% (0/48)	2
Session 33	3% (1/33)	4
Session 34	0% (0/6)	2
Session 35	0% (0/13)	2
Session 36	0% (0/41)	2
Session 37	0% (0/10)	3

Table 121. Stress shift in /CV.'CV/ words (Luma)

Session	% (absolute values)	Types
Session 1-10	-	-
Session 11	0% (0/1)	1
Session 12-22	-	-
Session 23	0% (0/4)	1
Session 24	0% (0/1)	1
Session 25	0% (0/2)	1
Session 26	0% (0/1)	1
Session 27	0% (0/1)	1
Session 28	0% (0/1)	1
Session 29	11.1% (1/9)	2
Session 30	0% (0/2)	2
Session 31	8.3% (1/12)	8
Session 32	0% (0/3)	1
Session 33	42.9% (3/7)	7
Session 34	4.5% (1/22)	7
Session 35	14.3% (1/7)	3
Session 36	0% (0/27)	10
Session 37	23.1% (3/13)	7

Table 122. Stress shift in /CV.'CVC/ words (Luma)

In Luma's speech, the percentage of stress shift in /CV.'CV/ and /CV.'CVC/ words is reduced. In session 33, the child has 42.9% of stress shift in /CV.'CVC/ words that correspond to 3 productions in 7 tokens. In the following sessions, however, the percentages have a decreasing again (values vary from 0% to 23.1%).

In the tables presented above, we observe that stress shift in /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words is not frequent. Some cases exist in João for /CV.'CVC/ words, as attested in Table 120, but in the other children, a change in stress placement in /CV.'CVC/ words is not a used strategy.

As shown in the previous section, /'CV.CVC/ words are rarely selected and stress shift was rarely attested. Clara and João did not select any /'CV.CVC/ words and Luma selected one single token.

As shown in Chapter 5, stress shift is not a strategy used by the Portuguese children in dealing with word stress. When the children do not produce a target word and a target stress pattern accordingly, the most common strategies are reduplications, filler insertion and truncation[240].

[240] Cf. Chapter 5, section 5.1.3..

6.1.2.4. Summary for weight

In section 6.1.2., we tested weight-sensitivity in the speech productions of the five children in our *corpus*.

We analyzed the deletion rate in heavy and light unstressed syllables, the acquisition path for /CV.'CVC/, /'CV.CVC/ and /CV.'CV/ words, and finally, we accounted for the rate of stress shift in /CV'CVC/ and /'CV.CVC/ words.

Our results on weight sensitivity show that:

(i) deletion in unstressed light syllables tends to be more deleted than unstressed heavy syllables (cf. Table 97, for a summary), though the reduced number of unstressed heavy syllables in the children's intake is absent (in the case of Clara) or reduced (in the case of Luma and João);

(ii) in Clara, /CV.'CVC/ words emerge earlier than /CV.'CV/ words; Inês, Joana and João have the opposite path; Luma has a simultaneous emergence of the two structures (cf. Table 110, for a summary);

(iii) the emergence path for /CV.'CVC/ and /CV.'CV/ words opposes to the acquisition path for /'CV.CVC/ words: the former is earlier acquired than the latter (cf. Tables 98-109);

(iv) /'CV.CVC/ words are not selected by Clara and João, and Luma has one single token of this structure; Inês and Joana have a very reduced number of /'CV.CVC/ words in their intake (cf. Tables 102 and 105);

(v) /'CV.CVC/ words might be truncated until late and, contrary to /CV.'CVC/ words, they can be produced with a final light syllable (cf. examples in (219) and (220), for Inês, and in (221) and (222), for Joana);

(vi) stress shift in /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words is a infrequent strategy (cf. Tables 111-122). However, Inês tends to use epenthesis at the right edge of words ending in a sonorant (/CV.'CVC/ and /'CV.CVC/), not exactly performing stress shift but changing the target stress pattern of the words. João had one session (session 20) in which high rates of stress shift in /CV.'CVC/ is observed.

In general, three main facts suggest that children process differently words with heavy syllables in stressed and in unstressed position, providing evidence for weight-sensitivity in the early speech of Portuguese children:

(i) The asymmetry found in the deletion of unstressed heavy and light syllables (with higher deletion rates in the latter);

(ii) The asymmetry found in the emergence path for /CV.'CVC/, and /'CV.CVC/ words (with an earlier emergence of the former);

(iii) The fact that the two children who selected and produced /'CV.CVC/ words, truncated these structures until late and produced them with a final light syllable, when /CV.'CVC/ words were mainly produced with a final heavy syllable;

(iv) The paucity of /'CV.CVC/ words in the children's intake.

Despite some differences in the percentages of stress shift in /CV.'CV/ and in /CV.'CVC/ words, /CV.'CVC/ and /CV.'CV/ words seem to behave more similarly with respect to stress assignment among them, than /'CV.CVC/ words.

6.1.3. Summary of the main findings

In section 6.1., we have presented the results of our analysis on morphology-dependence and weight-sensitivity in the path of word stress acquisition in EP.

As far as the interaction between morphology and word stress is concerned, we observed that, at the early stages, children's productions mostly consist in monosyllabic words (either [+nouns] or [+verbs]) and in di- and polisyllabic [+nouns]. Polisyllabic verbs emerged later in the speech of all observed children (cf. Tables 67-71).

With respect to non-verbs, we observed that the acquisition of trochees was, in general, parallel to the acquisition of the word marker, though, in João and Luma, the word marker was noticeable before trochees are acquired, mainly, through the production of stress shift[241]. However, we also showed that trochees without word marker could be produced as trochees or be produced with the same strategies as target non-reduplicated iambs and trochees with word marker (cf. examples in (199)-(203)), i.e., truncation (/SW/->[S]),

[241] - cf. instances (197) and (198).

reduplication (/'$CV_1.CV_2$/->[CV_1.'CV_1]) and epenthesis at the left-edge of the circumscribed syllable (/SW/->[fσ]). Our findings for non-verbs inflection (namely, gender inflection) suggest that the presence of the word marker might not explain the apparent iambic tendency found in the early speech of Portuguese children, as they mainly use truncation or other above-mentioned strategies at an early stage, irrespectively of the morphological constituency of the target word and the target stress pattern.

In [+verbs], data showed that the early multisyllabic verb forms emerging were consistent with the unmarked stress pattern for verbs (/SW/). Our results indicated an earlier emergence of the 3rdp.sg. of the Present Indicative and the Imperative, which display a /SW/ stress pattern (cf. Tables 83-87 and Table 96, for a summary) and mainly consists in a verb theme (stem+theme vowel - cf. examples (205)-(213)). Person/number or tense/mood suffixes, namely with a /WS/ stress pattern, were only produced later. In Clara and Inês, a simultaneous acquisition of /SW/ and /WS/ verb forms (Present and Simple Past in Clara; Present and Infinitive in Inês) occurred. In João and Joana, a distinct acquisition moment was found in /SW/ and /WS/ verb forms, with an earlier acquisition of the Present Indicative and Imperative with a /SW/ stress pattern and a later acquisition of the Simple Past and Infinitive, which have a /WS/ stress pattern. In all children the acquisition of verb tenses, either /SW/ or /WS/, occurred after the trochaic foot was the predominant pattern. Until that moment, children mostly truncated or reduplicated /SW/ and /WS/ verb forms (cf. Tables 88-95).

The asymmetry found in the selection and production of monosyllabic and multisyllabic verbs, and the later emergence of verb forms in general, and in particular, of the verb forms which do not conform to a trochee and a verb theme (where, in general, the marked positions of word stress in verbs occurs) suggest that stress assignment in the verb paradigm might be a difficult task for children.

As far as syllable weight and word stress are concerned, our data of showed that light unstressed syllables were more prone to deletion than heavy unstressed syllables (cf. Table 97). However, the asymmetry found in the amount of tokens in each variable analyzed (heavy syllable in unstressed position and light syllable in unstressed position, both in /SW/ and /WS/) did not allow for robust conclusions. It suggests, nevertheless, that heavy unstressed syllables are very infrequent in the children's intake (as it is in the adult speech[242]).

The comparison between the emergence of /CV.'CVC/, /CV.'CV/ and /'CV.CVC/ words indicated that /CV.'CVC/ and /CV.'CV/ emerged earlier than /'CV.CVC/ (cf. Tables 98-109). In the speech of three children (Inês, Joana and João), /CV.'CV/ words emerged earlier than

[242] Cf. Chapter 1, section 1.2.4., information in (52).

/CV.'CVC/. /CV.'CVC/ words emerged earlier in Clara's speech and Luma had a simultaneous emergence of /CV.'CV/ and /CV.'CVC/ words (cf. Table 110, for a summay). /'CV.CVC/ words were absent in the intake of Clara and João, and they were rarely selected and produced target-like by Inês, Joana and Luma (cf. Tables 102 and 105, for Inês and Joana, respectively). When /'CV.CVC/ words were selected (which occurred late in the speech of the three children), they were truncated or produced with a final light syllable.

Stress shift did not occur productively in the speech of the five observed children (cf. Tables 111-122). João was the only child with high rates of stress shift in /CV.'CVC/ (cf. Table 120), though it happened mainly in one session. Inês mainly used a strategy that implied a change in the target stress pattern (vowel epenthesis at the right-edge of words ending in a sonorant consonant - cf. examples in (220)), but this strategy does not necessarily imply a shift in the target stress position. The remainder children did not use stress shift productively.

In the following section, we will discuss the target analyses on word stress, based on the results brought up by our results on morphology-dependence and syllable weight during the acquisition of word stress in EP.

6.2. Discussion

In the first section of this chapter, we have presented the descriptions and analyses on Portuguese word stress, and we further showed the proposals on BP word stress acquisition from Santos (2001, 2007) - supporting a morphology-based word stress algorithm in Portuguese - and Bonilha (2005) - supporting a weight-based word stress algorithm in Portuguese.

In the following sections, we will discuss the target analyses purported for Portuguese, on the light of our results.

6.2.1. Discussing the interaction of word stress with morphology

As presented in Chapter 1, Lee (1995) defends that the domain for stress in Portuguese non-verbs is the stem and that the default foot in Portuguese is an iamb. Indeed, the morphology-based approaches in Portuguese often have a contradictory factor: since they consider the stem as the domain for word stress, causing the word marker to be extrametrical, word stress is normally at the right-most syllable of the stress domain, indicating an iambic foot.

If one looks at the early metrical representations on word stress proposed by Andrade (1992) and Andrade & Laks (1992), one observes that there are inconsistent postulates: on the one hand, the domain for stress is the stem and, on the other hand, the language has a binary trochaic foot ("Feet are binary and prominent on the left" - Andrade, 1992:109). In the metrical representations presented in Andrade (1992), we observe that morphological constituency is relevant, as it is necessary to distinguish between thematic (e.g., *cabel*]*o* 'hair') and athematic (*jacaré*] 'aligator') non-verbs, for stress purposes. In non-verbs with word marker, stress falls on the penultimate syllable of the lexical word ('feet are *binary* and prominent on the *left*'), whereas in words without word marker, stress falls on the last syllable of the lexical word. That syllable constitutes itself a foot, since it 'stands alone', though no motivation for why the 'element standing alone' is a foot, a *unary* one, is postulated. Additional motivation for the unary character of the word-final foot is, thus, required.

Andrade & Laks (1992:17) stated that "main stress falls on the last vowel of the stem, or on the penultimate, if there is an extrametrical vowel". However, the rhythmic principle postulated ("Rhythmic wave, peak-trough anchored at the right, first peak strong" - Andrade & Laks, 1992:19) could not apply to the stem. In fact, the representations present in Andrade & Laks (1992) clearly show a trochaic rhythm. However, on the assumption that one should stress the last syllable of the stem, the stem must be considered the domain for stress and the word marker is explicitly considered as extrametrical. It is not clear, though, why the rhythmic principle is applying to the lexical word and word prominence is always at the right-edge of the stress domain. Since the word marker is extrametrical, it should be invisible to the rhythmic principle and for stress assignment. It remains unclear how the author(s) reconcile(s) the application of the metrical and rhythmic principles inside the stress domain (the stem) with a metricalization of morphological elements that are outside the stem (word markers) in non-verbs.

Pereira (1999) suggests that Portuguese word stress is morphology-dependent and a trochaic system (Pereira, 1999:135). In order to defend a trochaic rhythm in the language, the author argues that:

(i) Stress in Portuguese overwhelmingly falls on the penultimate syllable of prosodic words;

(ii) Stress echoes affect the even syllables at the left of the stressed syllable in an alternating SW rhythm, from right to left;

(iii) Portuguese evolved from a trochaic system: Latin;

(iv) Iambic systems are always weight-sensitive.

Within Idsardi's (1992) metrical framework, Pereira (1999) presents the metrical and rhythmic principles that allow for the construction of prominences grid in Portuguese non-verbs. The principles established define that, in Portuguese, main stress is on the right-most edge of its domain, the stem. However, the nature of the constituent that marks the domain boundary - whether it is a foot, a degenerate one, or a syllable -, remains unclear. Furthermore, the word marker is not present in the representations showed in Pereira (1999), the author does not mention what is the metrical status of the word marker. One of the hypotheses would be that the word marker is extrametrical. As far as extrametricality in non-verbs is concerned, the author states that the stress domain-final syllable is lexically marked with the information of 'do not stress' within a specific syllable (e.g., *súpli̲ca* 'supplication', *âmbar* 'amber'). The author seems to assume that only within the stress domain it is necessary to specify extrametricality. On this assumption, word markers are not extrametrical. They are simply inexistent for stress assignment purposes. On the assumption that Portuguese word stress, at least in non-verbs, crucially falls on the last syllable of its domain, we furthermore need to state that word prominence in Portuguese is right-headed (-WS), even if we do not assume that the foot plays any role in the language phonology. In sum, morphology-based approaches fail in accounting for the trochaic rhythm of the target language. With this respect, Mateus & Andrade (2000) clarify that:

> "It [the derivational stem] is, we assume, the basic domain of stress. The apparent complexity of the facts, as one can see, can be reduced to an essential principle: main stress falls on the last vowel of the stem, or on the one before the last, if there is an extrametrical vowel.
> In this analysis, the right-to-left rhythmic wave cannot be considered a primitive of the stress system but only as a derived effect. Therefore, it is not possible to formalize the regularity according to which main stress falls systematically on the first vowel to the left of the syllable that contains an extrametrical vowel." (Mateus & Andrade, 2000:121)

According to Mateus & Andrade (2000), assuming that the stem is the domain for stress, there is no way of accounting for the trochaic rhythm of Portuguese. If one assumes that "the right-to-left rhythmic wave cannot be considered a primitive of the stress system but only a derived effect", therefore stress is not "the linguistic manifestation of the rhythmic structure", as suggested by Hayes (1995:8), but, instead, its motivator. Put differently, if we assume that word stress is generally domain-final (stress the last syllable of the stem), therefore, the trochaic rhythm of Portuguese is a consequence of stress, and not the contrary.

Additionally, the authors clearly claim that the final syllable of non-verbs bearing word markers is extrametrical, which, from a phonological acquisition perspective, raises a problem: being considered extrametrical, words with the word marker should be considered marked structures and, thus, should be subjected to a late acquisition.

Santos (2007) supported Lee's (1995) analysis for the adult language, according to whom the default foot in non-verbs is an iamb and the domain for stress is the stem. Santos (2007) observed that iambs, but not trochees, were earlier produced and acquired in BP. The high frequency of reduplicated words with an [WS] shape, where no morphological endings were present, and the truncation of /SW/ words to [S] lead the author to defend that Brazilian children have a default iambic foot, and that Brazilian children only acquire trochees when morphological contrasts are mastered, namely gender contrasts, which are extrametrical.

In verbs, Santos (2007) did not support Lee's analysis. Lee (1995) defends that the stress domain is the lexical word and the default foot is a trochee, since in most verb forms stress falls on the penultimate syllable of the lexical word. Santos (2007) found a similar tendency as the one found in nouns, i.e., Brazilian children tended to produce /WS/ forms (mainly Infinitives) earlier than /SW/.

Based on Santos (2007), according to whom /SW/ would not be acquired until extrametricality (associated to the word marker) was acquired, in section 6.1.1., we analyzed:

(i) the distribution of word classes (non-verbs and verbs) per word shape (monosyllables, /-SW/ and /-WS/);
(ii) the acquisition of the word marker and trochees;
(iii) the acquisition of verb tenses and strategies used in the production of verb forms.

We hypothesized that:

A. Given the results found in previous analyses on the adult language (Andrade, 1988/1992; Andrade & Laks, 1992; Mateus, 1983; Mateus & Andrade, 2000; Pereira, 1999) and on word stress acquisition in Portuguese (Santos, 2007), morphological acquisition interacts with word stress and word shape acquisition in EP.

If Portuguese word stress is morphology-dependent (Lee, 1995; Pereira, 1999, among others), and assuming that the word-final information in /SW/ [+nouns], but not in [+verbs], is extrametrical (as proposed by Lee, 1995 and supported by Santos, 2007 with BP acquisition data), then we would expect that children acquire /WS/ in [+nouns] and /SW/ in [+verbs].

The results of our analysis on the interaction of morphology within the acquisition of trochaic [+nouns] – the only words bearing morphological information in the early stages – show that:

(i) multisyllabic verbs are selected later than multisyllabic non-verbs and moosyllabic verbs (cf. Tables 67-71);

(ii) the acquisition of the trochaic stress pattern and the word marker in /SW/ non-verbs is in general simultaneous, though two of the children observed are able to produce the word marker before the acquisition of trochees (cf. Tables 73-82);

(iii) /SW/ non-verbs without the word marker are subject to the same production strategies as /SW/ non-verbs with the word marker (cf. examples in (199)-(203));

(iv) /SW/ [+nouns] with word marker are subject to the same strategies observed for non-reduplicated /WS/ words and target monosyllables observed in Chapter 5 (cf. examples in (117)-(121));

(v) in verbs, trochaic forms emerge earlier than iambic forms and these mainly consiste in verb themes (Tables 83-87 and examples in (205) -(213)).

The results found in non-verbs seem to confirm Santos' (2007) findings: the acquisition of trochees in non-verbs appears to be dependent on the acquisition of gender contrasts. Before the acquisition of the word marker, trochees are rarely observed in the speech of the Portuguese children; when morphological contrasts are acquired, trochees are produced as well. In (225), we recall the examples from Inês and Joana for the acquisition of trochees, where the word marker is not present, in the beginning, and later is produced.

(225) Inês – initial production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
manta	'blanket'	/ˈmɐ̃tɐ/	[ˈmɐ̃]	1;3.6 (S4)
banho	'bath'	/ˈbɐɲu/	[ˈpɐ]	1;3.6 (S4)
barco	'boat'	/ˈbaɾku/	[ˈbæ:]	1;3.6 (S4)
carro	'car'	/ˈkaʀu/	[ˈkaˈka]	1;4.9 (S5)
meia	'sock'	/ˈmɐjɐ/	[ˈmɛ]	1;5.11 (S6)
banho	'bath'	/ˈbɐɲu/	[ɐˈbɐ]	1;5.11 (S6)
balde	'bucket'	/ˈbaɫdɨ/	[ˈpa]	1;6.11 (S7)
cartas	'cards'	/ˈkaɾtɐʃ/	[ˈka]	1;6. 11 (S7)

(186) Inês – later production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
boa	'good'	/ˈboɐ/	[ˈboɐ]	1;8.2 (S9)
tampa	'lid'	/ˈtɐ̃pɐ/	[ˈpata]	1;8.2 (S9)
casa	'house'	/ˈkazɐ/	[ˈkatʲɐ]	1;9.19 (S10)
banho	'bath'	/ˈbɐɲu/	[ˈbaju]	1;9.19 (S10)
bolos	'cakes'	/ˈboluʃ/	[ˈboluʃ]	1;9.19 (S10)

In Inês' productions, we observe that, before session 9, she does not produce trochees target-like. Until session 8, the child circumscribes the stressed syllable and uses truncation, reduplication and filler insertion. After session 8, she is able to correctly produce trochees.

