

Occitan traces in the Southern French schwa

A pilot study

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Introduction

French and Occitan, or what this project is about



A map of historically Occitan-speaking areas, by Joan Francés Blanc

The project, and where today's study fits in

“New Speakers”: L1-French, L2-Occitan speakers

1. sociolinguistic approach: Who are the New Speakers of Occitan?
2. **phonetic-phonological part**: How do the New Speakers of Occitan speak?
 - **L1-French: Southern French accent**
 - **L2-Occitan: New Speakers' accent**

Southern French

There is an ongoing levelling of regional accents toward Reference French (which is based on Northern French):

- Characteristics of regional accents diminish in intensity and/or prevalence
- Traits from Northern French may be introduced into Southern speech

Southern French

Parenthesis: Southern French?

- français d’oc (‘Occitan French’) ([Mazel 1975](#))
- francitan (‘Frenchitan’) ([Mazel 1975](#))
- ‘Southern’ also includes historically Basque- or Catalan-speaking areas ([Pustka 2011](#))



Southern French

Traditional characteristics (mostly transfers from Occitan):

- schwa (“e muet”)
- mid-vowel alternation (“Loi de position”)
- nasal vowels
- word accent

schwa: Durand, Slater, and Wise ([1987](#)); Armstrong and Unsworth ([1999](#)); Eychenne ([2019](#)); Müller and Wiedner ([2022](#))

mid-vowels: Moreux ([2006](#)); Dufour, Nguyen, and Frauenfelder ([2007](#)); Nguyen, Dufour, and Brunellière ([2012](#)); Storme ([2017](#))

nasal vowels: Clairet, 2005; Violin-Wigent, 2006; Carignan, 2017

word accent: Sichel-Bazin, 2016

Southern French

Recent additions from Northern French accents:

- /ɔ/-fronting?
- stop aspiration?

- /ɔ/-fronting: Mooney (2016)

Project aims

Pilot data

- descriptive account of the dataset
 - quantify the variability, create accent profiles
- test hypotheses derived from the literature
 - develop methods
- determine limitations in the dataset with respect to methods
 - obtain further funding

Outline of the remaining talk

Production:

- schwa realisation rate
- schwa quality

Perception:

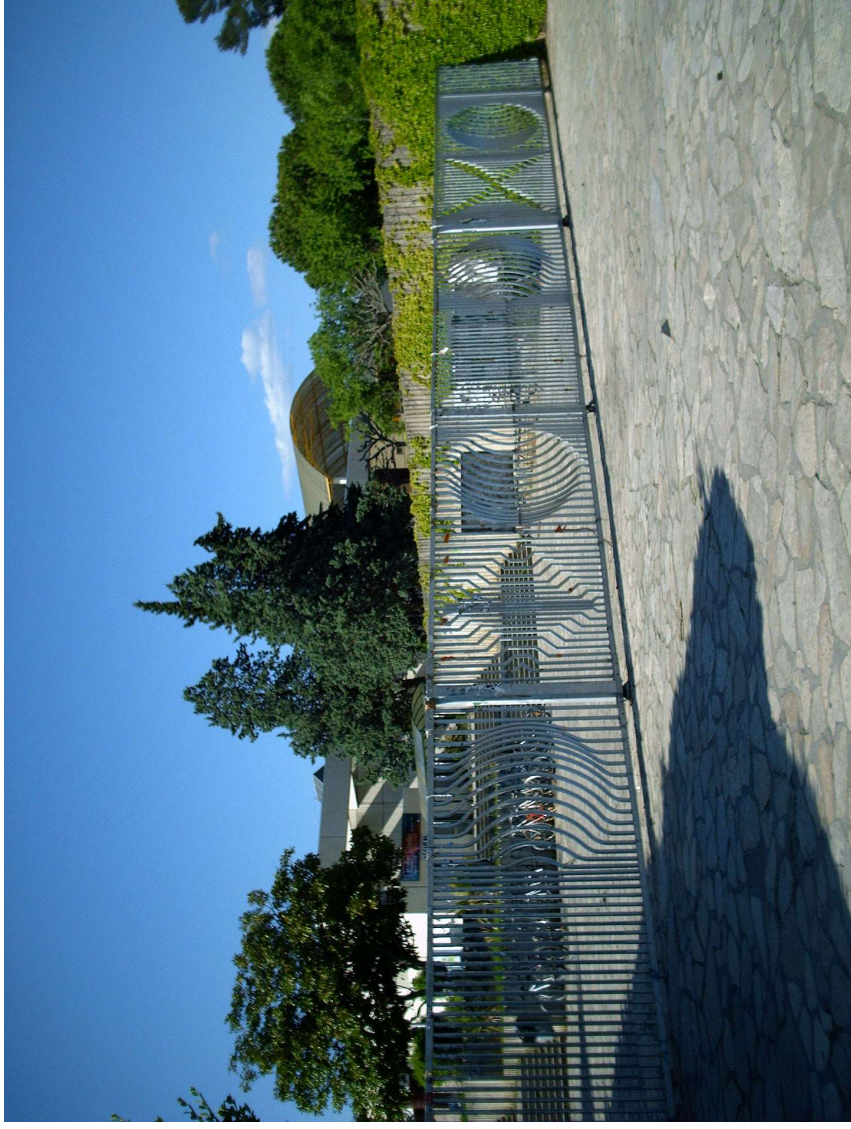
- accent judgment task

Discussion and summary

Production

Audio recordings

- Master seminar with fieldwork
- March 2019



Université Paul-Valéry - Montpellier 3

Audio recordings

- semi-spontaneous speech
- elicitation: description of pictures and narration of stories presented on series of pictures
- in both French and Occitan
- recordings: Zoom H4nSP portable recorder, Sennheiser HSP4 cardioid headset microphone, in the department library

Recordings

15 speakers from the Department of Occitan Studies

- 12 students, 3 faculty (6 women, 9 men)
- age range: 20-65 years, median age: 30 years
- L1-French, L2-Occitan, no other L1
- 10 born in Southern France, 5 born outside of Southern France

Data preparation

- TextGrids in Praat ([Boersma and Weenink 2022](#))
 - orthographic transcription
 - segmentation into words
- conversion into an Emu-database ([Jochim et al. 2023](#))
 - manual correction of formant values and segment boundaries
- all analyses in R ([R Core Team 2023](#))

1 Schwa realisation rate

What is schwa realisation rate?

Schwa realisation rate

is the ratio of realised schwa (“e muet”) vowels to non-realised ones within a given speech sample.

des toma[tə] 

les toma[t] 

Schwa realisation rate is declining

As accent-levelling toward Reference French continues, rates of schwa realisation are declining.

Rural speakers born before World War II

Schwa realisation rates approach 100%:

- Lézignan-la-Cèbe (34), Pézenas (34) ([Durand, Slater, and Wise 1987](#))
- Septèmes-les-Vallons (13) ([Coquillon and Turcsan 2012](#))
- Tournettes-sur-Loup (06) ([Thomas 2006](#))

These were Occitan-dominant speakers in childhood, then dominance-switch to French and attrition of Occitan.

Schwa realisation rate is declining

Urban speakers born before World War II

Schwa realisation rates around 70-90%:

- different areas of Southern France ([Martinet 1945](#)) (speakers from Northern France in Martinet ([1945](#)): 20%)
- Marseille (13) ([Coquillon and Turcsan 2012](#))
- Nice (06) ([Thomas 2006](#))

These were probably already L1-French speakers, knowledge of Occitan unknown.

Schwa realisation rate is declining

Speakers born circa 1970-1985

Schwa realisation rates extremely variable:

- almost 80% among speakers from Septèmes-les-Vallons (13) ([Coquillon and Turcsan 2012](#))
- 5% among speakers from Tourrettes-sur-Loup (06) ([Thomas 2006](#))

L1-French speakers, no knowledge of Occitan

Schwa realisation rate is declining

The age effect could be observed within families of three or four generations.

In the case of the family from Lézignan-la-Cèbe (34) and Pézenas (34) studied in Durand, Slater, and Wise ([1987](#)), age correlates well with the decline of knowledge of Occitan.

What's this got to do with Occitan?

word-finally: Fr. [ə] = Oc. [ɔ]

Latin *villam* ['wi:l:am] “country estate”

Late spoken Latin ['vil:a]

French *ville* [vilə] ~ [vil]

[-a] > [-ə]: ca. 7th c., Marchello-Nizia et al. (2020)

Occitan *vila* ['bilɔ]

[-a] > [-ɔ]: ca. 15th c., Ronjat (1930)

What's this got to do with Occitan?

word-finally: Fr. [ə] = Oc. [e]

Latin *hominem* ['hominem] “man”

Late spoken Latin ['ɔmne]

French *homme* [ɔmə] ~ [ɔm]

[-e] > [-ə]: ca. 3rd c., Marchello-Nizia et al. ([2020](#))

Occitan *òme* ['ɔme]

What's this got to do with Occitan?

