

Variable effects in the acquisition of word-final /T/ in French

Yvan Rose^{1,2}

yrose@mun.ca

Christophe dos Santos²

christophe.dos-santos@univ-lyon2.fr

1. *Memorial University of Newfoundland*
2. *Laboratoire Dynamique Du Langage UMR
5596 CNRS - Université Lumière Lyon 2*

Focus of the study

- Case study of the first language acquisition of French (Marilyn)
- Segment studied: /T/ (include /t/, /d/, /tʁ/ and /dʁ/)
- Differences in the behaviors of /T/ in onsets versus in word-final position
- Emergent processes affecting /T/ (and other consonants)
 - Consonant Harmony (CH)
 - Consonant Place Harmony (CPH)
 - Consonant Manner Harmony (CMH)
 - Consonant Deletion (and its relation with CH)

General Hypothesis

- Articulatory complexity underlies emergent processes such as CH (Levelt 1994; Pater 1997; Fikkert & Levelt 2004; cf. Rose 2000)
- The child's grammar reacts to this complexity (p.ex. Rose 2005)
- Any account of emergent processes must consider the phonological properties of the target language and of the child's grammar (Goad 2000, 2004; Rose 2000, 2003, 2005; Inkelas & Rose 2003)

Presentation roadmap

- Child consonantal inventory: an overview
 - Onsets of stressed (final) syllables
 - Word-final consonants
- Behavior of word-final /T/
 - From the perspective of target forms
 - From the perspective of the child's productions
- Analysis of word-final /T/ behavior
- Prosodic differences between /T/ in onsets and in word-final position
- Discussion

The data from Marilyn

- Marilyn (code-named MAS in other presentations):
 - Monolingual French learner
 - Recorded every second week between 0;9 and 3;0
 - Period studied: 1;11 - 2;01
- Recorded data transcribed phonetically by native speakers of French
- Results compiled in an Excel spreadsheet

Marilyn's consonantal inventory in onsets of stressed (final) syllables

		Realization		Substitution		Deletion	
Manner	#	#	%	#	%	#	%
stops	737	469	64	247	33	21	3
fricatives	69	5	3	119	68	51	29
nasals	271	243	90	22	8	6	2
//	315	290	92	12	4	13	4
/b/	99	2	2	65	66	32	32

Consonantal inventory in onsets: summary

- Stops are acquired:
 - 84% of the 247 substitutions result from Harmony (Voicing Harmony, Dorsal Harmony) (Rose & dos Santos, 2005):
'snail' *escargot* [ɛskaʁgo] → [kako] 1;11.13
- Fricatives are not acquired:
 - 67% of the 119 substitutions come from // substitutions:
'piece' *morceau* [mɔʁso] → [lo] 1;11.13
 - (the other substitutions result from manner harmony (nasal and stop harmony)

Consonantal inventory in onsets: summary (cont'd)

- Nasals are acquired: 90% are produced
- Liquids /l/ and /ʁ/ display different behaviors:
 - /l/ is acquired: 92% of target /l/ are produced
'bed' *lit* [li] → [li] 1;11.28
 - /ʁ/ is not acquired:
 - 89% of the 65 /ʁ/ substituted come from the same word
Marie [maʁi] → [mini] 2;0.12

Marilyn's consonantal inventory in word-final position

Manner	#	Realization		Substitution		Deletion	
		#	%	#	%	#	%
stops	89	45	51	36	40	8	9
fricatives	69	6	9	41	67	17	24
nasals	48	13	27	1	2	34	71
liquids	272	5	2	9	3	258	95

Consonantal inventory in word-final position: summary

- Stops are produced in word-final position:
 - The high substitution level (40% out of 36 items) is explained in a proportion of 72% by the behavior of /T/
- Fricatives are produced in coda position. The high substitution level (67%):
 - Is due to substitution for /s/ in the case where the fricative involved is not /s/
'fluffy' *peluche* [pəlyʃ] → [pylys] 2;0.12
 - and to [-continuant] harmony
- Nasals and Liquids are not acquired yet
'braces' *bretelles* [brətɛl] → [tɛ] 1;11.28

Consonantal inventory: summary

	Onset	Word-final
Stops	YES	YES
Fricatives	NO	YES
Nasals	YES	NO
//	YES	NO
/β/	NO	NO

