Longitudinal normative data on developmental speech errors in French-speaking preschoolers : the average percentage of occurrences of phonological processes

8th International Conference on Speech Motor Control

August 24th - 27th, 2022, Groningen, the Netherlands

Léonor Piron[1]
Andrea MacLeod[2]
Morgane Warnier[1]
Christelle Maillart[1]

LIÈGE université Logopédie
RUCHE

1. Introduction

Phonological processes (PPs)
- ✓ are **developmental** speech errors [1]
- ✓ are a frequent SLP in-depth analysis [2-4]
- ✓ **vary** from one language to another [2,5]

French is currently the *5th largest language* in the world [6]
but longitudinal ***developmental data on PPs are scarce***.

Determining the ***average percentage of occurrences (POC)*** of main PPs in French-speaking children will :
- ***Increase French data on developmental PPs***
- Provide SLPs with fresh ***norms*** on developmental PPs, thereby improving qualitative assessment [3-4]
- Meets the ***cross-linguistic research movement*** on phonological development [7-8]

2. Goals

Determining in French-speaking preschoolers' speech :

1. Normative data on the ***average POC of main PPs*** in French
2. Changes over time in ***segmental*** and ***suprasegmental*** PPs

3. Method

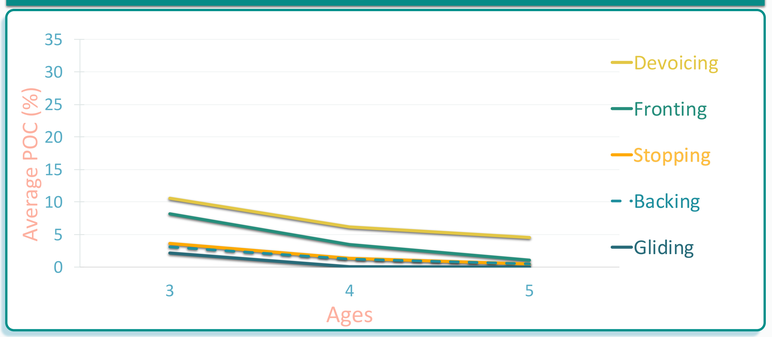
- ***29 typically*** developing ***French-speaking*** preschoolers
  → *Tested for IQ, audition, lexical level and history*
- Followed **longitudinally at 3, 4 and 5 years old** in 🇧🇪
- Phonological single-word picture naming task : a shorten version of Eulalies Test [9,10]
- Reliability between transcribers = 90,93%

- Phonological analyses carried out on Phon [11]
- Calculation of the average POC of PPs [12, 13]
  1. For each PP and each child
     → **POC of a PP** = $\frac{number\ of\ actual\ occurrences\ of\ the\ PP}{number\ of\ potential\ occurences\ of\ the\ PP} \times 100$
  2. Mean and Stand. Dev. of the 29 children's POC of the PP
- Changes over time
  → *Friedman Anova for repeated measures*
- PPs considered as **frequent** if their ***average POC ≥ 5%*** [2].

4. Results

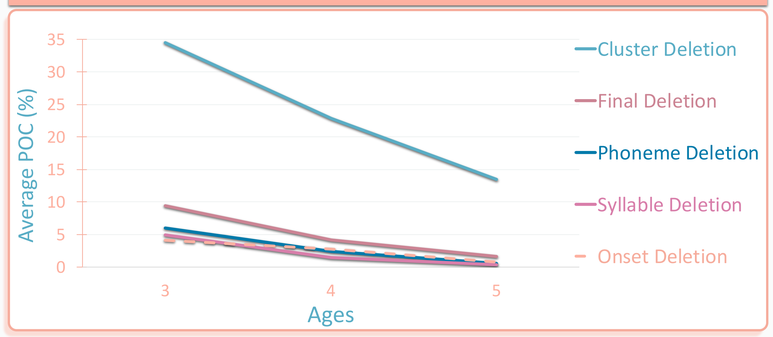
Our longitudinal normative data developed with the average POC provide French-speaking SLP with further landmarks and norms on PPs.

Figure 1 & table 1 : Average POC of segmental PPs and results of Friedman ANOVAs



	3 Years old		4 Years old		5 Years old		Friedman Anovas for non-parametric repeated measures		
	Mean	SD	Mean	SD	Mean	SD	X^2	Df	p
Devoicing	10,57	7,83	6,22	4,39	4,54	2,95	17,2	2	<0,001
Fronting	8,185	6,272	3,420	4,31	1,06	2,26	38,8	2	<0,001
Stopping	3,63	6,41	1,317	3,25	0,48	1,52	18	2	<0,001
Backing	3,1	3,04	1,179	1,38	0,49	0,69	24,5	2	<0,001
Gliding	2,16	3,35	0,11	0,6	0	0	21,8	2	<0,001

Figure 2 & table 2 : Average POC of suprasegmental PPs and results of Friedman ANOVAs



