

## Reference

Andreassen, H. N. (2014). What hinders the acquisition of schwa alternation? Paper presented at *Variation in Language Acquisition (ViLA) 2*, 3-5 December 2014, Université Stendhal, Grenoble.

## Pictures (if not otherwise indicated)

Colourbox.com

**UiT**

THE ARCTIC  
UNIVERSITY  
OF NORWAY

# What hinders the acquisition of schwa alternation?

---

Helene N. Andreassen  
UiT The Arctic University of Norway

*Variation in Language Acquisition (ViLA) 2*  
3-5 December 2014, Université Stendhal, Grenoble



## Schwa alternation in French

---

- Schwa can surface as a vowel [œ] or be absent from the phonetic output of the word, without changing its meaning.



*Alors là, oui d'accord, mais mais mais la **seconde**, oui la **seconde** partie du jeu est une partie de de calcul purement mental.*

(svarv1, informal conversation)



*seconde* 'second;f'

[sœgõd] with schwa

[sgõd] without schwa, secondary cluster

(Bazylko 1976)

# Acquisition of schwa alternation and factors susceptible of shaping it

---



## Grammar-external factors

- Input frequency of variants (Fikkert et al. 2005), with and without schwa, for the various schwa-items (Liégeois 2014)

## Grammar-internal factors

- Prosodic structure at the level of the syllable, where consonants of various types may be combined (e.g. Fikkert 1994, Gnanadesikan 1995/2004, Rose 2000, Kehoe et al. 2008, Fikkert & Altwater-Mackensen 2013)
- Prosodic structure at the level of the word, where the internal syllable count may be subject to modification (Fikkert 1994, Demuth & Johnson 2003, Carter & Gerken 2004, Goad & Buckley 2006)



# Outline of the talk

---

- Previous works on schwa
- Schwa in adult speech
- Acquisition of schwa alternation



# French schwa: A linguistic celebrity

---

- The behaviour of schwa in adult French has served as testing ground for a wide range of theoretical frameworks in the last 50 years.
- Aspects of schwa that have been studied the most frequently
  - **Phonological alternation vowel~zero**, e.g. *seconde* ‘second;f’ [sœgõd] ~ [sgõd] (Dell 1973/1985, Durand 1976, Morin 1978, Anderson 1982, Charette 1991, Côté 2000, Tranel 2000, Eychenne 2006)
  - **Phonetic confusion with stable /œ/**, e.g. schwa in *Genève* [ʒœnev] ~ [ʒnev] vs. stable /œ/ in *jeunet* ‘very young’ [ʒœnɛ] ~ \*[ʒnɛ] (Malécot & Chollet 1977, Walker 1993)
  - **Stylistic/social constraints**, e.g. higher level of schwa presence in more formal situations (Lucci 1976), recently contested by Durand et al. (2014), and in senior speakers (Malécot 1976, Racine & Andreassen 2012)

# French schwa: A linguistic celebrity

---

- **The acquisition of schwa**
  - a research topic currently gaining interest, but surprisingly few with a strict phonological approach
  - **Acquisition of French L2:** studied from a pedagogical, sociolinguistic (Thomas 2001, 2004, Uritescu et al. 2004), **or a psycholinguistic angle** (Stridfeldt 2005)
  - **Acquisition of French L1:** from a psycholinguistic angle (older children) (Racine et al. 2013), with focus on input frequencies (Liégeois et al. 2012, Liégeois 2014), or with focus on the developing phonological system (Andreassen 2013)



# Area of investigation (Andreassen 2013)

## – Nyon district, Vaud canton in Romandy

Répartition géographique des langues officielles en Suisse (2000)



