# The Role of Syllable Structure in the Acquisition of Brazilian Portuguese

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1. Introduction

According to Fery and Van de Vijver (2003), the 70's were characterized, in the phonological studies, as the time when the syllable was considered as a prosodic unit, especially in the studies of Vennemann (1974), Hooper (1976) and Kahn (1976).

There are two main lines of thought concerning the syllabic structure analysis: the first is the one developed by Kahn in 1976 and the second by Selkirk in 1982. For Kahn, the segments are directly connected to the syllabic node, then the rules act on the syllable as a role, as shown in (1). According to Selkirk, the relationship among the constituents takes place in a distinguished way, as the rules are applied to just one of the elements: *onset* (O), rime (R), nucleus (Nu) or coda (Co), as shown in (2).

(1)
$$\sigma$$
m a r

(2)
$$\sigma$$
O R
Nu Co
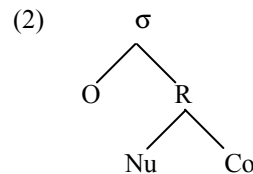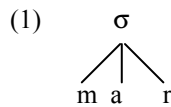
According to Freitas (1997), Vigário and Falé (1993) and Mateus (1993) proved the working of the model proposed by Selkirk (1982) for the description and analysis of the syllable in European Portuguese. The same can be said in relation to the acquisition of Dutch (Fikkert, 1994).

The acquisition of the syllabic constituents of Brazilian Portuguese has been the research focus for many papers such as Mezzomo (2004), Bonilha (2000) and Ribas (2002), among others. Most papers make use of cross-sectional data, offering results about the ordering in the acquisition of syllabic structure and trying to contribute to the description of Portuguese.

Nevertheless, the study of longitudinal data and the possibility of observing the interaction of different phonological units in the acquisition process, like segment, syllable and foot structure, for example, makes it necessary to rethink the syllable structure acquisition in Brazilian Portuguese.

On the bases of data of two longitudinal children aged 1:1 to 3:9, the present paper rethinks the role of syllabic structure in the segmental acquisition of Brazilian Portuguese by making use of Optimality Theory (Prince & Smolensky, 1993) and by

the application of the gradual learning algorithm proposed by Boersma and Hayes (2001).

The present study will focus on three main questions:

(i) What is the role of the syllabic structure in the phonological acquisition of Portuguese? Which evidence found in the child data indicates that these structures have been acquired?

(ii) Does the segmental acquisition drive the syllabic structure acquisition (bottom-up) or is it the syllabic structure acquisition which prevents the segmental acquisition (top-down)?

(iii) In terms of OT, is there any evidence in the data for the demotion of constraints related to the syllabic structure, such as NoCoda and NotComplex(nucleus)? Does the demotion of these constraints happen in a gradual way, as it does with the feature constraints, or does the raking just show the gradual demotion of feature constraints below the faithfulness constraints?

2. The syllable in Brazilian Portuguese

According to the literature, there are 15 syllabic patterns in Portuguese.

(3) a. Open syllables

V	água
CV	pá
CCV	abre
CVV	pai[1]
CCVV	grau
VV	oi

b. closed yllables

CVC	lar
VC	ar
CCVC	três
CVCC	monstro
CCVCC	trens
VCC	instante
CCVVC	graus
CVVC	dois
VVC	austero

The patterns shown in (3) are formed by the following syllabic constituents: simple onset, complex onset, simple nucleus, complex nucleus, simple coda and complex coda.

The medial onset can be formed by 19 consonants and the initial one by just 16, as the language has a filter that prevents the distribution of the elements /ɲ/ and /ʎ/ and /r/ at the beginning of the word.

In coda position, four consonants can be produced, the nasal, which assimilates the point of articulation of the following consonant, the coronal fricative, which

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[1] A syllable that presents a falling diphthong is not considered closed because the glide is in a complex nucleus, according to Câmara Jr. (1977), Cristófaro-Silva (1999) and Bonilha (2000).

assimilates the sonority value of the subsequent consonant, a coronal lateral liquid, which is produced as a dorsal glide in many dialects, and the non-lateral liquid.

Another limitation lies in the distribution of the segments in complex onsets. According to Bisol (1999), the onset position is formed of up to two elements. According to the author, in Brazilian Portuguese, the complex *onset* must be formed by elements that have a minimum distance of two points in the sonority scale, as the first consonant will always be a plosive or a labial fricative, while the second one will always be a lateral or non-lateral liquid.

