

Target phonologies in bilingual and monolingual development of branching onsets

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Presentation outline

- Goal
- Background information on the target systems
- Research question
- Data & Methods
- Results
- Discussion



Goal

- To describe and compare the development of branching onsets by a French-EP bilingual child and EP monolingual children;
- To contribute to the identification of the impact of French and EP target systems on their phonological development.

Background: the phonological and phonetic properties of European Portuguese and French branching onsets

Phonological properties of branching onsets: target systems

French and EP exhibit similar syllable structures:

- Both systems allow 4 combinations of obstruent + liquid branching onsets (Mateus & Andrade 2000; Dell 1995):

	EP	French	<i>gloss</i>
- Plosive + rhotic	[tr]ês	[tʁ]ois	<i>three</i>
- Plosive + lateral	[pl]ano	[pl]at	<i>straight</i>
- Fricative + rhotic	[fr]io	[fʁ]oid	<i>cold</i>
- Fricative + lateral	[fl]or	[fl]eur	<i>flower</i>

Phonetic output forms of branching onsets: target systems

- In French, all branching onsets surface in the domain of syllables with full nuclei;
- ≠
- In EP, the syllable nucleus may surface with no segmental material, as the result of vowel deletion;

Examples

telephone	[tɛli'fɒni]; [tɛl'fɒn]	<i>telephone</i>
despregar	[dɪsprɪ'gar]; [dʒprɪ'gar]	<i>to unfasten</i>

Unlike French, EP vowel deletion in adult speech leads to an asymmetry between phonological structures and their phonetic forms

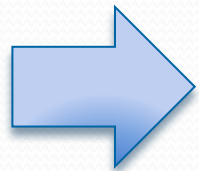
Consequences for acquisition

- EP children are exposed to a system where sequences of several consonants in the phonetic string are common;
- To identify the syllable structure of the language behind the utterances children are exposed to may therefore become a problematic task;
- Such a difference between phonological structures and phonetic output forms is not attested in French;

 To identify the syllabic nature of consonants would then be an easier task in French than in EP acquisition.

Consequences for acquisition

- The literature on bilingual phonological acquisition points to some degree of influence of one system over the other;
- The acquisition of branching onsets in EP and French bilingual acquisition may constitute a relevant structure to evaluate the impact of different target phonologies in the bilingual child's developmental path



Unlike French, an EP branching onset may be hard to identify due to the presence of sequences of up to 6 consonants in the phonetic string.



Research question

Does the distance between phonological representations and the phonetic string have an impact on the acquisition of branching onsets?



Hypothesis

If the properties of the systems mentioned before play a significant role in the path of language acquisition, it will be harder for EP learners to identify and to acquire branching onsets than for French learners.

Data & Methods

- Longitudinal data from 1 French-EP bilingual child:
110 sessions (55 in each language);
recordings twice a month (30mins in each language);
aged between 1;00 and 3;10;
“one person-one language” protocol;
- Longitudinal data from 7 EP children, aged between 0;10 and 3;07.
- Naturalistic settings;
- Searches in the database *Phon*

The Acquisition of branching onsets by EP monolinguals: previous analysis

Cluster reduction ($C_1C_2 \rightarrow C_1\emptyset$)

As reported for the acquisition of other systems (Lleó 1990, Fikkert 1994, Bernhardt & Stemberger 1998, Gnanadesikan 1995, Rose 2000, Grizenhout & Joppen 2002, Ribas 2004), EP learners start producing target branching onsets by using cluster reduction: $C_1C_2 \rightarrow C_1\emptyset$.

Examples

« creme »	$['krɛmi] \rightarrow$	$['kɛ]$	Inês	1;05.11	<i>cream</i>
« abre »	$['abri] \rightarrow$	$['abi]$	Inês	1;08.02	<i>to open</i>
« praia »	$['prajɐ] \rightarrow$	$['pajɐ]$	Inês	1;10.29	<i>beach</i>

The Acquisition of branching onsets by EP monolinguals: previous analysis

Cluster reduction ($C_1C_2 \rightarrow \emptyset C_2$)

On the contrary, for EP learners, cluster reduction with deletion of C_1 is not productive (this contrasts with what happens in the acquisition of Dutch - Fikkert 1994).