We observe the exact same pattern in Joana.

(226) Joana – initial production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Carla	'name'	/ˈkaɾlɐ/	[ˈka]	1;8.4 (S8)
escola	'school'	/ʃˈkɔlɐ/	[ˈkɔ]	1;8.4 (S8)
pato	'duck'	/ˈpatu/	[paˈpa]	1;9.25 (S9)
escola	'school'	/ʃˈkɔlɐ/	[kɔˈkɔ]	1;9.25 (S9)
sapato	'shoe'	/sɐˈpatu/	[paˈpa]	1;9.25 (S9)
luva	'glove'	/ˈluvɐ/	[ˈbu:]	1;10.22 (S10)
Nando	'name'	/ˈnɐ̃du/	[ˈɲɐ̃]	2;0.9 (S11)

(187) Joana – later production of /SW/:

Orthogr.	*Gloss*	*Target*	*Output*	*Age*
mota	'motorbike'	/ˈmɔtɐ/	[ˈmɔːtʲɐ]	2;4.1 (S13)
fralda	'diaper'	/ˈfɾaɫdɐ/	[ˈfawdɐ]	2;4.1 (S13)
pedra	'stone'	/ˈpɛdɾɐ/	[ˈpɛdɐ]	2;4.1 (S13)
quadro	'picture'	/ˈkʷadɾu/	[ˈkajdʲu]	2;6.24 (S14)
pato	'duck'	/ˈpatu/	[ˈpatʲu]	2;6.24 (S14)

In Joana's speech, truncation and reduplication are observed, in dealing with /SW/ [+nouns] in the early stages (until session 12). After session 12, she is able to produce /SW/ [+nouns] target-like.

Apparently, these results confirm Santos (2007) as, indeed, at the beginning children mainly produce words with a [WS] shape and no morphological contrasts (gender, person, tense, number, etc.) are present in the children's productions. However, it is hard to argue that morphological constraints, rather than prosodic constraints, are conditioning the acquisition of stress patterns in non-verbs, when no evidence for the iambic foot is found. In the following paragraphs, we will show why the results of this comparison, aiming at testing previous analyses (Santos, 2007) might be misleading.

The hypothesis according to which the late acquisition of trochees was dependent on, and related to the presence of word-final morphological (extrametrical) information is hardly falsifiable. Trochees without word marker (/SW/ - e.g., *lápis* 'pencil' /ˈlapiʃ/) are in much lesser amount than trochees with word marker (/S+W/ - e.g., *gat*]*o* 'cat' /ˈgatu/, *cas*]*a* 'house' /ˈkazɐ/). Since the word marker is always in unstressed final position and since children initially circumscribe the stressed syllable of the target word (irrespective of the stress pattern), it is likely that, during the acquisition of trochees, the preservation of the last syllable of the stem (which, in general, coincides with the stressed syllable) occurs, along with the deletion of the unstressed syllable, where the word marker is located. Therefore, the target-like production of trochees and the word marker are, expectedly, highly correlated. On the other hand, non-reduplicated iambs should be compared with trochees (with and without word marker), in order to verify whether morphological or prosodic constraints were acting during acquisition of word stress. Furthermore, it is observed that the early deletion of the word marker alone is not attested, as children do not produce the word marker because, in fact, they delete the entire unstressed syllable of target trochees.

Indeed, the results found in this chapter indicate that:

(i) at an early stage, trochees in general, and trochees without word marker in particular, are prone to the same strategies as non-reduplicated target iambs (cf. the renditions in (227) and (229), below);

(ii) trochees without word marker were prone to the same strategies and acquisition path as trochees with word marker (cf. the renditions in (228) and (229), below).

In (227) and (228), we provide some examples from Inês showing that trochees (with and without word marker, respectively) and iambs (in (229)) are prone to the same production strategies, namely reduplication, epenthesis and truncation.

(227) Inês – production of /SW/ with word marker:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Epenthesis	*Mário*	'name'	/ˈmaɾiw/	[əˈmɐ]	1;1.30 (S3)
	chupeta	'pacifier'	/ʃuˈpetɐ/	[ɐˈbe]	
Redupl.	*chupeta*	'pacifier'	/ʃuˈpetɐ/	[ˈpe]	
	babete	'bib'	/bɐˈbɛtɨ/	[baˈbaː]/[ˈbɛˈbɛˈbɛ]	1;3.6 (S4)
	Teresa	'name'	/tɨˈɾezɐ/	[tiˈtʲi]	
	bóia	'buoy'	/ˈbɔjɐ/	[βaˈβə]	
	banho	'bath'	/ˈbɐɲu/	[bɐˈbɐba]	
Truncation	*manta*	'blanket'	/ˈmɐ̃tɐ/	[ˈmːɐ̃]	1;3.6 (S4)
	pêlo	'hair'	/ˈpelu/	[ˈpe]	1;4.9 (S5)
	fralda	'diaper'	/ˈfɾaɫdɐ/	[ˈkaː]	1;5.11 (S6)
	cartas	'cards'	/ˈkaɾtɐʃ/	[ˈka]	1;6.11 (S7)

In this table, we observe that Inês mostly uses reduplication, truncation and filler insertion at the left-edge of the stressed syllable, when she attempts trochaic words [+nouns] with word marker. The same is observable in trochaic [+nouns] without the word marker.

(228) Inês – production of /SW/ without word marker:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Epenthesis	*Bambi*	'name'	/ˈbɐ̃bi/	[ɛˈbe]	1;3.6 (S4)
	Bambi	'name'	/ˈbɐ̃bi/	[ɐˈbɐ] [ɨˈbɐ]	1;4.9 (S5)
	lápis	'pencil'	/ˈlapiʃ/	[æbaˈtu]	1;8.2 (S9)
Redupl.	*Bambi*	'name'	/ˈbɐ̃bi/	[ˈbabaˈba] [βɐˈbɐ] [βɐˈbɐ] [peˈbe] [beˈbɛ]	1;3.6 (S4)
	Bambi	'name'	/ˈbɐ̃bi/	[ˈbaˈaˈba]	1;4.9 (S5)
Truncation	*Bambi*	'name'	/ˈbɐ̃bi/	[ˈbi] [ˈbab]	1;3.6 (S4)
	Bambi	'name'	/ˈbɐ̃bi/	[ˈbɐ]	1;4.9 (S5)
	Bambi	'name''	/ˈbɐ̃bi/	[ˈβɐ]	1;6.11 (S7)
	lápis	'pencil'	/ˈlapiʃ/	[ˈpatʰ]	1;8.2 (S9)

The child uses epenthesis, reduplication and truncation to [S], to deal with trochees without the word marker. Even though, these words are far less frequent in the child's speech, she uses the same strategies, irrespective of the target stress pattern attempted.

In iambic words, reduplication, truncation and filler insertion is also observed.

(229) Inês – production of non-reduplicated /WS/:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
Epenthesis	*Isabel*	'name'	/izɐˈbɛɫ/	[ɛˈbɛ]/[əˈβɛ]	1;1.30 (S3)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[ɐˈβɐ]	1;6.11 (S7)
Redupl.	*chapéu*	'hat'	/ʃɐˈpɛw/	[ˈpaˈpa] [ˈbɛˈbɛˈbɛ] [bɐˈbæ]	1;1.30 (S3)
	biberon	'milk bottle'	/bibɨˈɾõ/	[ˈɣəˈɣɑ]	1;5.11 (S6)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[bɐˈbɐ]/[βoˈβo]	1;6.11 (S7)
	colher	'spoon'	/kuˈʎɛɾ/	[kɛˈkɛ]	
Truncation	*ali*	'there'	/ɐˈli/	[ˈiː]	1;1.30 (S3)
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈpʰɐ]	1;1.30 (S3)
	Isabel	'name'	/izɐˈbɛɫ/	[ˈbɛ]	1;1.30 (S3)
	João	'name'	/ʒuˈɐ̃w̃/	[ˈdʲaːwː]	1;4.9 (S5)
	champô	'shampoo'	/ʃɐ̃ˈpo/	[ˈpo]	1;5.11 (S6)
	balão	'balloon'	/bɐˈlɐ̃w̃/	[ˈbə]	1;6.11 (S7)
	colher	'spoon'	/kuˈʎɛɾ/	[ˈkɛ]	1;6.11 (S7)
	avô	'grandfather'	/ɐˈvo/	[ˈdo]	1;7.2 (S8)
	chapéu	'hat'	/ʃɐˈpɛw/	[ˈpʰɛ]	1;7.2 (S8)

It is worthwhile noticing, also, that the use of the same strategies (epenthesis, reduplication and truncation) implies the same production patterns, i.e., mainly monosyllables and [WS] words. However, the truncation of non-reduplicated iambs provides evidence against the early processing of an iambic foot.

The examples in (227)-(229), along with the data presented in Chapter 5, indicate that there is no clear preference for iambic words.

Recall that the authors claiming for an early iambic tendency in BP (Santos, 2007; Stoel-Gammon, 1976) had into account the children's early reduplications, which are mostly [WS]. In Chapter 5, we have demonstrated that early [WS] words in the speech of Portuguese children do not necessarily indicate the processing and production of an iambic foot. In fact, we defended that the Portuguese children's early productions are consistent with an early processing of the syllable, and not the foot, since:

(i) both /SW/ and /WS/ words are truncated to [S] (the stressed syllable is overwhelmingly circumscribed, either in /SW/ with word marker, in /SW/ without word marker and in /WS/) - cf. Chapter 5, section 5.1.3.2.;

(ii) /WSW/ can be truncated either to /SW/ or /WS/, with a slight tendency for /SW/ (cf. Chapter 5, section 5.1.3.3.);

(iii) when the observed children start producing trochees and iambs, they initially truncate them, or use reduplication and epenthesis. That is irrespective of the target stress pattern (monosyllables were actually prone to the same strategies).

The emergence of stress patterns in verbs showed that the early verb forms to consistently emerge were in general trochaic (3rdp.sg. of the Present Indicative), though a simultaneous emergence of /WS/ verb forms, such as the Infinitive or the 3rdp.sg. of the Simple Past is possible (in Inês and Clara), as shown in Table 96, which we now recall:

	Emergence of verb tenses/stress patterns	***Strategies***
Clara	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) ~ Past Perf. (3rdp.sg) (/WS/)	/-SW/: not analyzed (insufficient data) /-WS/: not analyzed (insufficient data)
Inês	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) ~ Infinitive (/WS/) >> Past Perf. (3rdp.sg.) (/WS/) >> Past. Imper. (3rdp.sg.) (/WS/)	**/-SW/**: [S] >> [WS] (redupl.) **/-WS/**: [WS] (redupl.) >> [WS] >> [SW]
Joana	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) >> Past Perf. (3rdp.sg) (/WS/) >> Infinitive (/WS/)	**/-SW/**: [S] >> [SW] **/-WS/**: [S] ~ [WS]
João	Pres. Ind. (3rdp.sg.)/Imp. (/SW/) >> Infinitive (/WS/) ~ Simp.Past (3rdp.sg.) (/WS/)	**/-SW/**: [SW] **/-WS/**: [S] >> [WS]
Luma	Pres. Ind. (3rdp.sg.) (/SW/) >> Past Perf. (3rdp.sg.) (/WS/) >> Infinitive (/WS/)	**/-SW/**: [S] >> [SW]~[WS] >> [SW] **/-WS/**: [S] >> [WS] >> [SW]

Table 96. Summary for the emergence of verb inflection and stress patterns in verbs.

Our results on the distribution of word classes per stress pattern (Tables 67-71) furthermore indicated that:

(i) monosyllabic verbs (*dá* 'give' /ˈda/, *é* 'it is' /ˈɛ/, *há* 'there is' /ˈa/, *quer* 'want' /ˈkɛɾ/) are frequent in the speech of Portuguese children;

(ii) mono- and multisyllabic non-verbs are frequent in the speech of Portuguese children;

(iii) di- and multisyllabic verbs are selected and emerge later than mono-, di- and multisyllabic non-verbs.

These results suggest that:

(i) non-verbs and verbs may, indeed, be subject to different stress algorithms;

(ii) prosodic and rhythmic constraints, namely, constraints on the acquisition of the algorithm for word stress in verbs, might be preventing children from producing verb forms with more than two syllables.

In our data, we did not find evidence to consider that the default foot in EP is an iamb, neither the data showed that the word marker is an extrametrical element. Instead, as soon as word prominence is being processed (at Stage III) and prosodic organization within the word domain emerged, Portuguese children seem to acknowledge that a trochaic pattern is at stake and produce the rightmost syllables of /SW/ non-verbs, including the word marker. The exceptional character of extrametricality is confirmed, since /SWW/ words, whose final syllable is extrametrical - but not /SW/ or /WSW/ with word marker - are rarely selected and, therefore, not acquired until the end of the observation period (2;6).

Overall results on morphology suggest that, at the early stages, children select the stressed syllable of the target-word and apply the strategies of truncation to monosyllables, reduplication and epenthesis, irrespective of the target stress pattern. In the early stages, there is no evidence to consider that children are processing morphological information and morphological contrasts, since early productions mostly consist in the stressed syllable of the target word, optionally preceded by something else (either a repetition of that syllable, or a filler sound).

In sum, our results do not infirm or confirm an initial interaction between morphology and word stress in EP. Instead, the data from this chapter suggest that the early word's representation in EP is not an iambic foot and that the early word's representation does not seem to be driven by any kind of morphological constraint but, rather, by prosodic ones. It is worth mentioning, however, that even though our results disconfirm the early processing of an iambic foot, they do not totally disconfirm a morphology-dependence of word stress in Portuguese. In our data, we observed that:

(i) Monosyllabic verbs are selected and produced from the onset of word production (cf. Tables 67-71);

(ii) Multisyllabic verbs are not selected and produced until late in development cf. Tables 67-71);

(iii) Verbs forms where person/number or tense/mood suffixes are present tend to be acquired later than verb forms in which we observe the verb theme only (cf. Tables 83-87 and examples in (205)-(213)).

The differences found in the acquisition of disyllabic non-verbs and verbs, on the one hand, and the differences found in the production of monosyllabic verbs and disyllabic verbs, on the other hand, suggest that Portuguese children might be sensitive to the fact that non-verbs and verbs are subject to a different stress algorithm.

6.2.2. Discussing weight

In this section, we will discuss the target analyses arguing for a weight-sensitive word stress algorithm, based on the data found in this chapter. We will give special attention to the early stages, when mostly non-verbs were found in the speech of the Portuguese children observed. That is due, on the one hand, to the greater frequency of non-verbs in the early speech of the Portuguese children observed and, on the other hand, to the controversial issue on the nature and shape of the default foot in Portuguese non-verbs.

In Chapter 5, we showed that, after an initial period when children mostly produce monosyllables and a few number of real disyllabic forms (Stage I and II, respectively), Portuguese children start producing [SW] words (while they still truncate /WS/ words). At this stage, /WSW/ words were mainly truncated to [SW] as well.

In the present chapter we analyzed /SW/ and /WS/ words, having into account the syllable structure of the stressed and unstressed syllables, in the cases where weight-sensitivity should be noticed. In particular, we analyzed:

(i) Words with final stressed heavy syllables - /CV.'CVC/ (e.g. *amor* [ɐˈmoɾ] 'channel');

(ii) Words with final unstressed heavy syllables - /'CV.CVC/ (e.g. *lápis* [ˈlapiʃ] 'pencil');

(iii) Words with final stressed light syllable - /CV.'CV/ (e.g. *café* [kɐˈfɛ] 'coffee').

According to Bisol (1992, 1993, 1999) and Wetzels (2006), the general, unmarked rule for stress assignment in Portuguese is: stress the penultimate or the final syllable if it is heavy. This holds true for non-verbs[243]. Any Branching Rhyme (or Nucleus) counts as heavy. The marked rule for stress predicts the presence of a final extrametrical syllable in words with antepenultimate stress (e.g., *pássa<u>ro</u>* 'bird' [ˈpasɐ<u>ru</u>]) or a final extrametrical consonant (Bisol, 1993, 1999) in words with penultimate stress but a final heavy syllable (e.g., *lápi<u>s</u>* 'pencil' [ˈlapiʃ]). The stress algorithm based on weight predicts that the domain for word stress is the lexical word.

According to Fikkert (1994) for Dutch acquisition, children learned that their language was quantity-sensitive when words like /'CV.(C)VC/, with a final extrametrical syllable, were produced with level stress (['CV.'(C)VC]). Since extrametricality was not yet acquired but the prosodic word for the children at that stage was a disyllable, they produced the two syllables of the word, putting the same amount of prominence in both syllables (in the heavy and in the penultimate syllable). Furthermore, Dutch children never produced stress shift in /CV.'(C)VC/ words, showing that they knew that a heavy syllable must be stressed in the language.

In BP, Bonilha (2005) found evidence for weight early acquisition since the Brazilian child observed (i) correctly produced /CV.'CVG/ words from the beginning and (ii) had a different acquisition path for words with the unmarked stress pattern (penultimate syllable or the final syllable if it is heavy) and the marked stress pattern (penultimate syllable with final heavy syllable or antepenultimate syllable). Bonilha (2005) supported and provided empirical evidence for the algorithms proposed by Bisol (1992, 1993, 1999) and Wetzels (2006) for word stress acquisition in non-verbs. According to the authors, the domain for stress assignment in non-verbs is the lexical word. Feet are binary and trochaic. The unmarked stress rule states that one should stress the penultimate syllable of the lexical

[243] For a detailed description on a weight-based rule for word stress cf. Chapter 1, section 1.2.3. and, in particular, Wetzels (2006). Verbs are subject to a different stress rule, which we will not refer to in this discussion, since early words in Portuguese children were mostly [+nouns], and the verb tenses produced by the children did not allow for any further conclusions on an algorithm for word stress.

word (/-'CV(C).CV/) or the penultimate syllable if it is heavy (/-CV.'CVC/[244]). In the marked cases - antepenultimate stress or penultimate stress with final heavy syllable -, extrametricality was assumed in the final syllable or in the final consonant, respectively. Bonilha (2005) found that /-'CV.CV/, /CV.'CVC/ and /CV.'CV/ words were acquired earlier than /'CV.CV.CV/ and /'CV.CVC/ words, providing evidence for the unmarked character of penultimate stress and final stress when the last syllable is heavy, and the marked character of antepenultimate stress and penultimate stress when the final syllable is heavy.

In the beginning of this chapter, we hypothesized that:

B. Given the results found in the previous chapter and on previous analyses for the child data and the target language (e.g., Bonilha, 2005, Bisol, 1993, 1999; Wetzels, 2002, 2006), word stress in EP acquisition relies on a weight-based algorithm.

In particular we predicted that, if Portuguese is weight sensitive, it is expected that children obey the general weight-based rule for stress assignment (Bisol, 1992, 1994; Wetzels, 2006): stress the penultimate syllable of the lexical word, or the final syllable if it is heavy). Evidence for stress-attraction in heavy syllables would be found, through earlier acquisition of the unmarked stress pattern (penultimate stress, or final stress if the last syllable is heavy) and a later acquisition of the marked stress pattern (penultimate stress if the final syllable is heavy and antepenultimate stress).