Morphological correspondances

as a **feminin marker**:

French *belle* [bɛlə] ~ [bɛl] “beautiful”

Occitan *bèla* [ˈbɛlə] “big/beautiful”

as the marker of the **3rd p.sg.ind.** (1st conjugation)

French *parle* [paʁlə] ~ [paʁl] “he/she speaks”

Occitan *parla* [ˈparlə] “he/she speaks”

What's this got to do with Occitan?

word-internally: Fr. /ə/ = Oc. unstressed /e/

Latin *septimanam* [ˌsɛptiˈmaːnam] “week”

spoken Late Latin [sept'mana]

French *semaine* [səməne] ~ [smɛn]

[-e-] > [-ə-] ca. 11th c., Marchello-Nizia et al. ([2020](#))

Occitan *setmana* [se'm:ano]

Regional identity as a moderator of schwa realisation rate

Armstrong and Unsworth ([1999](#)): variationist study

- male and female speakers born ca. 1975-1985
- Carcassonne (11) and Lézignan-Corbières (11)
- schwa realisation rate in word-final position (polysyllabic words)
- regional attachment questionnaire (0-15 points)

cf. Labov's ([1963](#)) study of diphthong centralisation on Martha's Vineyard

Oberseminar Romanistik, 29 May 2024

Regional identity as a moderator of schwa realisation rate

Armstrong and Unsworth ([1999](#)): variationist study

Results:

- male speakers:
 - regional attachment: 7/15 points
 - schwa realisation rate: 82%
- female speakers:
 - regional attachment: 3.75/15 points
 - schwa realisation rate: 52%

Although not measured, as New Speakers of Occitan, we suppose that our speakers are strongly attached to Occitania.

Study 1: Schwa realisation rate

Aims and hypotheses

Aim

Quantify schwa realisation rate per speaker.

Hypotheses

Age: Schwa realisation rate positively correlates with age for speakers who grew up in Southern France.

Articulation rate: Schwa realisation rate is not correlated with speakers' articulation rates.

Data preparation

Identification of potential schwa realisation sites

- word-internal schwa (e.g. *demain*)
- word-final schwa
 - in monosyllables (e.g. *le, de, se*)
 - in polysyllables (e.g. *frère*)
 - before a consonant or at the end of an intonational phrase

Data preparation

We excluded

- word-final schwa before a vowel within an intonational phrase (e.g. *mon frère et moi*)
- “schwa-tags”, i.e. any hesitation markers (*euh*)

Total number of potential schwa sites: 1370

Range of schwa realisation rates: 46% - 92%

Results: schwa realisation rates

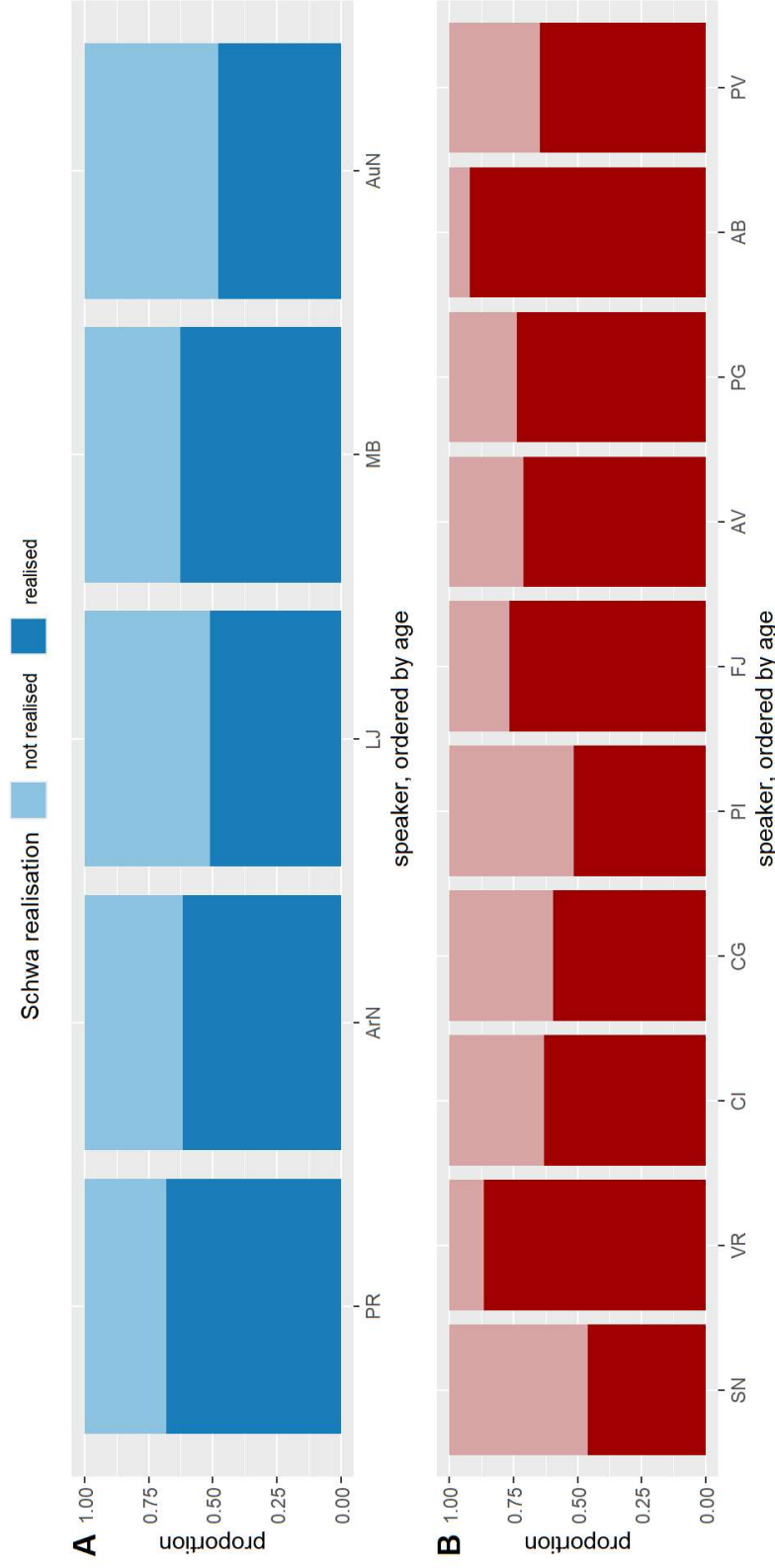


Figure 1: A: Speakers born in the 'North'. B: Speakers in the 'South'.