It is worthwhile mentioning that some authors put the glide in a complex nucleus in Brazilian Portuguese, such as Câmara Jr. (1977).

In (4) the segments and consonantal sequences allowed by Portuguese in a simple onset, complex onset, simple coda and complex coda are presented.

(4)

Constituents	Segments and consonantal sequences
Initial onset	/p/, /b/, /t/, /d/, /k/, /g/, /f/, /v/, /s/, /z/, /ʃ/, /ʒ/, /χ/, /m/, /n/, /l/
Medial onset	/p/, /b/, /t/, /d/, /k/, /g/, /f/, /v/, /s/, /z/, /ʃ/, /ʒ/, /χ/, /m/, /n/, /ɲ/, /l/, /ʎ/, /r/
Coda	/N/, /l/, /S/, /r/
Complex coda	ns, rs, ls
Complex onset	pr, br, tr, dr, kr, gr, pl, bl, tl, kl, gl, fl, fr, vr

3. Syllabic structure acquisition

Fikkert (1994) presents the first acquisition model of prosody that integrates the syllable as a unit composed of hierarchically organized constituents. The author proposes, based on Principles and Parameters framework, universal stages for the acquisition of the syllable. In (5) we give the syllable acquisition stages proposed for Dutch:

(5) a. Acquistion stages of simple onsets
   Stage I: simple onsets (oclusives)
   Stage II: empty onsets
   Stage III: simple onsets (other consonants)
   Stage III a: nasals in simple onset
   Stage III b: other articulation manners in simple onsets

   b. Acquisiton stages of complex onsets
   Stage 0: selection strategy – there are no targets formed by complex onsets
   Stage 1: deletion of the 2nd element that constitutes the onset
   Stage 2: deletion of the 1st. element that constitutes the onset
   Stage 3: production of complex onset

c. Acquisition stages of rime
Stage I: simple nuclei
Stage II: branching rime (final obstruent)
Stage III: branching nuclei
Stage IV: extra-rime consonants

Freitas (1997) analyses European Portuguese data and notices that Portuguese children exhibit basically the same stages proposed by Fikkert (1994), which corroborates the universality of these developmental stages.[2] Some differences in relation to the acquisition stages of simple onset were found, as in EP stage 1 includes the production of empty onsets and nasals.

According to the author, the data observed in European Portuguese acquisition provided evidences in favor of the syllabic representation model that sees the syllable as a hierarchically organized unit composed of internal constituents.

According to Freitas (1997), the segmental emergency depends on the availability of the functioning of the syllabic constituents, as some segments appear firstly in specific positions and only later on in others. In (6) we give the results found by the author, based on longitudinal/cross-sectional data.

(6) a. <u>Fricatives</u>
1. Simple onset – MINIMUM ONSET PARAMETER
2. Coda – BRANCHING RIME PARAMETER

b. <u>Liquids</u>
1. Simple onset – MINIMUM ONSET PARAMETER
2. Syllable end – BRANCHING NUCLEUS PARAMETER
3. Complex onset – MAXIMUM ONSET PARAMETER

As can be observed in (6a), the coronal fricative, /s/, is first produced in simple onsets, as the YES value of the BRANCHING RIME PARAMETER has not yet been activated. According to (10b), the liquids, /l/ and /r/, are also first produced in simple onsets, and later on, with the activation of the YES value for the BRANCHING NUCLEUS PARAMETER, they are produced at the end of syllable. Later on, with the activation of the YES value for the MAXIMUM ONSET PARAMETER, the liquids are produced in complex onsets.

The emerging order of the fricatives and the liquids follows, therefore, the activation order of the parameter. It is not because the production of a segment is possible in the child's system that it appears simultaneously in different syllabic constituents. Then, according to Freitas (1997), the fact that the segmental emergence depends on the activation of the parameters relates to the syllabic

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[2] According to Freitas (1997:280), stage IV should not be considered in the Rime acquisition of EP, as the parameter of the position extra-Rime is not activated in the target system.

structure, constitutes evidence in favor of a top-down type of phonological acquisition model.

In terms of OT, it is as if we stated that the constraints related to the features have already been demoted in the hierarchy of the child, but specific segments are not produced in specific syllabic positions because constraints such as NoCoda, NotComplex(nucleus) and NotComplex(onset) continue ranked above faithfulness constraints.