Examples

« bicicleta »	[bisi'kleɐ̃]	→	[bsi'leɐ̃]	Luís 2;02.27	<i>bicycle</i>
« flores »	['floriʃ]	→	['loliʃ]	Marta 1;07.17	<i>flowers</i>

The Acquisition of branching onsets by EP monolinguals: previous analysis

Cluster deletion

As for problematic segments in non branching onsets (target fricatives and target liquids), EP learners also use empty onsets to deal with target branching onsets.

Examples

« bruxa »	['bruʃɐ]	→	['ũgɐ]	JoãoII	2;02.28	<i>witch</i>
« bicicleta »	[bisi'kleɐ]	→	['ɛɐ]	JoãoII	2;04.30	<i>bicycle</i>
« Pedro »	['pedru]	→	['peu]	JoãoII	2;04.30	<i>Peter</i>

The Acquisition of branching onsets by EP monolinguals: previous analysis

Epenthesis ($C_1C_2V \rightarrow C_1VC_2V$)

Vowel epenthesis is the second most productive pattern to deal with target clusters.

Examples

« grande »	$['gr\tilde{e}di] \rightarrow$	$['kir\tilde{e}di]$	Luís	2;05.27	<i>big</i>
« prenda »	$['pr\tilde{e}d\emptyset] \rightarrow$	$[pi'r\tilde{e}di]$	Laura	2;02.30	<i>gift</i>
« cobra »	$['k\text{ɔ}br\emptyset] \rightarrow$	$['k\text{ɔ}bi r\emptyset]$	Pedro	3;05.18	<i>snake</i>

The Acquisition of branching onsets by EP monolinguals: previous analysis

Summary

Cluster reduction to C ₁	73%
Cluster reduction to C ₂	2%
Cluster deletion	9%
Epenthesis	16%

Considering the children able to produce branching onsets at some point during data collection, the rate of epenthesis increases (**Luís: 32%; Laura: 29%**)

The Acquisition of branching onsets by EP monolinguals: previous analysis

Vowel Epenthesis

The use of vowel epenthesis is mentioned in literature as a possible but rare production to deal with target clusters (Bernhardt & Stemberger 1998). Its low frequency is behind the fact that it is never mentioned in developmental scales.

This type of production could easily be interpreted as the result of an intermediate stage between C2 deletion and target-like productions:

I: reduction to C ₁
II: epenthesis
III: target-like cluster

The Acquisition of branching onsets by EP monolinguals: previous analysis

Vowel Epenthesis: the problem

(i) Accordingly, for the EP target [prátu] ‘dish’, we would expect:

Stage I: [pátu]
Stage II: [pírátu]
Stage III: [prátu]

The Acquisition of branching onsets by EP monolinguals: previous analysis

Vowel Epenthesis: the problem

(ii) However, the behaviour displayed by EP learners is:

Stage I: [pátu]
Stage II: [prátu]
Stage III: [pírátu] / [prátu]
Stage IV: [prátu]

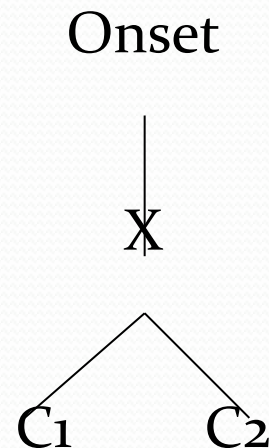
Apparent U-shaped development

The Acquisition of branching onsets by EP monolinguals: previous analysis

Epenthesis in EP learners – Interpretation (Freitas 2003)

Stage II - [prátu]

The child has no branching onsets available in her/his phonological system; the segmental information encoded in C₁C₂ is processed as part of one single **complex segment**, under a single skeletal position