AB, 92% schwa realisation

SN, 46% schwa realisation



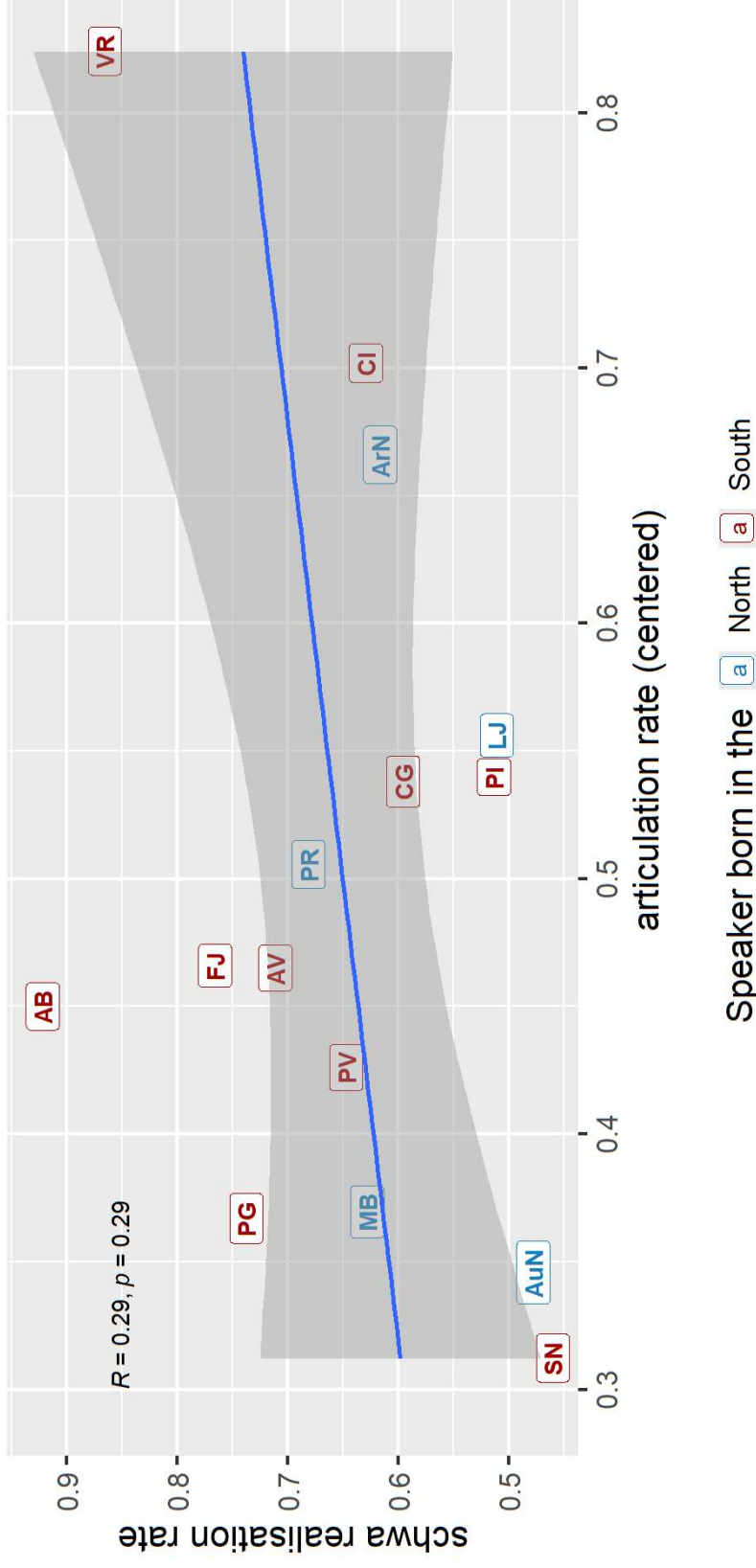
Articulation rate

Articulation rate, a potential confounding factor?

- Historically, schwa is the outcome of vowel reduction.
- It is stressed only in a few constructions such as *Prends-le* “Take it”.
- Is it similar in behaviour to e.g. English [ə]?

Prediction: Schwa realisation rate decreases as articulation rate increases.

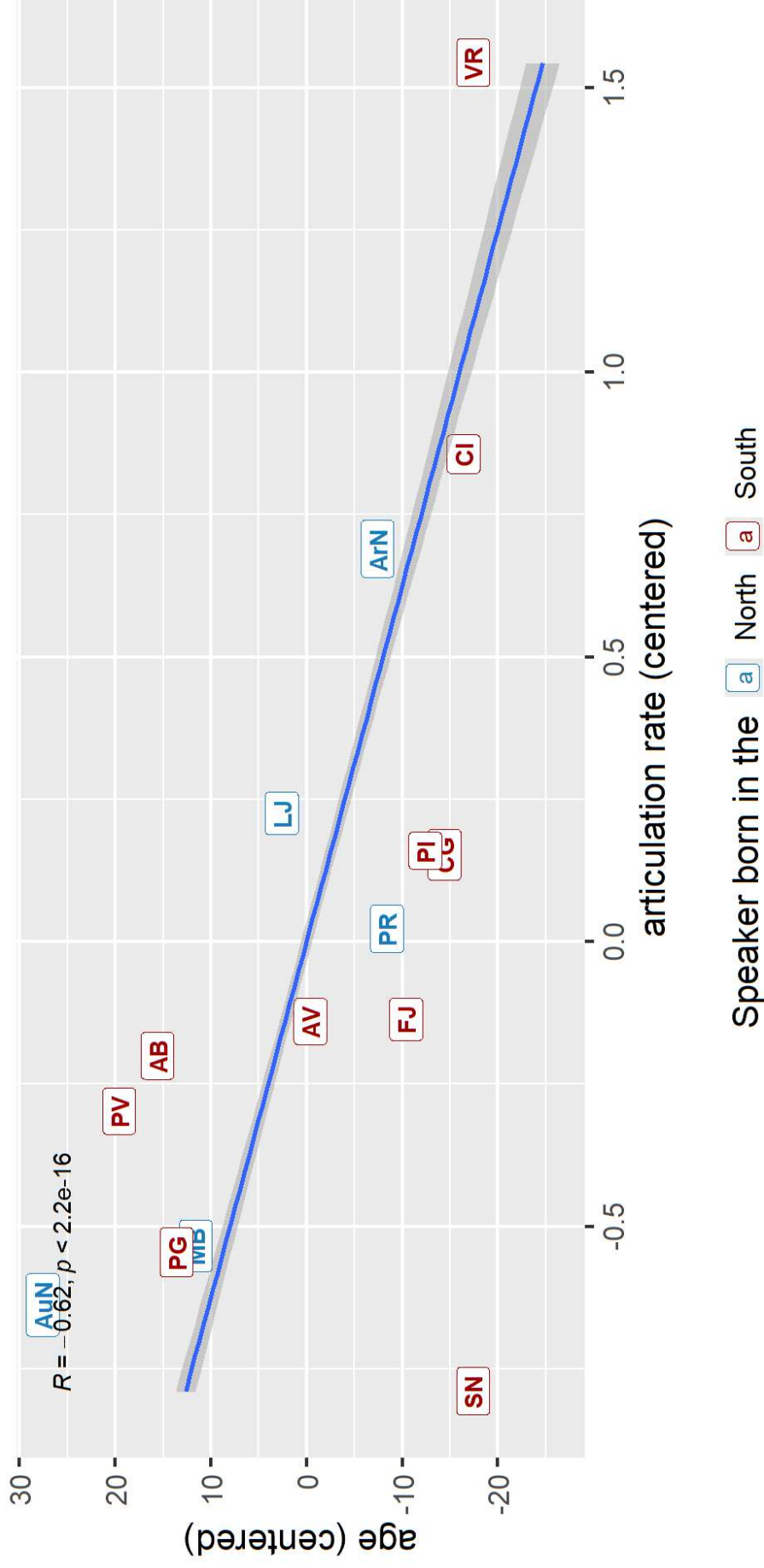
Articulation rate



Here, schwa realisation rate increases as articulation rate increases.

Hence, no evidence for a vowel reduction effect (casual speech effect) due to higher articulation rate.

Articulation rate



Correlation: Older speakers speak more slowly.

AuN (age 65)

Cichocki, Raminskaia, and Hagar (2023)

VR (age 20)

Analysis

Only for speakers born in the South ($n=10$)

Bayesian logistic regression

- outcome variable: absence or presence of schwa
- predictor variable: age (centered)
- random variable: speaker

prior predictive checks, model comparisons, post-estimation checks for convergence and auto-correlation issues as recommended in Depaoli and Schoot ([2017](#))

The model

```
Family: bernoulli
Links: mu = logit
Formula: eMuet ~ 1 + age_centered + (1 | speaker)
Data: schwaSouth (Number of observations: 880)
Draws: 4 chains, each with iter = 4000; warmup = 500; thin = 1;
       total post-warmup draws = 14000
```

Group-Level Effects:

