C-to-V COARTICULATION IN SPONTANEOUS FRENCH: ACOUSTIC ANALYSIS & CLASSIFICATION

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INTRODUCTION

- Background -

Asymmetry between high front and high back vowels in:

Synchrony: back vowels are more likely to front in front context.

Diachrony: high back vowel fronting in many languages.

- Research questions -

Goal: test this asymmetry in French by looking at *global* and *contextual* acoustic variability of oral vowels.

Are some vowels more stable (less variable | more distinct) than others?

Does C-to-V coarticulation depend on vowel frontness?

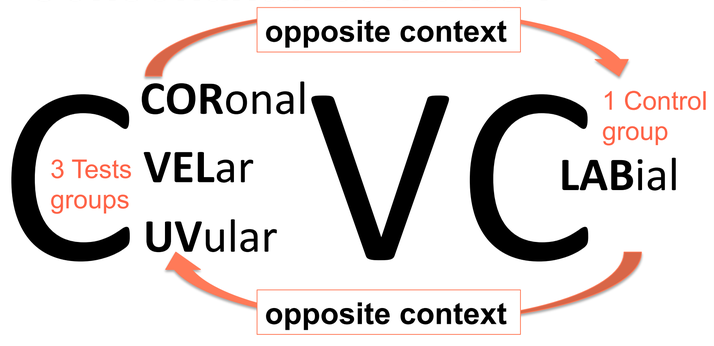
METHOD

- Corpus -

NCCFr: large speech corpus of casual French (Torreira & al., 2010).