Our analysis on weight-sensitivity in the speech of five Portuguese children indicated that:

(i) Light unstressed syllables are slightly more prone to deletion than heavy unstressed syllables in /-WS/ words (cf. Table 97);

(ii) Words with final stress (/CV.'CV/ and /CV.'CVC/) are acquired earlier than /'CV.CVC/, but they are subject to an unstable behavior until the end of the observation period (cf. Tables 98-109);

(iii) Stress shift in /CV.'CVC/ is rare (cf. Tables 112, 114, 117, 120 and 122);

(iv) /SW/ words with a final heavy syllable (/'CV.CVC/) are rarely selected by the children (Tables 102 and 105);

[244] Recall that Bisol (1993) suggests that /CV.'CV/ words bear a final abstract consonant, based on derived words - e.g., *café* 'coffee' [kɐˈfɛ], *cafeteira* 'coffee kettle' [kɐfɨˈt̠ɐjɾɐ].

(v) when /'CV.CVC/ words are selected, they are initially truncated or produced with a final light syllable, whereas the final heavy syllable of /CV.'CVC/ words is produced as heavy from the beginning.

The higher frequency of deletion in unstressed light syllables than in heavy unstressed syllables, the different acquisition paths for the unmarked stress position (/CV.'CVC/)and the marked /'CV.CVC/ stress pattern, along with the paucity of cases of stress shift in /CV.'CVC/ suggest that, indeed, children perceive what counts as a heavy syllable in their language (i.e., any Branching Rhyme or Nucleus - /VN/, /VG/, /VGN/ and /VC/) and crucially stress those syllables.

The data from Chapter 5 indicated that, at an initial stage (Stage I), children's productions are consistent with the processing of a syllable (monosyllabic words prevailed, target monosyllables are mainly produced target-like and disyllables are mainly [WS], though that is the result of reduplication or filler insertion - cf. Figures 29-33). At Stage II, disyllabic words emerge, though in very reduced amounts and they are still prone to truncation. At Stage III, we argued for the processing of a trochee, since the target-like production rate in /SW/ become higher than 50%, and it overcomes the target-like production rate in /WS/. Additionally, /WSW/ words are mostly truncated to [SW].

These developmental stages indicate that, as soon as any prosodic and metrical organization emerge in the Portuguese children's speech, the trochaic foot is being processed. However, /SW/ and /WS/ emerge simultaneously (Tables 34-38) and the acquisition of /SW/ and /WS/is very close in time. This led us to argue for a neutral start. We observed that, as soon as the trochaic foot (penultimate stress) is available, final stress emerges, though /WS/ words kept being more prone to truncation than /SW/ (cf., for instance, João's truncation patterns in Table 48). This developmental path cannot be accounted for in a morphology-based algorithm, which predicts that /SW/ words, but not /WS/, have a final extrametrical word marker which would be acquired later.

These data suggest that the early prosodic and metrical organization in the Portuguese children's speech is the product of the application of a general rhythmic and weight-based algorithm for word stress in the language: stress the penultimate syllable of the lexical word or the final syllable, if it is heavy. As soon as trochees (penultimate stress) are acquired, Portuguese children learn and produce word stress in words with final heavy syllables, since those words obey the default stress algorithm.

Thus, our findings are partly comparable to the ones found in Bonilha (2005): there is a distinct acquisition path for unmarked /CV.'CVC/ and marked /'CV.CVC/ words. However, contrary to Bonilha (2005), we do not find this pattern since the early stages of word production, but only after the Portuguese children observed were processing the trochee.

On the assumption that children are showing weight-sensitivity, one intriguing fact, however, is the simultaneous acquisition path for /CV.'CV/ and /CV.'CVC/ words, which could provide evidence against weight. Indeed, assuming that children already know that a heavy syllable must be /VN, /VG/ or /VC/, they should distinguish between the two structures (/CV.'CV/ and /CV.'CVC/), as the former has a light stressed syllable and the latter has a heavy stressed syllable.

The alternative accounts (i) either postulate a word-final abstract consonant (Bisol, 1992, 1993, 1999) or (ii) simply state that those words are of foreign origin (Wetzels, 2006). As for (i), it is true that in most non-verbs ending in a stressed light syllable, a consonant surfaces in derived contexts (e.g. *café* 'coffee' [kɐˈfɛ] ~ *cafe<u>t</u>eira* 'coffee kettle' [kɐfɨˈt̠ɐjɾɐ] ~ *cafe<u>z</u>al* 'coffee field' [kɐfɛˈz̠aɫ]). It is also true that most of the /CV.'CV/ words have an indigenous or French origin (as indicated in Wetzels, 2006). However, words like *avô* 'grandfather' [ɐˈvo], *avó* 'grandmother' [ɐˈvɔ] or *aqui* 'here' [ɐˈki] have an undeniable Latin/Portuguese origin, and words like *rubi* 'ruby' [ʀuˈbi] or *peru* 'turkey/Peru' [pɨˈɾu] do not derive words containing any abstract consonant (*rubiáceo* 'ruby-colored' [ʀubiˈasiu] or *peruano* 'Peruvian' [pɨɾuˈɐnu]?

A closer analysis on the production of the three stress patterns (/CV.'CV/, /CV.'CVC/ and /'CV.CVC/) is required, in order to clarify the heavy character of the final stressed syllable in /CV.'CV/ words. Notice that in all the referred stress patterns, the last vowel is the last of the stem. Recall, also, that, in our data, /CV.'CV/ and /CV.'CVC/ had a similar behavior and are acquired earlier, whereas /'CV.CVC/ words have a distinct development and are acquired later. The question one might ask at this point is whether the similarity in the development found for /CV.'CVC/ and /CV.'CV/ words were due to the light or heavy character of the final syllable.

Assuming that /CV.'CVC/ words are unmarked with respect to stress position in the adult and in Portuguese child language, and that /'CV.CVC/ words are marked (as our results further confirmed), the similarities between /CV.'CVC/ and /CV.'CV/ words should provide evidence for children being processing these two structures as similar metrical structures, that is, as both having a final heavy (stressed) syllable. Additionally, since children often produced ['CV.CV] as an output for /'CV.CVC/ words, it was expected that stress shift in /CV'CV/ words occurred. However, that was not the case. In (230) and (231), we show some productions attested in our data for each stress pattern, in the only two children who produced /'CV.CVC/ words (in Inês and Joana, respectively).

(230) Inês – renditions for /CV.'CV/, /CV.'CVC/ and /'CV.CVC/ words:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
/CV.'CV/	*café*	'coffee'	/kɐˈfɛ/	[kɐˈpɛ]	2;1.10 (S10)
/CV.'CVC/	*chapéu*	'hat'	/ʃɐˈpɛw/	[tɐˈpɛw]	2;0.11 (S12)
/'CV.CVC/	*lápis*	'pencil'	/ˈlapiʃ/	[ˈapi] [ˈlapi]	2;0.11 (S12) 2;2.1 (S14)

(231) Joana – renditions for /'CV.CVC/, /CV.'CV/ and /CV.'CVC/ words:

	Orthogr.	*Gloss*	*Target*	*Output*	*Age*
/CV.'CVC/	*nariz*	'nose'	/nɐˈɾiʃ/	[ɐˈɾiʃ]	2;2.19 (S12)
/CV.'CV/	*aqui*	'here'	/ɐˈki/	[ɐˈki]	2;4.1 (S13)
/'CV.CVC/	*pónei*	'pony'	/ˈpɔnɐj/	[ˈpɔɲi]	2;6.24 (S14)

As illustrated in (230) and (231), and further shown in section 6.1.2.2., /'CV.CVC/ words are mostly produced as monosyllables, or with a final light syllable but with penultimate stress (as ['CV.CV], without the final consonant or glide), even though final stressed syllables are already produced in /CV.'CVC/ words.

On the assumption that (i) by the time children select /'CV.CVC/ words, they are processing a trochaic foot (/SW/ words had higher target-like production rates than /WS/ and /WSW/ are truncated to [SW]) and (ii) syllable-weight is irrelevant to children, then stress shift in /CV.'CV/ words would be highly expected. Our data, however, do not confirm this prediction (cf. Tables 111, 113, 116, 119 and 121). Stress shift in /CV.'CV/ words rarely occurrs in the speech of the five observed children. Moreover, since children produce /'CV.CVC/ words with a final light syllable, it appears that children are mislead by the stress placement and produce the final syllable as light (e.g., *pónei* 'pony' /ˈpɔnɐj/ -> [ˈpɔɲi] Joana, 2;6; *lápis* pencil' /ˈlapiʃ/ -> [ˈpatu], [ˈlapi], Inês, 1;8 and 2;2, respectively). On the assumption of a morphology-based algorithm, as soon as children start producing word stress in the target position in /'CV.CVC/, they should be able to produce words like *pónei* or *lápis* with a final heavy syllable, as they do in *chapéu* 'hat' /ʃɐˈpɛw/ -> [tɐˈpɛw] (Inês, 2;0) and [ʒəˈpɛw] (Joana, 2;6). However, in the early stages, children's production of /'CV.CVC/ words, either are truncated, or produced with a final unstressed light syllable (['CV.CV]).

Our data suggest that children perceive the heavy character of a final syllable in /CV.'CVC/ words and, consequently, place stress on it. Our results support Bisol's (1993, 1999) and Wetzels' (2006) proposals, according to which the unmarked position of stress in

Portuguese is the penultimate syllable of the lexical word, or the final syllable if it is heavy. On this assumption, the domain for word stress is the lexical word.

As soon as the (trochaic) foot is acquired, children are able to correctly assign stress, as they stress the penultimate syllable of the lexical word ([-'CV.CV]). At this stage, binary feet are built left-headed. /-WS/ words are possible after children realize that words can be longer than a foot and that stress falls on the last syllable of the word, if it is heavy. At this stage, also, children know that feet in their language are quantity-sensitive (on the final syllable) and that any Branching Rhyme or Nucleus (oral or nasal) and nasal Non-Branching Nucleus counts as heavy.

If Portuguese children were insensitive to weight, words of the type /'CV.CVC/ (*lápis* 'pencil', *íris* 'iris', *pónei* 'poney', *móvel* 'chest', *ténis* 'sneakers', etc.) should not be problematic, especially when /-SW/ words are the most frequent words in the language and the evidence for the trochaic foot is attested in the children's productions (namely, through the high target-like production rate for /SW/ words and the truncation for [SW] in /WSW/ words). Also, if syllable weight was 'invisible' to children, there would be no reason for the disparate acquisition of /'CV.CVC/ words, when compared to the other (unmarked) structures (/SW/ words in general, and /WS/). Though the production of /CV.'CVC/ and /CV.'CV/ was subject to some instability and variability, a parallel acquisition path and the absence of stress shift of the type /CV'CV/ -> ['CV.CV] suggest that these are, in fact, two instances of the same structure: /CV.'CVC/. Additionally, if weight was not relevant, /'CV.CVC/ words should be produced correctly from the beginning and there would be no reason for their infrequent (marked) character in the language.

Our data confirmed the marked nature of /'CV.CVC/ and /'CV.CV.CV/ words, which bear extrametrical information and, therefore, are acquired later by EP-speaking children.

When non-reduplicated disyllables are selected, no preference for any foot type is attested. /SW/ and /WS/ words are equally prone to truncation and /WSW/ words can be truncated to [SW] or [WS], with a slight tendency for [SW]). When children start producing the trochaic foot, they already know the general word stress algorithm: stress the penultimate syllable of the lexical word (232a.), or the final syllable if it is heavy (232b.), as shown in the following metrical representations for the /SW/ word *casa* 'house' [ˈkazɐ] and the /WS/ word *balão* 'balloon' /bɐˈlɐ̃w̃/ -> [məˈɲɐ̃w̃].

(232) Metrical representation of /SW/ and /WS/ words produced by the children when the basic stress algorithm is acquired:

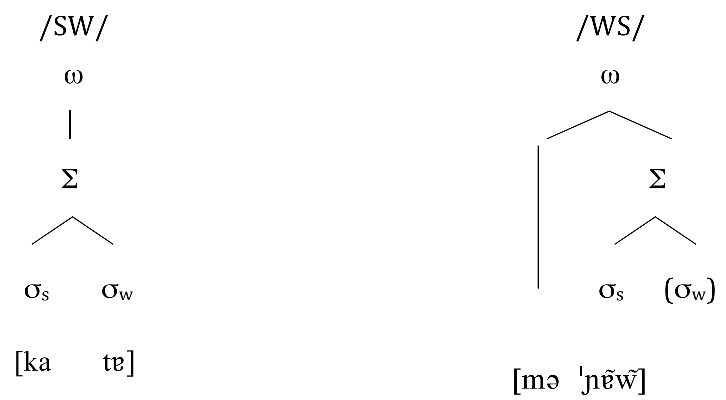
```
                         *
                         (*      .)
a. /ˈkazɐ/ ->            [ˈka    tɐ]

                                 *
                         .       (*)
b. /bɐˈlɐ̃w̃/ ->           [mə     ˈɲɐ̃w̃]
```

The prosodic representation of word prominences for the non-verbs *casa* 'house' /ˈkazɐ/ and *balão* 'balloon' /bɐˈlɐ̃w̃/, produced by the children as [ˈkatɐ] and [məˈɲɐ̃w̃], respectively, would be the one presented in (233a.) and (233b.).

(233) Prosodic representation of /SW/ and /WS/ words produced by the children when the basic stress algorithm is acquired:

a. e.g., *casa* 'house' /ˈkazɐ/ -> [ˈkatɐ]   b. e.g., *balão* 'baloon' /bɐˈlɐ̃w̃/ -> [məˈɲɐ̃w̃]



When both /SW/ and /WS/ words are correctly produced, children have learned the basic algorithm for word stress in their language, even though extrametricality (present in /'CV.CVC/ and in /SWW/ words) is not yet acquired.

The results found in this chapter indicate that, indeed, children appear to be sensitive to syllable weight during the acquisition of words stress and, in particular, to the heavy character of the final syllable in lexical words. The asymmetry found between /CV.'CVC/ and

/'CV.CVC/ words, attested in the emergence path, in the children's productions and in the amount of tokens selected, suggested that, indeed, final stressed syllables in EP are heavy and that the word stress algorithm might be sensitive to syllable weight.

6.3. Summary

In this chapter we analyzed two putative stress-related aspects in the spontaneous speech of five Portuguese children: the interaction with morphology and the role of syllable weight in word stress acquisition.

Firstly, we analyzed the distribution of word classes per word shape and stress pattern in the children's intake. We accounted for the amount of monosyllabic and multisyllabic (/-SW/ and /-WS/) non-verbs and verbs. The results showed that some children earlier selected /-WS/ words (Clara, Inês and Joana) and others earlier selected /-SW/ words (João and Luma). All children had greater amounts of monosyllabic targets, in the early stages. The results further showed an asymmetry between (i) monosyllabic and multisyllabic verbs and (ii) disyllabic non-verbs and verbs. Initially, children selected both verbs and non-verbs, but mostly monosyllables. Multisyllabic non-verbs were selected later and, finally, multisyllabic verbs were selected as well. The presence of monosyllabic verbs and both mono- and multisyllabic non-verbs in the children's intake suggested that prosodic or rhythmic constraints, rather than morphological ones, were preventing children from producing multisyllabic verbs. These data however, indicated that children may indeed be sensitive to different stress algorithms in the non-verb and in the verbs' system.

In the following section, we investigated the acquisition of trochees and the word marker, aiming to test whether morphological information was interacting with the acquisition of trochaic non-verbs, and to test whether there was evidence for a default iambic foot. We accounted for the acquisition of the word marker and the acquisition of trochees and concluded that there was a general simultaneous acquisition on both, suggesting that, in fact, the production of a /SW/ stress pattern might be motivated by the acquisition of gender contrast. However, two children were able to produce the word marker before they acquired the trochaic pattern, by recurring to stress shift in target trochees (e.g., *carro* 'car' /ˈkaʀu/ -> *carró* [kɑˈʀo], Luma, 2;1; *bola* 'ball' /ˈbɔlɐ/ -> [buˈlaː], João, 1;5). Moreover, trochees without gender marker, which do not bear morphological information and would be produced as iambs, were produced accordingly or they were prone to the same strategies as both trochees with word marker and iambs. In fact, as observed in Chapter 5, much variability in the early stages was attested in the children's production patterns, at the beginning. Target-like productions, truncation, reduplication and epenthesis were strategies available for the children, when dealing with non-reduplicated iambs, target trochees, with and without the word marker. Therefore, we found no indisputable evidence for a default iambic foot, neither a trochaic one, or for an interaction of morphology in word stress acquisition in EP.

As for the acquisition of stress patterns in verbs, we found that, in general, when multisyllabic verb forms were selected and produced – which occurred later than for multisyllabic no-verbs and monosyllabic verbs – children preferred /-SW/ verb forms and verb forms that tend to conform to a theme (stem+theme vowel). Inflection markers (person/number or tense/mood), especially with a /-WS/ stress pattern, tend to emerge later in the children's productions. At the early stages, children mainly use the same strategies used for non-verbs, irrespective of the target stress pattern (mostly truncations and reduplications) and, later, they produce target verb forms accordingly. The results from the observation of the acquisition of verb forms indicated that the early stress patterns produced in verbs are trochaic and conform to a verb theme.

In the second main section of this chapter, we investigated the role of syllable weight in the acquisition of stress pattern in the speech of the five children in our *corpus*.

We analyzed the deletion rate in unstressed light and heavy syllables in the speech of 4 of the children and concluded that (i) unstressed light syllables were slightly more prone to deletion than unstressed heavy syllables; (ii) unstressed heavy syllables were in much lesser amounts than unstressed light syllables, in the children's intake.

Afterwards, we compared the emergence path for words with stressed and unstressed heavy syllable (/CV.'CVC/ and /'CV.CVC/, respectively), and words with stressed CV final syllables (/CV.'CV/). In all cases, no morphological constituents apart from the stem were present (e.g., *anel*] 'ring' /ɐˈnɛɫ/, *lápis*] 'pencil' /ˈlapiʃ/ and *café*] 'coffee' /kɐˈfɛ/, respectively). The results found indicated that there was a difference in the acquisition path for /CV.'CVC/ and /'CV.CVC/, noticeable either in the amount of tokens selected and in the production patterns. /CV.'CVC/ words emerged and were acquired much earlier than /'CV.CVC/. When /'CV.CVC/ words are selected, they are initially truncated or produced with a final unstressed light syllable, contrary to /CV.'CVC/ words, which tend to maintain the Rhymal structure of the target, i.e., their heavy character. These data suggested that children were sensitive to the different stress pattern and prosodic structure of /CV.'CVC/ and /'CV.CVC/ words, and to the fact that, in /'CV.CVC/ words, stress was not in the final syllable, which, in that case, should not be heavy. /CV.'CV/ words pursued an emergence and acquisition path similar to the one observed in /CV.'CVC/ words, which lead us to assume that the final syllables of both /CV.'CVC/ and /CV.'CV/ words were being processed as heavy and stressed. Infrequent stress shift in /CV.'CV/ words, in a period of children's development where trochees were acquired, supported the assumption that the final syllable in /CV.'CV/ words was being processed as heavy. As referred to in section 6.1.2., since no verb forms were analyzed with respect to syllable weight (mainly due to its paucity and later productions in the children's speech), any conclusions as to the role of syllable weight during the acquisition of word stress born out from our data should only apply to non-verbs.

Overall results in this chapter supported the claim that children are sensitive to syllable weight during word stress acquisition and that the interaction of morphology with word stress in the early stages is unclear.