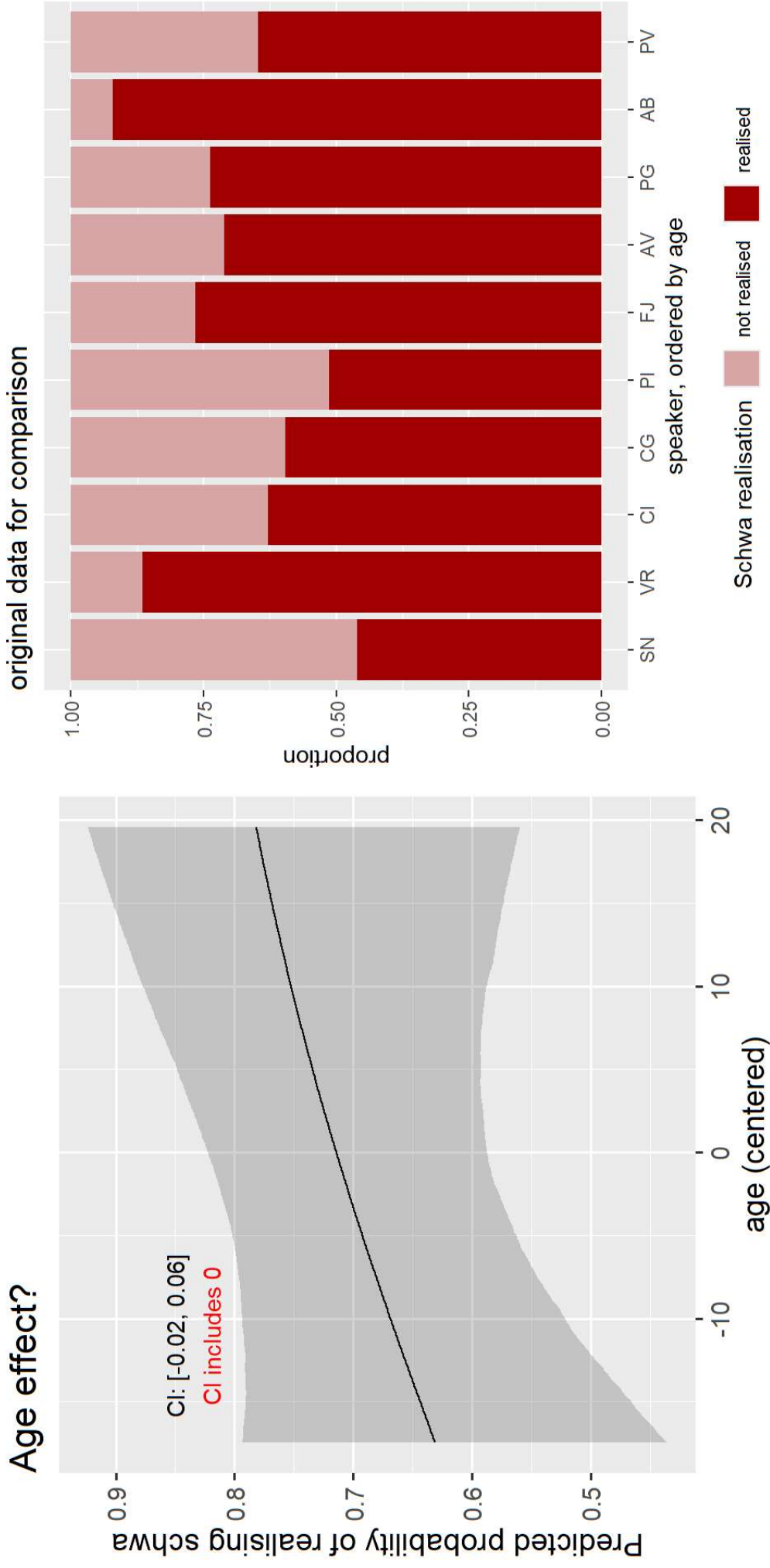
```
~speaker (Number of levels: 10)
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sd(Intercept)    0.84    0.30    0.44    1.60  1.00    3301    4016
```

Population-Level Effects:

```
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept    0.93    0.30    0.35    1.53  1.00    4066    4993
age_centered  0.02    0.02   -0.02    0.06  1.00    4249    4643
```

Draws were sampled using sampling(NUTS). For each parameter, Bulk_ESS and Tail_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

The age effect in our pilot data



Interim discussion

- Weak evidence for schwa realisation rate declining in younger speakers.
- Not correlated to articulation rate (because it isn't the result of vowel weakening in Southern French).
- Descriptive goal: Schwa realisation rate will serve as a predictor variable in Study 3.

2 Schwa quality

Introduction

Recall that in word-final position

- Fr. [ə] = Oc. [e] (e.g. Fr. *homme* = Oc. *òme*)

and

- Fr. [ə] = Oc. [ɔ] (e.g.
 - in lexemes: Fr. *femme* = Oc. *femna*,
 - in morphological functions: feminine marker for and 3rd p. sg. ind. for 1st conjugation verbs)

Schwa quality could be transferred from Occitan phonology into Southern French.

Introduction

Historical evidence:

1539: mention of schwa quality in a treatise on poetics

“Sẽblablement toutz aultres termes feminins naturelz qui sont escriptz par, E, en fin de mot resonant en O” (du Pont [1539] 1972: XI - XII).

“Similarly, all the other natural feminine terms that are written with E at the end of the word sound like O.” (my translation)

Introduction

Modern evidence:

only anecdotal ([Durand, Slater, and Wise 1987](#), auditory impression)

“For a number of speakers, its [the schwa’s] quality in this context [word-final position in polysyllabic words] is distinguishable from both [œ] and [ø]: it often has a centralized quality, less labialization than the front rounded vowels, and one can even observe a back realization (near cardinal vowel 14) for speakers with an Occitan background ([...])” ([Durand, Slater, and Wise 1987: 991](#)).

Study 2: Schwa quality

Aims and hypothesis

Aim

Quantify the vowel quality of schwa in the final position of polysyllabic words per speaker

Hypothesis

Speaker variability: For some speakers born in the South, [ə] is closer to the back rounded vowels than to the front rounded vowels.

Data preparation

extract all French oral vowels (/a, ɔ, e, ɛ, i, o, ø, œ, u, y/) + schwa in the word-final position of polysyllabic words

Caveat: unequal sample

Speakers produced unequal amounts of schwas because

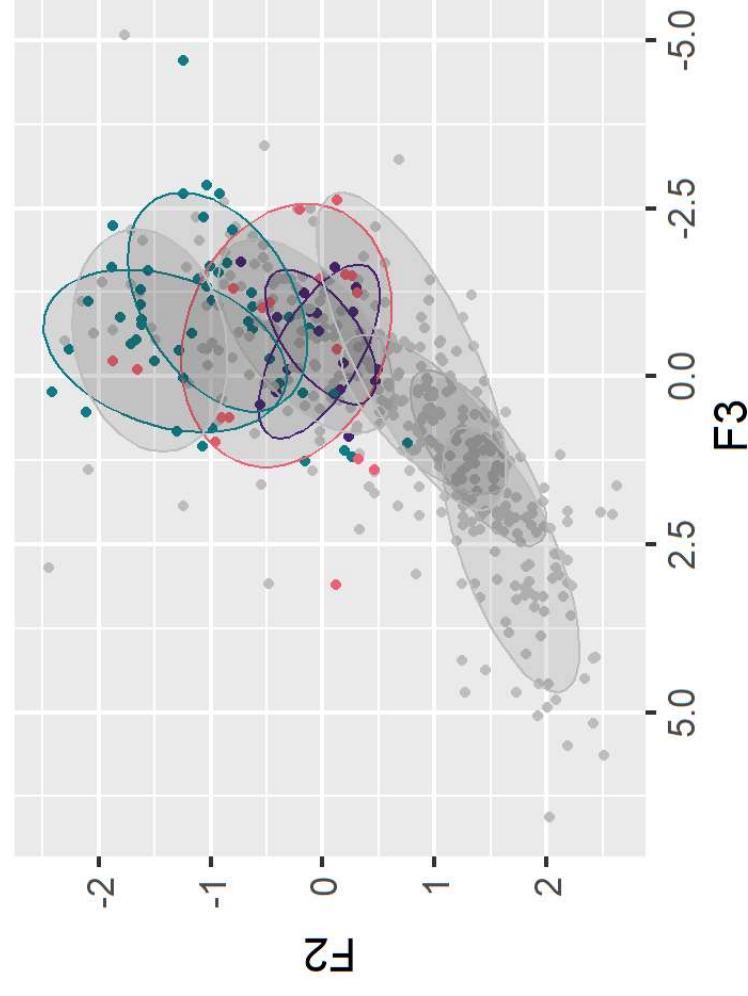
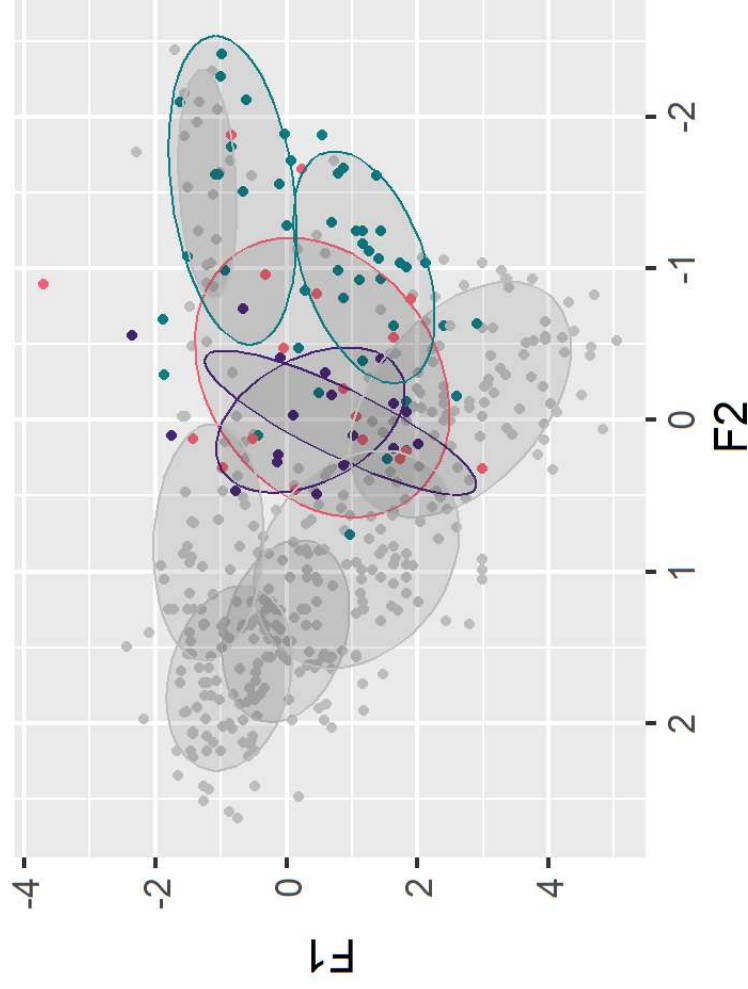
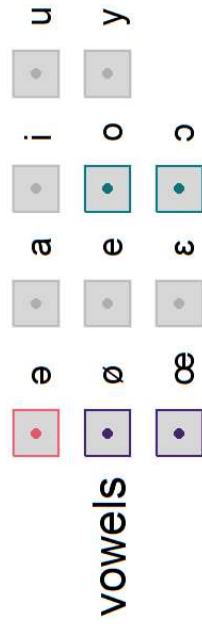
- some speakers were more talkative during the picture description and narration tasks than others;
- some had higher schwa realisation rates than others (see Study 1).