The idea that the acquisition of a segment is intrinsically connected to the position it occupies in the syllable and in the word is shared by many studies on the phonological acquisition of Brazilian Portuguese based on cross-sectional data. Lamprecht (1986, 1990) and Miranda (1996) showed in their studies that the syllabic position occupied by the segment is decisive in considering the segmental acquisition process finished.

Miranda's (1996) study on the acquisition of /r/ in coda position in Brazilian Portuguese, in which they analyzed the cross-sectional data of 110 children aged 2:0 to 3:9, found that the position that /r/ occupies in the syllable and also in the word is the most important factor for its acquisition. According to the author, a non-lateral liquid is first acquired in the coda, then in simple onsets and finally in complex onsets. The early acquisition in coda position is justified by the phonic salience of segments at the end of the word.

It is interesting to point out that such observation does not mean that the segmental acquisition is driven by the acquisition of the syllabic structure, as was clearly observed by Fikkert (1994) and Freitas (1997) for the Dutch and the European Portuguese data respectively. In this case there is no non-production of the segment in a specific position, which would corroborate the role of the syllabic structure in the acquisition process. The reasons that motivate the percentage variations across the different age groups can, however, be different ones. Among them, we can consider possible interferences of the cross-sectional data in the interpretation of the results.

The results found in relation to the acquisition of the syllabic structures in Portuguese do not always converge. Bonilha (2000) proposes four stages in the acquisition of syllabic constituents – simple onset, complex nucleus, coda and complex onset – as she considers that the glides are positioned in complex nucleus in Portuguese, based on arguments of the acquisition process of the language. The author's proposal, however, is not in agreement with the universal developmental stages defended in Fikkert (1994) and Freitas (1997).

According to Mezzomo (2004), the glide that forms the falling diphthongs is in syllabic codas in Portuguese, in agreement with Collischonn (1997) and Bisol (1999). Therefore, the second acquisition stage proposed by Bonilha does not exist. So, the universal ranking proposed by Fikkert (1994) is maintained. For Mezzomo (2004), the glides are positioned in syllabic coda, as they appear as the first filling elements of this constituent, due to aspects related to sonority scale. According to the author, and in agreement with the findings of the referred study, the coda acquisition is linked to the segmental emergence, hence there are no specific parameters acting in the acquisition of the different codas of Portuguese. In order to

make this acquisition occur, it is just necessary that the Branching Rime Parameter have its YES marked value activated.

Bonilha (2000) tries, adopting the falling oral diphthongs acquisition analysis, to corroborate the positioning of the glide in the syllabic nucleus. Some observed aspects had a special relevance: (i) the fact that the acquisition of the phonological diphthong [aw], derived from the sequence /au/, and of he diphthong [aw], derived from the semi vocalization of /l/, shows many significant differences,[3] and (ii) the fact that the stabilization of the falling diphthongs is connected to the difference in height between the base vowel and the glide that form the diphthong.[4] According to Booij (1989) the glide will be positioned in the coda or in a complex nucleus depending on the relationship that it will have with the nucleus or with the syllabic coda. In the acquisition data, there is a connection between the syllabic nucleus and the glide, since the acquisition of the diphthongs is connected tot the different sequences of segments that form them.

4. Methodology

The subjects of the current study are two children, from now on S1 and S2, with normal phonological development, in the age group of 1:1 to 3:9 years old. Both are Portuguese-speaking monolingual girls.

The data used in this study were selected from the *INIFONO databank*. The selected subjects present phonological systems considered normal until the time of the data recollection and have normal hearing, perception, neurological, motor and cognitive abilities. The data that form the sample of this study were obtained from interviews, at the informants house, and recorded on tape. The data gathering happened spontaneously, while the children were interacting with the family and the interviewers. The analysis was based on the words produced spontaneously.

In line with other studies in the field, a segment was considered to be acquired if its correct use reaches 80%.

In relation to S1, the data were recollected in 32 moments considering periods of 15 days, from 1:02 to 1:08, and 1 month in the other age groups.

In line with Fikkert (1994), the S1 data were transcribed just on a perceptual basis. The absence of the acoustic analysis, however, does not seem to have a significant effect on the results found.

A longitudinal approach was chosen instead of a cross-sectional approach, because we focus on the presence of markedness constraints related to different

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[3] According to Bonilha (2000), the phonological diphthong [aw] emerges and stabilizes in a stage before the diphthong [aw], derived from the semi vocalization of /l/ in the coda. It seems to show that they occupy different syllabic positions, in the complex nucleus and the coda, respectively.