7. Summary and conclusions

In this dissertation we investigated the acquisition of primary word stress in EP. We aimed to describe the acquisition path undertaken by Portuguese children with respect to primary word stress. Specifically, in this research project, we intended to:

(i) identify the developmental path for the acquisition of stress patterns and word shape in EP;

(ii) provide empirical evidence for the ongoing discussion on the nature of word stress in the target language;

(iii) compare the acquisition of stress patterns in EP with the acquisition of stress patterns and word shape in other languages (namely Dutch, English and BP), in order to contribute for a discussion on the nature of this prosodic aspect in human languages.

In the first chapter, we described the general properties of word stress, and defined it as a prosodic property of a subset of languages of the world. Despite being a language-specific aspect, word stress is governed by general principles that are common cross-linguistically. Stress is defined as "the linguistic manifestation of the rhythmic structure" (Hayes, 1995:8). In stress languages, stress placement is predictable and assigned on the basis on an algorithm (fixed stress) or not (free stress). Stress is, also, a phonological aspect that is related to rhythmic, prosodic and metrical properties of the languages.

In Portuguese, word stress has been under debate in the last 4 decades. Mainly, two different analyses have been purported aiming at describing and explaining how stress works in the language.

On the one hand, authors defend that primary word stress is assigned on the basis of morphological information (Lee, 1995; Mateus, 1983; Mateus & Andrade, 2000; Pereira, 1999). The default rule for non-verbs predicts that stress falls on the last syllable of the stem (e.g., *gat*]*o* 'cat' [ˈgatu], *calor*] 'heat' [kɐˈloɾ]). In non-verbs the stem is, thus, the domain of word stress. In verbs, word stress is assigned on the basis of morphological constituency alone, with different stress rules applying to different tenses (Present, Past and Future), depending on the morphological constituency of the word. In verbs, the domain for word stress is the lexical word.

On the other hand, authors defend that stress is assigned on the basis of syllable weight (Bisol, 1992, 1993, 1999; Wetzels, 2006). In this case, the default rule predicts that stress is on the penultimate syllable or in the final syllable, if it is heavy (at the level of the Rhyme /VC/, /VNC/ - or at the level of the Nucleus - /VN/, /VG/, /VGN/). The domain for word stress is the lexical word, both in non-verbs and in verbs.

Besides the conflicting descriptions above-mentioned, the pertinacity of feet in the language phonology is not clear either (Mateus *et al.*, 2003; Vigário, 2003). Apart from the putative role of feet in stress assignment, the foot is only referred to in two other processes: the Spondaic and the Dactylic Lowering (Wetzels, 1992, 1995). Neither of these two processes provides evidence for the trochaic foot.

In the second chapter, we reviewed the literature on the acquisition of word stress and word shape. This literature on the topic focusses on three main aspects: the representation of early words, the development of stress patterns across development, and the role of filler sounds and reduplications in the prosodic development.

In most Germanic languages (Dutch, English and German), the developmental paths found are consistent with an early production of monosyllabic words (Stage 0) (Fikkert, 1994; Demuth, 1995, 1996; Lleó & Demuth, 1999). In fact, Germanic languages are known to have a longer stage in which mostly monosyllables are produced (Demuth & Lleó, 1999; Roark & Demuth, 2000). Particularly in Dutch, a language that has been exhaustively studied from the stress acquisition perspective, it was observed that, during the early stages of disyllabic productions (Stage I), correctly children produce target trochees and mainly truncate target iambs to monosyllables. At Stage II, children no longer truncate iambs to monosyllables, and tend to transform iambs into trochees. In later stages (Stage III), the production of longer words (with more than one foot) is attained, though some cases of deviant productions are yet attested for words longer than two syllables. Dutch children acquire weight when they realize that heavy syllables attract stress and produce two prominent syllables in words with a final heavy syllable. In the later stage (Stage IV), stress patterns are fully acquired and words are produced target-like. The results for Germanic languages indicate that children are sensitive to the properties of the language they are acquiring.

Despite the great agreement found in Germanic languages, in the data from children speaking other languages, different results are observed. Children acquiring trochaic languages tend to mirror the trochaic rhythm of the target system (e.g., Demuth, 2001b and Gennari & Demuth, 1997, for Spanish; Prieto, 2006, for Catalan). In French, a language with phrase final accent, children's early productions alternate between mono- and disyllables, and there is a heavy tendency for reduplications with a final stressed syllable (Braud, 2003; Demuth & Johnson, 2003; Rose, 2000; Wauquier-Gravelines, 2003). In Hebrew, a language with a majority of iambic feet, a trochaic tendency is observed (Adam & Bat-El, 2008, 2009). In Greek, also a trochaic, weight-insensitive language, no general preference for an earlier acquisition of iambs or trochees is observed, and a great variability between children is found in the truncation patterns of both trochaic and iambic words, suggesting a neutral start in the acquisition of word stress (Tzakosta, 2004). From this cross-linguistic analysis, it is possible to verify that, despite some variation observed, in most cases, children mirror the rhythmic tendency attested in the target language (Hebrew is, probably, the only exception and the pattern favored was trochaic - Adam & Bat-El, 2008, 2009).

Early productions with filler sounds at the left-edge of words and reduplications are reported in some languages (namely, English, French, German, Spanish, Swedish and BP). The nature and role of filler sounds and reduplications, their lexical and prosodic status is, however, far from being clear. The literature suggests that children may use filler sounds and reduplications for a number of reasons, which are mainly related to the prosodic and morphosyntactic requirements (e.g., Lleó, 1997, 2001a,b; Peters, 2001b; Santos & Scarpa, 2005; Scarpa, 1998, for fillers; e.g., Demuth & Johnson, 2003; Fee & Ingram, 1982; Ferguson, 1983; Moskowitz, 1973; Wauquier-Gravelines, 2002, for reduplications). The results found in some studies suggest, though, that they are normally produced in order to match either feet, word or phrasal templates.

Cross-linguistic investigation on word stress acquisition further suggests that frequency information and the prosodic structure of the language (tendency for proclitization or encliticization, minimality and maximality requirements and the rhythmic tendency) may provide children with evidence for specific word shapes as well. The frequency of word shapes found in the language may provide children with evidence for larger or shorter prosodic words, which children will mirror in the early productions. For instance, in languages where a high number of monosyllabic words are present, children tend to keep monosyllabic word shapes for longer time (e.g., Catalan and English vs. Spanish - Roark & Demuth, 2000; Prieto, 2006). In Spanish, a proclitic language, children tend to produce longer words earlier, due to the language's prosodic properties, namely due to the high frequency of multisyllabic phrases provided by sequences of determiner+nouns. In French, a language with no minimality requirements and a language with phrase-final accent, in which feet are irrelevant for prominence, alternating productions between mono- and disyllables, a high frequency of reduplications and a predominance of early iambic words are observed.

Therefore, the early word shape does not necessarily match a foot, and it might very well fulfill a word or phrase template.

The works on BP word stress (e.g., Bonilha, 2005; Santos, 2001, 2007) suggest that the majority of early words in Brazilian children have a [WS] shape. Santos (2001) describes word stress acquisition from an intonational perspective and observed an inital [WS] tendency, mainly due to phrasal stress, which is left-to-right in BP. The word stress algorithm is only mastered when extrametrical syllables (in /SWW/ words) are produced. Santos (2007) defends that Brazilian children have a default iambic foot and they cannot produce and acquire trochees due to the interaction with morphology, since trochaic – but not iambic – non-verbs bear a final word marker. These results support Lee's (1995) description for Portuguese word stress, according to which word markers are extrametrical and the default foot in non-verbs is an iamb (e.g., *sapát*]~~o~~ 'shoe'; e.g., *colár*] 'necklace'). In verbs, an iambic tendency is also observed in BP (Santos, 2007), though in the adult verb system (Lee, 1995), a trochaic default foot is assumed.

Based on the reports and findings in the literature, both on Portuguese and other languages, we adressed three main research questions in this dissertation:

(i) How is word stress acquired in Portuguese?

(ii) What can the development of word shape and stress patterns tell us about the stress algorithm in Portuguese?

In particular, we aimed at discussing how and when do children acquire primary word stress, whether children's early words match a default monosyllabic or a disyllabic template, and whether children's early disyllabic productions match a default trochaic foot.

In Chapter 3, a description on the method used in this dissertation was provided, by introducing the information about the children, data collection and phonetic transcriptions.

In Chapters 4, 5 and 6, we presented and discussed the results for word stress acquisition in EP.

Chapter 4 consisted in a preliminary acoustic study based on a speech sample of two of the children in our *corpus* (Inês and Joana). In this chapter, we carried out an analysis, aiming at measuring the acoustic parameters that are relevant for word stress, both cross-linguistically (fundamental frequency, intensity and duration) and in EP (intensity and duration - Delgado Martins, 1977, 1986, 1988). Frequent perception of level and final stress lead us to analyze fundamental frequency, intensity and duration in the early disyllables of two children, in order to identify word prominence. Our results confirmed that, at the onset of word production, and until around 2;0, children might not master the acoustic parameters used to assign word prominence. Great variability is found in the early stages of word production, in the use of fundamental frequency, intensity and duration. Variability is also observed in the production of the acoustic parameters, both between children and within the same child. A closer analysis on duration and intensity in the children's disyllables showed that, in fact, Joana uses frequent recursion to level stress and Inês prefers final stress, although cases of level stress are also attested in both children. From the three parameters analyzed, only duration in /-WS/ words show some consistency, in the early speech of one of the children observed. Inês normally lengthens the second vowel in /-WS/. Joana shows a great early variation in all acoustic parameters. In the last analyzed sessions, both children are able to correctly produce the target stress pattern. Overall results of the acoustic analysis suggest that word stress in the early stages of word production might not be mastered (Pollock, Brammer & Hageman, 1993; Kehoe, Stoel-Gammon & Buder, 1995).

In Chapter 5, we conducted an analysis on the word shapes and stress patterns produced by the children, hypothesizing on an early trochaic tendency in EP. We identified the children's production patterns, and analyzed the data taking into account the degree of faithfulness, and the strategies used by the five children in our *corpus*. We investigated monosyllables, disyllables and trisyllables, both in the children's production and in the children's intake. The results for the production patterns show that, at the onset of word production, there is a majority of monosyllabic forms and monosyllables have higher target-like production rates. Early [WS] word shapes are frequent as well, and they are overwhelmingly reduplicated forms or productions resulting from epenthesis at the left-edge of words. Great variability is found in this early stage, both in the strategies used by the children (some show a preference for monosyllabic forms, others use more reduplications or epentheses) and in the faithful productions. In a second stage, non-reduplicated disyllables produced target-like emerge and no preference for trochaic or iambic forms is observed. Both target forms can be occasionally produced accordingly or be truncated. At this stage, faithful productions of target trisyllables emerge in some children's speech, but truncation is also a frequent strategy. Truncation of /WSW/ words in stage II does not favor a trochaic or iambic foot. Some children prefer to truncate /WSW/ to [SW], others to [WS] and others still prefer [S]. At a third stage, target trochees are generally produced target-like and with lower rates of truncation than target iambs, and /WSW/ trisyllables are preferably truncated to trochees. Trisyllables are only acquired later in development, at a fourth stage, and only /WSW/ show an acquisition path, since /WWS/ and /SWW/ have a late emergence.

The results showed that, at the early stages (stage I and II), no general fixed word shape and stress pattern is observed in the children's speech, suggesting that (i) word prominence is not acquired and the stress algorithm is not mastered and (ii) there might be no prosodic organization within the prosodic word domain. Reduplications and filler syllables, which are frequent in these stages, are optional elements within the word, and might actually provide evidence for the stressed syllable being the target of children's attention. At the beginning of speech productions, the Portuguese children observed produce only the stressed syllable and, optionally, a repetition of the stressed syllable or a filler sound at the left-edge of words. Prosodic organization appears when a trochaic preference is attested, both by the higher rates of target-like production in trochees, a higher truncation rate in target iambs and a preference for truncation to [SW] in trisyllables of the type /WSW/. Both /WWS/ and /SWW/ are not acquired until the end of the observation period, /WWS/ having, in general, higher target-like rates than /SWW/.

Our hypothesis was partly confirmed since, indeed, a trochaic tendency was attested in the data, though, initially, no word shape was favored categorically, contrary to what occurs, for instance, in Dutch. The developmental path accounted for in Chapter 5 suggest that, despite the early differences found between EP and other Germanic languages, EP behaves like other trochaic languages, such as Greek or Spanish. Indisputable evidence for an early iambic foot is not found since most non-reduplicated target iambs are scarce at the beginning and are prone to truncation, just like trochees. The claim for an early iambic foot in BP (Santos, 2007) might be biased by the tendency for reduplications and epenthesis, which tend to conform to a [WS] pattern (though not only, as multiple reduplications with level stress are also found). These early productions might not be iambic feet and, like in French (Braud, 2003), they might be used to match prominences assigned from higher prosodic levels, namely phrasal stress (Santos, 2001; Santos & Scarpa, 2005; Vihman, DePaolis & Davis, 1998). The data found in Chapter 5 suggest a syllable prominence account, with a putative role of phrasal prominence in early word production, and children's sensitivity for the rhythmic properties of the language during the acquisition of word stress.

In Chapter 6, we tested the acquisition of morphological aspects and syllable weight in relationship with the acquisition of stress patterns. We analyzed the distribution of word classes (non-verbs and verbs) per word shape (monosyllables, di- and trisyllabic words ending in /-SW/ and /-WS/). In respect with the non-verb paradigm, our main purpose was to test the interaction of morphology and word stress. We analyzed the acquisition of word markers and trochees (e.g., *casa* 'house' /ˈkazɐ/, *gato* 'cat' /ˈgatu/) and the production strategies in trochees where the word marker is an empty category in the target form (e.g., *lápis* 'pencil' /ˈlapiʃ/). Moreover, we investigated the acquisition of stress patterns and inflection in verbs, by accounting for the acquisition of verb tenses and word shapes. The results from the interaction between morphology and the acquisition of word stress in non-verbs suggested that an interaction between word stress acquisition and the mastery of some morphological aspects (namely, noun and verb inflection) is arguable and hardy testable, as the Portuguese children observed tend to delete unstressed syllables and not specifically the word marker.

Regarding the verb system, our data indicated some sensitivity to the word class in the asymmetrical distribution of word classes per word shape. Mono- and multisyllabic non-verbs are present in children's early intake, but only monosyllabic verbs are selected at that moment. The early verb forms produced target-like conform, in general, to a /SW/ stress pattern and a verb theme (namely, through the production of the 3rd p.sg. of the Present/Imperative). Inflection suffixes are not found in the children's early productions and iambic verb forms tend to emerge later in the observed children's speech. Though verbs emerge and are acquired later than non-verbs, the order of emergence and acquisition of stress patterns in non-verbs and verbs is similar ([S] > [SW],[WS] > [SW]). These results indicated that longer verb forms, which are normally more complex, are acquired later.

General results of the interaction between the mastery of some morphological aspects and word stress acquisition suggested that, despite some differences observed in the emergence and acquisition timings, the developmental path for stress patterns in non-verbs and verbs proceeds very much alike: initially, no word shape is preferred, later a preference for trochaic words is mostly observed and, finally, iambic verb forms emerge. Also, evidence for morphological contrasts (either the word marker or verb inflection) being produced is found at the later stages of word production.

With respect to the potential effect of syllable weight carried on in Chapter 6, we investigated the emergence and the deletion rate in words with final unstressed heavy and light syllables (/CV.'CVC/ and /'CV.CVC/ words – e.g., *amór* 'love' and *lápis* 'pencil', respectively), and in words with a final stressed light syllable (/CV.'CV/ words – *café* 'coffee'). The classification in EP on the heavy character of these final syllables is not consensual. Our analysis in this dissertation mainly aimed at analyzing them under the perspective that children might process them as heavy, even though adults might not. In addition, we analyzed the frequency of stress shift in these word shapes. Such words consisted in non-verbs and neither of them contained any word marker or plural suffix. The results showed that /'CV.CVC/ words are rarely selected by the children and that their developmental path is different from the one observed in /CV.'CVC/ and /CV.'CV/ words, as the former emerge much later than the latter. This asymmetry appears to confirm the exceptional and marked character of the former, when compared to the latter and, moreover, it indicates that, in fact, Portuguese children might be sensitive to syllable weight in the last syllable, during word stress acquisition. Indeed, even though they correctly produce the final stressed syllable in words like *balão* 'balloon' ou *amór* 'love', words like *lápis* 'pencil' or *núvem* 'cloud' are often truncated or produced with a final light syllable. Stress shift, however, does not reveal sensitivity for syllable weight, as this strategy is not frequent in none of the word forms tested.

In this dissertation, we defend that Portuguese children seem to process word stress on the basis of the rhythmic properties of the target language. The data indicated that children mirror the trochaic rhythm of the target language, furthermore supporting a rhythmic word stress algorithm. Despite the variable and neutral productions at the beginning, trochaic words tend to be acquired earlier than non-reduplicated iambs, which are prone to truncation until later.

The data did not show, however, robust conclusions as to the interaction of morphology during word stress acquisition. Children initially delete unstressed syllables and not necessarily word markers in non-verbs, and early verbs acquired tend to be trochaic and conform to a verb theme. Early inflection is not noticeable, probably due to its unmastery at the onset of word production but, more likely, due to prosodic constraints shaping children's early words. However, multisyllabic – but not monosyllabic – verbs are not early selected by children, even though mono- and multisyllabic non-verbs are produced, at the same stage. This asymmetry suggests that, indeed, children might be sensitive to a different stress algorithm in verbs and non-verbs.

As the results of the interaction of morphology in word stress acquisition were not conclusive, many other aspects were left aside, in this dissertation. We now wish to list them, in order to provide new insights for future research.

One first aspect is related to our option to consider speech productions until 2;6 only. This option was formerly based on the importance of discussing the presumed problematic stages of word stress acquisition in EP (the early stages), and additionally, on the fact that 3 of the five children in the database were only recorded and transcribed until that age. However, this decision clearly limited our analysis, namely with respect to the acquisition of trisyllables (especially /WWS/ and /SWW/), extrametricality and the full mastery of verb inflection. Therefore, further analysis on the later speech of Portuguese children is required, in order to fully account for word stress acquisition in EP.

Also, frequency data on heavy syllables attracting stress in the target system is necessary, in order to empirically support or definitely reject the role of syllable weight in Portuguese word stress. This information should consider spontaneous adult speech, take into account both the number of types and tokens in the language and put apart words in which /-s/ that does not correspond to the plural marker, as in words like *rapaz* 'boy' /ʀɐˈpaʃ/ or *viés* 'bias' /viˈɛʃ/. Afterwards, and given the reduced amount of words with unstressed heavy syllables in the observed children's intake, cross-sectional and longitudinal experimental studies on syllable weight during acquisition are necessary, in order to provide more robust evidence for or against the role of syllable weight, both in non-verbs and verbs, during the acquisition of EP.

Finally, one issue that is strongly related to word stress and which requires further investigation is intonation. It is yet to be deeply studied the role and the nature of the relationship between word stress and intonation, in EP word stress acquisition (in the line of the research conducted in Frota & Vigário, 2008 and Frota & Matos, 2009). This research would allow, not only for a better understanding on the nature of the apparent iambic tendency, early reduplications and epentheses, but also it would enable us to more empirically ground the putative interaction between lower and the higher levels of the prosodic hierarchy. It would furthermore shed light on a possible interactive top-down and bottom-up processing of prosodic acquisition.

In sum, with this research work, we hope to have provided an extensive description on the acquisition of word stress in EP, by means of developmental stages. On the assumption that the investigation on language acquisition contributes to build and validate theoretical models on the representation of language, with this dissertation we hopefully have contributed with further empirical evidence to the discussion on the linguistic representation of word stress, in Portuguese and in cross-linguistic acquisition.