Analysis

- extract F1, F2, F3 in Hz for all oral vowels
- time-normalise the vowels to 11 data points per vowel token
- normalise the formant values using a modified Lobanov normalisation technique ([Brand et al. 2021](#))

Analysis

Is a speaker's [ə] closer to the front rounded vowels or to the back rounded vowels?



Mahalanobis distances

- normalised F1, F2, F3 values averaged over the middle third portion of the vowel before calculating the Mahalanobis distances
- [ø] and [œ] merged: front mid vowels
- [o] and [ɔ] merged: back mid vowels
- log transformation of Mahalanobis distances

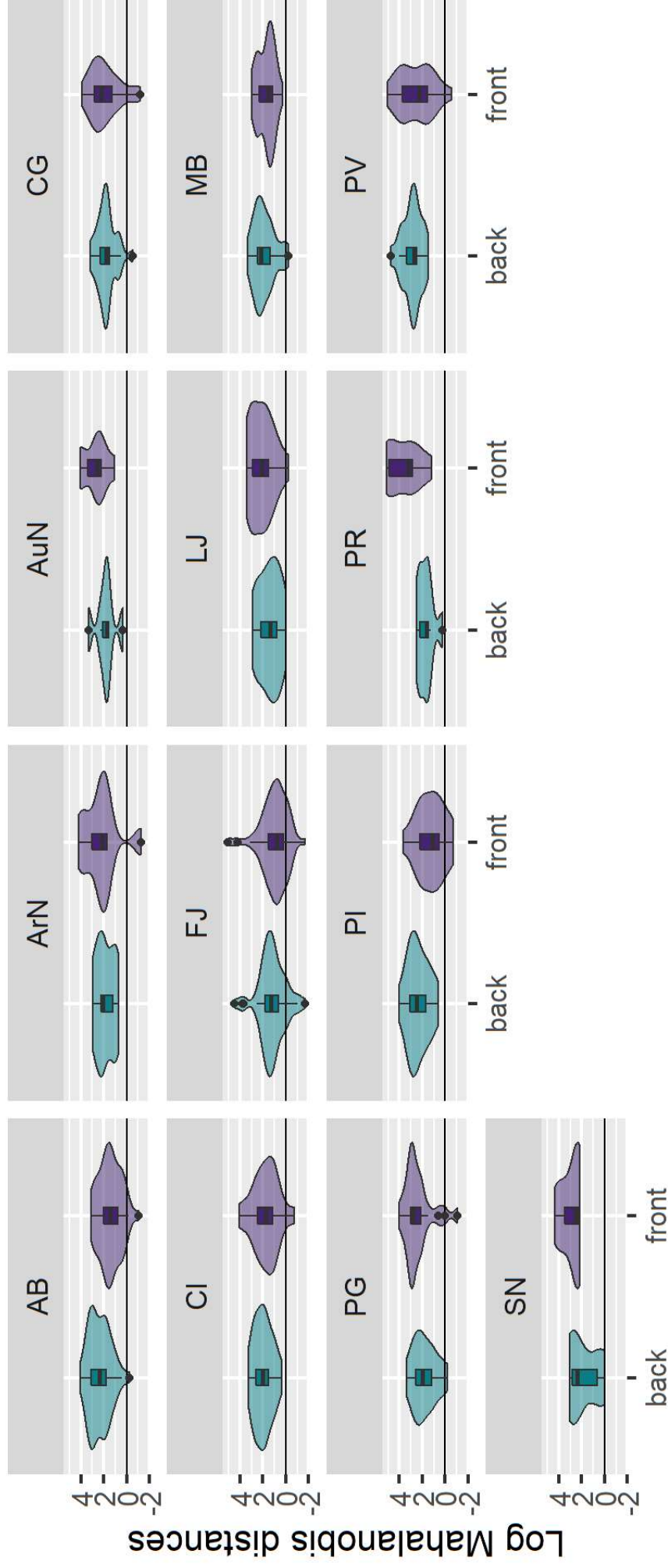
Mahalanobis distances

Two speakers were removed:

- VR because she lacked the minimum number of tokens necessary for the calculation of Mahalanobis distances in the front vowel category
- AV because in his Occitan dialect (niçard), Fr. [ə] = Oc. [a]

Mahalanobis distances

Distribution of Mahalanobis distances



Vowel category: back vs. front

Analysis

Is the Mahalanobis distance measured from schwa tokens to the front vowel distribution different from the Mahalanobis distance measured from schwa tokens to the back vowel distribution?