Word-final /T/: Target perspective

Onset		#	Target	#	%	Production
STOP	Lab	10	Lab - V - T	10	91	Lab - V - T
		1	<i>pupitre</i>	1		Cor - V - T
	Cor	24	Cor - V - t	22	92	Cor - V - T
			<i>pintade</i>	2		Cor - V - Ø
	Dor	9	Dor - V - t	9	100	Dor - V - Dor
		5	<i>carotte</i>	5		Dor - V - Dor
Fricative (FRIC)		7	FRIC - V - t	7	78	l - V - s
		1	<i>zut</i>	1		Ø - V - T
		1	<i>chaussette</i>	1		l - V - Ø
		5	f - V - t	5	100	Ø - V - T
Nasale (N)		6	N - V - t	6	75	N - V - Ø
		2	<i>lunette</i>	2		l - V - s
/ʁ/		1	R - V - t	1	100	Ø - V - T
/l/		8	l - V - t	8	73	l - V - s
		1	<i>toilette</i>	1		Cor - V - T
		1	<i>malade</i>	1		Ø - V - Ø
		1	<i>Juliette</i>	1		j - V - T
Ø		1	Ø - V - t#	1	100	Ø - V - T
		84		84		

Target perspective: summary

- No regular pattern can be found to describe the behavior (production, substitution or deletion) of word-final /T/:
 - Produced as T# when the target onset is: Cor, Lab, FRIC, liquids and \emptyset
 - Produced as /k/ when the target onset is: Dor or /ʁ/
 - Produced as /s/ when the target onset is: FRIC, N and //
 - Deleted when the target onset is: Cor, FRIC, N and //
- Conclusion: we must look elsewhere, i.e. at production patterns (instead of 'intended' patterns)

Word-final /T/: Production perspective

T# realization	#	Context of production	#
[t]	43	Lab...Cor	10
		Cor...Cor	24
		∅...Cor	9*
[k]	14	Dor...Dor	14
[s]	17	Lat...Fric	17
∅	10	Nas...∅	6
		Cor...∅	2**
		Lat...∅	1
		∅...∅	1
Total	84		84

* Rising diphthongs are included: *Juliette* → [jɛt] (1/6)

** These two examples come from the same word: *pintade* → [taɨ]

Examples

Pattern	Production	Target	IPA	Age
Lab...Cor	<i>botte</i>	[bɔt]	[bɔt]	1;11.13
Cor...Cor	<i>tête</i>	[tɛt]	[tɛt]	2;0.25
∅...Cor	<i>arrête</i>	[aʁɛt]	[ɛt]	2;0.12
Dor...Dor	<i>baguette</i>	[bagɛt]	[kɛk]	1;11.28
Lat...Fri	<i>chaussette</i>	[ʃosɛt]	[lɛs]	1;11.28
Nas...∅	<i>lunette</i>	[lynɛt]	[nɛ]	2;0.12
Cor...∅	<i>pintade</i>	[pɛ̃tad]	[taj]	2;0.12
Lat...∅	<i>chaussette</i>	[ʃosɛt]	[lulɛ]	2;0.12
∅...∅	<i>malade</i>	[malade]	[a]	2;0.12

Analysis of word-final /T/ from a production perspective

- Word-final /T/ is realized when:
 - There is no consonant
 - The onset produced is a Coronal (T)
 - The onset produced is a Labial
- Absence of an onset consonant does not affect the production of word-final /T/
- Coronal onsets have no (visible) influence on word-final /T/ (which is also coronal)
- Labial is articulatory independent of lingual consonant (Rose and dos Santos, 2005)

Analysis of word-final /T/ realized as velar

- Word-final /T/ is realized as velar when the produced onset is also velar
- Rose & dos Santos (2005):
The interaction between lingual consonants is due to physiological and articulatory constraints
 - The dominant lingual articulator in Marilyn's phonology is Dorsal, as we have seen in stop onset substitutions
- Result: Progressive Dorsal Harmony

Analysis of word-final /T/ realized as a fricative

- Word-final /T/ is realized as a fricative when the produced onset is //
- Target onset fricatives are replaced by //, both share the feature [+continuant]
'shoes' *chaussures* [ʃosyʋ] → [lyly] 1;11.13
 - [+continuant] is thus another dominant feature of Marilyn's system
- The dominance of [+continuant] provides an explanation for the emergence of a Progressive Continuant Harmony affecting /T/