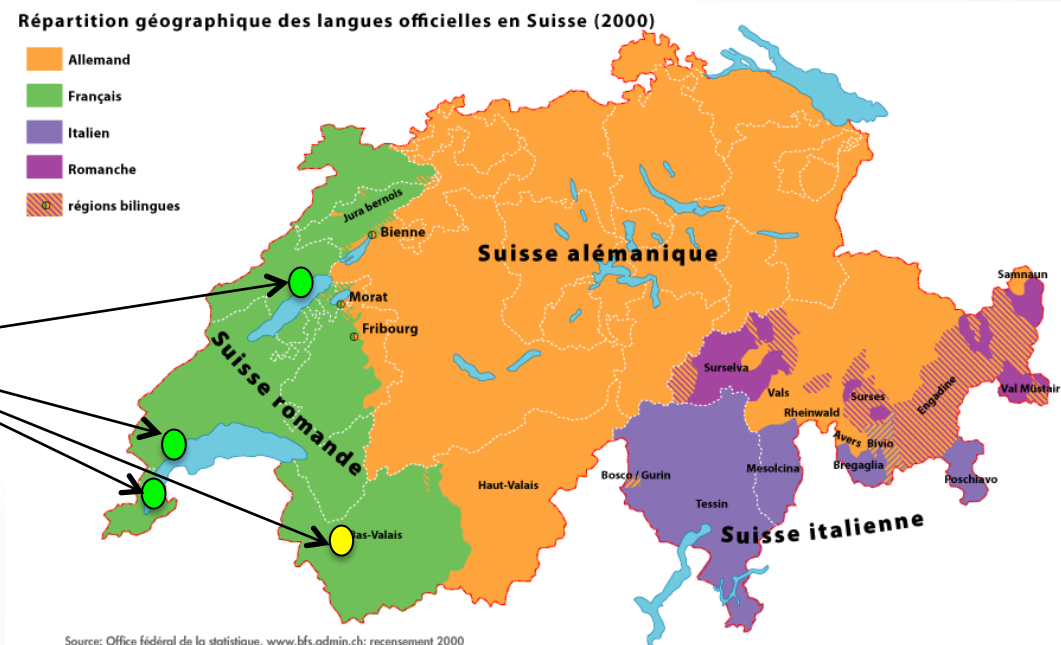
## Area of investigation (Andreassen 2013)

### – Nyon district, Vaud canton in Romandy

- Renewed interest in the Swiss French varieties
  - Research program *Phonologie du français contemporain* (PFC), cf. Durand, Laks & Lyche (2002, 2009) and [www.projet-pfc.net](http://www.projet-pfc.net).

PFC investigation  
points in Romandy  
(as of 2014):

Genève (GE)  
Neuchâtel (NE)  
Nyon (VD)  
Martigny (VS)



# Schwa and the Swiss French varieties

---

- According to Léon (2005), the rate of schwa absence is higher in speakers with a strong regional accent
- According to Walter (1982), Romand speakers are among those with the highest rate of schwa absence
- Racine (2008) compares the alternation rate in the word-initial syllable among Neuchâtel (Romandy) and Nantes (France) speakers
  - Higher acceptance for schwa absence in Neuchâtel than in Nantes
  - Important inter-variety differences for some words
    - *degré*, some alternation (NE) vs. presence (NA)
    - *femelle*, alternation (NE) vs. presence (NA)

*Et on avait des [dɔʁ]és encore après*

(scajb1, conversation guidée)



*On doit pas tirer sur les les [fm]elles, hein*

(scapy1, conversation guidée)





# The acquisition of schwa

## – hypotheses and predictions

---

### **Hypothesis I**

*Given the high rate of schwa absence in the input, the child starts early using both variants of schwa-items*

### **Predictions**

The structure of the schwa-less variant is modified to conform to the current state of the child's phonotactic knowledge

Application of structural modifications gradually declines, as the various clusters are mastered

### **Hypothesis II**

*Despite the high rate of schwa absence in the input, the child greatly prefers the least complex variant of schwa-items*

### **Predictions**

Requiring no consonant sequencing, the variant with schwa is preferred over the schwa-less variant

Usage of the schwa-less variant increases gradually, alongside mastery of the various clusters.

# Method: The data required

---



- Several occurrences of each schwa-item
  - Detect intra- and inter-speaker variation
- Production of available variants of schwa-items in the same speaker
  - Reveal output modifications

## Two sampling strategies selected

- *Semi-controlled speech* to ensure multiple production of schwa-items, production of available variants, as well as comparable data
- *Spontaneous speech* to ensure naturalistic rates of schwa alternation

## Method: The corpus

- Observe intra-speaker development
- Establish path of development
  - longitudinal and cross-sectional observation
- Age span in corpus
  - Aim: 2;00, 2;06 and 3;00 at the outset of the recording period
  - *Few two-year-olds available*

Age group	Child	Gender	First session	Last session
1	Fabienne	F	2;02.15	2;05.21
1	Henri	M	2;04.01	2;07.08
2	Lucas	M	2;07.01	2;10.25
2	Adèle	F	2;07.08	2;10.13
2	Janice	F	2;07.27	3;00.14
2	Kim	M	2;08.29	3;00.05
2	Théa	F	2;09.29	3;01.12
3	Armand	M	2;11.13	3;04.03
3	Lambert	M	2;11.13	3;03.02
3	Eric	M	2;11.16	3;02.15
3	Albert	M	3;01.00	3;04.03
3	Tom	M	3;01.17	3;06.05
3	Guy	M	3;02.14	3;07.06