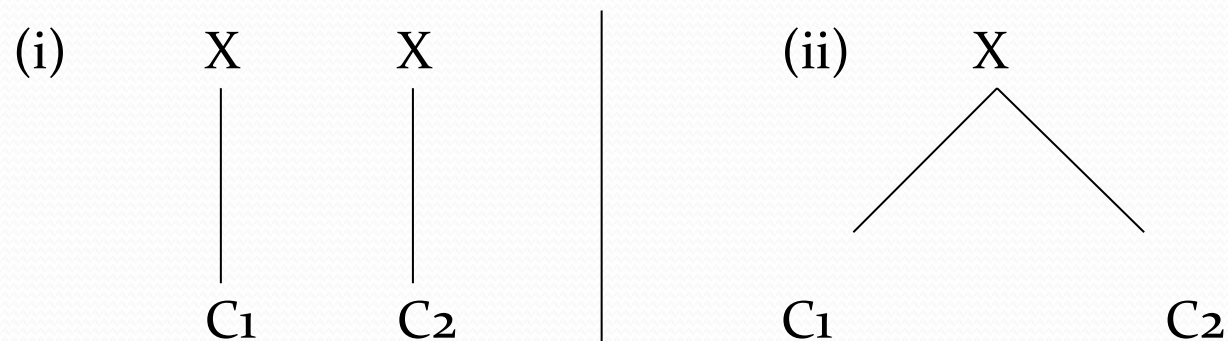


The Acquisition of branching onsets by EP monolinguals: previous analysis

Epenthesis in EP learners - Interpretation

Stage III - [pirátu] / [prátu] alternation

Only the non branching configuration is available for Onsets; at the segmental level, the child starts to discriminate C₁ and C₂ - **emergence of vowel epenthesis**; however, at the syllabic level, Onsets can not yet host 2 skeletal positions, dominating 2 root nodes, so the **complex segment** hypothesis is still available:

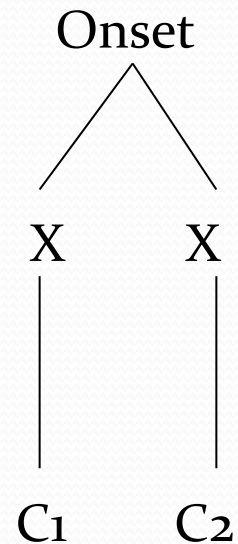


The Acquisition of branching onsets by EP monolinguals: previous analysis

Epenthesis in EP learners - Interpretation

Stage IV - [prátu]

Branching Onsets are finally available.



The Acquisition of branching onsets by French monolinguals: previous analyses

As for EP learners, French children start producing target branching onsets by using cluster reduction: $C_1C_2 \rightarrow C_1\emptyset$ (Rose, 2000; dos Santos, 2007)

pleure	/plœʁ/	→	/pœ:/	Clara	1;07.27	(he) cries
clé	/kle/	→	/ke/	Théo	2;04.28	keys

They then produce target-like clusters without going through other stages:

gros	/gʁo/	→	/gʁo/	Théo	2;05.29	big
trouvé	/tʁuve/	→	/tʁuve/	Clara	2;03.19	found

The Acquisition of branching onsets by French monolinguals: previous analyses

Dos Santos (2007):

1) C1 PoA: labial plosives + lateral sequences are acquired first:

bleu	/blø/	→	/blø/	Marilyn	2;00.12	<i>blue</i>
cloche	/klɔʃ/	→	/kak/	Marilyn	2;00.12	<i>bell</i>
flûte	/flyt/	→	/yt/	Marilyn	2;00.12	<i>flute</i>
prête	/pʁɛt/	→	/pɛt/	Marilyn	2;00.12	<i>ready</i>

2) C2 MoA: C2 lateral emerges before the rhotic; but in fact there is a segmental issue with [ʁ]: it is absent from the phonetic inventory of the child.

Results EP Monolinguals

Table 1 - Production of branching onsets

children	age	nº targets	% target-like
João	0;10 - 2;8	100	0%
Inês	0;11 - 1;10	57	0%
Marta	1;2 - 2;2	191	2%
Luís	1;9 - 2;11	255	17%
Raquel	1;10 - 2;10	109	0%
Laura	2;2 - 3;3	268	55%
Pedro	2;7 - 3;7	289	3%

Branching onsets are problematic for EP monolinguals

Table 2: Luís - plosive+rothic (rate of accuracy-%)

