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The first steps in the acquisition of syllables and geminates in Tashlhiyt Berber

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A large body of literature on early language acquisition has shown continuity between phonetic forms in infant pre-linguistic vocalizations and earliest speech forms (cf. Locke 1983, Oller 1980, Stark 1980, Stoel-Gammon & Cooper 1984, Vihman, Ferguson & Elbert 1986, among others). Strong similarities in sound types, sound combinations and syllable type preferences in different communities have been frequently documented across these periods, suggesting universal foundations for early production patterns. These similarities have been explained by articulatory constraints and structural factors as well (cf. Browman & Goldstein 1986, Goldstein, Byrd & Saltzman 2006, Vihman et al. 1985). It has also been proposed that input from the ambient language may influence the shaping of children's production preferences at some point in the late babbling and first word period (Werker & Lalonde 1988, Konopczynski 1986, Snow & Stoel-Gammon 1994).

In this paper, we present preliminary results of a longitudinal study that focuses on the developmental trajectory of speech production capacities in two Berber children acquiring Tashlhiyt from the babbling period to the emergence of early grammar. Very few studies, if any, are devoted to the Berber language acquisition, and Tashlhiyt, the variety spoken in South-west Morocco, presents very interesting phonetic and phonological characteristics to study in a developmental perspective. Probably the most salient characteristic is the use of complex consonants clusters, resulting in a highly marked syllable structure where any segment, even a voiceless obstruent, may occur in the nucleus position (cf. Dell & Elmedlaoui 1985, 2002). Another feature, which deserves to be studied relates to consonant length. Tashlhiyt Berber contrasts singleton and geminated consonants in various contexts, including word-initial, medial and final positions.

This paper is structured as follows. Section 1 provides a cross-linguistic overview of the preferred sound patterns in babbling and first words. Section 2 turns to Tashlhiyt Berber: data and methods are presented therein. The preliminary results of a longitudinal two-case study will be discussed in section 3. We will show that the

two children followed during the babbling and first words periods exhibited production preferences that were often described as preferred productions in children learning different languages. In section 4, we discuss the acquisition of geminates, taking advantage of the case of Tashlhiyt Berber in order to shed light on the phonological representation of these segments. In particular, we will be testing the ‘ambisyllabicity’ hypothesis in relation with the assumption that any segment in Tashlhiyt Berber may function as a syllable nucleus. Section 5 concludes the paper.

1. Cross-linguistic preferences in babbling and first words

In this section, we briefly review the similarities in sound and syllable types, which have been documented across the babbling and first word periods.

1.1. *Consonants and vowels*

Several studies have shown that children from different ambient language backgrounds prefer producing consonants with a complete closure in the front part of the vocal tract, including labials and coronals, oral as well as nasal. The reader is referred to Kent & Bauer (1985), Vihman et al. (1985), Robb & Bleihle (1994), Davis & MacNeilage (1995) on American English, Kern & Davis (2009) on Dutch and French, and Cataño, Barlow & Moyna (2009) on Spanish. These preferences constitute a universal tendency for early consonant patterns, although not shared by all children, especially when acquiring languages with an important amount of dorsal and pharyngeal consonants. In this respect, Rosenhouse (2000) reported an important use of velars, uvulars, pharyngeals and glottals in children acquiring Arabic spoken in Israel before the age of 24 months. The use of fricatives is also found in children first words in Egyptian Arabic (Omar 1973) and Jordanian Arabic (Amayreh & Dyson 2000).

As to vowels, children begin producing the ones belonging to the lower left quadrant of the vowel space, in particular, mid [ɛ] / [e], low front [æ] / [a] and central [ə]. This has been reported in various languages, including American English (Kent & Bauer 1985, de Boysson-Bardies et al. 1989, Davis & MacNeilage 1990, 1995, among others), Arabic (de Boysson-Bardies et al. 1989 and Kern & Davis 2009), French (de Boysson-Bardies et al. 1989, Kern & Davis 2009), Brazilian Portuguese (Teixeira & Davis 2002), and Ffulde (Cissé 2014). Depending on the input

language, certain vowels may emerge relatively early in child productions. In Egyptian and Jordanian Arabic, whose vowel systems contain only three cardinal vowels contrasting in length, children produce the high vowels [i] and [u] early in their first words period (Omar 1973, Amayreh & Dyson 2000). According to Omar (1973), [u] is found even earlier in the pre-linguistic period (6 to 10 months) along with the vowels [ɛ, e, æ, a].