# Sampling strategy 1: Semi-controlled speech

---

**PowerPoint-test presented monthly to all children, in the kindergarten**

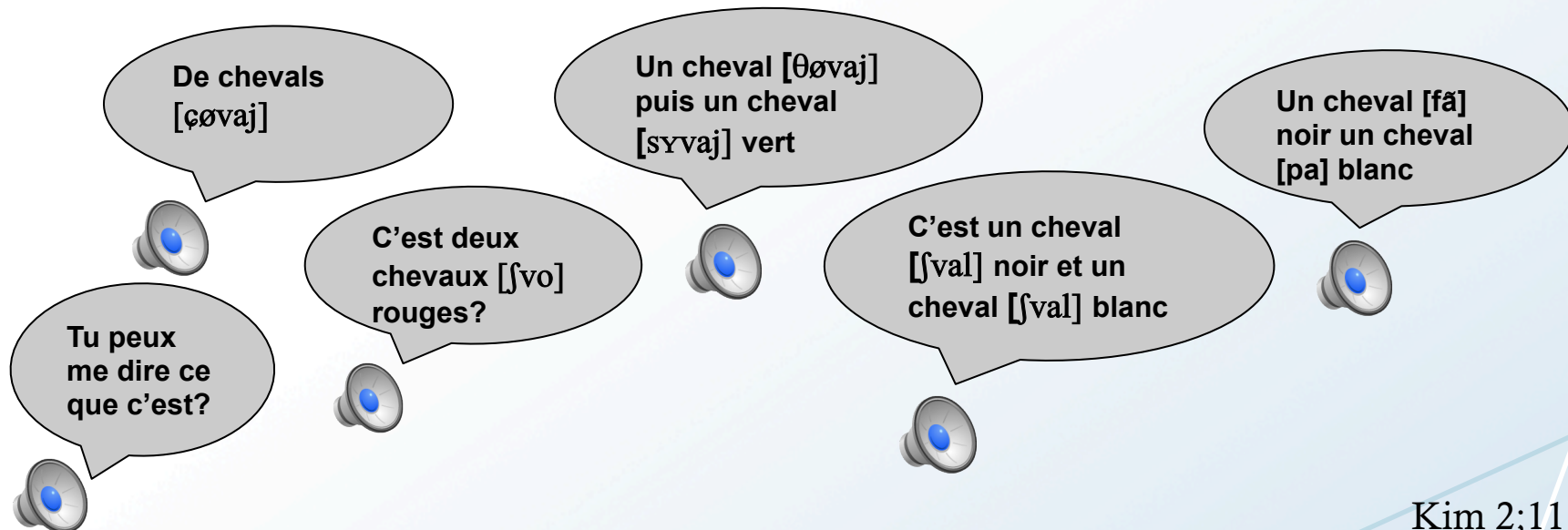
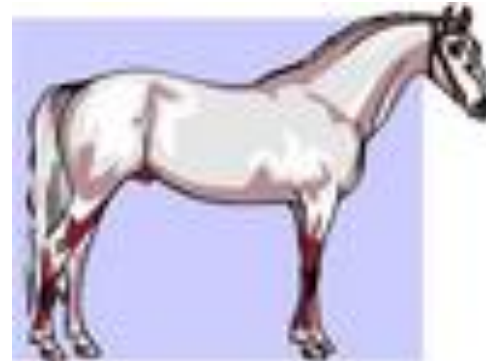
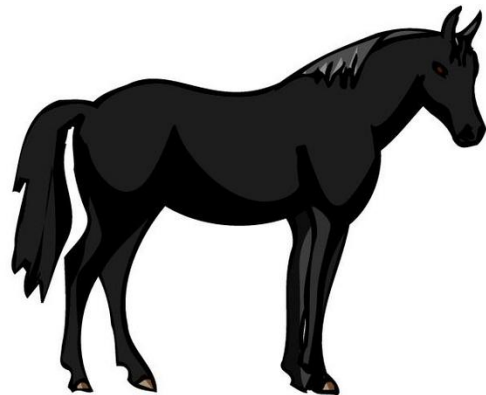
- Observe the child's default reaction to illustrations of schwa-items
  - Does he select the variant with or without schwa? Is the same variant used for all schwa-items?
- Observe the child's reaction to schwa alternation in the input
  - Does he reveal a second, “non-default”, variant?
- Observe the target secondary cluster in the case of schwa absence
  - Is the cluster modified?