	1;9	1;11	2;0	2;2. 0	2;2. 27	2;4	2;5. 7	2;5. 27	2;6	2;8	2;9	2;11
[pr]	-	0	0	33	33	0	100	0	0	40	0	55
[br]	0	0	0	0	0	33	50	17	0	0	60	50
[tr]	0	0	0	0	0	0	0	38	0	11	0	25
[dr]	-	-	-	-	-	-	0	-	0	0	0	0
[kr]	-	-	0	0	-	-	-	-	0	0	0	-
[gr]	-	0	-	0	50	25	0	33	-	17	100	-

Table 3: Luís – plosive+lateral (rate of accuracy-%)

	1;9	1;11	2;0	2;2. 0	2;2. 27	2;4	2;5. 7	2;5. 27	2;6	2;8	2;9	2;11
[pl]	-	-	100	-	-	-	-	-	-	-	-	-
[bl]	-	-	-	-	0	-	-	-	-	-	-	-
[tl]	-	-	-	-	-	-	-	-	-	-	-	-
[kl]	-	0	0	-	0	-	-	0	0	-	-	-
[gl]	-	-	0	0	-	-	-	-	-	-	-	-

Table 4: Luís – labial fricative + liquid(rate of accuracy-%)

	1;9	1;11	2;0	2;2. 0	2;2. 27	2;4	2;5. 7	2;5. 27	2;6	2;8	2;9	2;11
[fr]	0	0	-	0	-	-	50	0	0	0	-	-
[vr]	0	-	-	100	0	-	100	-	-	-	0	100
[fl]	0	-	-	25	-	-	0	-	-	0	-	-

Summary – Results – Monolingual EP - Luís

- Order of acquisition of branching onsets:
 - (1) plosive+rothic >> plosive+lateral; fricative+liquid
 - (2) LABIAL ; DORSAL >> CORONAL (target-like clusters with coronal emerge later and rich lower values than labial and dorsal at the end of data collection)
 - (3) C2 Rhotic > C2 Lateral

Table 5: Laura - plosive+rothic (rate of accuracy-%)

	2;2	2;3	2;4	2;6	2;7	2;8	2;9	2;11	3;0	3;1	3;2	3;3
[pr]	0	60	-	50	-	66	83	100	100	57	100	50
[br]	33	17	-	20	0	100	-	80	67	100	66	83
[tr]	0	17	0	11	25	90	33	86	75	40	66	89
[dr]	-	-	0	50	-	-	-	-	-	-	100	100
[kr]	-	100	0	-	0	100	50	-	0	-	-	100
[gr]	0	-	100	0	33	100	100	-	-	80	100	100

Table 6: Laura – plosive+lateral (rate of accuracy-%)

	2;2	2;3	2;4	2;6	2;7	2;8	2;9	2;11	3;0	3;1	3;2	3;3
[pl]	-	-	-	-	-	100	-	-	-	-	-	-
[bl]	-	-	-	-	-	-	-	-	-	-	-	-
[tl]	-	-	-	-	-	-	-	-	-	-	-	-
[dl]	-	-	-	-	-	-	-	-	-	-	-	-
[kl]	-	-	-	0	-	-	-	-	-	0	-	-
[gl]	0	-	-	-	-	-	-	-	-	-	-	-

Table 7: Laura - labial fricative+liquid (rate of accuracy-%)

	2;2	2;3	2;4	2;6	2;7	2;8	2;9	2;11	3;0	3;1	3;2	3;3
fr	0	-	100	50	0	-	-	-	-	-	-	100
vr	-	-	33	0	0	50	100	0	0	-	0	-
fl	75	-	100	-	25	0	0	0	80	-	100	-

Summary – Results – EP Monolingual - Laura

- Order of acquisition of branching onsets:
 - (1) plosive+rothic >> fricative+liquid >> plosive+lateral
 - (2) LABIAL , DORSAL , CORONAL: no contrast
 - (3) C2 Rhotic > C2 Lateral

Results-Bilingual

Table 8 – Bilingual – EP - Plosive + Rhotic

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [pr]	-	77% (15)	86% (16)	65% (22)	49% (25)
LAB [br]	0% (11)	30% (5)	72% (33)	84% (7)	93% (30)
COR [tr]	0% (16)	52% (30)	54% (61)	58% (56)	52% (78)
COR [dr]	0% (12)	13% (23)	17% (10)	6% (7)	29% (17)
DOR [kr]	33% (7)	33% (4)	0% (1)	25% (8)	32% (11)
DOR [gr]	13% (26)	80% (15)	60% (14)	76% (14)	89% (20)