1.2. Syllable types

Open light syllables are the most predominant types, often reduplicated as CVCV or resulting from consonant cluster reduction and coda deletion, especially in first words (Fikkert 1994, Levelt & Van de Vijver 1998, de Boysson-Bardies 1999, Levelt, Schiller & Levelt 2000). This is actually not surprising as CV is the universally least marked syllable type. Closed syllables are very limited in children babbling and first words, regardless of the input language. However, in certain languages, children tend to produce a relatively high number of closed syllables. According to Fee et al. (1982) and Stoel-Gammon & Cooper (1984), some English-learning children had dominant closed syllables. In Dutch, one child followed by Elbers & Ton (1985) is reported to have no preference for CV syllables in his first words. Another interesting case can be found in languages with phonemic geminates. In intervocalic position, these geminates are generally analysed as ambisyllabic, branching into coda and onset positions. This automatically increases the number of closed syllables as soon as the geminates emerge in children productions. As we shall see later in section 4, Tashlhiyt Berber is one such language where geminates are produced early in the babbling and first words periods.

2. Materials and methods

2.1. Tashlhiyt Berber

Berber belongs to the Afroasiatic family. It is spoken in large parts of North Africa, mainly in Morocco and Algeria, and to a lesser extent in Mali, Niger, Libya, Egypt, Tunisia and Burkina Faso. Berber communities also live in Diasporas, mainly in France, Spain, Holland, and Belgium. Tashlhiyt, whose native speakers are

estimated at four millions based on the data of the official census of 2004,¹ is spoken in South-west Morocco. The language presents interesting phonetic and phonological features, which can serve as a testing ground for important theoretical proposals. In particular, it allows complex consonant clusters, which may result in utterances without any vocalic segment (e.g. *ts:lkmt:nt* ‘you made them (fem.) arrive’). Based on this characteristic, Dell & Elmedlaoui (1985, 1988, 2002) argued that in Tashlhiyt any segment, even a voiceless obstruent, can be syllabic (see also Boukous 1987).

Regarding the phonemic system, Tashlhiyt Berber has only three vowels /i, a, u/. The so-called “transitional voicoids”, which appear in certain consonant clusters (e.g. *nkər* ‘wake up, stand up’, *lkəm* ‘arrive’), have no syllabic status according to Dell & Elmedlaoui (2002), while Coleman (1996, 2001) argues that they are epenthetic, filling syllabic nuclei that would otherwise remain empty. As to consonants, Tashlhiyt has 33 consonants and two glides /j, w/, which often occur in complementary distribution with the corresponding high vowels /i/ and /u/ (cf. Guerssel 1986, and Lahrouchi 2013). The consonantal inventory is given below in table (1).

Table 1. The consonantal inventory of Tashlhiyt Berber.

	Labial	Dental	Alveolar	Palatal	Velar	Uvular	Pharyngeal	Laryngeal
Stop	b	t d tʰ dʰ			k g kʷ gʷ	q qʷ		
Fricative	f		s z sʰ zʰ	ʃ ʒ ʃʰ ʒʰ		χ ʁ χʷ ʁʷ	ħ ʕ	h
Trill			r rʰ					
Lateral			l lʰ					
Nasal	m		n					
Approximant	w			j				

¹ Chaker (1992) refers to three million natives at the beginning of the 90s. According to Boukous (2011:28), 28% of the population speaks Berber, of which 52% are native Tashlhiyt.

Each of the above consonants has a geminate counterpart. Table 1 also shows pharyngealized coronals and labialized dorsals, as opposed to their plain counterparts. All of these phonological properties will prove interesting in the study of language acquisition. In the remainder of this paper, we will be examining how these properties arise in babbling and first words.