# PowerPoint-test

– Dialogue between a child and a pre-recorded native speaker

---





## Sampling strategy 2: Spontaneous speech

---



**Weekly ~30 minute-long recordings of 8 children, at home with the mother present**

- ~ 46 hours of total recording
- Occurrences in total: 2487
- Occurrences per hour: 54
  
- *For comparison*
  - *PFC corpus with inter-adult speech: 111 occurrences per hour (~14 hours in total)*
  
- Low number of (recurrent) schwa-items
  - **Methodological shortcoming** because difficult to draw conclusions about schwa behaviour in general
  - Use denser sampling to determine frequency and length of recording that would ensure a representative corpus (cf. Tomasello & Stahl 2004)





## Main results

---

- Spontaneous target-like schwa alternation mainly observed in the phonologically more advanced children (age group 3, age 3 →)

*Ouais, après elle les remet*

[ʁəmɛ]

‘Yeah, afterwards, she put them back on’

Tom (3;06.05)

*... et puis après il la remet*

[ʁəmɛ]

‘... and afterwards, he puts it back on’

Tom (3;04.19)



## Main results

---

- All children show a certain degree of sensitivity to variation in the input (i.e. the pre-recorded native speaker)
- Selection of the less preferred variant, after exposure to this variant, is in particular observed in the phonologically more advanced children (mainly age group 3, age 3 years →)



<i>Ça c'est un cheval</i> 'That is a horse'	[ʃœval]
<i>Oui, c'est un cheval. Et puis ça c'est quoi?</i> 'Yes it's a horse. And this is what?'	[ʃval]
<i>Un cheval qui court</i> 'A horse that runs'	[ʃvaj]



Albert (3;01.00)

# Main results

Adèle	<i>X tous les fenêtres</i> 'X all windows'	[tʌnæt]
Native sp.	<i>Où est-ce que tu vois la lumière?</i> 'Where do you see the light?'	
Adèle	Là.	
Native sp.	<i>Dans les fenêtres</i> 'In the windows'	[fnɛtʁ]
[...]		
Native sp.	<i>Est-ce qu'on trouve d'autre chose dans une maison?</i> 'What else can we find in a house?'	
Adèle	<i>X fenêtre(s)</i> 'DET window(s)'	[ɪ klæ:t]

- For the less advanced children, (mainly age groups 1 and 2), less sensitive to variation, some non-target-like outputs are observed



Adele 2;08.29

# Interpretation

---

- *Reminder: Adult vs. child speech*
  - Target schwa alternation involves variants CVCV ~ CCV
  - Children by large prefer the CVCV variant
- *Reminder: Prerequisites for target-like alternation*
  - Production of consonant clusters
  - Reduction of the word-initial, non-prominent syllable

## **Plo+C**

*tenir* 'hold' [tœniɪ̯] ~ [tɲiɪ̯]  
*depuis* 'since' [dœpɥi] ~ [dɲɥi]

## **Fri+C**

*semaine* 'week' [sœmɛn] ~ [smɛn]  
*jeter* 'throw' [ʒœte] ~ [ʒte]

## **Nas+C**

*monsieur* 'mister' [mœsjø] ~ [msjø]  
*neveu* 'nephew' [nœvø] ~ [nvø]

## **Liq+C**

*refaire* 'do again' [ʁœfɛʁ] ~ [ʁfɛʁ]  
*lever* 'rise' [lœve] ~ [lve]

# Prosodification of secondary clusters

---

- Syllabic approach I
  - The most sonorous element of the cluster (C1 or C2) fills the empty nucleus: *pl.louse* ‘lawn’, *rr.nard* ‘fox’ (Rialland 1986)
- Extrasyllabic approach I
  - C1 attaches directly to the prosodic word: *p|louse* ‘lawn’ (Rialland 1994)
- Syllabic approach II
  - If not ObsLiq or SibC, C1 attaches to the left: *le r|nard* ‘the fox’ (Tranel, 2000)

## In the acquisition literature

- Empty nucleus
- Rightward attachment
- Leftward attachment

*... are acquired later than complex onsets*



# Prerequisite 1: Consonant clustering

---

- We expect mastery of primary ObsLiq-clusters to precede mastery of secondary clusters
  - The majority of children that spontaneously produce secondary clusters also master primary ObsLiq-clusters
  - The secondary clusters are identical to, or near-identical to, target forms

*À Genève ça ferme pas*

*Il part à Genève avec le train*

[ʒ(œ)nev] → [zœnev]

[ʒ(œ)nev] → [ɲnev]

Tom (3;06.00)

**Tom (3;06.01)**



## Prerequisite 1: Consonant clustering

---

- We expect mastery of secondary clusters to precede schwa alternation
  - The children that are least sensitive to variation in the input (the native speaker) do not master primary clusters, nor secondary clusters
  - In the rare occurrences of the schwa-less variant, the secondary cluster is modified