[4] The data analyzed by the author showed that the acquisition of diphthongs is basically related to the height of the base vowel that constitutes them, that is, diphthongs formed by low vowels are acquired in a previous stage to those formed by medium and high vowels.

phonological units as segments, and on syllabic structure. Only by studying longitudinal data it is possible to establish whether some segments, although acquired, are not produced by the presence of constraints related to the syllabic structure.

The minimum age of 1:0 for this study was set because around this age children start producing heir first words; the maximum age, 3:9, is justified because at this age the phonological system of Portuguese is practically acquired. Lamprecht (1990) observed that except for the consonant clusters, all the phonological processes are acquired by de age of 4:1 or 4:2. It is also important to mention that other studies involving the syllabic structure acquisition used similar age groups, e.g., Fikkert (1994) and Freitas (1997).

5. Data Analysis

In order to answer questions (i) and (ii), we must consider the segments that can form different syllabic constituents in Portuguese, such as the consonants /l/, /s/, /r/ and /n/, which can occupy the positions of onset and medial coda in Brazilian Portuguese.

If there is a role of the syllabic structure in the segmental acquisition of S1, it is expected, for example, that emergence and acquisition of the segments take place first in specific syllabic positions, in line with what was observed by Freitas (1997) for European Portuguese data.

In table 1 we provide the results obtained in relation to the segmental emergence and acquisition of S1.

Segments	Emergence					Acquisition				
	Final coda	Med coda	Init onset	Med onset	Comp onset	Final coda	Med coda	Init onset	Med onset	Comp onset
N	-	1:4	1:5	1:5	-	-	1:7	1:7	1:7	-
L	1:6	2:1	1:4	1:4	2:2	1:6	2:7	1:8	1:8	2:2
R	1:10	2:9	-	1:10	2:7	3:0	3:2	-	3:2	3:2
S	1:6	1:10	1:6	1:6	-	3:2	3:2	3:2	3:1	-

Table 1 – Segmental emergence and acquisition

The final nasal coda was not considered in the results in table 1, as in this position it is produced as a diphthong in Portuguese. Mezommo (2004) argues that the coronal coda is the most frequent one in the data. According to this author, out of 441 production possibilities of the nasal coda in medial position produced by the subjects of her study, 297 corresponded to the coronal coda, that is, 67,34%. The same was observed in relation to the data of S1.

According to table 1, the coronal nasal emerges at around 1:4 in the onset and in syllabic codas, and the acquisition age was exactly the same in onsets and codas, namely 1:7. Observe the data in (7).

(7) Some productions of the nasal in onset and medial coda by S1
   a. tampar [ko´pa] ~ [kõ^m´pa] – 1:4:22 – *to buy*
   b. banana [´ba] – 1:5:7 - *banana*
   c. boneca [ta´tɛka] – 1:5:20 - *doll*
   d. pronto [´potu] – 1:5:20 – *it´s done*
   e. conto [kõ^{n}tu] – 1:6:3 - *tale*
   f. não [nãw̃] – 1:5:20 - *no*
   g. nenê [ne´ne] – 1:5:20 – *baby*
   h. banana [nana] – 1:6:17 - *banana*
   i. senta [ʃẽ^{n}ta] – 1:6:17 – *sit down*
   j. conto [kõntu] – 1:7:1 - *tale*
   k. boneca [´nɛka] – 1:7:1- *doll*

In the acquisition of the nasal, therefore, there was no evidence concerning the role of syllabic structures as simple onsets and codas in the analyzed data.

The acquisition of the non-lateral liquid /r/ also occurs simultaneously in the different syllabic constituents, at around 3:2. In relation to this segment, two aspects must be highlighted. The first one is that /r/ emerges only at 2:9 in medial coda and at 1:10 in final coda. The emerging age in medial coda also goes beyond the emerging age in complex onsets that occurs at 2:7. Such fact has been explained in the literature – see Yavas (1988), Miranda (1996) and Mezzomo (1999) for data of Brazilian Portuguese. The end of the word is the most favorable position for the production of 'r', as can be observed in (8).