2.2. Data collection and methods

Two children acquiring Tashlhiyt Berber participated in our study: a girl named Imane and a boy named Reda. They were recorded every two weeks in their home from 7 to 24 months (the whole data is downloadable from CHILDES²). Parents were told to follow their normal types of activities with their child. No extra material was used in the recording sessions, so that samples reflected the children's typical vocalizations in familiar surroundings. We ended up with 31 sessions of one hour for Reda and 26 for Imane. The data were broadly transcribed using IPA. They were entered into the PHON software designed for describing phonetic patterns (Rose *et al.* 2006). Then, they were divided in two periods: period 1 from 7 to 12 months and period 2 from 13 to 24 months. Only babbling utterances were considered in the first period and word utterances in the second period. Frequency of segments and syllable types were calculated for both periods.

For the purpose of our study, consonants are grouped according to 1) *place of articulation*: labial (bilabial, labiodental, labio-palatal and labio-dorsal), *coronal* (dental, coronal, post-coronal and palatal), *dorsal* (dorsal and uvular) and *guttural* (pharyngeal and glottal), and 2) *manner of articulation*: oral stops, nasals, fricatives, liquids and glides. Glides are considered as consonants: [w] is classified as labial and [j] as coronal. As to vowels, they are grouped according to 1) *backness*: front, central and back dimensions, and 2) *height*: high, mid and low dimensions.

Regarding syllable types, we distinguished open syllables from closed ones. The consonant clusters, which appear later in both kids productions were syllabified by means of a set of constraints based on Dell & Elmedlaoui's model of syllabification (2002), whose basic idea is that any segment, even a voiceless obstruent, can occur

² <http://childes.psy.cmu.edu/browser/index.php?url=PhonBank-Phon/>

in the nucleus position. Some of the constraints proposed in the original work have been slightly modified here. The whole set of constraints is listed below in (1).

(1)

Two principles:

- *The licit consonantal nuclei thesis*, which states that any segment even a voiceless obstruent can act as a syllabic nucleus.
- *The sonority-driven syllabification thesis*, which holds that in the competition for the status of syllabic nucleus, more sonorous segments are favoured over less sonorous segments.

Segments are ranked along the following scale where they appear in order of decreasing sonority: *a* > *high vocoids* > *liquids* > *nasals* > *fricatives* > *stops* (cf. Dell & Elmedlaoui 2002:76).

Six constraints:

- Complex onsets are prohibited (Dell & Elmedlaoui 2002:114). This constraint has been slightly modified in this paper, suggesting that only domain-initial onsets can be complex.
- Any rime contains at most three consonants. If so, the last two consonantal slots host a geminate (Dell & Elmedlaoui 2002:98).
- The coda position cannot be more sonorous than the nucleus (Dell & Elmedlaoui 2002:102).
- Every syllable has an onset, except domain-initially where the onset may be empty (Dell & Elmedlaoui 2002:92).
- Any sequence with a sonority peak must contain a nucleus (Dell & Elmedlaoui 2002:100).
- A geminate cannot branch into an onset followed by a nucleus (Dell & Elmedlaoui 2002:102). However, in cases where none of the above constraints leads to the appropriate syllabification such as in words made of one geminate (e.g. /ʔ/ 'eat') as well as in domain-initial position (e.g. *kʔnt* 'cross them (fem.)'), the geminate seems to constitute an onset-nucleus sequence, inevitably running counter Dell & Elmedlaoui's proposal.

3. Results

This section briefly presents our results about sound and syllable patterns in Imane and Reda's productions. The reader is referred to Lahrouchi & Kern (2015) for

further details and analysis.

3.1. Ratio of consonants to vowels

Table 2 shows the frequency of segments and utterances.

Table 2. Frequency of occurrence of segments and utterances.

	Utterances	Consonants	Vowels	C/V ratio
Imane	3339	8924	7261	1,23
Reda	2986	5537	5823	0,95
Total	6325	14461	13084	1,09

Both kids produced more consonants than vowels as illustrated by the C/V ratio, departing from the patterns observed in other languages such as French, Turkish, German and Tunisian Arabic (cf. Kern & Davis 2009). This is probably due to the ambient language effect, namely the fact that Tashlhiyt Berber has common complex consonant clusters.