# Prerequisite 1: Consonant clustering

## Strategy Gliding

C + glide	<i>piece</i> 'piece'	[pjɛs] → [pɛθ]	Adèle (2;08.16)
	<i>pieds</i> 'feet'	[pje] → [ple]	Adèle (2;09.24)
	<i>toi</i> 'you'	[twa] → [fwa]	Adèle (2;08.22)
	<i>coin</i> 'corner'	[kwɛ̃] → [kwa]	Adèle (2;09.15)
Primary clusters	<i>près</i> 'near'	[pʁɛ] → [kwɛ]	Adèle (2;10.07)
	<i>blanc</i> 'white'	[blɑ̃] → [bjʌ]	Adèle (2;09.24)
Secondary clusters	<i>cheval</i> 'horse'	[ʃ(œ)val] → [tɔvad] ~ [fwad]	<b>Adèle (2;08.29)</b>
	<i>cheveux</i> 'hair'	[ʃ(œ)vø] → [sjø] ~ [θijɛ]	Adèle (2;08.22) and (2;08.09)

Although marginal throughout the corpus, the gliding strategy is only attested in children who also produce glides in a target-like manner elsewhere.

Henri (age group 1), does not perform gliding in secondary clusters, nor as a strategy in primary clusters. Nor are target glides correctly produced when a consonant precedes.

*boire* 'drink' [bwaʁ] → [bax]    *avion* 'plane' [avjɔ̃] → [vavɔ̃]    Henri (2;05.13)

# Prerequisite 1: Consonant clustering

---

## Strategy Reduction

Primary clusters	<i>prend</i> 'take'	[pʁɑ̃] → [bɔ]	Fabienne 2;05.21
	<i>fraise</i> 'strawberry'	[fʁɛz] → [fet]	Kim (3;00.05)
	<i>bleu</i> 'blue'	[blø] → [bø]	Henri (2;06.18)
Secondary clusters	<i>fenêtre</i> 'window'	[f(œ)nɛtʁ] → [henɛt] ~ [jet]	Fabienne (2;03.12)
	<i>cheval</i> 'horse'	[ʃ(œ)val] → [θœvaj] ~ [fã]/[pa]	Kim (2;11.14)
	<i>cerises</i> 'cherries'	[s(œ)ʁiz] → [hajiç] ~ [çi]	<b>Henri (2;05.06) and (2;05.27)</b>



Less marginal than gliding, the reduction strategy is attested in children who employ gliding in primary clusters, as well as in children who do not.

## Prerequisite 2: Reduction of non-prominent syllable

---

- In French, target disyllables rarely subject to syllable reduction (Goad & Buckley 2006)
  - Early constraint on word minimality: the binary foot → Retain both syllables in disyllabic targets
- In French (and other languages), tendency to associate a H tone with the word-initial syllable (Allen 1983)
  - Prominence is preferably associated with a vocalic element
- In English, the syllable may be retained all while not realising the vowel (Carter & Gerken 2004)
  - The phonetic omission leaves traces in the signal through compensatory lengthening

## Prerequisite 2: Reduction of non-prominent syllable

---

- We expect faithfulness to the syllable structure to block schwa absence
  - Schwa presence is combined with consonant deletion in the phonologically less advanced children
    - Here, schwa presence cannot reflect a solution to avoid cluster formation

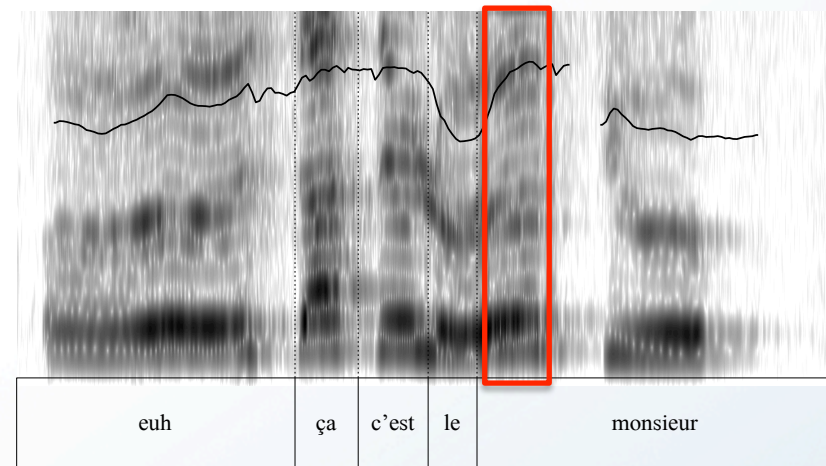
CVV	<i>fenêtre</i> ‘window’ <i>Genève</i>	[f(œ)nɛtʁ] → [tɛɛk] [ʒ(œ)nɛv] → [ʒβɛv]	Fabienne (2;05.00) Lucas (2;09.14)
VCV	<i>petit</i> ‘small’ <i>monsieur</i> ‘mister’	[p(œ)ti] → [ati] [m(œ)sjø] → [œθjø]	Fabienne (2;03.19) Adele (2;10.04)
VV	<b><i>renard</i></b> ‘fox’ <i>regarder</i> ‘look’	<b>[ʁ(œ)naʁ] → [eaʁ]</b> [ʁ(œ)gaʁde] → [ɛɛðe]	<b>Armand (2;11.28)</b> Fabienne (2;05.21)