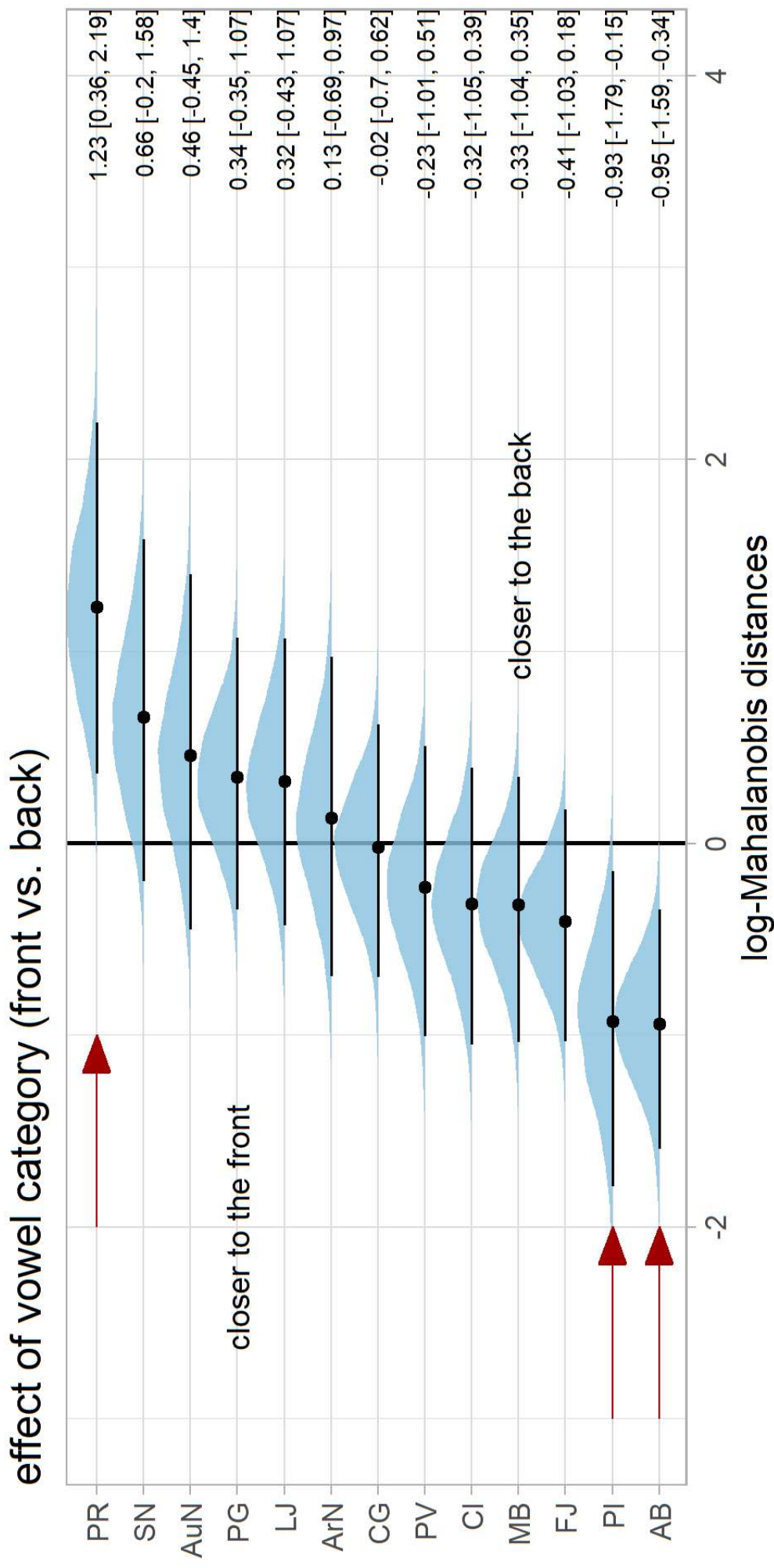
Analysis

Bayesian linear regression:

- outcome variable: log Mahalanobis distance
- predictor variable: category front vs. back
- random intercepts and slopes for speaker

prior predictive checks, model comparisons, post-estimation checks for convergence and auto-correlation issues as recommended in Depaoli and Schoot ([2017](#))

Results: Random slopes for speakers



Interim discussion

- Two speakers (PI, AB) seem to have schwas that resemble the front rounded vowels - a generalisation from word-internal position?

PI *d'une hache*

0:00 / 0:00

AB *elles risquent*

0:00 / 0:00

- One speaker (PR) perhaps may have a somewhat backed schwa.

PR *un arbre*

0:00 / 0:00

⚠ All credible intervals very close to 0!

- Descriptive goal: Schwa quality (= average Mahalanobis distance to the front vowels - average Mahalanobis distance to the back vowels) will serve as a predictor variable in Study 3.

3 Accent perception

Characteristics of Southern French in perception?

Pustka ([2011](#))

- written questionnaire: “Quelles sont les particularités de prononciation du français du Sud de la France ?” (“What are the pronunciation characteristics of French in the South of France?”)
- non-linguists from Toulouse (n = 169) and Paris (n = 104)

Characteristics of Southern French in perception?

Pustka ([2011](#))

answers obtained from laypersons:

- prosody (Toulouse: 40%, Paris: 90%)
- nasal vowels (Toulouse: 20%, Paris: 20%)
- schwa realisation rate (Toulouse: 15%, Paris: 10%)
- mid-vowel alternation (Toulouse: 5%, Paris: 10%)

Study 3: Accent rating

Aims

Aim

Quantify the degree of Southern accent per speaker

Hypotheses

If schwa realisation rate and schwa quality are important characteristics of Southern French, then

1. Higher schwa realisation rates should lead to higher Southern accent ratings.
2. Negative schwa quality score values should lead to higher Southern accent ratings.

Method

- two audio extracts from each of the 15 speakers
 - duration range: 1-16 s, mean: 5.5 seconds
 - one extract presented per trial, random order, no repetitions
- tool: Percy ([Draxler 2011](#))
- demographic information elicited from listeners
- link to the experiment distributed via Email lists
- task
 - judge the audio extract on a scale of 0 (“Reference French”) to 100 (“Southern French”)
 - by clicking in an empty bar representing a visual analog scale with only the endpoints labeled

Listeners

189 listeners completed the task

We removed

- 9 participants for not being native speakers of French
- 4 participants for reporting not having normal hearing

176 listeners' data were used for the analysis.

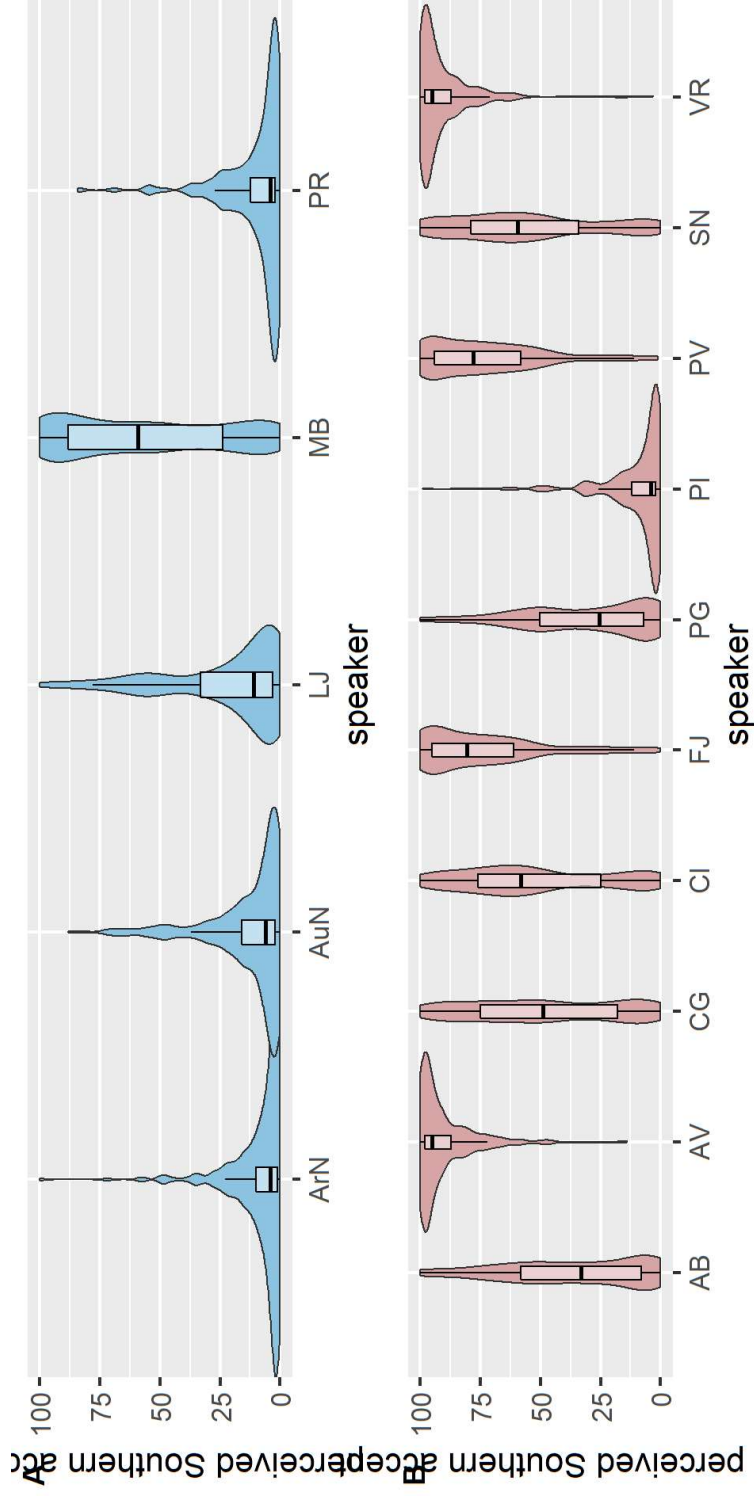
Listeners

Of the 176 listeners

- 3 bilinguals (German, Occitan, Polish), 173 monolinguals
- age range 17-71, median age: 26 years
- childhood spent in
 - Ile-de-France region (58 listeners)
 - Auvergne-Rhône-Alpes region (23 listeners)
 - Grand-Est region (11 listeners)
 - Hauts-de-France region (11 listeners)
 - rest of France métropolitaine (58 listeners)
 - overseas (12 listeners)

Accent ratings

Accent ratings



Speakers ArN, AuN, PR, and PI were clearly perceived as Northern/Reference speakers.

Only speakers AV and VR were clearly perceived as Southern French speakers.