3.2. Consonants and vowels

Both kids produced more oral stops than other manners of articulation in the babbling period, thus confirming the preferences that were often described in other languages. The liquids and glides are the least represented categories in their productions with less than 10% of occurrences in both categories. As to fricatives and nasals, Imane produced more nasals than fricatives (18% of fricatives in the first period vs. 26% of nasals), whereas Reda showed the reverse order (34% of fricatives vs. 18% of nasals). This is mainly due to the frequent use of the laryngeal fricative [h] which represented over 50% of the fricatives in Reda's babbling.

Similar patterns arose in period 2 (first words). Both children produced more oral stops than any other manner of articulation: 43.8% of the consonants found in Imane's productions are stops, as opposed to 33.5% in Reda's productions. Glides and liquids are the least produced categories in first words, just as in the babbling period.

Regarding place of articulation, over 67% of the consonants produced by Reda and Imane in the babbling period were labials and coronals, while gutturals represented approximately 19% and dorsals around 13% for Imane and 17% for Reda. Similar patterns arose in first words, although we noticed an increasing use of gutturals, especially in Imane's productions where they reached 19% of the consonants compared to 9% in the babbling period. The use of laryngeal [h] explains the relatively high frequency of gutturals in both kids productions.

As to vocalic patterns, the open vowel represented 80% of the vowels found in both children productions during the babbling period. Of particular interest is the use of the front [æ], specifically in Reda's productions. This is consistent with what has been found in other languages such as Tunisian Arabic, whose vocalic system is similar to that of Tashlhiyt Berber. Kern & Davis (2009) noticed that children acquiring this language use the front [æ] much more than the central variant [a]. Another interesting point is the use of the mid vowel [e], especially in Imane's productions (23% of the vowels in the babbling period).

In the first words period, we noted a much more varied vocalic repertoire, with an increasing use of the high vowels [i] and [u] over the months. We also noted an increasing use of the low vowel [a] as opposed to [æ]. For instance, Reda's preference for [æ] shifted down from 82% in the babbling period to 48% in the first words. In addition, both kids displayed a few instances of schwa in babbling and first words as well. These schwas deserve to be examined given their controversial status in Tashlhiyt Berber.

3.3. Syllable types

Open syllables and more precisely CV ones were predominant in both kids productions during the whole period of study. Out of 3000 syllables produced by Imane and Reda in the babbling period, 85% were open. In the first words period, Imane produced 2370 syllables, 73% of which were open, whereas Reda had 82% of the syllables open (2082 syllables in total). The results are given in tables 3 and 4 (underlined consonants are syllabic).

Table 3. Syllable types in Reda's productions

	Open						Closed				
	CV	CC	V	C	CCV	CCC	VC	CC	CVC	CCC	VCC
Babbling period	59,78	0,05	21,85	2,62	0,92	0	4,20	0,81	8,85	0,32	0,54
Words period	57,10	0,28	22,04	2,01	1,15	0,04	5,42	0,09	11,43	0	0,38

Table 4. Syllable types in Imane's productions

	Open						Closed				
	CV	CC	V	C	CCV	CCC	VC	CC	CVC	CCC	VCC
Babbling period	75,77	0,11	8,27	0,23	0,11	0	1,55	0,23	13,54	0,11	0
Words period	62,78	1,09	8,52	0,12	0,88	0	4,30	3,37	17,80	0,80	0,29

Among open syllables, CV ones are much more frequent in both children productions. CC syllables are far fewer though phonologically speaking they are equivalent to CV syllables in that they contain an onset plus a nucleus, both of which are simplex. The relatively high percentage of closed syllables (in particular CVC) in both children productions is due to the frequency of geminates, which are syllabified as ambisyllabic typically branching into coda and onset positions. The following section is dedicated to this type of segments, focusing on their syllabic analysis.