## Prerequisite 2: Reduction of non-prominent syllable

- Schwa presence is often combined with prosodic prominence (H tone)
  - Schwa presence might reflect a prosodic constraint targeting the initial syllable



*Ça, c'est le monsieur* Adèle 2;10.04

### Semi-controlled corpus

**Full vowel, initial prominence** 65% (1024/1571)  
Full vowel, no initial prominence 12% (181/1571)  
(by large children in age group 3)

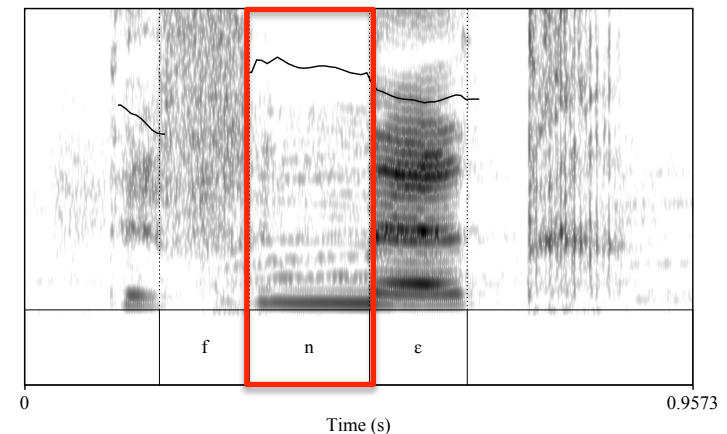
## Prerequisite 2: Reduction of non-prominent syllable

- We expect faithfulness to the syllable structure to be more important than faithfulness to the segmental content
  - Non-target-like vowel qualities are observed in the phonologically less advanced children

*petit* ‘small’ [p(œ)ti] → [piti] Henri (2;04.01)

*renard* ‘fox’ [ʁ(œ)naʁ] → [kona] Adèle (2;07.25)

- Syllabic consonants are observed in the phonologically more advanced children



*des fenêtres*  
‘windows’

[fn:ɛtʁ̥]  
Tom (3;03.29)

# Acquisition of schwa alternation and factors susceptible of shaping it – *revisited*

---

## Grammar-external factors

- The schwa-items spontaneously used by the children by far belong to those subject to highly frequent schwa absence in target Swiss French
  - The high rate of schwa presence in the child language corpus establishes an *a priori* mismatch between child and adult speech
- **Remains to be established the importance of child-directed speech.**
  - CDS corpus, with restricted and unbalanced size
  - indicates a higher schwa presence compared to inter-adult speech
  - indicates rates of schwa absence not immediately found in the children's spontaneous production
  - Liégeois (2014) observes a correspondence between schwa behaviour in monosyllables between CDS and child language in 3 parents-child corpora (2;4, 3;0 and 3;4 at the outset of the study) → **Discussion needed**



# Acquisition of schwa alternation and factors susceptible of shaping it – *revisited*

---

## Grammar-internal factors: **Proposition**

- Mismatch between adult and child speech  
→ **the general development of phonology hinders the acquisition of schwa alternation**
- Two challenges reported in the literature
  - Consonant clustering
  - Syllable reduction
  - Grammatical solution: Select the variant that avoids them, i.e. the variant with schwa



# Acquisition of schwa alternation and factors susceptible of shaping it – *revisited*

---

## Grammar-internal vs. -external factors

- Children mastering consonant clusters are most sensitive to variation in the input
- The rare sensitivity observed in the other children indicates that grammar-internal and -external constraints develop simultaneously
  - **The grammar-internal constraints seem to take precedence over the grammar-external ones in the spontaneous production of the young child**
- Tease apart the roles played by grammar-internal constraints vs. input frequencies:
  - **A more controlled and/or denser study targeting a larger amount of consonant combinations, as well as a larger variety of schwa-items**