Examples:

« grande »	['grẽdi]	→	['grẽdi]	2;03.21	<i>big</i>
« brincar »	[brĩ'kar]	→	[bri'ka]	2;05.23	<i>to play</i>
« três »	['treʃ]	→	['tre]	2;07.11	<i>three</i>
« frio »	['friɯ]	→	['friɯ]	3;01.14	<i>froid</i>

Table 9 – Bilingual – EP - Plosive + Lateral

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [pl]	-	83% (8)	-	-	100% (2)
DOR [kl]	0% (1)	0% (5)	50% (3)	-	100% (7)

Examples:

« Pluto »	[pl utu]	→	[pl utu]	2;07.11	<i>proper name</i>
« bicicleta »	[bi si 'kle tɛ]	→	[bi si 'kle tɛ]	3;00.05	<i>bicycle</i>
« claro »	[k laru]	→	[k la]	3;05.03	<i>of course</i>

Table 10 – Bilingual – EP - Labial Fricative + Liquids

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [fr]	-	56% (5)	100% (4)	88% (7)	75% (12)
LAB [vr]	0% (2)	0% (7)	100% (1)	100% (2)	100% (2)
LAB [fl]	33% (10)	100% (6)	-	100% (4)	100% (1)

Examples:

« flor » ['flor] → ['flole] 2;04.27 *flower*
 « frio » ['friɯ] → ['friɯ] 3;01.14 *cold*

Summary – Results – Bilingual - EP

- Order of acquisition of branching onsets:
 - (1) fl > pl > pr > fr > br,kl,vr,gr > tr,dr,kr
 - (2) fricative + liquid, plosive + lateral >> plosive + rhotic
 - (3) LABIAL >> DORSAL >> CORONAL
 - (4) C2 Lateral > C2 Rhotic

Table 11 – Bilingual – French - Plosive + Rhotic

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [pr]	0% (1)	0% (1)	-	97% (13)	85% (102)
LAB [br]	0% (2)	0% (1)	100% (5)	100% (12)	97% (18)
COR [tr]	5% (11)	0% (20)	46% (28)	64% (18)	87% (75)
COR [dr]	-	0% (1)	-	-	100% (5)
DOR [kr]	0% (3)	0% (1)	75% (3)	67% (3)	77% (19)
DOR [gr]	0% (14)	0% (11)	33% (14)	80% (13)	92% (42)

Examples:

« biberon »	[bibʁ̃]	→	[bibʁ̃]	2;10.10	<i>feeding-bottle</i>
« trois »	[tʁwa]	→	[tʁwa]	2;11.22	<i>three</i>
« grand »	[ˈgʁɑ̃]	→	[ˈgʁɑ̃]	3;01.14	<i>big</i>
« imprimer »	[ɛ̃pʁiˈme]	→	[ɛ̃pʁiˈme]	3;07.12	<i>print</i>

Table 12 – Bilingual – French – Plosive + Lateral

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [bl]	0% (1)	100% (1)	75% (5)	67% (7)	100% (1)
LAB [pl]	0% (4)	60% (7)	79% (16)	75% (21)	89% (60)
DOR [kl]	0% (1)	25% (14)	100% (3)	100% (3)	100% (17)

Examples:

« bleu » ['blø] → ['βle] 2;06.28 *blue*
 « pluie » ['plɥi] → ['pli] 2;08.24 *rain*
 « cloche » ['klɔʃ] → ['klɔʃø] 2;09.11 *bell*

Table 13 – Bilingual – French - Labial Fricatives + Liquids

Type	1;09-2;04	2;04-2;09	2;09-3;00	3;01-3;04	3;05-3;10
LAB [fr]	0% (1)	0% (13)	0% (1)	100% (7)	81% (37)
LAB [fl]	0% (2)	100% (1)	100% (2)	0% (1)	100% (6)

Examples:

« fleur » [ˈflœʁ] → [ˈϕlɔ] 2;05.23 *flower*
 « français » [fʁɑ̃ˈsɛ] → [fʁɑ̃ˈsɛ] 3;10.00 *french*