(8) a. gordo [´gudu] – 1:7:1 - *fat*
   b. garagem [ga´aʒi] – 1:9:9 - *garage*
   c. quero [´kɛlu] – 1:9:9 – *I want*
   d. agora [a´gɔla] – 2:1:27 - *now*
   e. comprei [kõmpej] – 2:7:12 – *I bought*
   f. dormi [´dumi] – 2:7:12 – *I slept*
   g. jogador [ʒoga´dor] – 2:7:12 - *player*
   h. três [´tres] – 2:7:12 - *three*
   i. porque [pur´ke] – 3:2:28 - *because*
   j. abri [a´bri] – 3:2:28 – *I opened*
   k. estrela [is´trela] – 3:2:28 - *star*
   l. agora [a´gɔra] – 3:2:28 - *now*

The simultaneous acquisition of the non-lateral liquid in all syllabic positions does not make it possible to verify the role of the syllabic constituents as a simple onset, coda and complex onset in the data of S1.

The data of another longitudinal subject, S2, can corroborate how much the segmental acquisition seems to drive the acquisition of the syllabic constituents. In the analysis of spontaneous data recollected at 3:1:26 e 3:2:15, it was observed that

S2 produces the complex onsets formed by the lateral liquid and reduces the ones formed by the non-lateral liquid[5], as can be observed in (9).

(9) a.　florzinha [´flor´ziɲa] – 3:1:26 – *little flower*
　　b.　outra [´ota] – 3:1:26 - *other*
　　c.　brincar [bĩn´ka] – 3:2:15 – *to play*

Considering the role of syllabic structure in segmental acquisition, it is expected that the consonant clusters formed by the lateral liquid and by the non-lateral liquid were acquired together. This does not happen simply because the acquisition of /r/ in the system of S1 and S2 occurs after the acquisition of /l/, at 3:2, in all the syllabic constituents. This can be easily explained by Optimality Theory, as shown in (10).

(10) a.

/´blu.za/	Not Complex Onset	MAX I/O	Ident I/O	Markedness
☞ /´bu.za/		*		*
/´blu.za/	*!			*
/´bru.ʃa/				
☞ /´bu.ʃa/		*		*
/´bru.ʃa/	*!			*
/´blu.ʃa/	*!			*

b.

/´blu.za/	[*[+aproximante] [-vocóide]]	MAX I/O	Ident I/O	Markedness	Not Complex
/´bu.za/		*!		*	
☞				*	*
/´bru.ʃa/					
☞		*		*	
/´bru.ʃa/	*!			*	*
☞			*	*	*

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[5] The reduction is not categorical if there are cases of substitution of the lateral liquid, metathesis, and epenthesis.

c.

| /ˈblu.za/	MAX I/O	Ident I/O	[*[+aproximante] & *[+contínuo] & [-vocóide]]	Markedness	Not Complex Onset
/ˈbu.za/	*!			*	
☞				*	*
/ˈbru.ʃa/					
/ˈbu.ʃa/	*!			*	
☞			*	*	*
/ˈblu.ʃa/		*!		*	*

The tableaux in (10) express the three stages evidenced by S1 in the acquisition of onsets formed by liquids: (i) reduction of consonant clusters; (ii) production of onsets with lateral liquids, reduction of clusters with non-lateral liquid and substitution of liquids; (iii) acquisition of onsets formed by non-lateral liquids.

It is interesting to notice that, according to a probabilistic grammar (Boersma and Hayes, 2001), the floating ranking between Max I/O and Ident I/O shows why the second acquisition stage does not postulates just the violation of Ident I/O, with the substitution of liquids. As can be observed in (11), the gradual reordering among faithfulness constraints and the conjoined constraint [*[+aproximant] & *[+continuous] & [-vocoid]] $_{(seg)}$ relates to segmental features.
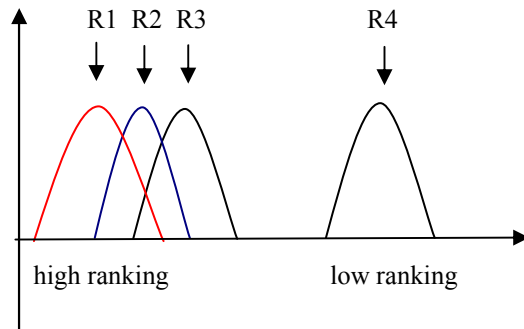
(11) a.
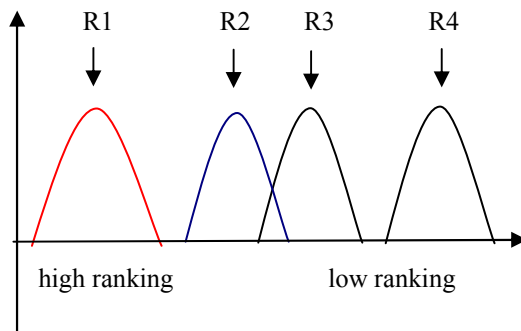
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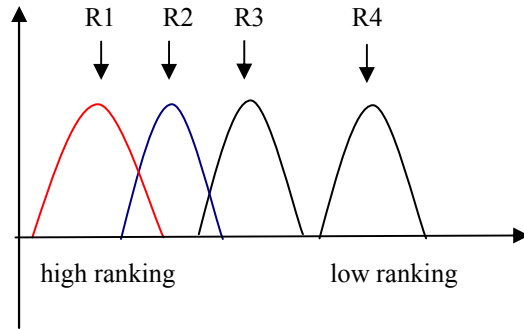
c.