VR

0:00 / 0:00

0:00 / 0:00

0:00 / 0:00

PI CG

Correlation between audio extracts

Two audio extracts per speaker were presented to the listeners.

Were they rated the same? It depends on the speaker.

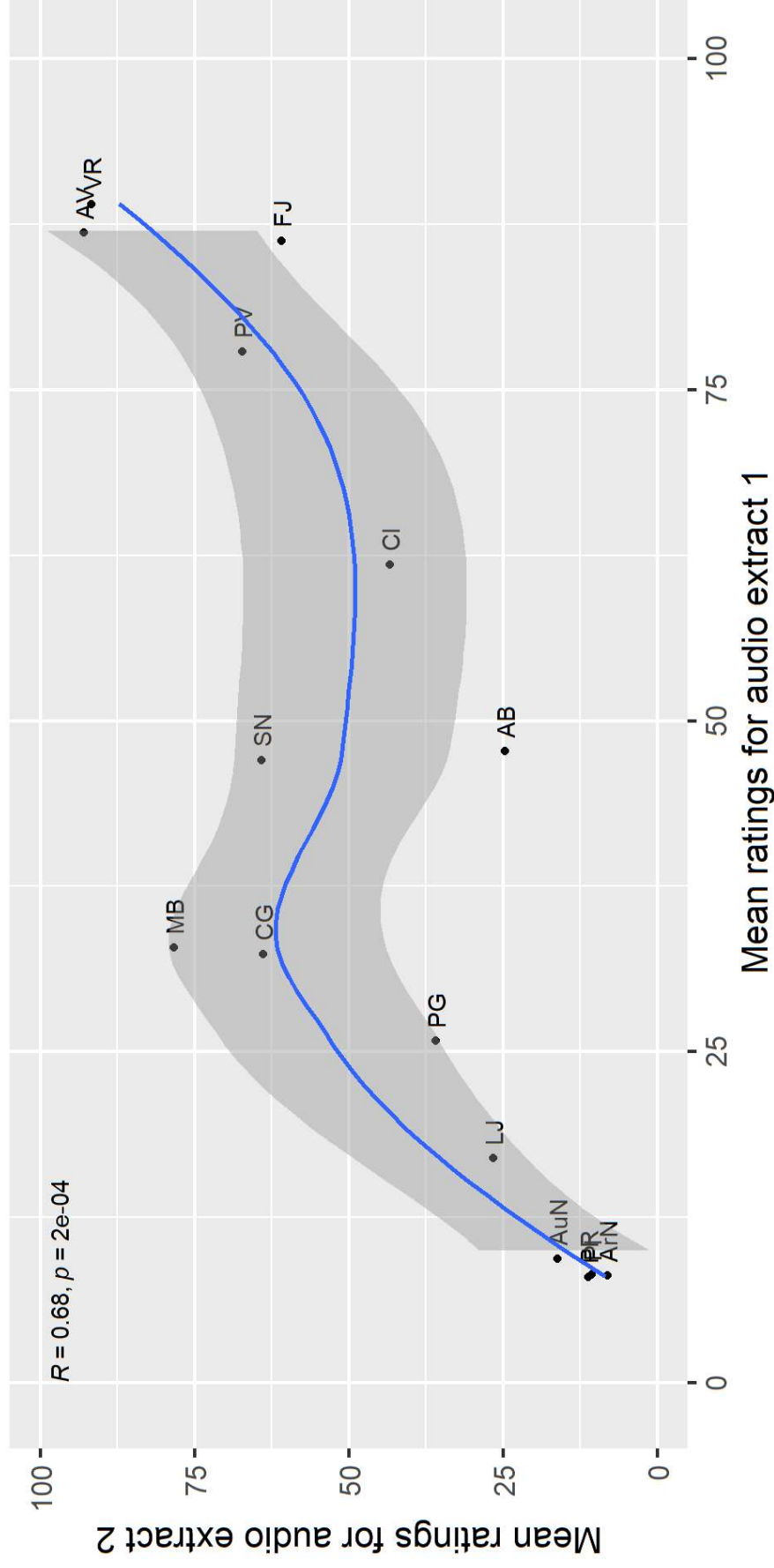


Figure 2: Correlation of the two audio extracts with Kendall's Tau-b correlation coefficient rho

Analysis

Bayesian ordered beta regression ([Kubinec 2022, 2023](#))

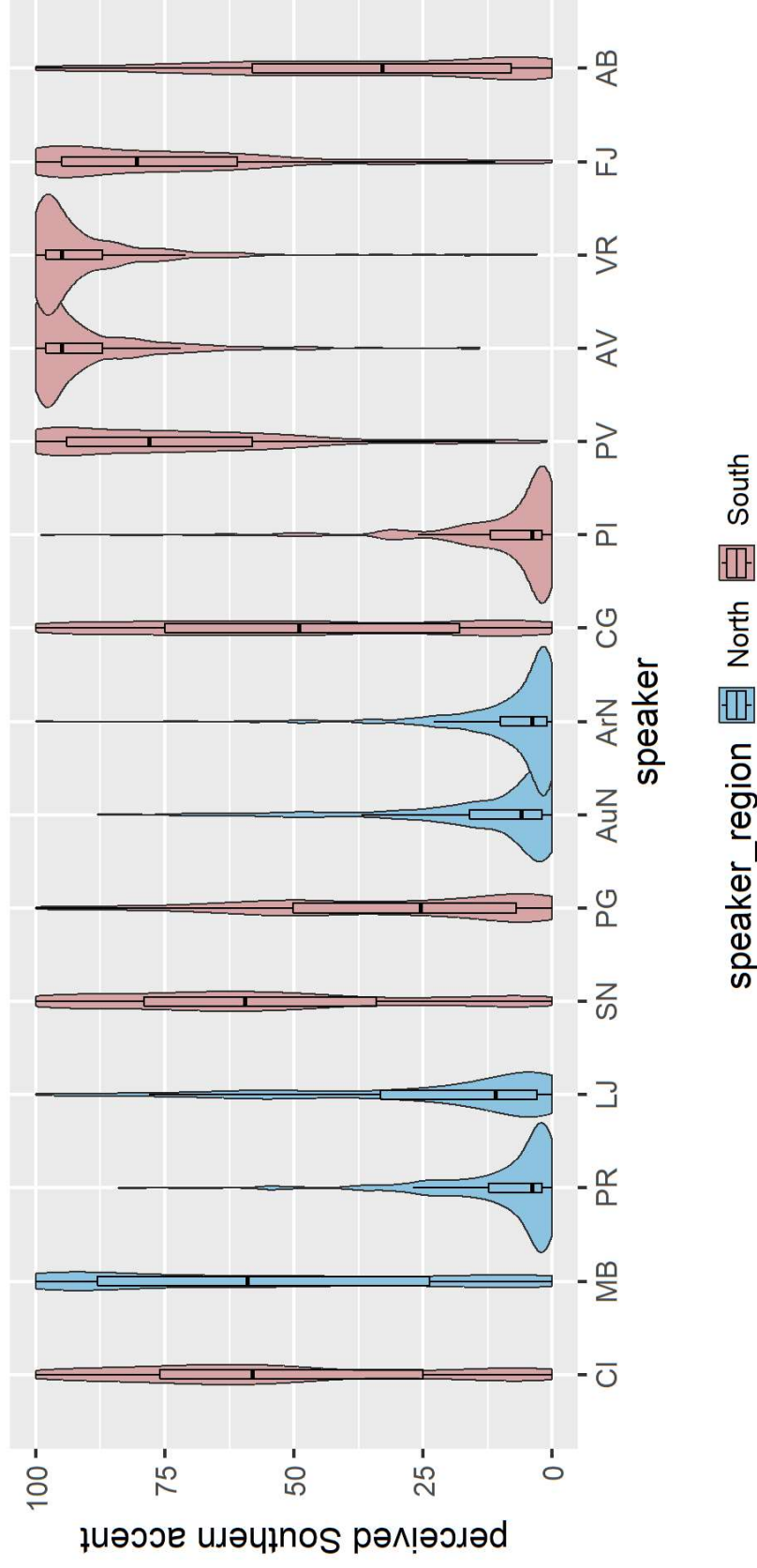
Why?

A rating scale is a Likert-type item with discrete ordered values from 0-100.

- outcome variable: rating on the 0-100 scale
- predictor variable: speaker-specific schwa realisation rate
- random intercept: listener

Schwa realisation rate in the audio extracts

We recalculated the schwa realisation rate for the audio extracts presented to the listeners.



Speakers are ordered by increasing schwa realisation rates, from left to right.