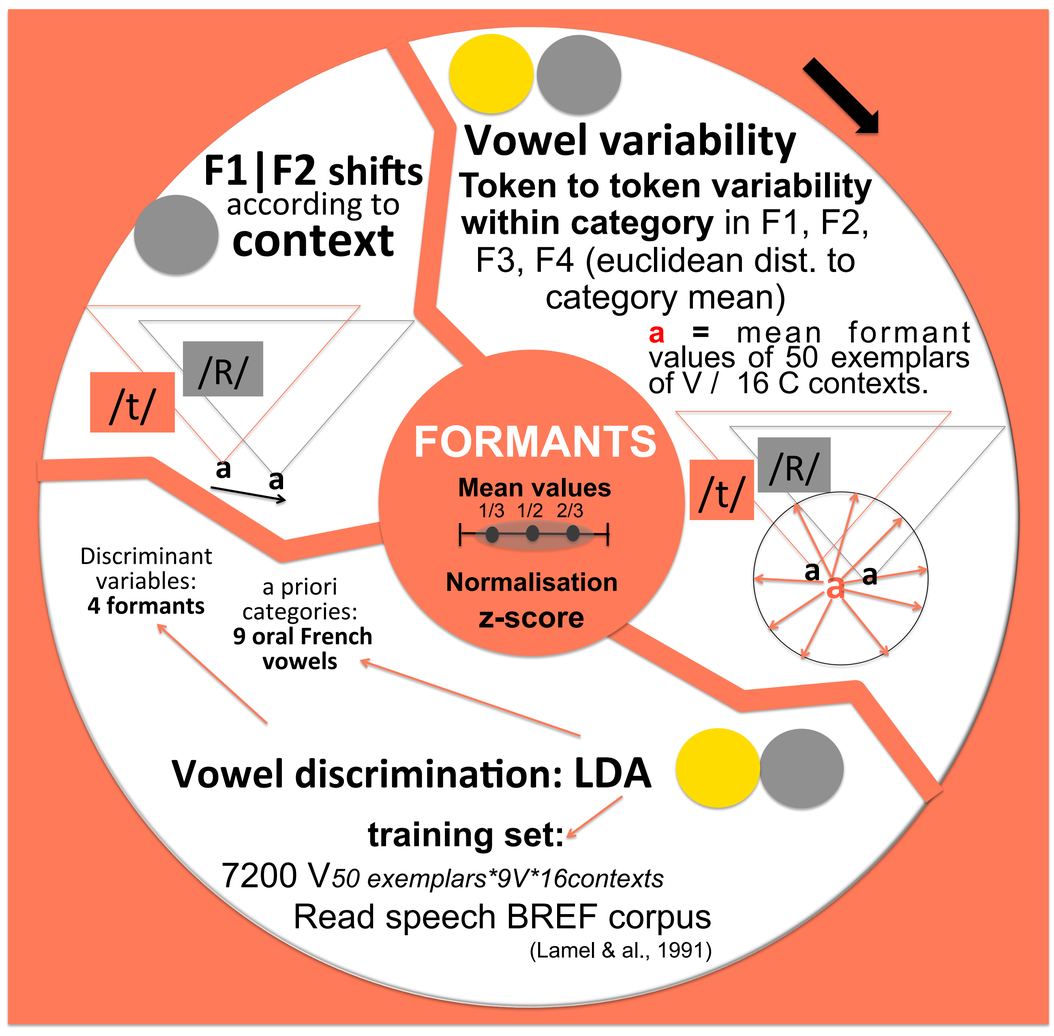
- Linguistic material -

- **17.628 V** /i,y,e,ɛ,x,a,u,o,ɔ/
  - → /x/=/ø, œ, ə/
  - → 50-150 ms duration
  - → **CVC** structure
- 15 male speakers
- **Consonantal contexts :**



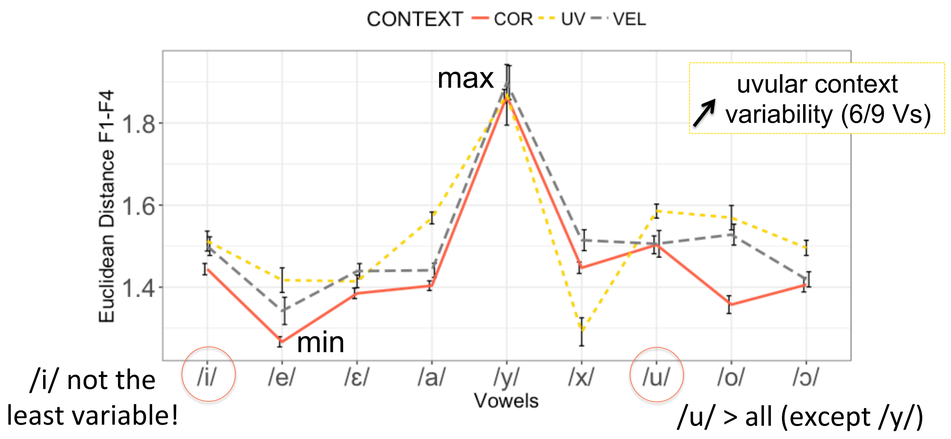
	/i/	/e/	/ɛ/	/a/	/y/	/x/	/u/	/o/	/ɔ/
COR	1174	2299	1932	4218	579	1172	255	257	461
VEL	226	92	408	492	17	171	97	171	402
UV	192	116	729	982	57	86	519	118	406

- Acoustic metrics -



RESULTS

- Vowel (token to token) variability -



- Vowel discrimination -

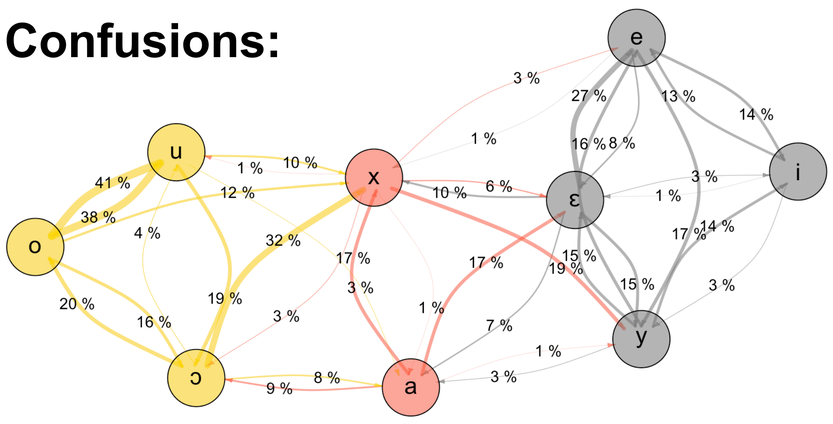
- **Correct classification: 53%** (chance 11.11%)

	/i/	/e/	/ɛ/	/y/	/a/	/x/	/u/	/o/	/ɔ/
Sensitivity	83%	60%	39%	52%	56%	66%	30%	31%	36%
Precision	71%	56%	47%	22%	90%	34%	46%	22%	35%