4. Geminates

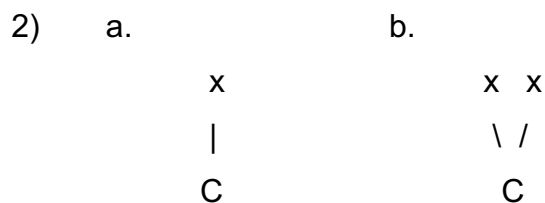
Geminates have been the source of much debate in phonological theory, with regard to their representation and their behaviour in phonological processes (cf. Hayes 1986, 1989, Schein & Steriade 1986, Selkirk 1990, Kenstowicz 1994, Davis 1994, 1999, 2003, 2011). Berber is no exception to this debate, as the language contrasts singleton and geminates in various structural contexts, which inevitably raises the problem of their syllabic representation. This section discusses some aspects of this problem, in light of the facts used in the present study.

4.1. The phonology of geminates, an overview

Cross-linguistic study of geminates states interesting implicational

relationships, whereby a language having word-initial and word-final geminates also has word-medial ones (cf. Taylor 1985, Thurgood 1993, Kraehenmann 2011). The general finding is that word-medial, specifically intervocalic, is the preferred position for this kind of segments. Among the languages with phonemic geminates, very few contrast them with singleton consonants in word-initial position. Tashlhiyt Berber is one such language in which lexical geminates occur not only in medial position (e.g. *ag:u* 'smoke', *ur:i* 'turn back') but also in initial and final positions (e.g. *d:u* 'go', *f:i* 'pour', *al:r* 'raise', *uf:r* 'inflate'). In addition to lexical geminates, Tashlhiyt has morphological (e.g. *lkm* 'arrive' / *lk:m* 'arrive-imperfective'), concatenated (e.g. /t-lkm-m/ > [tlkm:] 'you (2.MS.PL) arrived') and assimilated geminates (e.g. /rad tftu/ > [rat:ftu] 'she will go').

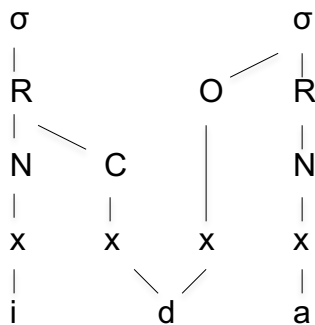
Taking advantage of autosegmental representations, most phonologists (cf. Guerssel 1977, Dell & Elmedlaoui 1997, 2002, 2011, Lahrouchi 2001, Ridouane 2010) analyse geminates in Berber as a single melodic unit associated to two adjacent skeletal slots, as opposed to singleton consonants which attach to only one slot. This is illustrated below in (2).



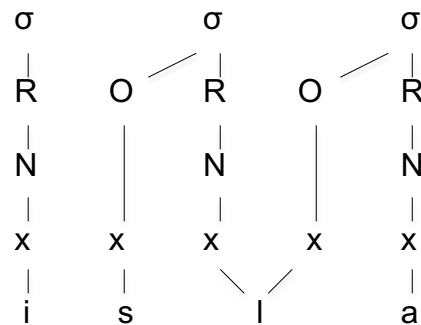
This kind of representation inevitably raises the issue of syllabification, leading to cases where the two skeletal positions in (2b) are dominated either by one or by two syllabic constituents. The later case is found particularly in the intervocalic position, where geminates are ambisyllabic, attached to coda and onset positions. Dell & Elmedlaoui's (1985, 2002, 2011) hypothesis that any segment in Tashlhiyt Berber can be syllabic allows this configuration (see (3a)) as well as the one where geminates branch into nucleus + onset positions (see (3b)). However, it prohibits any branching into onset + nucleus positions, relying on Hayes (1989: 258) idea that onset segments are weightless and that branching into onset and nucleus positions entails a 'flopped structure'.

(3) O, R, N and C respectively stand for Onset, Rime, Nucleus and Coda.

a. *id.ra* 'he went'



b. *is/ra* 'he heard'



In the following section, we present the frequency of geminates in children productions. Then we discuss some of the issues they raise with regard to ambisyllabicity.

4.2. Geminates in Tashlhiyt language acquisition

Both children started producing geminates early in their babbling. Reda produced 1725 geminates during the whole period of study, 53% of which involve coronal consonants, followed by labials (26%), dorsals (13%) and gutturals (8%). Imane produced almost the same amount of geminates (1677), with the same preferences: 54% of the geminates are coronals, followed by labials (29%), dorsals (11%) and gutturals (6%). Figures 5 and 6 present the results for both kids.