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Appendices

Appendix A

Regular verb inflection in Portuguese and stress patterns

Cantar 'to sing' = Cant]$_{Root}$+a]$_{TV}$+r]$_{TM}$ (TV /a/ - 1st conjugation)

Indicative

Present Tenses	*Past Tenses*			*Future Tenses*
Present	Past Perfect	Imperfect	Pluperfect	Future
CANto (SW)	canTEI (WS)	canTAva (SW)	canTAra (SW)	cantaREI (WS)
CANtas (SW)	canTASte (SW)	canTAvas (SW)	canTAras (SW)	cantaRÁS (WS)
CANta (SW)	canTOU (WS)	canTAva (SW)	canTAra (SW)	cantaRÁ (WS)
canTAmos (SW)	canTÁmos (SW)	canTÁvamos (SWW)	canTÁramos (SWW)	cantaREmos (SW)
canTAIS (WS)	canTAStes (SW)	canTÁveis (SW)	canTAreis (SW)	cantaREIS (WS)
CANtam (SW)	canTAram (SW)	canTAvam (SW)	canTAram (SW)	cantaRÃO (WS)

Infinitive	**Past Participle**	*Conditional*
canTAR (WS)	canTAdo (SW)	cantaRIa (SW)
		cantaRIas (SW)
Imperative		cantaRIa (SW)
CANta (SW)		cantaRIamos (SWW)
canTAmos (SW)		cantaRIeis (SW)
Gerund		cantaRIam (SW)
canTANdo (SW)		

Subjunctive

Present Tenses	*Past Tenses*
Present	Imperfect
FAle (SW)	faLAsse (SW)
FAles (SW)	faLAsses (SW)
FAle (SW)	faLAsse (SW)
faLEmos (SW)	faLÁssemos (SWW)
faLEIS (WS)	faLÁsseis (SW)
FAlem (SW)	faLAssem (SW)

Comer 'to eat' = com]$_{Root}$ + e]$_{TV}$ + r]$_{TM}$ (TV /e/ - 2nd conjugation)

Indicative

Present Tenses	*Past Tenses*			*Future Tenses*
Present	Past Perfect	Imperfect	Pluperfect	Future
COmo(SW)	coMI (WS)	coMIa (SW)	coMEra (SW)	comeREI (WS)
COmes (SW)	coMESte (SW)	coMIas (SW)	coMEras (SW)	comeRÁS (WS)
COme (SW)	coMEU (WS)	coMIa (SW)	coMEra(SW)	comeRÁ (WS)
coMEmos (SW)	coMEmos (SW)	coMÍamos (SWW)	coMEramos (SWW)	comeREmos (SW)
coMEIS (WS)	coMEStes (SW)	coMÍeis (SW)	coMEreis (SW)	comeREIS (WS)
COmem (SW)	coMEram (SW)	coMIam (SW)	coMEram (SW)	comeRÃO (WS)

Infinitive	**Past Participle**	*Conditional*
coMER (WS)	coMIdo (SW)	comeRIa (SW)
		comeRIas (SW)
Imperative		cantaRIa (SW)
COme (SW)		comeRIamos (SWW)
coMAmos (SW)		comeRIeis (SW)
Gerund		comeRIam (SW)
coMENdo (SW)		

Subjunctive

Present Tenses	*Past Tenses*
Present	Imperfect
COma (SW)	coMEsse (SW)
COmas (SW)	coMEsses (SW)
COma (SW)	coMEsse (SW)
coMAmos (SW)	coMÊssemos (SWW)
coMEIS (WS)	coMÊsseis (SW)
COmam (SW)	coMEssem (SW)

Dormir 'to sleep' = dorm]$_{Root}$ + i]$_{TV}$ + r]$_{TM}$ (TV /1/ - 3rd conjugation)

Indicative

Present Tenses	*Past Tenses*			*Future Tenses*
Present	Past Perfect	Imperfect	Pluperfect	Future
DURmo (SW)	dorMI (WS)	dorMIa (SW)	dorMIra (SW)	dormiREI (WS)
DORmes (SW)	dorMISte (SW)	dorMIas (SW)	dorMIras (SW)	dormiRÁS (WS)
DORme (SW)	dorMIU (WS)	dorMIa (SW)	dorMIra (SW)	dormiRÁ (WS)
dorMImos (SW)	dorMImos (SW)	dorMÍamos (SWW)	dorMÍramos (SWW)	dormiREmos (SW)
dorMIS (WS)	dorMIStes (SW)	dorMÍeis (SW)	dorMIreis (SW)	dormiREIS (WS)
DORmem (SW)	dorMIram (SW)	dorMIam (SW)	dorMIram (SW)	dormiRÃO (WS)

Infinitive	**Past Participle**	*Conditional*
dorMIR (WS)	dorMIdo (SW)	dormiRIa (SW)
		dormiRIas (SW)
Imperative		dormiRIa (SW)
DORme (SW)		dormiRIamos (SWW)
dorMImos (SW)		dormiRIeis (SW)
Gerund		dormiRIam (SW)
dorMINdo (SW)		

Subjunctive

Present Tenses	*Past Tenses*
Present	Imperfect
DURma (SW)	durMIsse (SW)
DURmas (SW)	durMIsses (SW)
DURma (SW)	durMIsse (SW)
durMAmos (SW)	durMÍssemos (SWW)
durMEIS (WS)	durMIsseis (SW)
DURmam (SW)	durMIssem (SW)

Appendix B

Monosyllables

(faithfull production and strategies)

Clara

	/S/	[S]	%	[SW]	%[SW]	[WS]	%[CV1CV1]	[FS]	%[fS]	[CVCV...]	%[CVCV...]	%TOTAL
Session 1	-	-	-	-	-	-	-	-	-	-	-	-
Session 2	1	0	0	0	0	0	0	1	100	0	0	100
Session 3	4	4	100.0	0	0	0	0	0	0	0	0	100
Session 4	7	6	85.7	0	0	1	14.3	0	0	0	0	100
Session 5	7	5	71.4	0	0	1	14.3	1	14.3	0	0	100
Session 6	13	6	46.2	1	7.7	0	0	5	38.5	1	7.7	100
Session 7	27	20	74.1	3	11.1	0	0	2	7.4	2	7.4	100
Session 8	17	11	64.7	5	29.4	0	0	0	0	1	5.9	100
Session 9	22	15	68.2	2	9.1	2	9.1	1	4.5	2	9.1	100
Session 10	34	32	94.1	1	2.9	1	2.9	0	0	0	0	100
Session 11	100	86	86.0	4	4.0	0	0	6	6.0	4	4.0	100
Session 12	87	82	94.3	2	2.3	3	3.4	0	0	0	0	100

Inês

	/S/	[S]	%	[SW]	%[SW]	[WS]	%[CV1CV1]	[FS]	%[fS]	[CVCV...]	%[CVCV...]	%TOTAL
Session 1	1	0	0	0	0	0	0	0	0	1	100	100
Session 2	22	13	59.1	0	0	0	0	6	27.3	3	13.6	100
Session 3	68	25	36.8	2	2.9	2	2.9	5	7.4	34	50.0	100
Session 4	112	45	40.2	1	0.9	15	13.4	3	2.7	48	42.9	100
Session 5	39	27	69.2	0	0	1	2.6	8	20.5	3	7.7	100
Session 6	129	81	62.8	1	0.8	4	3.1	25	19.4	18	14.0	100
Session 7	80	54	67.5	0	0	3	3.8	8	10.0	15	18.8	100
Session 8	89	64	71.9	13	14.6	1	1.1	3	3.4	8	9.0	100
Session 9	97	86	88.7	4	4.1	3	3.1	1	1.0	3	3.1	100
Session 10	136	119	87.5	8	5.9	1	0.7	8	5.9	0	0	100
Session 11	236	200	84.7	22	9.3	0	0	5	2.1	9	3.8	100
Session 12	410	374	91.2	18	4.4	1	0.2	0	0	17	4.1	100
Session 13	259	239	92.3	8	3.1	1	0.4	1	0.4	10	3.9	100
Session 14	316	288	91.1	11	3.5	2	0.6	1	0.3	14	4.4	100
Session 15	226	211	93.4	4	1.8	0	0	0	0	11	4.9	100
Session 16	454	416	91.6	13	2.9	0	0	2	0.4	23	5.1	100
Session 17	236	218	92.4	0	0.0	0	0	0	0	18	7.6	100
Session 18	428	358	83.6	21	4.9	1	0.2	0	0	48	11.2	100

Joana

	/S/	[S]	%	[SW]	%[SW]	[WS]	%[CV1CV1]	[FS]	%[fS]	[CVCV…]	%[CVCV…]	%TOTAL
Session 1	2	2	100	0	0	0	0	0	0	0	0	100
Session 2	1	1	100	0	0	0	0	0	0	0	0	100
Session 3	1	1	100	0	0	0	0	0	0	0	0	100
Session 4	8	8	100	0	0	0	0	0	0	0	0	100
Session 5	3	3	100	0	0	0	0	0	0	0	0	100
Session 6	3	2	66.7	0	0	0	0	0	0	1	33.3	100
Session 7	7	7	100	0	0	0	0	0	0	0	0.0	100
Session 8	8	7	87.5	0	0	1	12.5	0	0	0	0	100
Session 9	21	18	85.7	2	9.5	1	4.8	0	0	0	0	100
Session 10	62	52	83.9	6	9.7	0	0	1	1.6	3	5.0	100
Session 11	57	48	84.2	2	3.5	1	1.8	4	7.0	2	4.0	100
Session 12	59	51	86.4	4	6.8	1	1.7	1	1.7	2	3.0	100
Session 13	55	49	89.1	0	0	1	1.8	1	1.8	4	7.0	100
Session 14	229	171	74.7	0	0	0	0	5	2.2	53	23.0	100

João

	/S/	[S]	%	[SW]	%[SW]	[WS]	%[CV1CV1]	[FS]	%[fS]	[CVCV…]	%[CVCV…]	%TOTAL
Session 1	-	-	-	-	-	-	-	-	-	-	-	-
Session 2	4	1	25.0	0	0	2	50.0	1	25.0	0	0	100
Session 3	1	0	0	0	0	0	0	1	100	0	0	100
Session 4	-	-	-	-	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-	-	-	-	-
Session 7	3	2	66.7	1	33.3	0	0	0	0	0	0	100
Session 8	1	1	100	0	0	0	0	0	0	0	0	100
Session 9	26	16	61.5	5	19.2	1	3.8	0	0	4	15.4	100
Session 10	13	10	76.9	1	7.7	2	15.4	0	0	0	0	100
Session 11	26	12	46.2	0	0	12	46.2	1	3.8	1	3.8	100
Session 12	39	13	33.3	0	0	21	53.8	1	2.6	4	10.3	100
Session 13	18	15	83.3	0	0	2	11.1	1	5.6	0	0	100
Session 14	12	10	83.3	0	0	1	8.3	1	8.3	0	0	100
Session 15	29	27	93.1	0	0	1	3.4	1	3.4	0	0	100
Session 16	41	35	85.4	2	4.9	0	0	2	4.9	2	4.9	100
Session 17	72	55	76.4	7	9.7	2	2.8	1	1.4	7	9.7	100
Session 18	31	25	80.6	3	9.7	3	9.7	0	0	0	0	100
Session 19	68	62	91.2	0	0	3	4.4	3	4.4	0	0.0	100
Session 20	52	48	92.3	3	5.8	0	0	0	0	1	1.9	100
Session 21	33	26	78.8	5	15.2	0	0	1	3.0	1	3.0	100
Session 22	71	63	88.7	4	5.6	1	1.4	2	2.8	1	1.4	100

Luma

	/S/	[S]	%	[SW]	%[SW]	[WS]	%[CV1CV1]	[FS]	%[fS]	[CVCV…]	%[CVCV…]	TOTAL
Session 1	1	0	0	0	0	0	0	0	0	1	100	100
Session 2	2	1	50.0	0	0	0	0	1	50.0	0	0	100
Session 4	-	-	-	-	-	-	-	-	-	-	-	-
Session 6	13	12	92.3	0	0	0	0	0	0	1	8	100
Session 8	36	12	33.3	0	0	2	5.6	11	30.6	11	31	100
Session 10	1	1	100	0	0	0	0	0	0	0	0	100
Session 12	5	3	60.0	0	0	2	40	0	0	0	0	100
Session 14	2	2	100	0	0	0	0	0	0	0	0	100
Session 16	7	2	28.6	0	0	4	57.1	0	0	1	14	100
Session 18	7	5	71.4	0	0	2	28.6	0	0	0	0	100
Session 19	22	11	50.0	0	0	7	31.8	2	9.1	2	9	100
Session 20	14	8	57.1	0	0	2	14.3	1	7.1	3	21	100
Session 21	7	2	28.6	0	0	3	42.9	2	28.6	0	0	100
Session 23	3	2	66.7	0	0	1	33.3	0	0	0	0	100
Session 25	14	10	71.4	0	0	3	21.4	0	0	1	7	100
Session 27	53	51	96.2	0	0	1	1.9	0	0	1	2	100
Session 29	89	85	95.5	0	0	3	3.4	0	0	1	1	100
Session 30	149	136	91.3	0	0	1	0.7	5	3.4	7	5	100
Session 32	260	227	87.3	11	4.2	4	1.5	5	1.9	13	5	100
Session 34	168	144	85.7	20	11.9	0	0	2	1.2	2	1	100
Session 36	183	162	88.5	13	7.1	4	2.2	0	0	4	2	100

Appendix C

Truncation in trisyllables

Clara

	/WSW/	[WSW]	%[WSW]	[SW]	%[SW]	[WS]	%[WS]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	3	0	0	1	33.3	0	0	2
Session 8	-	-	-	-	-	-	-	-
Session 9	4	2	50.0	2	50.0	0	0	0
Session 10	11	4	36.4	1	9.1	0	0	6
Session 11	21	12	57.1	4	19.0	0	0	5
Session 12	22	8	36.4	8	36.4	1	4.5	5

	/WWS/	[WWS]	%[WWS]	[WS]	%[WS]	Other
Session 1	-	-	-	-	-	-
Session 2	-	-	-	-	-	-
Session 3	-	-	-	-	-	-
Session 4	-	-	-	-	-	-
Session 5	-	-	-	-	-	-
Session 6	-	-	-	-	-	-
Session 7	-	-	-	-	-	-
Session 8	-	-	-	-	-	-
Session 9	-	-	-	-	-	-
Session 10	-	-	-	-	-	-
Session 11	1	0	0	1	100	0
Session 12	5	0	0	4	80	1

Inês

	/WSW/	[WSW]	%[WSW]	[SW]	%[SW]	[WS]	%[WS]	[S]	%[S]	Other
Session 1	1	0	0	0	0	1	100	0	0	0
Session 2	1	0	0	0	0	0	0	0	0	1
Session 3	12	0	0	1	8.3	0	0	6	50.0	5
Session 4	11	0	0	0	0	3	27.3	3	27.3	5
Session 5	13	0	0	3	23.1	1	7.7	7	53.8	3
Session 6	33	1	3.0	0	0	16	48.5	8	24.2	8
Session 7	35	1	2.9	0	0	16	45.7	4	11.4	14
Session 8	33	7	21.2	4	12.1	5	15.2	6	18.2	11
Session 9	28	7	25.0	8	28.6	4	14.3	1	3.6	8
Session 10	77	33	42.9	9	11.7	3	3.9	23	29.9	9
Session 11	85	49	57.6	12	14.1	3	3.5	7	8.2	14
Session 12	112	74	66.1	19	17.0	9	8.0	7	6.3	3
Session 13	125	78	62.4	12	9.6	9	7.2	1	0.8	25
Session 14	75	53	70.7	11	14.7	2	2.7	3	4.0	6
Session 15	112	77	68.8	5	4.5	4	3.6	1	0.9	25
Session 16	106	54	50.9	27	25.5	21	19.8	0	0.0	4
Session 17	69	37	53.6	12	17.4	11	15.9	4	5.8	5
Session 18	79	45	57.0	11	13.9	12	15.2	4	5.1	7

	/WWS/	[WWS]	%[WWS]	[S]	%[S]	[WS]	%[WS]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	16	0	0	16	100	0	0	0
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	1	0	0		0	0	0	1
Session 7	-	-	-	-	-	-	-	-
Session 8	2	0	0	0	0	1	50.0	1
Session 9	4	1	25.0	0	0	3	75.0	0
Session 10	2	0	0	0	0	2	100	0
Session 11	11	2	18.2	2	18.2	6	54.5	1
Session 12	6	1	16.7	0	0	5	83.3	0
Session 13	22	9	40.9	0	0	6	27.3	7
Session 14	14	7	50.0	0	0	0	0	7
Session 15	17	8	47.1	1	5.9	3	17.6	5
Session 16	12	6	50.0	0	0	2	16.7	4
Session 17	12	1	8.3	0	0	6	50.0	5
Session 18	14	5	35.7	0	0	3	21.4	6

	/SWW/	[SWW]	%[SWW]	[S]	%[S]	[SW]	%[SW]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	7	0	0	4	57.1	0	0	3
Session 4	1	0	0	0	0	0	0	1
Session 5	2	0	0	1	50.0	0	0	1
Session 6	-	-	-	-	-	-	-	-
Session 7	21	0	0	15	71.4	0	0	6
Session 8	3	0	0	1	33.3	0	0	2
Session 9	1	0	0	0	0	0	0	1
Session 10	-	-	-	-	-	-	-	-
Session 11	-	-	-	-	-	-	-	-
Session 12	7	2	28.5	1	14.3	3	42.9	1
Session 13	5	1	20.0	0	0	2	40.0	2
Session 14	3	0	0	0	0	2	66.7	1
Session 15	9	6	66.7	0	0	2	22.2	1
Session 16	5	0	0	0	0	0	0.0	5
Session 17	4	0	0	0	0	3	75.0	1
Session 18	3	1	33.3	0	0	2	66.7	0

Joana

	/WSW/	[WSW]	%[WSW]	[SW]	%[SW]	[WS]	%[WS]	[S]	%[S]	Other
Session 1	-	-	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-	-	-
Session 7	2	0	0	0	0.00	0	0.00	1	50.0	1
Session 8	1	0	0	0	0.00	0	0.00	1	100	0
Session 9	11	0	0	0	0.00	5	45.45	4	36.4	2
Session 10	12	1	8.3	0	0.00	4	33.33	6	50.0	1
Session 11	31	5	16.1	2	6.45	4	12.90	13	41.9	7
Session 12	42	2	4.8	28	66.67	0	0.00	7	16.7	5
Session 13	44	5	11.4	15	34.09	5	11.36	5	11.4	14
Session 14	84	39	46.4	20	23.81	10	11.90	4	4.8	11

	/WWS/	[WWS]	%[WWS]	[S]	%[S]	[WS]	%[WS]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-
Session 8	-	-	-	-	-	-	-	-
Session 9	1	0	0	0	0	0	0	1
Session 10	3	0	0	1	33.3	0	0	2
Session 11	2	0	0	0	0	2	100	0
Session 12	1	0	0	1	100	0	0	0
Session 13	1	0	0	1	100	0	0	0
Session 14	3	0	0	0	0	1	33.3	2

	/SWW/	[SWW]	%[SWW]	[S]	%[S]	[SW]	%[SW]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-
Session 8	-	-	-	-	-	-	-	-
Session 9	-	-	-	-	-	-	-	-
Session 10	3	0	0	3	100	0	0	0
Session 11	5	0	0	2	40	0	0	3
Session 12	2	0	0	1	50	1	50	0
Session 13	1	0	0	0	0	0	0	0
Session 14	12	1	8.3	3	25	8	66.7	0