Analysis

```
Family: ord_beta_reg
Links: mu = identity; phi = identity; cutzero = identity; cutone = identity
Formula: inputvalue ~ rate_centered + (1 | userid)
Data: data (Number of observations: 5280)
Draws: 1 chains, each with iter = 2000; warmup = 1000; thin = 1;
      total post-warmup draws = 1000
```

```
Group-Level Effects:
~userid (Number of levels: 176)
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sd(Intercept)    0.16    0.03   0.11   0.21  1.00    343    397
```

```
Population-Level Effects:
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept    -0.18    0.02  -0.23  -0.14  1.00    770    841
rate_centered  1.16    0.06   1.04   1.29  1.02   1062    761
```

```
Family Specific Parameters:
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
phi      1.26    0.02   1.22   1.31  1.00    915    665
cutzero  -3.74    0.09  -3.90  -3.57  1.00    807    765
cutone    2.03    0.02   1.99   2.06  1.00    736    565
```

Schwa quality in the audio extracts



It was not possible to calculate Mahalanobis distances for the audio extracts because of the very small number of vowel tokens.

Therefore, schwa quality will not be correlated to accent judgments here.

Interim discussion

Schwa realisation rate:

Yes, apparently, there is an effect. Unclear whether it is in reality non-linear, that is, if it only holds up to or from a certain threshold.

Schwa quality:

Unfortunately impossible to calculate, but in light of the negative results of study 2, we don't expect an effect in our data.

Discussion and Summary

Discussion

Aim of production studies 1 and 2:

Provide a descriptive account of the pilot dataset by quantifying each characteristic of Southern French with a single score

Study 1: Is the age effect observed in the literature present in our pilot dataset?

Perhaps. As accent levelling proceeds and as inter-speaker variability increases, it is more difficult to find the effect.

Study 2: Do some of our speakers have a backed realisation of word-final schwa in polysyllabic words?

There isn't really evidence for this, nor for a merger with the front rounded vowels.

Study 3: Do ratings for Southern accent increase when schwa realisation rates increase in speakers?

It seems they do. Unclear at the moment how to model the presence of a threshold effect.

Summary

- novel analysis of schwa realisation rate
- first analysis of schwa quality in Southern French
- first analysis of determining the role of specific phonetic characteristics in the perception of the Southern French accent

Merci !

References

- Armstrong, Nigel, and Sharon Unsworth. 1999. "Sociolinguistic Variation in Southern French Schwa." *Linguistics* 37 (1). <https://doi.org/10.1515/ling.1999.001>.
- Avanzi, Mathieu, and Philippe Boula de Mareüil. 2019. "Peut-on identifier perceptivement huit accents régionaux en français ? La réponse des sciences participatives." *Glottopol* 31: 53–73.
- Boersma, Paul, and David Weenink. 2022. "Praat: Doing Phonetics by Computer." <http://www.praat.org>.
- Brand, James, Jen Hay, Lynn Clark, Kevin Watson, and Márton Sóskuthy. 2021. "Systematic Co-Variation of Monophthongs Across Speakers of New Zealand English." *Journal of Phonetics* 88 (September): 101096. <https://doi.org/10.1016/j.wocn.2021.101096>.
- Bürki, Audrey, Mirjam Ernestus, and Ulrich H. Frauenfelder. 2010. "Is There Only One "Fenêtre" in the Production Lexicon? On-Line Evidence on the Nature of Phonological Representations of Pronunciation Variants for French Schwa Words." *Journal of Memory and Language* 62 (4): 421–37. <https://doi.org/10.1016/j.jml.2010.01.002>.
- Bürki, Audrey, Cécile Fougeron, Cedric Gendrot, and Ulrich H. Frauenfelder. 2011. "Phonetic Reduction Versus Phonological Deletion of French Schwa: Some

- Methodological Issues.” *Journal of Phonetics* 39 (July): 279–88.
<https://doi.org/10.1016/j.wocn.2010.07.003>.
- Cichocki, Wladyslaw, Svetlana Kaminskaïa, and Luke Hagar. 2023. “Regional Variation in Articulation Rate in French Spoken in Canada.” *Journal of the International Phonetic Association* FirstView.
<https://doi.org/https://doi.org/10.1017/S0025100323000154>.
- Coquillon, Annelise, and Gabor Turcsan. 2012. “Chapter 5. An Overview of the Phonological and Phonetic Properties of Southern French.” In *Studies in Language Variation*, 105–27. John Benjamins Publishing Company.
<https://doi.org/10.1075/silv.11.07coq>.
- Depaoli, Sarah, and Rens van de Schoot. 2017. “Improving Transparency and Replication in Bayesian Statistics: The WAMBS-Checklist.” *Psychological Methods* 22 (June): 240–61. <https://doi.org/10.1037/met0000065>.
- Draxler, Christoph. 2011. “Percy – an HTML5 Framework for Media Rich Web Experiments on Mobile Devices.” In *Proceedings of the 12th Annual Conference of the International Speech Communication Association (Interspeech 2011)*, Florence, 3339–40.
- Dufour, Sophie, Noël Nguyen, and Ulrich Hans Frauenfelder. 2007. “The Perception of Phonemic Contrasts in a Non-Native Dialect.” *The Journal of the Acoustical Society of America* 121 (4): EL131–36. <https://doi.org/10.1121/1.2710742>.
- Durand, Jacques, Catherine Slater, and Hilary Wise. 1987. “Observations on Schwa in Southern French.” *Linguistics* 25 (5): 983–1004.

- Eychenne, Julien. 2019. “On the Deletion of Word-Final Schwa in Southern French.” *Phonology* 36 (3): 355–89. <https://doi.org/10.1017/s0952675719000198>.
- Jochim, Markus, Raphael Winkelmann, Klaus Jaensch, Steve Cassidy, and Jonathan Harrington. 2023. *emuR: Main Package of the EMU Speech Database Management System*. <https://CRAN.R-project.org/package=emuR>.
- Kubinec, Robert. 2022. “Ordered Beta Regression: A Parsimonious, Well-Fitting Model for Continuous Data with Lower and Upper Bounds.” *Political Analysis*. <https://doi.org/10.1017/pan.2022.20>.
- . 2023. *Ordbetareg: Ordered Beta Regression Models with 'Brms'*. <https://CRAN.R-project.org/package=ordbetareg>.
- Labov, William. 1963. “The Social Motivation of a Sound Change.” *Word* 19 (3): 273–309.
- Marchello-Nizia, Christiane, Bernard Combettes, Sophie Sophie Prévost, and Tobias Scheer, eds. 2020. *Grande Grammaire Historique Du Français (GGHF)*. Berlin, Boston: De Gruyter Mouton. <https://doi.org/doi:10.1515/9783110348194>.
- Martinet, André. 1945. *La Prononciation Du Français Contemporain: Témoignages Recueillis En 1941 Dans Un Camp d'officiers Prisonniers*. Vol. 3. Librairie Droz.
- Mazel, Jean. 1975. “Français Standard Et Français d'oc.” *Cahiers Du Groupe de Recherche Sur La Diglossie (Lengas)* 2: 1–13.
- Mooney, Damien. 2016. “C'est Jeuli, La Gasceugne!': Lantériorisation Du Phonème // Dans Le Français régional Du béarn.” *French Studies* 70 (1): 61–81. <https://doi.org/10.1093/fs/knv228>.

- Moreux, Bernard. 2006. “Les Voyelles Moyennes En Français Du Midi : Une Tentative de Synthèse En 1985.” *Cahiers de Grammaire* 30: 307–17.
- Müller, Daniela, and Marinus Wiedner. 2022. “Le schwa dans l’accent français méridional.” Edited by Franck Neveu, Sophie Prévost, Agnès Steuckardt, and Badreddine Hama. *SHS Web of Conferences* 138: 08006. <https://doi.org/10.1051/shsconf/202213808006>.
- Nguyen, Noël, Sophie Dufour, and Angèle Brunellière. 2012. “Does Imitation Facilitate Word Recognition in a Non-Native Regional Accent?” *Frontiers in Psychology* 3. <https://doi.org/10.3389/fpsyg.2012.00480>.
- Pustka, Elissa. 2011. “L’accent méridional : représentations, Attitudes Et Perceptions Toulousaines Et Parisiennes.” *Lengas*, no. 69 (July): 117–52. <https://doi.org/10.4000/lengas.385>.
- R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Ronjat, Jules. 1930. *Grammaire Istorique Des Parlers Provençaux Modernes*. Soci’et’e des langues romanes.
- Storme, Benjamin. 2017. “The *Loi de Position* and the Acoustics of French Mid Vowels.”