# Tentative learning model

---

[CV<sub>1</sub>CV<sub>2</sub>], faithfulness to the syllable count, e.g. *refais* [ɔfɛ] (Adèle, **age group 2**)



[CV<sub>1</sub>CV<sub>2</sub>] > [CCV<sub>2</sub>], mastery of primary clusters, gradual mastery of secondary clusters, e.g. *Genève* [zənɛv] > [ɲnɛv] (Tom, **age group 3**)



[CV<sub>1</sub>CV<sub>2</sub>] > [CCV<sub>2</sub>], gradual learning of lexical and stylistic constraints imposed by the linguistic community (although impeded by gradient phonotactic constraints, e.g. on [ʁ]-initial clusters), e.g. *remet* [ʁɛmɛ] > ?[ʁmɛ] (Guy, **age group 3**)



[CV<sub>1</sub>CV<sub>2</sub>] = [CCV<sub>2</sub>], orthographic influence excluded, identity between the child's and the adult's grammar with regard to schwa alternation



**Uit**

THE ARCTIC  
UNIVERSITY  
OF NORWAY

# Thank you for your attention!

---

**To contact me**

[helene.n.andreassen@uit.no](mailto:helene.n.andreassen@uit.no)

**To have a look at my webpage**

[tiny.cc/lhr9kx](http://tiny.cc/lhr9kx)

**To read my thesis**

<http://munin.uit.no/handle/10037/5193>



# References

---

- Allen, George D. 1983. Some suprasegmental contours in French two-year-old children's speech. *Phonetica* 40, 269-292.
- Anderson, Stephen R. 1982. The analysis of French shwa: Or, how to get something for nothing. *Language* 58, 534-573.
- Andreassen, Helene N. 2013. *Schwa: Distribution and acquisition in light of Swiss French data*. PhD dissertation, University of Tromsø.
- Bazylo, Sławomir. 1976. Groupes consonantiques primaires et secondaires à l'initiale du mot dans le français contemporain. *La Linguistique* 12, 63-80.
- Carter, Allyson & LouAnn Gerken. 2004. Do children's omissions leave traces? *Journal of Child Language* 31, 561-586.
- Charette, Monik. 1991. *Conditions on phonological government*. Cambridge: Cambridge University Press.
- Côté, Marie-Hélène. 2000. *Consonant cluster phonotactics: A perceptual approach*. PhD dissertation, MIT.
- Dell, François. 1985. *Les règles et les sons: Introduction à la grammaire générative*, 2 edn. Paris: Hermann.
- Demuth, Katherine & Mark Johnson. 2003. Truncation to subminimal words in early French. *Canadian Journal of Linguistics* 48, 211-241.
- Durand, Jacques. 1976. Generative Phonology, Dependency Phonology and Southern French. *Lingua e stile* 11, 3-23.
- Durand, Jacques, Laks, Bernard & Chantal Lyche. 2014. French phonology from a corpus perspective: the PFC programme, in Jacques Durand, Ulrike Gut & Gjert Kristoffersen (eds), *The Oxford Handbook of Corpus Phonology*. Oxford: Oxford University Press, 486-497.
- Durand, Jacques, Bernard Laks & Chantal Lyche. 2009. Le projet PFC (phonologie du français contemporain): Une source de données primaires structurées. In Jacques Durand, Bernard Laks & Chantal Lyche (eds.), *Phonologie, variation et accents du français*, 19-62. Paris: Hermès.
- Durand, Jacques, Bernard Laks & Chantal Lyche. 2002. La phonologie du français contemporain: Usages, variétés et structure. In Claus D. Pusch & Wolfgang Raible (eds.), *Romanistische Korpuslinguistik - Korpora und gesprochene Sprache / Romance Corpus Linguistics - Corpora and Spoken Language*, 93-106. Tübingen: Gunter Narr Verlag.
- Eychenne, Julien. 2006. *Aspects de la phonologie du schwa dans le français contemporain: Optimalité, visibilité prosodique, gradience*. PhD dissertation, Université de Toulouse-Le Mirail.
- Fikkert, Paula. 1994. *On the acquisition of prosodic structure*. The Hague: Holland Institute of Generative Linguistics
- Fikkert, Paula & Nicole Altwater-Mackensen. 2013. Insights into variation across children based on longitudinal Dutch data on phonological acquisition. *Studia Linguistica* 67, 148-164.
- Fikkert, Paula, Clara C. Levelt & Joost van de Weijer. 2005. *Input, intake and phonological development: The case of consonant harmony*. Ms. Radboud University Nijmegen, Leiden University and the University of Lund.