Figure 5. Number of occurrences and types of geminates in Imane's productions

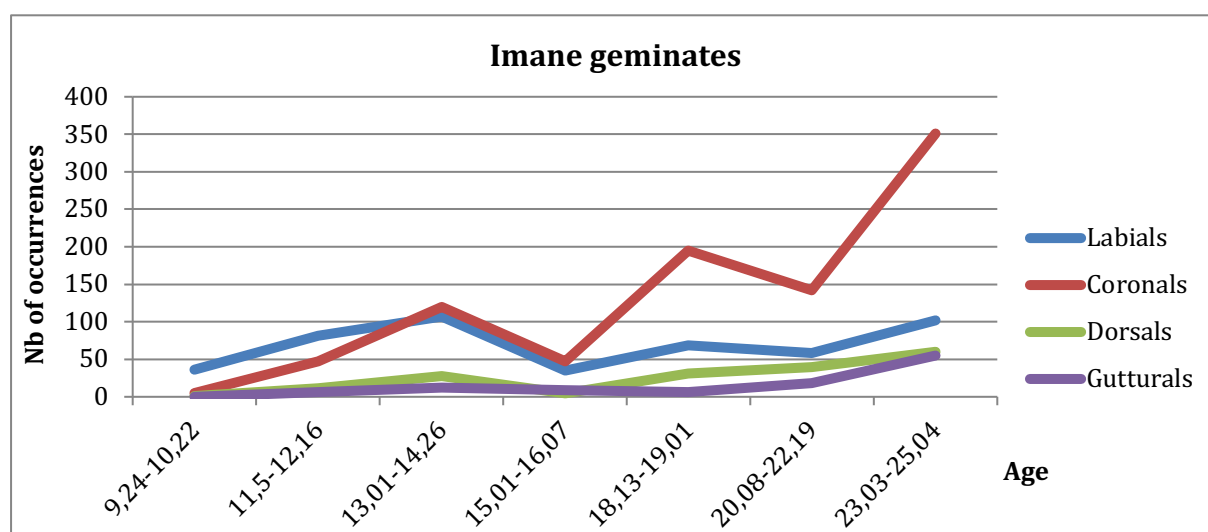
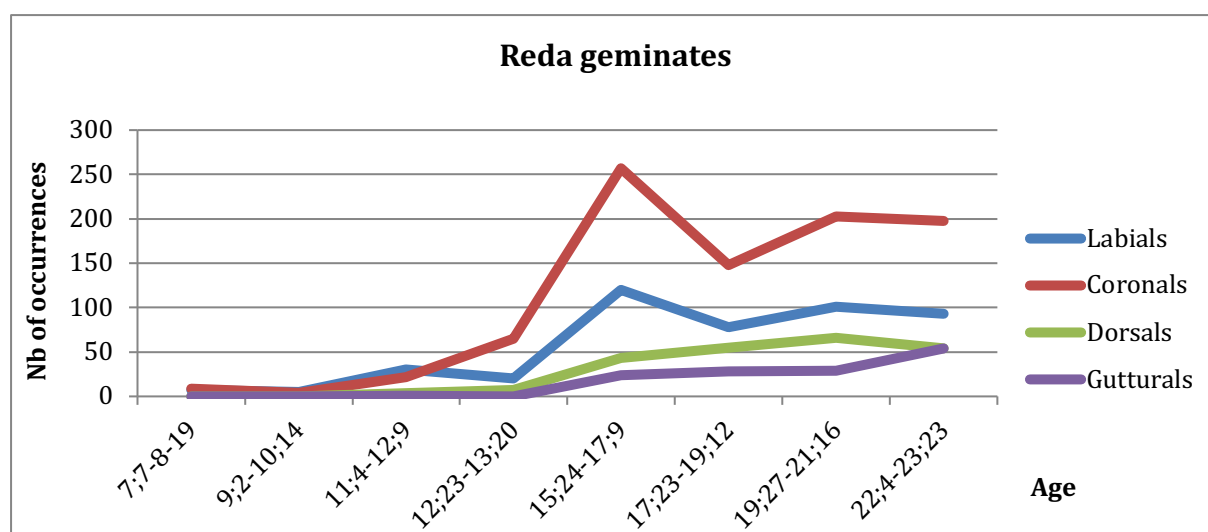


Figure 6. Number of occurrences and types of geminates in Reda's productions



Both children preferred geminates in the initial and medial positions. Very few occurred in the final position. Examples in first words are given in (4) for both kids.