João

	/WSW/	[WSW]	%[WSW]	[SW]	%[SW]	[WS]	%[WS]	[S]	%[S]	Other
Session 1	-	-	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-	-	-
Session 5	7	1	14.3	2	28.6	3	42.9	1	14.3	0
Session 6	10	0	0.0	0	0	0	0	4	40	6
Session 7	-	-	-	-	-	-	-	-	-	-
Session 8	5	0	0.0	0	0	0	0	0	0	5
Session 9	1	0	0.0	0	0	0	0	0	0	1
Session 10	1	0	0.0	0	0	0	0	1	100	0
Session 11	8	1	12.5	4	50	2	25.0	0	0	1
Session 12	7	1	14.3	2	28.6	3	42.9	1	14.3	0
Session 13	-	-	-	-	-	-	-	-	-	-
Session 14	-	-	-	-	-	-	-	-	-	-
Session 15	2	0	0.0	1	50.0	0	0	0	0	1
Session 16	48	27	56.3	3	6.3	3	6.3	1	2.1	14
Session 17	38	26	68.4	5	13.2	3	7.9	0	0	4
Session 18	62	39	62.9	17	27.4	0	0	0	0	6
Session 19	34	23	67.6	7	20.6	0	0	0	0	4
Session 20	49	28	57.1	15	30.6	1	2.0	0	0	5
Session 21	42	15	35.7	20	47.6	1	2.4	0	0	6
Session 22	62	48	77.4	9	14.5	1	1.6	0	0	4

	/WWS/	[WWS]	%[WWS]	[S]	%[S]	[WS]	[WS]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-
Session 8	-	-	-	-	-	-	-	-
Session 9	2	0	0	2	100	0	0	0
Session 10	-	-	-	-	-	-	-	-
Session 11	-	-	-	-	-	-	-	-
Session 12	1	0	0	0	0	1	100	0
Session 13	-	-	-	-	-	-	-	-
Session 14	1	1	100	0	0	0	0	0
Session 15	3	0	0	3	100	0	0	0
Session 16	8	1	12.5	4	50.0	2	25.0	1
Session 17	4	1	25.0	0	0	1	25.0	2
Session 18	1	0	0	0	0	1	100	0
Session 19	9	3	33.3	1	11.1	3	33.3	2
Session 20	2	1	50.0	0	0	0	0	1
Session 21	4	2	50.0	0	0	2	50.0	0
Session 22	12	5	41.7	0	0	1	8.3	6

	/SWW/	[SWW]	%[SWW]	[S]	[S]	[SW]	%[SW]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	5	0	0	4	80	1	20	0
Session 8	-	-	-	-	-	-	-	-
Session 9	-	-	-	-	-	-	-	-
Session 10	-	-	-	-	-	-	-	-
Session 11	3	0	0	3	100	0	0	0
Session 12	-	-	-	-	-	-	-	-
Session 13	-	-	-	-	-	-	-	-
Session 14	-	-	-	-	-	-	-	-
Session 15	-	-	-	-	-	-	-	-
Session 16	6	0	0		0	4	66.7	2
Session 17	-	-	-	-	-	-	-	-
Session 18	2	0	0	0	0	0	0	2
Session 19	15	3	20.0	0	0	5	33.3	7
Session 20	8	1	12.5	0	0	2	25.0	5
Session 21	3	1	33.3	0	0	1	33.3	1
Session 22	3	0	0	0	0	0	0	3

Luma

	/WSW/	[WSW]	%[WSW]	[SW]	%[SW]	[WS]	%[WS]	[S]	%[S]	Other
Session 1	-	-	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-	-	-
Session 8	3	0	0	3	100	0	0	0	0	0
Session 9	-	-	-	-	-	-	-	-	-	-
Session 10	-	-	-	-	-	-	-	-	-	-
Session 11	3	0	0	1	33.3	0	0	0	0	2
Session 12	7	0	0	1	14.3	2	28.6	0	0	4
Session 13	1	0	0	1	100	0	0	0	0	0
Session 14	-	-	-	-	-	-	-	-	-	-
Session 15	10	0	0	7	70.0	0	0	1	10.0	3
Session 16	-	-	-	-	-	-	-	-	-	-
Session 17	-	-	-	-	-	-	-	-	-	-
Session 18	1	0	0	0	0	1	100	0	0	0
Session 19	-	-	-	-	-	-	-	-	-	-
Session 20	2	0	0	0	0	1	50.0	0	0	1
Session 21	5	0	0	2	40.0	1	20.0	0	0	2
Session 22	-	-	-	-	-	-	-	-	-	-
Session 23	-	-	-	-	-	-	-	-	-	-
Session 24	1	0	0	0	0	0	0	1	100	0
Session 25	1	0	0	0	0	1	100	0	0	0
Session 26	-	-	-	-	-	-	-	-	-	-
Session 27	-	-	-	-	-	-	-	-	-	-
Session 28	-	-	-	-	-	-	-	-	-	-
Session 29	4	0	0	3	75.0	1	25.0	0	0	0
Session 30	7	1	14.3	4	57.1	0	0	0	0	2
Session 31	22	6	27.3	7	31.8	4	18.2	0	0	5
Session 32	63	6	9.5	47	74.6	1	1.6	1	1.6	8
Session 33	33	5	15.2	26	78.8	0	0.0	2	6.1	0
Session 34	55	9	16.4	41	74.5	1	1.8	0	0.0	4
Session 35	84	43	51.2	38	45.2	2	2.4	1	1.2	0
Session 36	55	28	50.9	23	41.8	0	0	0	0	4
Session 37	64	49	76.6	13	20.3	2	3.1	0	0	0

	/WWS/	[WWS]	%[WWS]	[S]	%[S]	[WS]	%[WS]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-
Session 8	-	-	-	-	-	-	-	-
Session 9	-	-	-	-	-	-	-	-
Session 10	-	-	-	-	-	-	-	-
Session 11	-	-	-	-	-	-	-	-
Session 12	-	-	-	-	-	-	-	-
Session 13	3	0	0	0	0	1	33.3	2
Session 14	-	-	-	-	-	-	-	-
Session 15	-	-	-	-	-	-	-	-
Session 16	-	-	-	-	-	-	-	-
Session 17	-	-	-	-	-	-	-	-
Session 18	-	-	-	-	-	-	-	-
Session 19	-	-	-	-	-	-	-	-
Session 20	-	-	-	-	-	-	-	-
Session 21	-	-	-	-	-	-	-	-
Session 22	-	-	-	-	-	-	-	-
Session 23	-	-	-	-	-	-	-	-
Session 24	-	-	-	-	-	-	-	-
Session 25	-	-	-	-	-	-	-	-
Session 26	-	-	-	-	-	-	-	-
Session 27	-	-	-	-	-	-	-	-
Session 28	-	-	-	-	-	-	-	-
Session 29	-	-	-	-	-	-	-	-
Session 30	1	1	100	0	0	0	0	0
Session 31	2	0	0	0	0	0	0	2
Session 32	-	-	-	-	-	-	-	-
Session 33	-	-	-	-	-	-	-	-
Session 34	-	-	-	-	-	-	-	-
Session 35	3	0	0	1	33.3	0	0	2
Session 36	11	2	18.2	0	0	7	63.6	2
Session 37	11	2	18.2	0	0	4	36.4	5

	/SWW/	[SWW]	%[SWW]	[S]	%[S]	[SW]	%[SW]	Other
Session 1	-	-	-	-	-	-	-	-
Session 2	-	-	-	-	-	-	-	-
Session 3	-	-	-	-	-	-	-	-
Session 4	-	-	-	-	-	-	-	-
Session 5	-	-	-	-	-	-	-	-
Session 6	-	-	-	-	-	-	-	-
Session 7	-	-	-	-	-	-	-	-
Session 8	-	-	-	-	-	-	-	-
Session 9	-	-	-	-	-	-	-	-
Session 10	-	-	-	-	-	-	-	-
Session 11	1	0	0	0	0	0	0	1
Session 12	1	0	0	1	100	0	0	0
Session 13	7	0	0	6	85.7	0	0	
Session 14	-	-	-	-	-	-	-	-
Session 15	1	0	0	0	0	0	0	1
Session 16	2	0	0	1	50.0	0	0	1
Session 17	-	-	-	-	-	-	-	-
Session 18	4	0	0	4	100	0	0	0
Session 19	-	-	-	-	-	-	-	-
Session 20	-	-	-	-	-	-	-	-
Session 21	2	0	0	1	50.0	0	0	1
Session 22	-	-	-	-	-	-	-	-
Session 23	2	0	0	1	50.0	0	0	1
Session 24	1	0	0	0	0	1	100	0
Session 25	2	0	0	2	100	0	0	0
Session 26	-	-	-	-	-	-	-	-
Session 27	-	-	-	-	-	-	-	-
Session 28	-	-	-	-	-	-	-	-
Session 29	-	-	-	-	-	-	-	-
Session 30	1	0	0	0	0	0	0	1
Session 31	2	0	0	0	0	0	0	2
Session 32	-	-	-	-	-	-	-	-
Session 33	2	2	100	0	0	0	0	0
Session 34	3	0	0	0	0	3	100	0
Session 35	3	0	0	0	0	3	100	0
Session 36	-	-	-	-	-	-	-	-
Session 37	-	-	-	-	-	-	-	-

Appendix D

Children's lexicon per word class and word shape

(With number of tokens)

Clara

	Monosyllables		Trochees		Iambs		Other
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns	
S1				1 papa			3 olá
S2	2 dá, está						1 olá
S3	1 dá		1 abre	3 papa		9 bebé	3 não
S4	3 dá, está					10 bebé, papá	6 não
S5				4 água, carro		6 bebé, pinguim, cocó	9 não, olá
S6		9 cão, mãe		4 água		4 bebé	6 não, olá
S7	4 é, dá	18 mãe, cão, pé, pai		8 Clara, mano, sapato, Aurora		6 chichi, bebé	28 não, olá, aqui
S8	6 é, está	13 cão, mãe		6 mano		10 chapéu, bebé, papá	3 ó, não
S9	2 está	18 pés, dois, pai		13 Clara, Aurora, mana, papa		17 bebé, João	10 não, aqui, olá
S10	6 é, está	18 mãe, pai, cão, Né		90 menina, mana, Noddy, Uva, Clara, gato, pato, peixe, Aurora, Tita, outro, sapato, queijo, papa		23 João, cocó, avô	26 não, ai, onde, aqui, cucu, olá

S11	31 é, tem, ver, põe, cai, sai, está	50 mãe, cão, pé, chão, pai, mau, um	10 olha, gosta, abre	173 Clara, chucha, Noddy, queijo, menina, papa, este, esta, Tita, Uva, isto, carro, casa, borboleta, tampa, pato, menino, bola, pata, outra, gato, uma, mano, lobo, peixe, lua, ano, quatro, isso	2 acabou, mordeu	35 João, memé, mamã, avô, bebé, nariz, chichi	69 não, já, aqui, aí
S12	34 é, tem, dá, está	43 mãe, cão, pai, sol, chão	21 toma, abre,	143 Clara, esta, mano, macaco, peixe, menina, Noddy, sapato, uma, lua, carro, mana, gato, tampa, Aurora, estrela, bola, Uva, outra, papa, batata, Ruca	5 acabou	50 João, papá, nariz, avó, avô, piu-piu, popó, chichi, cocó, bebé, mamã	118 não, pum! já, onde, aqui, olá

Inês

	Monosyllables		Trochees		Iambs		Others
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns	
S1	1 dá			1 Fernanda		19 Inês, bebé, mamã, papá	
S2	22 dá, está		2 toma	1 Fernanda		41 Inês, mamã, chichi	5 não, já
S3	31 dá, há, está	16 cão, má, mau, meu, mãe, pé		16 água, chupeta, queijinho		60 bebé, Inês, mamã, papá, Suzy, Isabel, chichi, chapéu	26 mais, não, já, aqui, ali
S4	31 há, dá, põe, tem, é, está	17 cão, mão, pé, céu	1 tapa	38 barco, cabelo, banho, Bambi, bóia, bola, babete, fralda, carro, queijo, manta, boneca, papa, sapato, Teresa, cadeirinha		67 bebé, mamã, Inês, bombom, chapéu, popó, quá-quá	65 cá, mais, não
S5	23 dá, é	5 cão, meu, um, Zé	1 mostra	39 Bambi, bola, Bela, macaco, carro, livro, Fernanda, Vanessa, papa, sapato, pêlo, chupeta, porta, Teresa		53 bebé, Inês, mamã, papá, popó, João	14 não, aqui, ali
S6	18 dá, quer, é, está	52 cu, cão, mão, pá, pé	2 corta	124 água, cabelo, banho, bola, dedo, dentes, faca, fralda, carro, queijo, copo corda, creme, leite,	1 cortar	99 bombom, bebé, biberõ, Inês, cucu, cocó, mamã, papá, popó, champô, João	72 mais, não, já, aqui

				vitaminas, minha, meia, mamocas, banana, boneca, papa, pêlo(s), penas, chupeta, pele, vestido, leitinho, cueca, passarinho, laranja			
S7	20 dá, foi, é, está	18 cu, cão, má, meu, pé, um		108 balde, boca, Bambi, bola, Bela, dedo, dente, fralda, cartas, colo, meia, boneca, ovo, papa, pato, pêlo, chupeta, prato, tio, urso, cavalo, casaco, cuecas, gato, garfo, golo, dinheiro, girafa	1 limpar	81 bombom, balão, bebé, Inês, colher, cocó, mamã, pipi, Suzy, ão-ão	56 mais, não, já, aqui
S8	10 há, dá, põe, é, está	28 có, mãe, mão, pai, pó, pé, um	4 puxam, tira, olha, gosto	69 água, cabelo, banho, cadeira, elefante, macaco, Carlos, carta, copo, creme, Guilhermina, neste, banana, Fernanda, sapato, porta, vestido, tia, uma, urso, garfo, iogurte, girafa, roda	1 tirar	73 bebé, dói-dói, Inês, colher, cocó, leão, mamã, papel, popó, Suzy, avô, avó, canguru, chapéu	61 mais, não, já, tudo, aqui
S9	45	36	8	159	8	87	49

	há, dá, põe, tem, vai, é, está	bom, Bé, dois, eu, cu, cão, meu, mão, pão, pó, pé	acho, tira, anda, olha, ajuda	água, cabelo, umbigo, boa, bolas, deste, dente, disco, duas, cadeira, este, fita, flores, folha, isto, carta, carro, escova, queijo, copo, quarto, lápis, livro, linda, Guilhermina, maminha, meia, manta, menino, outro, sapato, pente, perna, prato, preta, apertado, talco, vestida, Cristina, leitinho, tira, tampa, uma, unha, urso, ouvido, Ana, esta, barulho, jogo	fugiu, encontrou, caiu, limpar, lavar, vestiu	bacio, bebé, dói-dói, Inês, cocó, mamã, papá, popó, Suzy, sabão, Totó, Leonor, ó-ó, chichi, chapéu, João	não, já, onde, aqui, ali
S10	78 há, dá, dou, quer, pôr, põe, tem, vão, é, está, estás	19 dois, flor, cão, mar, meu(s), mãe, pá, pó, pé(s)	29 bebe, deita, queres, senta, tira, ouviste, anda, olha	274 água, balde, bolos, banho, bóia, brincos, duas, deita, este(s), faca, fato, fita, fotografia, festa, casa, cama, colo, cola, copo, creme, livro, baloiço, loura, minha, muita, meia, manta, pequenina, bonecos, boneca(s), janela, Vanessa, outro(a), papa, sapato, parque, pêlo(s),	7 beber, cair, cantar, lavar, tomar, guardar	89 bebé, Inês, colher, leão, mamã, maçã, papá, popó, Suzy, ó-ó, parabéns, chapéu	97 bem, mais, não, sim, já, onde, obrigada, agora

				chupeta, praia, prato(s), preta, sinos, piscina, pulseira, tia, tira, uma, Ana, esta, gaita, papagaio, garfo, igreja, grande, banheira, laranja, morena, amarelo(a), roupa, peixinhos, palhaço, coelhinho			
S11	140 há, dá, ir, cai, quer, põe, são, vai, é, és, está	46 dois, eu, flor, cão, mau, mar, meu(s), mim, mãe, mão, pó, pé(s), céu, Gil	43 abre, bebe, fecha, cabe, calça, canto, quero, queres, senta, sobe, partimos, tira(s), toma, verte, esmagaste, segura, gosta, ajuda	296 Tiago, água, bolo, boa, Bambi, comboio, bolas, felicidades, dele, crocodilo(s), Aladino, bocadinhos, duas, cadeira, dela, dessas, desta, este, flores, elefante, telefone, fralda, isto, macaco, casa, escuro, cama, copo, queque, aquela, creme, lado, lenço, lua, Legos, massas, minha, manta, penico, menino(s), pequenina, nuvem, nua, banana,	15 buscar, beber, caiu, limpar, partiu, papar, abrir, jogar	136 bombom(ns), bebé, doutor, dói-dói, Inês, colher, cocó, mamã, memé, papá, popó, tau-tau, avião, avó, ó-ó, parabéns, chichi, chapéu, João, jardim	143 lá, não, mé, já, ainda, onde, cima, agora, aqui, ali, assim

				boneco, boneca(s), janelas, outro(a), papa(s), pato, leitinho, patatinha, batatinha, toda, tampa, ténis, uma, vaca(s), vela, coelho, olhos, ela, esta(s), papagaio, garfo, grande, querida, barulho, orelhas, laranja, rua, palhaços, sapato(s), chupeta, piupius, portas, praia, prato, preta, sala, dinossauros, princesa, triciclo, sumo, sujo			
S12	244 há, dá, cai, quer, lê, leu, pôr, põe, pões, são, tem, vai, ver, é, está, estão	53 dois, eu, cão, má, mau, meu, mãe, mão, pão, pé, teu, ti, tu, três, Gil	29 abre, deu-lhe, fica, cabe, encontra, mostra, preciso, estava, tinha, tira, toma	338 água, barba, cabelo, cabeça, boca, bolso, Bambi, bola(s), babete, branco(a), Aladino, duas, duro, cadeira, dela, este, almofada, fotografias, flores, telefone, França, isto, macaco, casa, cama, colo, aquela(s), quarto, lápis, borboleta, lenço,	32 bateu, bater, brincar, dormir, fazer, caiu, limpar, ouvir, papar, pegar, tirar, tocar, estragou, abrir, guardou, chorar, chegou	128 balão, bebé, biberõ, Inês, cocó, lençol, mamã, nariz, papá, Paris, popó, Suzy, Portugal, Isabel, anões, anão, avô, avó, ó-ó, chapéu, João	317 cá, lá, mais, não, trás, já, dentro, nada, onde, tudo, agora, aqui, ali

				livro(s), galinha, limpo, lobo, loura, lua, minha, meias, vermelho, manta, Bernardo, nele, menino, menina, bonito, nomes, nua, banana, boneca, Vanessa, neve, outro(a/s), papa(s), patos(s), chupeta, tapete, porco, peça, praia, princesa, sinos, pulseira, insectos, sete, batata, castelo, partido, todos, toda, castanhos, castelo, estrelas, uma, verde(s), Joana, olhos, cuecas, esta, estragado, gato, grilo, grande(s), dinheiro, tartarugas, amarelo(s), amarela, roto, rua, capuchinho, chuva, palhaço, coelhinho, pijama			
S13	161 há, dá, dar, dou, dei,	54 dois, flor, cu, cão, luz,	75 abre, acho, brinca, deito, fala,	358 água, cabelo, bicho, boca, boa, banho,	53 bateu, bebeu, beber,	106 biberõ, dói-dói, Inês, colher, café,	125 bem, lá, mais, não, sim,