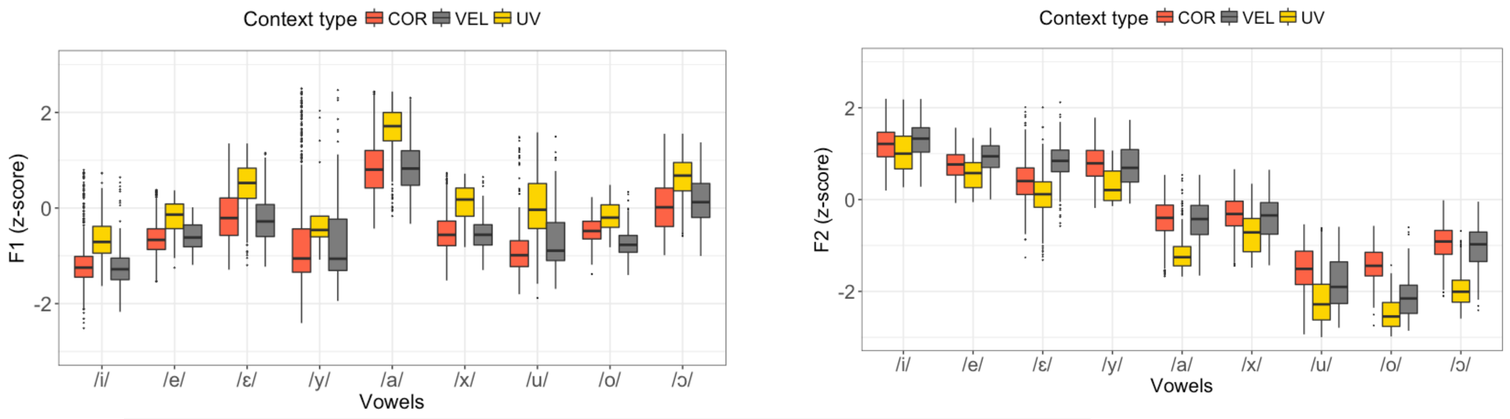
/i/ best classified: singularity in the system in F3 and F4 dimensions.

back vowels worst classified

- **Confusions:**



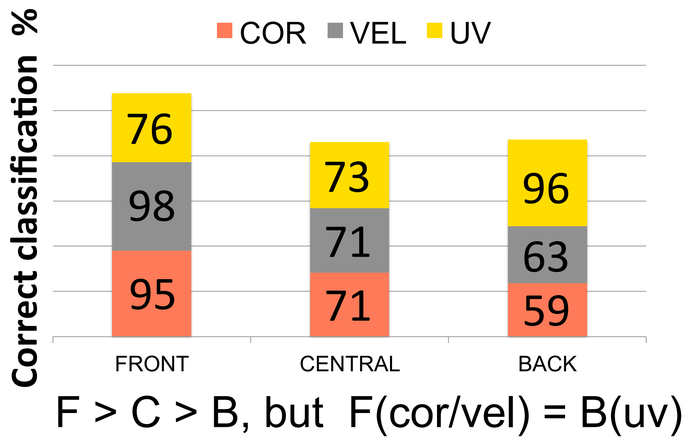
- F1 | F2 contextual shifts -



Contextual shifts in the same direction for all Vs:
- **F1 mainly affected by UV context** (↗ F1)
- **F2 affected by all contexts:**
  - COR | VEL ↗
  - UV ↘

But F2 shifts are larger for back vowels

- context effect on vowel discrimination-



F > C > B, but F(cor/vel) = B(uv)

Errors Analyse	COR	VEL	UV
F→B	0%	0%	1%
F→C	5%	2%	**25%**
C→F	**23%**	**19%**	1%
C→B	5%	10%	**25%**
B→C	**41**	**36%**	4%
B→F	0%	1%	0%

CONCLUSION

V-dependent global- and contextual- variability? Yes

- More global acoustic variability for /u/; larger coarticulatory effects on F2 for back vowels; discrimination for back vowels is weaker and more affected by C-context.

→ **Confirm an asymmetry between high back & high front vowels, which extend also to non-high vowels.**

- Surprisingly, /i/ is found to be quite variable and to undergo comparable contextual effects as other Vs.