(4)

	#			X V			#		
	Actual	Target	Gloss	Actual	Target	Gloss	Actual	Target	Gloss
Imane									
10,08	b:ab:a	baba	dad	mib:ab:a:	bajbaj	bye			
	t:ε	hati	here it is	mam:a:	mama	mom			
11,19	q:aq:a	ɛika	like this	man:ama	Imunika	doll			
13,29	f:u	if:uε	went out	ib:i	ib:i	he cut	ab:	ib:i	he cut
18,13	ʃ	ʃ	eat	xiz:u	xiz:u	carrots			
18,27	t:at:a	xt:a	this one	aq:an	ħaq:an	perhaps	maw:	amuf	cat
	ɛ:i	ɛi	here	xt:a	xt:a	this one			
	b:i	b:it	cut it	ħlli	ħhlib	milk			
19,10	m:i	km:i	you (fm)	ʃm:i	ʃm:i	my uncle	fs: fs:	fs:	keep quit
	t:a	tfta	whe went	ifa:	if:at	he ate it			
Reda									
11,4	m:æ	mama	mom	gug:u	ayrum	bread			
13,6	k:wɣ:æ	kura	ball	xwix:u	abux:u	insect			
	n:æj:h	n:am	eat	ənæn:æ	in:a	mom			
16,6	b:æħ	b:aħ	disappear	a:k:æ	mʃilqa	spoon	dnæn:	ʃan:	car
	k:u	kura	ball	æn:u:	dʃanun	yogurt	buʃ:	buʃ:u	monster
23,23	k:ik:i	k:iss	remove	xk:i	nk:i	me			
	j:i	ij:ih	yes	ft:æ	ifta	he went			
	w:æ	ɛwa	this one	xq:æ	iqf:a	it's hard			

Cross-linguistic studies (cf. Taylor 1985, Thurgood 1993, Kraehenmann 2011) in adult language state that geminates most commonly occur in word-medial position, particularly in the intervocalic position. Word-final geminates are also often allowed, while word-initial ones are relatively rare. The low frequency of word-final geminates in children productions can be explained by the late acquisition of consonants in the coda position, as opposed to the onset (cf. Ingram 1978, Fikkert 1994, Demuth 1995, Kirk & Demuth 2006, Gnanadesikan 2004, among others) and the preference for unmarked structures (cf. Jakobson 1968), namely open syllables.

As mentioned earlier in section 2.2, Dell & Elendlaoui's approach to syllable structure in Tashlhiyt Berber allows:

- complex coda but no complex onset
- geminates in the coda position but not in the onset position. Any geminate that can potentially occur in the onset position is split into an ambisyllabic structure coda + onset or nucleus + onset
- geminates as a nucleus + onset sequence but not the mirror-image onset + nucleus.

In this study, we assume that complex onsets may occur only domain-initially for it is difficult to show that forms like *kʔi* 'remember' and *bdu* 'start' involve an initial syllabic

consonant. This is even more difficult in forms containing sonority-equal segments such as *bdg* ‘be wet’ and *fsx* ‘invalidate’, since sonority hierarchy cannot determine which consonant is syllabic. In the same way, we assume that domain-initial geminates belong to the same syllabic constituent, namely the onset: forms in (4) like *t:ɛ*, *b:i* and *m:æ* are analysed as monosyllabic. However, in post-vocalic position geminates are syllabified either as tautosyllabic, associated to the coda position, or as ambisyllabic when followed by a syllabic segment. The latter case is well attested in both child and adult productions. It is also stated in typological studies as the preferred context for ambisyllabic consonants (see section 4.1 for relevant studies). As to ambisyllabic geminates attached to nucleus and onset positions, they are found only in Tashlhiyt Berber. As far as this assumption holds, the geminates in forms like *ħlli* and *ɣmzi* in (4) are syllabified exactly as in (3b). For the sake of convenience, both forms are represented below in (5).