R1 = [*[+aproximant] & *[+continuous] & *[-vocoid]] (seg)
R2 = Max I/O
R3 = Ident I/O
R4 = Markedness

In (11a), one can see a fragment of the grammar between 2:8:16 and 2:9:16, with the use of reduction strategies of consonant cluster and substitutions of non-lateral liquids. But (11b) shows the increase in the rate of substitutions made at the age of 2:10:17 and 3:0:21, and the beginning of the production of some consonant clusters formed by the non-lateral liquid, since the conjoined constraint is, in this stage, sharing stratum with Max I/O and Ident I/O.

The re-orderings seen in (11) therefore express the acquisition of consonant clusters driven by the segmental acquisition of a non-lateral liquid. It must be highlighted that the tableaux in (10) present the constraint NotComplex(onset), so the constituent has a role in the phonological acquisition of S1, as an integrant part of the syllable, but its connection with the emergence and acquisition of non-lateral liquids is not observed. This depends only on the demotion of the conjoined constraint [*[+aproximant] & *[+continuous] & [-vocoid]] (seg).

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In relation to the coronal fricative, the emergence of this segment occurs simultaneously in onset and coda position in the data of S1, at 1:6. The same can be observed for the development that takes place at around 3:2. Just as in case of the emergence of the non-lateral liquid, the fricative emerges first in initial coda and later on in medial coda position. Acquisition data of the fricative by S1 are displayed in (12).

(12) a. sapato [pa´pa] – 1:1:22 - *shoe*
    b. sentar [te´ta] – 1:4:22 – *to sit down*
    c. pescoço – [pi´ko] – 1:5:7 - *neck*
    d. sabe [´sabi] ~ [´ʃabi] – 1:6:17 – *she knows*
    e. sentar [sẽn´ta] – 1:6:17 – *to sit down*
    f. dois [´dojs] – 1:6:17 – *two*
    g. seis [´sejs] – 1:6:17 - *six*
    h. dois [´dojʃ] – 1:8:12 - *two*
    i. você [bo´se] – 1:9:9 - *you*
    j. sete [´ʃɛtʃi] – 1:9:9 - *seven*
    k. maçã [ma´sã] – 2:3:17 - *apple*
    l. sentar [ʃĩn´ta] – 2:3:17 – *to sit down*
    m. três [´tlejs] – 2:3:17 - *three*

Just like the nasal and the non-lateral liquid, the coronal fricative is acquired simultaneously in all the syllabic positions by S1.

It is interesting to observe that the difference between the final coda and medial coda occurs just in the emergence of the consonantal segments in the data of S1, as the acquisition occurs simultaneously in the two types of coda.

The emergence and acquisition of /l/ presents, in opposition to the other consonants displayed in table 1, a distinguished behavior, as this segment is first acquired in final coda and medial onset, at around 1:8, and only at 2:2 in complex onsets. The acquisition of /l/, consequently, as opposed to the other consonants, seems to show the presence of the syllabic constituent of a complex onset, given that, although acquired, the lateral liquid is not produced in all syllabic positions.

However, it should be pointed out that the production possibility index of consonant clusters formed by the lateral liquid is extremely low in Portuguese, i.e., the frequency of this structure is very low in the language. See the data in table 2.