	3 Years old		4 Years old		5 Years old		Friedman Anovas for non-parametric repeated measures		
	Mean	SD	Mean	SD	Mean	SD	X^2	Df	p
Cluster Deletion	34,48	25,64	22,88	19,38	13,48	8,97	10,7	2	0,005
Final Deletion	9,42	9,65	4,19	5,32	1,63	3,33	22,3	2	<0,001
Phoneme Deletion	6	5,55	2,42	3,24	0,56	0,70	28,2	2	<0,001
Syllable Deletion	4,94	7,04	1,5	2,21	0,36	0,69	33,8	2	<0,001
Onset Deletion	4,12	5,05	2,74	4,14	0,77	1,82	14,1	2	<0,001

5. Discussion

The main French PPs from our longitudinal study
- globally ***decrease in occurrence over time***
  = ***consistent*** with (1) similar findings in French [2,15] and in other languages [7,8,14].
  (2) the increase in intelligibility between 3 and 5 years of age [2,14,15].
- have a similar occurrence in comparison to other French Studies [2].

Cluster reduction
= the *most frequent PP* and the most frequent ***suprasegmental PP***, as in Brosseau-Lapré et al. [2]
= >10% of the occurrences at 5, which is a somewhat more frequent than in similar studies [2].
= Decreases more slowly than other PPs. This could be explained by the massive presence of the phoneme [ʁ] [10,16] and by the fact that clusters develop at a slower pace than singletons, in French [16]

Devoicing
is the most frequent ***segmental PP*** and is more frequent than fronting, contrary to what we first expected and to the results of Brosseau-Lapré et al. [2]

In comparison with English [1,14], in French
Devoicing is a frequent PP at ages 3 and 4. *Onset consonant reduction, gliding, stopping* and *syllable deletion* are no frequent PPs at any age.

[1] Speech and Language Pathology Department, RUCHE Research Unit, University of Liege, Belgium

[2] Faculty of Rehabilitation Medicine -Communication Sciences & Disorders, University of Alberta, Canada

Contact : leonor.piron@uliege.be, PhD candidate, Grant

1. Rvachew, S. & Brosseau-Lapré, F. (2018). *Developmental phonological disorders : foundations of clinical practice (Second edition)*. Plural Publishing, Inc.
2. Brosseau-Lapré, F., Rvachew, S., Macleod, A. A. N., Findlay, K., Bérubé, D., Bernhardt, B., & Findlay, K. (2018). Une vue d'ensemble : les données probantes sur le développement phonologique des enfants francophones canadiens. *Revue Canadienne d'orthophonie et d'audiologie, 42*(1), 1–19.
3. Macrae, T. (2016). Comprehensive Assessment of Speech Sound Production in Preschool Children. *Perspectives of the ASHA Special Interest Groups, 1*(1), 39–56. Kirk, C., &
4. Kirk, C. & Vigeland, L. (2015). Content coverage of single-word tests used to assess common phonological error patterns. *Language, Speech, and Hearing Services in Schools, 46*, 14–29.
5. Hayes, B. (2009). *Introductory phonology*. Wiley-Blackwell.
6. Semo, M. (2018, october 11). Le français, cinquième langue la plus parlée dans le monde. *Le Monde*.
7. Petinou, K., & Armostis, S. (2017). Phonological Process Occurrence in Typically Developing Toddlers. *Folia Phoniatrica et Logopaedica, 68*(5), 199–204
8. Keren-Portnoy T, Majorano M, Vihman MM: From phonetics to phonology: the emergence of first words in Italian. J Child Lang 2003;36:235–267.
9. Meloni G., Loevenbruck H., Vilain A., Macleod A. A. N. (2017, July 17-21). EULALIES, The France-Québec speech sound disorders project [Poster presentation]. IASCL 14th international congress, Lyon, France.
10. Warnier, M., Maillart, C., Rose, Y., & MacLeod, A. (In press). Exploring word production in three-year-old monolingual French-speaking children. *Clinical Linguistics and Phonetics*
11. Rose, Y., MacWhinney, B., Byrne, R., Hedlund, G., Maddocks, K., O'Brien, P., & Wareham, T. (2006). Introducing Phon: A Software Solution for the Study of Phonological Acquisition. Proceedings of the ... Annual Boston University Conference on Language Development. Boston University Conference on Language Development, 2006, 489–500.
12. Franklin, A., & McDaniel, L. (2016). The Development of English as a Second Language With and Without Specific Language Impairment: *Clinical Implications. American Journal of Speech-Language Pathology, 25*(2), 172–182.
13. Olswang LB, Stoel-Gammon C, Goggins E, Carpenter RL: Assessing Pre-Linguistic and Early Speech Skills in Developmentally Young Children. Seattle, University of Washington Press, 1987.
14. Cohen, W., & Anderson, C. (2011). Identification of phonological processes in preschool children's single-word productions. *International Journal of Language and Communication Disorders, 46*(4), 481–488.
15. Schelstraete, M. A., Maillart, C., & Jamart, A.-C. (2004). Les troubles phonologiques : cadre théorique, diagnostic et traitement. *Les Troubles Du Langage et Du Calcul Chez l'enfant*, 81–112.
16. MacLeod, A. A. N., Sutton, A., Trudeau, N., & Thordardottir, E. (2011). The acquisition of consonants in Québécois French: A cross-sectional study of pre-school aged children. *International Journal of Speech-Language Pathology, 13*(2), 93–109.