Summary – Results – Bilingual - French

- Order of acquisition of branching onsets:
 - (1) fl > bl > kl > br > gr > fr > pl > pr > kr > tr > dr
 - (2) fricative + liquid >> plosive + lateral >> plosive + rhotic
 - (3) LABIAL >> DORSAL >> CORONAL
 - (4) C2 Lateral > C2 Rhotic

Summary – Results - Bilingual

- **2 languages- 1 pattern**
- Age of acquisition: 2;03-EP; 2;05-French
- Fricative + liquid >> plosive + lateral >> plosive + rhotic
- C2 MoA: C2 lateral >> C2 rhotic
- C1 PoA: LABIAL >> DORSAL >> CORONAL

Summary

Production patterns	French Mono	EP Mono	Bilingual French	Bilingual EP
Epenthesis	-	✓	-	-
C1Ø >> C1C2	✓	-	✓	✓
C1PoA: labial >> dorsal, coronal	✓	-	✓	✓
C2 MoA: Lateral > Rhotic	✓	-	✓	✓

Discussion

Comparative analysis: onset configuration

Monolinguals	Bilingual
Cluster reduction to C ₁	Cluster reduction to C ₁
C ₁ C ₂ Co-occurrence of Epenthesis / C ₁ C ₂ Empty onsets	
C ₁ C ₂	C ₁ C ₂



Discussion-Onset Configuration

- All children use cluster reduction to C_1 , as reported for the acquisition of many languages;
- However, monolinguals show intermediate behaviors, where epenthesis is frequently attested, while the bilingual child seldom uses epenthesis;
- Branching onsets are early acquired by the bilingual child while monolinguals show a slow development for this structure.



Discussion-Onset Configuration

These results may be interpreted as follows:

- (1) Branching onsets are hard to identify in adult's speech in EP, due to the frequent vowel deletion, which generates strings of up to 6 consonants; **monolinguals** may use epenthesis as a mean to deal with the relation between the segmental level and the syllabic status of different root nodes (preservation of the segmental string and preservation of the non branching onset configuration);

Discussion-Onset Configuration

- (2) The non productivity of epenthesis in the **bilingual** child may be interpreted as the result of the influence of French properties, where no vowel deletion is attested in adult speech and syllable structure is easy to identify;
- (3) One of the systems (French) is bootstrapping the development of branching onsets in both languages, in the bilingual child.
(see Lleó et al. 2003 for the acquisition of codas in german-spanish bilinguals)

Comparative analysis: PoA

Monolinguals	Bilingual
LABIAL, DORSAL, CORONAL or LABIAL, DORSAL > CORONAL <i>No clear preference</i>	LABIAL
	DORSAL
	CORONAL

Discussion-PoA

- Monolinguals do not show a clear order of acquisition for the C₁ PoA;
- This result contrasts with the one for the bilingual child, where a clear order of acquisition of PoA is attested (Labial > Dorsal > Coronal).

Again, this might result from properties of the target systems:

- monolinguals are busy trying to identify the syllabic status of consonants in EP; they are not yet focused on branching onset's segmental structure;
- for the bilingual child, a branching onset is early acquired, which allows her to focus on segmental properties.

Comparative analysis: properties of C2

Monolinguals	Bilingual
RHOTIC	LATERAL
LATERAL	RHOTIC

Discussion-Properties of C2

- **Monolinguals** first develop the C2 rhotic;
- On the contrary, the **bilingual** first develops the C2 lateral; notice that, in French, the rhotic is not yet mastered in simple onset when branching onsets emerge (see dos Santos 2007 for similar results);
- French shows a Dorsal PoA for the C2 rhotic in branching onset; following Kehoe et al. (2008), French children show difficulties to acquire [ʁ] in this dependent position;
- The bilingual child shows a later development of the C2 rhotic both in French and in EP; again, the interference of properties of French in the bilingual child is attested in the acquisition of both systems.



Discussion

- The late acquisition of branching onsets and the production patterns exhibited by **monolinguals** may be interpreted as the result of the EP phonological complexity induced by vowel deletion.
- On the contrary, the early acquisition of the focused structure by the **bilingual** child and the production patterns in her data suggest that French is bootstrapping the acquisition of branching onsets in her two linguistic systems.

Obrigada! Merci!

Thank you!