Age	Onset – /l/		Onset - /r/		Substit. by /l/
	Pos	Oc	Pos	Oc	
1:7:1	0	0	7	0	
1:7:15	1	0	10	0	
1:7:28	1	0	7	0	
1:8:12	1	0	7	0	
1:8:27	1	0	7	0	
1:9:9	0	0	16	0	
2:1:27	3	0	21	0	
2:2:19	1	0	13	0	
2:3:17	1	1	37	0	1
2:5:24	0	0	32	0	
2:7:12	0	0	33	1	
2:8:16	2	2	26	0	2
2:9:16	0	0	32	0	13
2:10:17	1	1	47	3	16
3:0:21	2	1	50	8	27
3:1:20	0	0	39	12	6
3:2:28	1	1	41	39	3
3:3:27	0	0	24	19	
3:4:27	1	1	28	26	
3:5:28	0	0	37	31	
3:6:28	0	0	18	13	
3:8:14	2	2	21	18	
3:9:13	2	2	25	25	

Table 2 - Consonant clusters formed by the lateral liquid

As can be seen in table 2, the production possibilities of complex onsets formed by the lateral liquid are extremely reduced if compared to the possibilities of the complex onset formed by the non-lateral liquid[6]. The frequency of this sequence in the speech of S1 is in accordance with the frequency rates of the segments /l/ and /r/ in onset position, referred to as in Albano (2001): 1,28 and 2,53, respectively, for adult data.

Table 3 shows the occurrence of the branching onset formed by the lateral in Brazilian Portuguese.

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[6] The same was observed by Ribas (2002) based on cross-sectional data of 134 children aged 2:0 and 5:3.

Age	/l/ - %		
	Init	**Med**	**Final**
1:1:22			0
1:2:13 - 1:2:27		0	50
1:3:10 - 1:3:34	0		0
1:4:09 - 1:4:22	75	33,3	
1:5:07 - 1:5:20	**83,3**	33,2	0
1:6:03 - 1:6:17	75	0	60
1:7:01 - 1:7:15	66,6	66,6	23
1:8:12 - 1:8:27	**81,2**	72,7	**90**
1:9:09	**100**	**100**	50
2:1:27	**80**	**100**	**92,3**
2:2:19	**100**	**100**	26,6
2:3:17	**100**	**87,5**	**100**
2:5:24	**100**	**100**	**100**
2:7:12	**100**	**100**	**100**

Table 3 – Correct productions of lateral liquids

Although it is not produced in complex onsets, the lateral liquid can already be considered acquired at 1:8:12, as the correct production percentage goes beyond the predicted 80%. So, once more, just like in the acquisition of the other segments analyzed, the syllabic structure does not drive the segmental acquisition in the analyzed data.

The absence of asymmetries in the acquisition of the coronal nasal, the coronal fricative, and the non-lateral liquid may indicate that:

(i) glides are positioned in complex nucleus in Portuguese, according to Bonilha (2000). So, the absence of asymmetries in the acquisition of the coronal nasal and the non-lateral liquid seems to show, according to Freitas (1997), that nasals also occupy the position of syllabic nucleus in Portuguese.

(ii) glides are positioned in syllabic codas in Brazilian Portuguese, being acquired too early due to the presence of the sonority scale Mezzomo (2004). The segments in the coda emerge according to the sonority between the nucleus and coda, that is, the smaller the sonority distance, the earlier the acquisition. Because of this, the coronal nasal is acquired at the same time in onset and coda. Consequently the coronal fricative and the non-lateral liquid will not evidence asymmetries between onset and coda either.

(iii) glides are positioned in complex nucleus in Portuguese, and the data analyzed show that the syllabic structure acquisition is driven by segmental acquisition.

In order to validate the hypothesis in (i), the emergence of asymmetries in the acquisition of the coronal fricative is expected, as observed in the data analysis of the European Portuguese. The acquisition of the coronal fricative by S1 in simple onset and coda occurs, however, in the same age group. Hence, the similar behavior

of the three consonants /n/, /r/ and /s/ does not allow the hypothesis in (i) to be considered possible.

The hypothesis in (ii) would be valid only for the absence of asymmetries between onset and coda, but not between a simple onset and a complex onset. The data of S1 confirm this fact, as the acquisition of the lateral liquid evidences the asymmetries between simple onset and complex onset. However, the acquisition of the lateral liquid at 2:2 in the complex onset, six months after the acquisition of the lateral in simple onsets , does not indicate, as shown by Freitas (1997), the role of complex onset in the segmental acquisition of Brazilian Portuguese, as the liquid is already acquired at 1:8.

The problem of the hypothesis in (ii) is that it is not able to explain why the falling diphthongs formed by low and mid-low vowels are acquired so early by S1, as observed by Bonilha (2000, 2004). If the smallest sonority distance between the nucleus and glides is what guarantees that the diphthongs be acquired in the coda before the nasal, fricative and non-lateral liquid, how can we explain that sequences such as [aj] and [aw] are acquired before sequences like [ej] and [iw]? The highest sonority distance between low and mid-low vowels and glides would favor the early acquisition of [ej] and [iw].