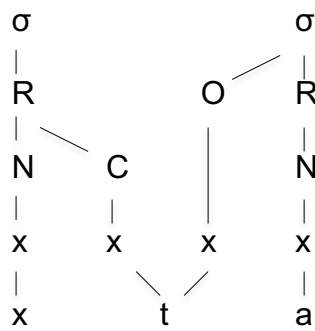
(5) a. *ħlli* ‘milk’

b. *ɣmzi* ‘my uncle’

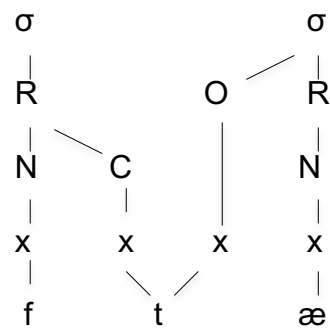


In the competition for the status of syllabic peak, the liquid */l/* and the nasal */m/* have priority over the less sonorous fricatives */ħ/* and */ɣ/*, resulting in bisyllabic forms where the ambisyllabic character of the geminate is reflected in its association to nucleus and onset positions. In case the first consonant is more sonorous than the following geminate, the resulting structures involve more common ambisyllabic geminates, interposed between two nuclei. The forms *xt:a* and *ft:æ* illustrate the situation in (6).

(6) a. *xt:a* 'this one'



b. *ft:æ* 'he went'



Ambisyllabicity therefore holds insofar as it involves a coda + onset or a nucleus + onset sequence. One can still ask how relevant is the assumption that a language may have geminates attaching to a nucleus + onset sequence but not their mirror-image forming an onset + nucleus sequence. The ban of the latter structure in syllable theory generally relies on the argument that onsets do not contribute to weight, and more particularly the avoidance of the so-called 'flopped structure' (cf. Hayes 1989: 258, and Topinzi 2008 for an alternative view). However, as far as Tashlhiyt Berber is concerned, there is no phonological evidence for syllable weight, apart from metrics and verse structure which has been argued to rely on fixed alternations of light and heavy syllables (cf. Dell & Elmedlaoui 2002, and Dell 2011; the reader is referred to Hammane 2010 for an alternative analysis without any distinction between light and heavy syllables). Furthermore, we are left with forms such as *fɜ:* 'eat' (see 4) and *kɜ:* 'cross' which, according to Dell & Elmedloui's approach, should be analysed as closed syllables only because they eschew prohibited branching into an onset + nucleus structure. This is all the more questionable in child phonology that open syllables are generally favoured over closed ones. Tashlhiyt Berber is no exception to this trend: During the whole period of study, Reda produced 5537, of which only 909 occurred in the coda position. Likewise, Imane produced 8924, 22,24% of which are coda consonants. The relatively important percentage of coda consonants is due the high frequency of ambisyllabic consonants in their productions.

5. Conclusion

In this paper, we presented preliminary results of a longitudinal study that focused on the developmental trajectory of speech production capacities in two Berber children acquiring Tashlhiyt. Our data provide evidence for universal tendencies in babbling

and first words: The subjects produced more stops, nasals and glides than other types of sounds; more coronals and labials than dorsals and gutturals; the vowel a is produced earlier than the remaining i and u. Open syllables and more precisely the CV syllable type are predominant in both babbling and words. In addition, we noticed the early emergence of geminates in both children productions. They occurred preferably in word-medial position. Word-initial geminates were favoured over word-final ones, departing from the patterns observed in adult language. This was explained by the late acquisition of coda consonants, as opposed to onset consonants. We also examined geminates in relation to syllable structure. We discussed two types of ambisyllabic geminates: Those attaching to a coda + onset sequence and those associated to nucleus and onset positions. We showed that there is no phonological reason for rejecting the syllabification of initial geminates either as a complex onset (typically when followed by a vowel) or as an onset + nucleus sequence, especially in words made of one geminate.

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