Analysis of word-final /T/ deletion

- Word-final /T/ is deleted when the produced onset is a Nasal
- We have seen that Nasal Harmony is attested
'eat' *mangez* [mãʒe] → [mene] 2;0.12
- We have also seen that there is no nasal in word-final position
'as' *comme* [kɔm] → [kɔ] 1;11.28
- The deletion of word-final /T/ is indirectly due to Progressive Nasal Harmony:
 - The feature [+nasal] is added to word-final /T/, but
 - The child cannot produce the resulting segment in this position, which gets deleted

Differences between onset and word-final /T/

		Realization		Substitution		Deletion	
/T/	#	#	%	#	%	#	%
Onset	279	197	71	76	27	6	2
Word-final	84	43	51	31	37	10	12

- 85% of the 76 onset substitutions is due to Dorsal Harmony
- Word-final /T/ is subject to many more processes; it is phonologically less stable

Hypothesis

- Coronals are often the targets of phonological processes (Paradis & Prunet 1991)
- Consonants in word-final position are generally weaker than consonants in onsets (e.g. Itô 1986; Piggott 1999)
- Prediction: coronals, which are generally subject to processes in all positions are prime targets in word-final position

Word-final consonants: prosodic representation

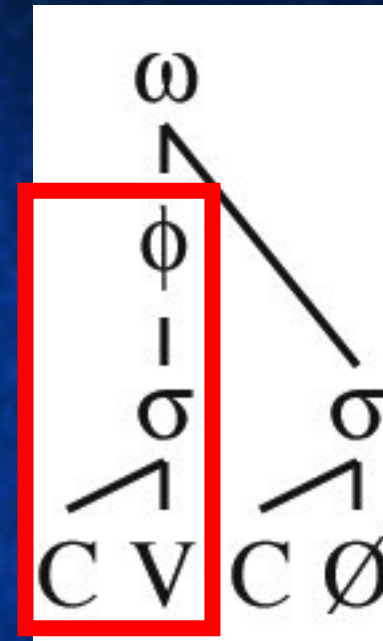
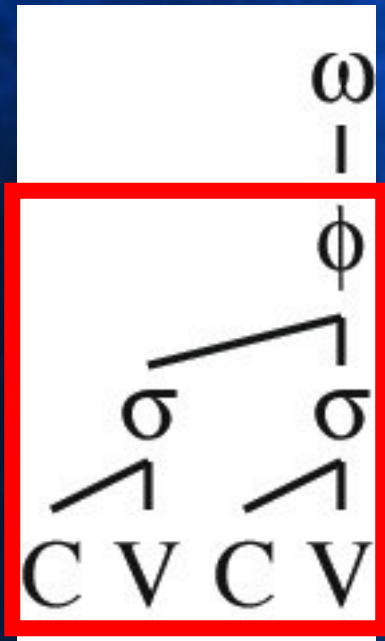
- Final consonants are syllabified by default as onsets of empty-headed syllables
- Consequence: a CVC word contains two syllables



(Kaye, Lowenstamm et Vergnaud 1990, Harris 1996, Piggott 1999, Goad & Brannen 2003; cf. Rose 2000, 2003)

Prosodic representation: the prosodic word in French

- CVCV: all consonants are licensed within the foot
- CVC: the word-final consonant is located outside the foot



Discussion

- Complex articulatory sequences are problematic in early production (e.g. lingual consonant interaction)
- The child's segmental inventory interacts with these physiological and articulatory constraints:
 - [+continuant] Substitution and Harmony (Onset fricatives are replaced by /l/, which harmonizes word-final /t/)
 - [+nasal] Harmony (aborted because nasals cannot be produced word-finally)
- Representational (truly grammatical) aspects have to be taken into account to predict what position will be the preferred target for phonological processes
- Future research: The behavior of sonorant consonants:
 - Observation: Word-final obstruents are acquired while word-final sonorant undergo deletion
 - This observation reflects Zec's generalization (1988) that sonorant are universally favored codas (moraic consonant), codas are typically acquired later than onsets (Rose 2000, 2003; Goad & Brannen 2003)

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