According to Albano (2001), *the inherent shortening of the semi vowels* characterizes these segments as constituents of the syllabic margins, but not specifically as codas, which makes it possible to classify them as a second element of a complex nucleus.

Bonilha (2000), applying a cross-sectional data analysis, observed that the falling diphthongs are produced in a precise way from the age of 1:3:24, with the production of the diphthong [aw]. The data of S1 prove the early acquisition of the diphthongs formed by the low vowel, [aw] and [aj]. It was also observed by the author that the diphthong formed by the mid-low vowel, [ɛw], is produced in a correct way in all tokens. Concerning the diphthongs formed by the mid-high vowels, [oj] and [ej], they not only emerge at 1:5:20 in the speech of S1, but also present instability in the production.

Such instability is observed mainly in the production of [ej], whose percentages vary from 33,3% to 100%. It should be noted that the diphthong [ej], in the analysis of Bonilha (2000), did not reach a satisfactory production percentage until the age of 2:5.

Following the author, it is possible to postulate the role of the constraints displayed in (13), to explain the acquisition of the falling diphthongs by S1.

(13) NoSequence (nucleus) (+low...+high): a complex nucleus must not present a vowel sequence [+low], [+high].
NoSequence (nucleus) (-low...+high): a complex nucleus must not present a vowel sequence [-low], [+ high].
NotTwice (coronal): two coronal elements must not appear in   sequence.

As was proposed by Bonilha (2000), in the first acquisition stage the demotion takes place of NoSequence (nucleus) (+low...+high) below the faithfulness

constraints, which, in agreement with the gradual acquisition algorithm, are promoted in the hierarchy. Therefore, such movement allows the production of diphthongs formed by low and mid-low vowels

In the second stage, there is the demotion of NoSequence (nucleus) (-low...+high), making it possible for [ej], [oj], [ew] and [iw] to emerge. The instability in the production of [ej] is shown by the role of NotTwice (coronal), that shares stratum with the faithfulness constraints. In (14) we present the constraint hierarchies that allow the acquisition of the falling diphthongs by S1.

(14) a. 1st acquisition stage
     H1 = NotTwice(coronal), NoSequence (nucleus) (-low...+high) >> Max I/O >> NotComplex(nucleus), NoSequence (nucleus) (+low...+high)

  b. 2nd acquisition stage
     H2 = NotTwice(coronal) >> Max I/O >> NotComplex(nucleus), NoSequence (nucleus) (+low...+high), NoSequence (nucleus) (-low...+high)

  c. 3rd acquisition stage
     H3 = Max I/O >> NotComplex(nucleus), NoSequence (nucleus) (+low...+alto), NoSequence (nucleus) (-low...+high), NotTwice(coronal)

The data of S1 show not only the acquisition of the diphthongs at a stage before the acquisition of codas, but also express the early emergence, even with unstable values, of the pattern CVVC.

Considering the early acquisition of the final coda /l/, we postulate that in final position of the word /l/ is interpreted by S1 as a constituent of the complex nucleus.

6. Conclusion

According to Fikkert (1994), Miranda (1996) and Freitas (1997), among others, the acquisition of a segment depends on the setting of parameters related to the syllabic patterns of a language. The age of emergence and acquisition of the segments in the different syllabic constituents, presented in Table 1, show, however, the absence of the role of the syllabic constituents in the segmental acquisition of S1. What seems to happen, in fact, is that the acquisition of specific syllabic constituents depends on the demotion of feature constraints.

The fact that the role of the syllabic structure in the segmental acquisition of S1 was not evidenced does not mean that constituents such as Onset, Coda and Rime should not be considered in the phonological analyses of Portuguese. What is defended here is not the absence of syllable structure in the phonological acquisition of S1 -the syllable linguistic unit is present since the beginning in production (Fikkert, 1994; Freitas (1997)), assuring the emergence of the different syllabic patterns of Portuguese - but the lack of evidence on the role played by syllabic structure in the segmental acquisition process of this child. In this sense, the syllabic representation proposed by Kahn (1976) seems sufficient to explain the data.

Having as a basis the data of a longitudinal subject, the results of the present study seem to show that analyses concerning the interaction between segmental acquisition and syllabic structure based on cross-sectional data must be rethought.

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