# References

---

- Gnanadesikan, Amalia. 2004. Markedness and faithfulness constraints in child phonology [revised version of a 1995 University of Massachusetts, Amherst paper]. In René Kager, Joe Pater & Wim Zonneveld (eds.), *Constraints in phonological acquisition*, 73-108. Cambridge: Cambridge University Press.
- Goad, Heather & Meaghen Buckley. 2006. Prosodic structure in child French: Evidence for the foot. *Catalan Journal of Linguistics* 5, 109-142.
- Kehoe, Margaret, Géraldine Hilaire-Debove, Katherine Demuth & Conxita Lléo. 2008. The structure of branching onsets and rising diphthongs: Evidence from the acquisition of French and Spanish. *Language Acquisition* 15, 5-57.
- Léon, P. 2005. *Phonétisme et prononciations du français*. Paris: Armand Colin (4<sup>ème</sup> édition).
- Liégeois, Loïc. 2014. *Usage des variables phonologiques dans un corpus d'interactions naturelles parents-enfant: impact du bain linguistique et dispositifs cognitifs d'apprentissage*. Thèse de doctorat, Université Blaise-Pascal – Clermont Université.
- Liégeois, Loïc, Inès Saddour & Damien Chabanal. 2012. L'élision du schwa dans les interactions parents-enfant: étude de corpus. *Actes de la conférence conjointe JEP-TALN-RECITAL 2012*, vol. 1, 313-320.
- Malécot, André. 1976. The effect of linguistic and paralinguistic variables on the elision of the French mute-e. *Phonetica* 33, 93-112.
- Malécot, André & Gérard Chollet. 1977. The acoustic status of the mute-e in French. *Phonetica* 34, 19-30.
- Morin, Yves Charles. 1978. The status of mute 'e'. *Studies in French Linguistics* 1, 79-140.
- Racine, Isabelle & Helene N. Andreassen. 2012. A phonological study of a Swiss French variety: Data from the canton of Neuchâtel. In Randall Gess, Chantal Lyche & Trudel Meisenburg (eds.), *Phonological variation in French: Illustrations from three continents*, 173-207. Amsterdam: John Benjamins.
- Racine, Isabelle. 2008. *Les effets de l'effacement du schwa sur la production et la perception de la parole en français*. PhD dissertation, Université de Genève.
- Racine, Isabelle, Audrey Bürki & Elsa Spinelli. 2013. The implication of spelling and frequency in the recognition of phonological variants: evidence from pre-readers and readers. *Journal of Language and Cognitive Processes*, 1-6.
- Rialland, Annie. 1986. Schwa et syllabes en français. In Leo Wetzels & Engin Sezer (eds.), *Studies in compensatory lengthening*, 187-226. Dordrecht: Foris.



# References

---

- Rialland, Annie. 1994. The phonology and phonetics of extrasyllabicity in French. In Patricia A. Keating (ed.), *Phonological structure and phonetic form: Papers in Laboratory Phonology III*, 136-159. Cambridge: Cambridge University Press.
- Rose, Yvan. 2000. *Headedness and prosodic licensing in the L1 acquisition of phonology*. PhD dissertation, McGill University, Montreal.
- Stridfeldt, Monika. 2005. *La perception du français oral par des apprenants suédois*. Umeå: Institutionen för moderna språk, Umeå universitet.
- Thomas, Alain. 2001. Schwa au niveau avancé du français langue seconde. *Revue canadienne de linguistique appliquée* 4, 103-112.
- Thomas, Alain. 2004. Phonetic norm versus usage in advanced French as a second language. *International Review of Applied Linguistics in Language Teaching* 42, 365.
- Tomasello, Michael & Daniel Stahl. 2004. Sampling children's spontaneous speech: How much is enough? *Journal of Child Language* 31, 101-121.
- Tranel, Bernard. 2000. Aspects de la phonologie du français et la théorie de l'optimalité. *Langue Française* 126, 39-72.
- Uritescu, Dorin, Raymond Mougeon, Katherine Rehner & Terry Nadasdi. 2004. Acquisition of the internal and external constraints of variable schwa deletion by French immersion students. *International Review of Applied Linguistics in Language Teaching* 42, 349-364.
- Walker, Douglas C. 1993. Schwa and /œ/ in French. *Canadian Journal of Linguistics* 38, 43-64.
- Walter, Henriette. 1982. *Enquête phonologique et variétés régionales du français*. Paris: Presses Universitaires de France.