	dói, faz, foi, cais, quer, lê, pôr, pôs, põe, sou, são, tem, vai, ver, vou, é, está(s), estou, estão	má, mau, meu, mim, pau, pé, teu, ti, tu, u, chão, Gil	cabem, procura, cola, quero, lembro, mete, mexe, enganaste, apaga, pode, posso, sabe(s), acende, precisa, consegue, estava, tinha, tira, tenho, toca, toma, olha, era, gosta, chega, cheira	Becas, babete, branco(a), Fabrice, deles, destes, cadeira, dela, caderno, desta, esse, este, doente, almofada, faca, fotografia, folha, fumo, elefante, telefone(s), febre, isto, capa, casa, calça, aquele, escuro, cama, colo, cola, copo, quero, laba, chocolate, borboleta, letra(s), Filipe, livro, lixo, lobo, louça, luvas, mesa, Mickey(s), amigo, minha, muito, muitas, vermelho, vermelha, manta, amoras, menino(s), menina, bonito, nome, boneco, bonecos, Vanessa, neve, outro, outra, papa, pato, sapatos, pena, pena, tapete, Poupas, porta, prato, sapo, princesa, triciclo, circo, sono, açúcar, sumo, sete,	brincar, dormir, deitar, entrar, fazer, fechou, encontrou, comer, acabou, caiu, calou, responder, partiu, papar, apagou, pentear, tocar, tomar, tapar, arrumar, chover, chorou	calor, mamã, Natal, nariz, papá, papel, sofá, senhor, tambor, televisão, Isabel, anões, avô, avó, Tiagão, ó-ó, coração, chapéu, cachecol, João	já, embora, dentro, como, nada, onde, cima, ena, obrigado, agora, também, adeus, aqui, ali, assim, olá

				leitinho, todos, pantufa(s), montanha, tantas, uma, cavalo(s), verde, sozinha, piano, Ana, olhos, Egas, esta, papagaio, galos, gorro, iogurte, grande, nenhuma, tartarugas, laranja, amarelo(a), roupa, rosa, chuva, palhaço, coelhinho, palhinha, beijinhos, jogo			
S14	233 há, dar, dá, dou, dói, foi, quer, pôr, põe, são, tem, vai, vou, é, está, estou, estão	43 bom, dois, eu, flor, cão, má, meu, mim, mão, pai, pé(s), teu, ti, tu, três	60 bebeste, sabia, bebe, falta, cabem, cabe, come, quero, lembro, pinta, sabe(s), preciso, consigo, assopra, estava, vesti-la, tira, sentou-se, estamos, toma, olha, gosta, chego, chama	271 água, cabelo, cabeça, Bicas, boca, boa(s), comboio, botas, Becas, babete, braços, branca, crocodilo, Aladino, duas, destas, este, doente, faca, folha, elefante, telefone, isto, macaco, macaca, quente, porquinho(s), copo, lápis, borboleta, Filipe, minha, monstro, muito, vermelho(a), manta,	34 buscar, bateu, bebeu, dormir, fazer, acordar, comer, acabou, caiu, cantar, ouvir, sentou, soprou, tirar, tirou, tocar, guiar, arrumar	89 botão, bebé, dói-dói, Inês, colher, café, mamã, maçã, Natal, hospital, papá, popó, televisão, avô, avó, coração, chapéu	196 cá, quem, lá, mais, não, sim, tão, já, dentro, como, quando, nada, onde, daqui, melhor, tinoni, também, aqui, ali, assim

				manga, neste, Nica, menino, pequenino, meninos, menina, bonito, bonito, bonitas, nisto, noutro, banana, boneco(s), boneca, Vanessa, outro(a), papa, chupeta, pino, pilha, Poupas, peixe, perna(s), prato, preta, preso, prendas, sala, sapo, sapos, triciclo, salsicha, sopa, sujo, suja, cassete, cantiga, toda, tantas, estrela, uma, cavalo, verde, piano, Joana, Egas, esta(s), estragada, garfo, iogurte, parede, tangerina, passarinho, tartaruga, barulho, orelhas, amarelo, barriga, roda, rosas, Jorge			
S15	159 há, faz, quer, leu, pôr, põe(s), sei, são, tem,	46 bons, eu, cu, má, mau, meu, mão, pó, pé, teu,	53 penteá-la, mudá-la, dá-me, acordaste, deixa, fica, limpa,	287 água, cabelo, cabeço(s), cabeça, borbulhas, bola, babete, braço, data,	41 buscar, bebeu, brincar, dormir, deitar, afiar,	50 balão, favor, feliz, cocó, leão, mamã, Nuni, Carnaval, nariz,	94 bem, quem, mais, não, sim, já, dentro,

	vai(s), ver, vou, vens, vão, é, está, estou, estão	ti, tu, Tó	aleijo, leva, muda, morde, mexe, puxa, sabes, esqueci-me, tinham, tiro, tira, toma, fazia, olha, era, eram, gosto, sujaste	dedo, Aladino, cadeira, este, fita, fotografia(s), flores, fralda, frente, isto, cabo, complicado, caixa, macaco, casa, carro, aquele, pequeno, copo, aquela, creme, lápis, chocolate, borboleta, lenço, livro, lobo, maluca, Mickey, Minie, Mina, minha(s), muito, muita(s), vermelho, manta, penico, menino(s), menina, bonito, nua, boneca(s), janela, nesta, outro(a), pato, sapatos, palmas, parque, pente, porco, perna, sala, dinossauro, salva, princesa, triciclo, ursinho, cinto, vestido, todos, toda, tua, estrela, uma, vela, horas, Joana, coelho, ela, esta, estragado, gordo, grande(s), tartaruga, barulho,	fazer, contar, encontrou, encontrei, acordou, comi, acabou, escrever, limpar, mordeu, morder, papar, sentar, tirar, tocar, pentear, vestiu, andar, arrumar	pinguim, totó, avião, você, parabéns, chichi, chapéu,	nada, onde, porque, para, cima, tudo, daí, depois, melhor, também, aqui, ali,

				orelha(s), rabo, roupas, capuchinho, cheio, bochechas, palhaço			
S16	235 há, dá, dar, faz, foi, ir, quer, ler, pôr, põe, sou, sei, são, tem, vai(s), vê, ver, vês, vi, vou, vem, vão, é, está(s), estar, estou	99 bom, dois, eu, flor, cu, cão, luz, meu, mim, pai, pé(s), tu, ti, chão	80 abro, abre, dá-me, dar-me, disse, deixa, dói-me, falta, ia, cabe, come, quero, lembro, comemos, pago, paga, pode, espera, consigo, estava, tiro, tira, toma, veres, vamos, olha, era, eram, chama, chamem	293 água, cabeça, boa, bola, bruxa, dele(s), escondida, dia, bocadinho, dela, desta(s), este, fada, elefante, fria, fruta, isto, casa, descalça, carro, casca, quente, autoclismo, cama, colo, copo, queque, gelado(s), livro, lixo, baloiço(s), Mina, amigo, minha, meia, primeiro, vermelho, amoras, menino(s), bonito, noite, nomes, boneco(s), boneca, nesta, outra, papa, sapatos, porta, pele, preta, prenda, saia, sapo, centro, ursinho, salsicha, açúcar, sumo, pulseira, apertado, castelo, partido, todo(s),	49 buscar, bebeu, brincar, dormir, deitei, fazer, comprar, comer, caiu, molhou, puxar, papar, pagar, parou, abri, abrir, andar, andou, gostei, jogar	60 bebés, doutor, favor, Inês, café, cocó, mulher, mamã, maçã, Natal, papel, popó, comercial, senhor, anéis, avó, chichi, chapéu, jardim	246 bem, cá, quê, quem, lá, mais, não, não, sim, já, dentro, como, comigo, nada, hoje, onde, porque, para, pronto, tudo, agora, então, amanhã, ninguém, adeus, aqui, ali, assim, olá

				toda(s), tua, tanto, tantos, retrete, uma, cavalo, verde, cozinha, Joana, cuecas, ela, esta, obrigado, estragada, iogurte, grande, dinheiro(s), tangerina, Maria, caroço, tartaruga, laranja, amarelo, carrinho, rua, escorrega(s), molhada			
S17	132 há, fiz, fui, ir, quer, ler, pôr, põe, pus, sei, tem, vai, são, vou, é, está, estou	43 dois, eu, cu, cão, luz, mal, meu(s), mim, mãe, pé, sol, teu, ti, tu, chão	51 acho, perdemos, perdeu-se, cabe, coube, procura, come, quero, morde, espera, sabe, estava, temos, estamos, toma, vamos, anda, olha, gosta(s)	196 avariado, quarto, toalha, bolos, banco, bola, dele, podemos, deste(s), duas, cadeira, ele, Julieta, este, faca, flores, isto, casa, carro, aquele, quente, aquilo, cubo(s), escola, copo, aquela, chocolate, Filipe, livros, maluca, longe, leite, Lego, Rometa, comida, Mina, minha, almoço, muito, mana, vermelho, penico, pequenina,	42 buscar, beber, bebi, fazer, esconder, contar, comeu, comer, comi, caiu, morder, mandei, subir, tirou, engoliu, arranjar	25 boné, doutor, colher, café, lugar, mamã, nariz, hospital, papá, senhor, azul, pinguim, cereais, chichi, cachecol	124 bem, cá, quê, lá, não, sim, sem, só, já, dentro, ainda, quando, porque, tudo, agora, daqui, também, aí, aqui, ali, assim

				cenoura, neve, outro, Diogo, espera, prato(s), preto(s), prenda, ursinho, lacinho, sopa, professora, sumo, leitinho, todo(s), tampa, uma, verde, cafezinho, cozinha, Joana, moeda, ela, esta, garfo, grande, girafa, orelhas, laranja, amarelo, roupa, resto, dinheiro			
S18	206 dá, dói, faz, fez, fiz, foi, fui, ir, quer, lê, ler, pôr, põe, sou, sei, são, tem, vai(s), ver, vês, vou, é, és, rir, está, estou, estão	123 bom, dois, dó, dez, eu, flor, cão, luz, má, mau, mar, meu(s), mim, mãe, mão, pá, pai, pé, seis, sol, teu, ti, tio, tu, três, um, reis, chão	82 sabia, cabia, procura, come, quero, lava, leio, levo, mostro, podes, posso, espera, sabes, acende, sentar-me, tinha, tenho, toma, podemos, mordeu-lhe, digo, deixa, fazes, fica, foste, fura, ia, caíram, indo, cabe, coube,	261 avariada, alfaiates, bata, balde, barco, bibe, bolos, banco, bola, branco, brancas, dedo, dele(s), deste(s), dia, mindinho, duma, duas, dela, eles, esse, este(s), almofada, Serafina, folha, frios, isto, casa, carta, coisa, compras, conto, cama, escola, aquela, quatro, quarto, gelado, lápis, rolava,	36 buscar, beber, brincar, dormir, fazer, fechar, pendurar, fechou, comprei, contar, encontrei, cortei, caí, escrever, escrevi, apagar, perdi, tirar, tapar, estraguei, vestir, andar, segurar, segurou, arrumar, chorar	56 boné, doutor, favor, Inês, cartões, Lili, mamã, Manel, nenhum, hospital, pincéis, papá, papéis, papel, senhor, Viseu, você(s), amor, anel, avô, azul, chorão, Juju, jardim	227 bem, cá, quê, quem, lá, mais, não, sim, só, já, dentro, ainda, como, nada, onde, cima, contigo, tudo, tanto, agora, ninguém, também, aí, aqui, ali, assim, atrás, epá

			traz-me, trouxe, havia, viram, veio, vamos, levantas, olha, era(s), estragou-se, segura, gosto, segurá-lo, ofereço, deixaram, rirem, arruma, chego, chega, aleijaram, ajuda	livro(s), lixo, mala, Mina, Gulhermina, amigos, caminho, minha, muito, meia(s), vermelha, caneta(s), neste, menino, Nita, Anita, nomes, boneco, janelas, Vanessa, nesta, outros, piolhos, tapado, papa, sapatos, pasta, pêlo, perna, praia, salva, lacinhos, cinco, sete, leitinho, todos, toda, tua, tanto, ténis, uma, verde, casaco, vizinho, sozinha, Joana, persiana, ela, esta, empregada, obrigado, obrigados, segura, nenhuma, dinheiro, pendurado, parede, amarelo(s), barriga, rosa, fechada, palhinha, Jorge			

Joana

	Monosyllables		Trochees		Iambs		Others
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns	
S1		1 mãe					1 não
S2						4 mamã	1 não
S3	2 é, está			2 meia		3 mamã	
S4	4 há	2 pé, pai				3 bebé, mamã	2 não
S5	2 há, é						1 não
S6		2 pai					1 não
S7	4 é, há	1 pai		18 Carla, boneca, papa, gato, bigode		2 bebé, avó	3 não, olá
S8	4 há	2 mãe, pai		6 Carla, escola, gato, capuchinho		2 avó, popó	3 não, cocorocó
S9	2 há, é	17 cão, mãe, pai, Zé, chá	1 gosto	23 água, Dinky, padrinho, Ricardo, escola, Mila, Nando, papa, sapato, Elvira, Ana, Joana		27 bombom, Bobby, café, cocó, quá-quá, piu-piu, popó, avó, ó-ó, carapau, Raquel, chichi, João	4 não, olá, cocorocó
S10	8	43		29	1	27	9

	há, quer, é	flor, cão, mau, mão, mãe, pai, pão, pé, Zé, rã, chá, chão		água, bolo, macacos, Carla, carro, colo, escola, lobo, luva, vermelho, Nando, papa, sapato, Paula, cabritinhos, Elvira, Ana, coelho, esta	ouvi	Fundão, nariz, bombom, bebé, mamã, papel, popó, titi, televisão, avião, avó, carapau, Raquel, João	não
S11	16 quer, é, está, estou	24 flor, frio, luz, mau, Mi, mãe, pá, pai, pás, pão, Zé, rei, rã, chão, giz	1 gosto	87 água, balde, barco, cabelo, cabeça, bola, bolso, flores, feio, fralda, macaco, calças, Carla, escola, gelado, Lina, palitos, lindo, linda, lua, leite, Mila, camisa, meio, mana, menino, menina, Nenuco, Nando, bonecos, bonecas, piscina, César, sapatinho(s), mosqueteiros, tecto, uma, cavalos, vela, Rosinha, candeeiro, Ana, Daniela, Algarve, Guito, bigode, grande, dinheirinho, coroa, peixinho(s), chucha, palhaço, Borralheira	1 acabou	50 balão, bebé, dim-dão, colar, mamã, maçã, memé, piu-piu, pastor, popós, sofá, vovó, avô, avó, azul, ó-ó, caracóis, Raquel, chapéu, João, Jesus	23 não, sim, já, aqui
S12	14 há, cai,	23 dois, má,	4	145 água, balde,	2 caiu,	32 caracóis,	21

	quer, tem, é	mãe, pá, pai, pão, véu, rei	olha	barco, cabelos, boca, bolo, Lisboa, aberta, Piedade, Dida, este, fada, fita, fotografias, flores, feia, isso, Inha, isto, escadas, Ricardo, Carla, Quina, gelados, Lina, Celeste, Rometa, manas, menino(s), menina(s), bonito, Nando, Manecas, janela, outra(s), papa, pato, sapatos, Paula, Gepeto, penso, pente, porta, pernas, praia, rebuçado, saco, seco, piscina, vassoura, sapatinho(s), pastilha, azeitonas, castelo, cavalos, Elvira, vela, Zinha, piano, Ana, olhos, Daniela, esta, galo, gata, Guito, dinheiros, Margarida, coroa, areia, fechada, chucha, Xana, Borralheira, beijinho	lavar	balão, dói-dói, Fundão, esfregão, colher, cocó, cristal, Luís, Manel, maçã, nariz, papéis, popó, anão, avô, avó, chapéu, João	não, sim
S13	16 foi, tem,	24 cão, mau,	7 deixas,	112 Heidi, barba,	8 fugiu,	27 bacio, cocó,	24 cá, não,

	é, está, estou	meu, mãe, mão, pai, pés, rei, giz	pode, anda, olha, grite, chore	cabeça, boa, botas, aberto, cabrinhas, dentes, Dido, Dida, estes, flores, elefantes, ferro, fralda, fralda, isto, Ricardo, Carla, Clara, colo, escola, quarto, Lina, livro, leite, Celeste, comprimidos, comida, missa, amiga, almoço, menino, Anita, Nenuco, boneco(s), Manela, outro, padre, Pedro, porta, pedra, praia, primos, prima, seco, sopa, César, batatas, tia, azeitonas, mosqueteiros, pestana, castelo, uma, cavalo, veado, casaco, Rosinha, Ana, homem, Daniela, essa, zangado, Guito, bigode, grande(s), Clarinha, amarelo, rato, fechado, peixinho, cachimbo, palhaço, jogo, Joana	fazer, comer, caiu, chover	Quequé, maçã, Pepê, piu-pius, popó(s), ó-ó, Carabás, chapéu, João, Jesus, avô, azul avó	sim, aqui
S14	147 dá, deu, diz, faz,	31 bons, dois, cão,	43 filma, mandam,	242 carruagem, Barbie, barba,	10 brincar, filmar,	31 bombons, irmã,	80 quê, não, sim,

	foi, pôs, põe, sai, tem, é, está	má, mau, más, meu, mãe, mão, mãos, pai, pão, pães, rei, rã, chá, giz	mora, mexe, partem, espera, estava, toma, anda, olha, gosta, parece, chama	barco, cabeça, boca, bolo, boa, banco, bolas, bota, Becas, Bela, brincos, branca, Dida, duas, cadeira, madrinha, este(s), fada(s), golfinho, flores, elefante, isto, casa, Ricardo, cara, esquilo, porquinho(s), quinta, bicicleta, coisa(s), quadro, laço, violino, livro(s), bolinhas, galinha(s), bolinhos, língua, lobo, baloiço, luvas, Legos, medo, aquecimento, comprimido, comida, amiga, palminhas, muitas, vermelho, caneta(s), menino(s), menina, Nici, Anita, Nenuco, Manecas, chinelo, neve, osso, outros, pato, Paula, parque, peras, porco, pónei, posta, prenda(s), prima, saco, adormecida, triciclo, vassoura, César, tia, ratinhos,	fazer, limpar, partiu, apanhar, pescar, pegou, varrer	chaminé, maçãs, Natal, piu-piu, postal, patins, popó, prisão, computador, tractor, avião, avô, avó, avós, azul, Romeu, Raquel, chapéu, João, Jesus	nada, onde, tumba, aqui, assim,

				sapatinho, sestinha, castelo, estrela(s), uma, uvas, vaca, cavalo, Elvira, vela, Rosinha, coisinha, avozinha, casinhas, Susana, piano, Ana, Joana, viola, Olga, olhos, Daniela, esta, estragado, iogurte, bigode, Tamagoshi, grandes, querida, coroa, cerejas, Maria, morango, amarela, borracha, escorrega, capuchinho, jipe, beijinhos			

João

	Monosyllables		Trochees		Iambs		Others
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns	
S1				6 papa			
S2	4 dá						1 olá
S3	1 dá			8 água			4 olá
S4				6 papa, água		2 mamã	4 olá
S5				14 bola, água, bolacha			
S6				10 bolacha, chupeta		5 mamã, papá	3 olá
S7		3 pau		15 papa, água, bola, panda		18 mamã, papá	4 olá
S8		1 pau		23 água, bolo, bola, chupeta, bolacha, comboio		11 limão, maçã, melão, avô, avó	1 olá
S9	5 dá, está	20 mãe, pá, pau		14 bola, mota, pato, panda, uva, chupeta	2 acabou	14 limão, maçã, papá, tau-tau, avô, avó,	2 mais
S10	3 dá	10 pá, pau, pé		39 água, boa, bola, meia, mano, panda	1 acabou	23 bebé, dlim-dlão, limão, mamã, maçã, papá,	6 olá

						popó, João	
S11	15 dá	7 pau		35 bola, mano, mota, pato, panda, banana		17 limão, maçã, mamã, memé, papá, popó	2 não
S12	20 dá, está	18 mã, pau, pão, pé		20 bola, meia, mano, bolacha, banana, sapato, girafa	1 acabou	26 limão, leão, mamã, papá, popó, vovô, avô	3 mais, não, babau
S13	8 dá, está	11 pau		23 bola, mano, pato		54 limão, mamã, memé, Natal, papá, sofá, avô	6 não, já
S14	2 está	4 mãe, pau, pé		17 bolo, bola, mano, mota, pato, uva	1 acabou	31 mamã, memé, Natal, papá, popó, João	9 mais, não, já, olá
S15	4 quer, está	12 mãe, pai, pau	1 ajuda	10 bola, papa, peixe, panda, verde, banana, Adriana		30 bebé, mamã, papá, avestruz, javali	17 não, já, olá
S16	9 dá, cai, cais, está	17 frio, luz, mãe, pai, pau, Zé, chão	9 dança, olha, atende	87 bolo, bola, fruta, quente, colo, mota, Noddy, papa, pombo, peixe, panda, porta, tia, Guida, roda, gira, banana, iogurte, quentinho,	6 acabou	34 balão, bebé, café, leão, pião, pinguim, popó, polar, avô, arroz, ó-ó, José, João, Jesus, avestruz, avião, computador	21 mais, não, sim, já, aqui, olá

				menina, Susana, ursinho, artista, chupeta, girafa, autocarro, bicicleta, barrigudo, crocodilo, joaninha, rinoceronte			
S17	3 é	56 cão, meu, mã, mãe, pai, pau, pão, pé, três, chão	1 ajuda	109 água, balde, bolo, cama, quatro, Lila, mano, mota, Noddy, pombo, Pumba, panda, porta, cinco, sopa, suja, urso, vaca, zebra, galo, gato, rua, chicha, alface, bolinho, comprido, cuidado, carnicha, cabeça, limpinho, leitinho, laranja, macaco, manteiga, Susana, sapato, artista, gatinho, chouriço, autocarro, capacete, crocodilo, proibido, torradinha, esfregona	3 limpar, trabalhar, acabou	22 café, mamã, papá, popó, avó, arroz, João, avião	17 ai, não, upa
S18	5 dá, é	21 luz, meu,	22 prova, senta,	104 água, bola, fruta, colo,	3 papar	50 dindão, kiwi, cocó,	20 não, upa, embora,

		pai	toma, adora, ajuda	livro, meia, mota, Noddy, papa, pêra, pombo, panda, porta, perna, sopa, soro, tia, urso, vida, zebra, galo, rua, roda, Benfica, banana, barulho, comboio, cuidado, cozinha, cadeira, cavalo, casaco, querido, laranja, morango, orelha, pombinho, papaia, Susana, sapato, tomate, girafa, crocodilo, autocarro, telefone, gelatina		limão, mamã, maçã, memé, papá, popó, polar, arroz, João, jardim, biberõ	obrigada, aqui, ali
S19	19 há, dá, deu, dói, é, está	22 Bi, dois, meu, pai, pó, pé, céu, tu, Zé	9 anda, ajuda	117 água, balde, banho, braço, dente, fruta, Lila, livro, mota, Noddy, outra, pêra, pombo, Pumba, porta, perna, prima, cinco, suja, sete, Tina, tampa, téni, trinta, uma, verde, Zoca, galo, gato, grande, rua, chave, banana,	6 pulou, parou, saltou, estragou, caiu	28 bebé, dim-dão, dói-dói, mamã, popó, polar, arroz, ó-ó, chichi, João, jardim, biberõ, construtor, computador	33 cá, mais, não, ão, catrapumba, aqui, ão-ão

				barriga, Benfica, Bernardo, cuidado, cadeira, laranja, mosquito, morango, menino, pijama, Susana, triciclo, girafa, autocarro, bicicleta, capacete, Catarina, Portalegre, amarela, estragado, fotografia			
S20	6 é	28 dois, meu, mãe, pai, pau, seis, sol, Zé	9 pára, posso, senta, ajuda	139 balde, Bento, bolo, doce, doze, fino, festa, cacto, carro, mano, mota, papa, pombo, panda, porta, perna, sopa, sumo, téni, trinta, vinte, zebra, Zoca, Guida, rua, jipe, batata, barriga, brinquedo, ervilha, fechada, cavalo, carrinha, Lourenço, menina, mexido, papaia, Susana, sapato, Tiago, tapete, triciclo, vizinha, vassoura,	1 trabalhar	35 Abi, baton, favor, Miguel, mamã, pinhais, papel, popó, polar, senhor, avô, ó-ó, João, jardim, fungagá	31 ai, mais, não, já, pouco, cedo, tudo, embora, obrigada, aqui, ali

				chichinha, escola, autocarro, bicicleta, bicharada, capacete, crocodilo, Margarida			
S21	1 é	16 dois, flor, meu, mão, pai, sol, céu, Zé	3 toma, anda, gosta	135 água, Bento, bolo, bola, este, fofo, quarto, livro, lua, mano, mota, Noddy, parque, pêra, pombo, Pumba, porta, tia, tampa, téni, uva, vida, zebra, Guida, grande, rua, chave, jipe, giro, Benfica, banana, Diogo, comboio, carrinha, laranja, migalha, mantinha, menina, Susana, tomate, Teresa, triciclo, chupeta, escuro, estrela, girafa, bicicleta, borboleta, elefante, capacete, tartaruga, telefone, rechonchudo		35 balões, balão, dim-dão, kiwi, miau, mamã, papá, popó, polar, real, chichi, João, jardim, construtor, avião	18 não, embora, aqui
S22	20 dá, cais,	30 meu,	10 anda,	117 Bento, bolo,	2 sentar,	38 balão, dói-	31 ali, embora,

	sai, é, está	mãe, pai, pé, Zé	viste, gosto, ajuda	burro, bola, fofo, fruta, casa, colo, creme, mano, mota, poucos, pomba, panda, porta, tia, tigre, tonto, vida, zebra, Zinho, esta, galo, Guida, Roque, rosa, jipe, bombeiro, cuidado, koala, cabeça, cadeira, cavalo, carrinha, menina, papaia, pantufas, Susana, estrada, girafa, autocarro, elefante, capacete, crocodilo, palhacinho, fotografia	acabou	dói, favor, kiwi, cocó, miau, mamã, popó, polar, real, chichi, João, jardim, Beatriz, Barnabé, construtor, pontapé, tinoni, avião	obrigado, ão-ão

Luma

	Monosyllables		-SW		-WS		Other
	+Verbs	+Nouns	+Verbs	+Nouns	+Verbs	+Nouns	
S1	1 dá			1 Frota			
S2	2 dá						
S3	1 dá			9 Frota			
S4				31 Hopla, Mara		7 bebé, mamã	
S5				5 Mara, pato, Hopla			
S6	13 dá			7 bola, Mara, pato		2 mamã	
S7	30 dá	1 cão		22 bola, Frota, lua, Mara, pato, gato			1 não
S8	35 dá	1 pau		29 bola, Mara, banana, pato, gato		2 mamã	
S9	8 dá, está	1 Po		13 bola, Frota, carro			
S10	1 dá			2 bola		2 mamã	
S11	1 dá			5 bola, banana, sapato, estrela		2 balão, cocó	
S12	5 dá			9 gato, banana		6 mamã	
S13	21 dá			12 bola, Mara, banana, pato, gato		3 mamã	
S14				8 bola, Mara, pato, gato	6 marchar	14 mami, mamã	1 não
S15	41 dá			28 harpa, bola, bolacha, borboleta, banana, Susana, papagaio, gato	3 marchar	29 cocó, mami, mamã	
S16	8			1	36	33	

	dá, está			bola	marchar	mami, mamã	
S17	8 dá			11 bola, Mara, Tito		17 mami, mamã	
S18	7 dá, está			15 bola, Mara, banana, chata		21 mami, mamã, chuchu	1 não
S19	22 dá			4 bola, pato		15 mami, mamã, Totô	
S20	12 dá, está		12 olha (?)	22 bola, Lala, bolachas, Mara, piscina, Ana, amarelo		49 bebé, mami, mimi, mamã, Pati	6 ó, já, aqui, ão-ão
S21	3 dá, está	5 Bi, Pi, chá	7 olha (?)	19 bola, Mara, pato, tia, Susana, Ana		57 Bibi, mami, mamã, Pati, vovô	
S22	2 dá		14 olha (?)	26 bola, Mara, Noddy, papa, Tito, gata, rechonchudo		30 mami, mamã	
S23	2 dá	1 chá	13 olha (?)	30 Mara, Noddy, tia		52 Miguel, mamã, bisavó, avô	
S24	2 é		3 olha (?)	29 bola, Mara, milho, menina, Noddy, sapato, gato		40 mami, Miguel, mamã	5 não, mais, au-au
S25	5 dá	9 bom, pé		31 bola, carro, baloiço, lua, Mara, meias, Noddy, pato, polvo, gato		21 bebé, mami, Miguel, mamã, Pati, bisavó, Totô	2 au-au
S26	1 dá	14 Bé, mão, pé, tio, três, um	2 olha (?)	23 bola, Mara, pato, Tito, verde, amarelo		42 bebé, mami, Miguel, mamã, Titi, Totô, bisavó, avô, chichi	3 au-au
S27	2 dá	10 pão, pé, três, um, chá	1 olha (?)	19 Fimbo, carro, Mara, Pome, Tito, verde, viva, amarelo		65 mami, Miguel, mamã, bisavó, ó-ó, chichi	41 não, sim

S28	1 sai	14 cão, mão, pé, chão		30 Heidi, carro, lobo, Mara, Noddy, Tito		60 bebé, Inês, cocó, mami, mamã, Pati, sofá, vovó, ó- ó	45 não, sim, aqui
S29	13 sai, vem	17 mar, mão, pum, pé, tu, três, chão		46 bamba, bola, queijo, Mara, menina, Noddy, Tito, verde, gato, amarela	1 sujou	75 dói-dói, mami, Miguel, mamã, pimpim, sofá, tau-tau, avô, ó-ó, chinês	59 não, sim
S30	6 tem, é, está	18 fio, cão, mau, mão, pai, pum, pé, tu, três, chão	8 abre, toma, anda	119 alto, água, bola, dele, filho, fumo, isto, casa, carro, linda, lobo, lua, Mara, menina, Noddy, olho, parvo, pêlo, Francisco, cinco, cinto, sujo, suja, santo, Tito, tinta, tonto, tonta, tua, Susana, gato, guizo, Goldy		86 bebé, dói- dói, cucu, mami, mamã, Pati, pipi, Soni, tau-tau, trovão, avião, vovô, vovó, ó-ó	147 não, sim, tum, já, upa, amen, dim-dom, aqui, ali
S31	10 sai, tem, vai, vou, vem, é, está	22 chão, dois, dez, frio, mau, mão, pé, seis, sol, três, um	11 corre, passa, salta, tira, toma, ajuda, magoa	134 água, alto, fimbinho, banco, bola, brinco, bruxa, dia, fotografia, isto, colo, lago, lindo(a), lobo, Mara, mundo, menino, banana, oito, outro(a), papa, espaço, parvo, prenda, sapo, cisne, cinco, sete, tenda, Tito,	3 empurrou, saiu	71 bebé, dói- dói, favor, cocó, mami, Miguel, Nené, pião, papéis, trovão, vovó, azul	165 ai, au, não, sim, sem, ó, já, nada, hoje, tanto, aqui, ali, assim, olá

				cabritinho, tinta, tonto, tua, uma, casaco, Susana, piano, Ana, gato, grandes, virados, amarela, onze			
S32	32 quer, põe, sai, tem, vai, vê, ver, vem, é, está	36 dez, fio, mão, nó, pé, seis, ti, três, u, um	96 abre, bate, brilha, brinca, dança, fica, fecha, foge, mata, manda, mete, passa, pára, puxa, pega, apanha, tira, pode, pega, aperta, espera, senta, toma, vira, voa, ando, anda, olha, ajuda	166 baixo, bicho(zinho), bola, bocadinho, duas, isto, carro, colo, Mara, medo, mocho, menina, Noddy, nove, oito, outro, pata, pinha, ponta, buraco, licença, cinco, seta, sete, Tito, tanto(a)(s), toca, uma, golfe, grande, choque		59 bebé, mami, mamã, piu-piu, tau-tau	253 au, lá, mais, não, sim, só, ó, dentro, frente, pumba, cima, tudo, aqui, ali, assim
S33	48 fez, cai, cais, quer, põe, sai, tem, vai, está	22 ar, dois, dez, cão, mau, pé, sol, ti, tu, três, u, um	41 abre, acha, bate, fecha, canta, muda, mexe, pára, apanha, pega, senta, sopra, tira, vira, voa, levanta, anda, olha, ajuda, joga	203 água, arco, baixo, balde, bolo, bola, Dina, Dingo, duas, fotografia(s), íris, isto, carro, bicicleta, coisa, colo, quatro, livro, lindo(a), lobo, lua, Mara, Mário, medo, mocho, comando, mota,	4 fugiu, caiu, chocou	94 balão, dói-dói, favor, mami, mamã, malhão, sofá, bisavó, televisão, avião, vovô, vovó, andor, algum	151 bem, cá, mais, não, sim, só, já, dentro, ainda, cima, tudo, então, aqui, ali, olá

				cogumelo, menina, Anita, banana, Noddy, nova, nove, outro(a), pata, peixe, porta, pedra, pernas, preza, licença, cinco, sombra, Tito, tinta, toda, tanto(a)(s), uma, urso, vela, Susana, anos, alguma, grande, Teresa, gelo, ajuda, jeito			
S34	48 faz, fez, quer, põe, sai, tem, vem, está	41 ar, dois, dez, frio, cor, mão, pum, pão, pó, pé, seis, três, um, chão	50 brinca, deita, entra, falta, larga, liga, leva, mete, mexe, puxa, aperta, empresta, sopra, tira, voa, levanta, anda	220 água, alto, baixo, cabeça, blusa, bola(s), cuidado, bocadinho, doze, duas, força, isto, quente, bicicleta, escuro, queijo, cama, copo, queda, caracolinho, linda, relógio, Mara, mosca, muito, muita, meia, comando, manga, negro, menina, Anita, bananas, Noddy, nove, oito, outro, outra, olho, onze, pilha, peças, cinco,	27 fugiu, caiu, morder, mexeu, partiu, saiu, tocou, voou, abriu, chover, chorou	108 balão, bebé, favor, mami, Miguel, mamã, televisão, vovó, azul, Jesus	111 cá, lá, mais, não, sim, só, já, dentro, pumba, pronto, aqui, ali, assim

				sujo, sete, Tito, mantinha, festinha, bonitinho, saltitona, torto, tampa, tanto, tecto, terra, uma, verde, Susana, gota, grande, buraco, barulho, laranja, rosa, escorrega, puxinho, ajuda, fechada			
S35	60 há, faz, ir, cai, quer, tem, vê, é, está	29 bom, dois, flor, cor, mão, pá, pé, sol, três, um	52 dada, falta, caía, come, leva, mora, pisa, empurra, apanha(s), aperta, salta, senta, tira, anda, agarra, chega, chupa, chora	184 alto(a), barco, bicho, sombrinha, cuidado, sentadinha, este, Frota, isso, isto, casa, carro, casca, quente, sequinho, casquinha, fresquinha, coisa, corda, quatro, bolinha, linda, baloiço, lua, Mara, medo, comida, formiga, muito(a/as), manta, cogumelo, meninos(as), perninha, banana, Noddy, nossa, outro, outra, papa, tapete, pele, praia, laranja, crescidos, crescida,	17 trabalhar, dançou, correr, mordeu, tirou, andar, andou, arranjou	68 bebé, favor, mami, mamã, vovô, vum-vum, avô, azul	134 mais, mal, não, sim, sem, já, hoje, depressa, adeus, aqui, assim

				sombra, Susana, sujo, Tito, antigo, terra, testa, estrela, tronco, uma, verde, vento, cãozinho, sozinha, besouro, anos, coelho, gato, grande, barriga, escorrega, bichinho(s), ajuda			
S36	122 dá, deu, faz, ir, quer, pôr, põe, ser, sei, são, tem, está	23 cão, lei, mau, mar, mão, pum, ti, três, um	54 rebenta, falta, fica, conta, mostra, mete, empurra, puxa, pode, pega, espera, empresta, tira, entorna, levanta, anda, olha	224 arco, baixo, barco, cabeça, bicho, boca, burro, aberta, brincos, Dina, dia, coitadinho, sentadinha, rodinha, disco, ele, esta, este, Sofia, isto, casa, carro, aquele, aquilo, buraquinho, porquinhos, coisa, escola, estrelinha, lindo, língua, lobo, pirilampo, Mara, medo, amigo, monstro, muito, menina, novo, numa, Noddy, boneca, outro(a), olho, parque, porco, pano, panda, porta, Francisco, Sophie, sujo,	29 buscar, brincar, dormir, deitar, entrar, fazer, escondeu, comer, caiu, limpar, levar, mostrar, pintou, partiu, pegar, sentar, será, tirar, entornou, tocar, andar, regar, chorou, chegar	116 bebé, dragão, favor, cocó, mami, mamã, maçã, nenhum, piu-piu, pum-pum, popó, prisão, senhor, Tatá, avião, vovô, chichi, chapéu, João	158 à, ai, cá, lá, mais, não, sim, tum, ó, hoje, cima, tanto, agora, balalão, aí, aqui, ali, assim, olá, epá

				Tito, pontinha, pestana, tanto, toca, uma, urso, vaca, vivo, ervinhas, velho, Susana, esta, papagaio, grande, girafa, cadeirinha, orelhas, Mafarricos, chave, chuchinha, ajuda			
S37	70 ir, quer, pôs, põe, ser, tem, vai, vê, viu, é, rir, está	12 Blu, Fá, flor, cor, cão, mão, Po, pé	26 rebenta, disse, deixa, entra, fica, fecha, leva, empurra, queria, puxa, apanha, pode, senta, anda, olha, chega, chora	207 água, baixo, cabeça, burro, banho, babete, sentadinho, sentadinha, este, fita, Afonso, elefante, fresco, Frota, isto, casa, aquilo, cobra, cola, aquela, lado, colagens, borboleta, colado, medo, amigos, flamingo, muito, menino(s), menina, Anita, caniche, novo, Noddy, boneco, trotinete, parque, poça, porta, sapo, ursinha, circo, cinco, sono, sujo, Catita, tigre, tanta, triste,	23 encher, fazer, cortar, correr, caiu, pintar, empurrar, empurrou, puxar, passou, sair, aturar, andar, regar, chover	81 balão, bebé, feijão, calor, cocó, mami, mamã, capitão, pinguins, Tatá, vovô, vovó, avô, avó, regador	75 mais, não, sim, tum, ó, xau, já, quase, nunca, onde, daqui, balalão, adeus, aqui, ali, assim

				trela, uma, gaveta, verde, casaco, tesoura, Susana, esta, girafa, Teresa, tartaruga, orelhas, laranja, amarelo, esta, roxo, rosa, chuva, cheio			