



Issues in longitudinal vowel analysis:
evidence from Montreal French

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Our previous work

- MacKenzie & Sankoff (2008), MacKenzie & Sankoff (2009)
 - Acoustic analysis of Montreal French vowel system
 - Evidence of linguistic change across the lifespan
 - Individual speakers participate in changes in the surrounding community as they age

Longitudinal change: complications

- What does it mean when speakers' lifespan changes are *not* observed in the community?
 - Noise in the data?
 - Effects of the aging process?
 - Community changes we can't see?

Montreal French corpora

- 1971: 120 speakers (Sankoff et al., 1976)
- 1984: 60 original plus 12 younger speakers (Thibault and Vincent, 1990)
- 1995: 12 original speakers plus 2 younger 1984 speakers (Vincent et al., 1995)
 - Allow for both trend and panel comparisons

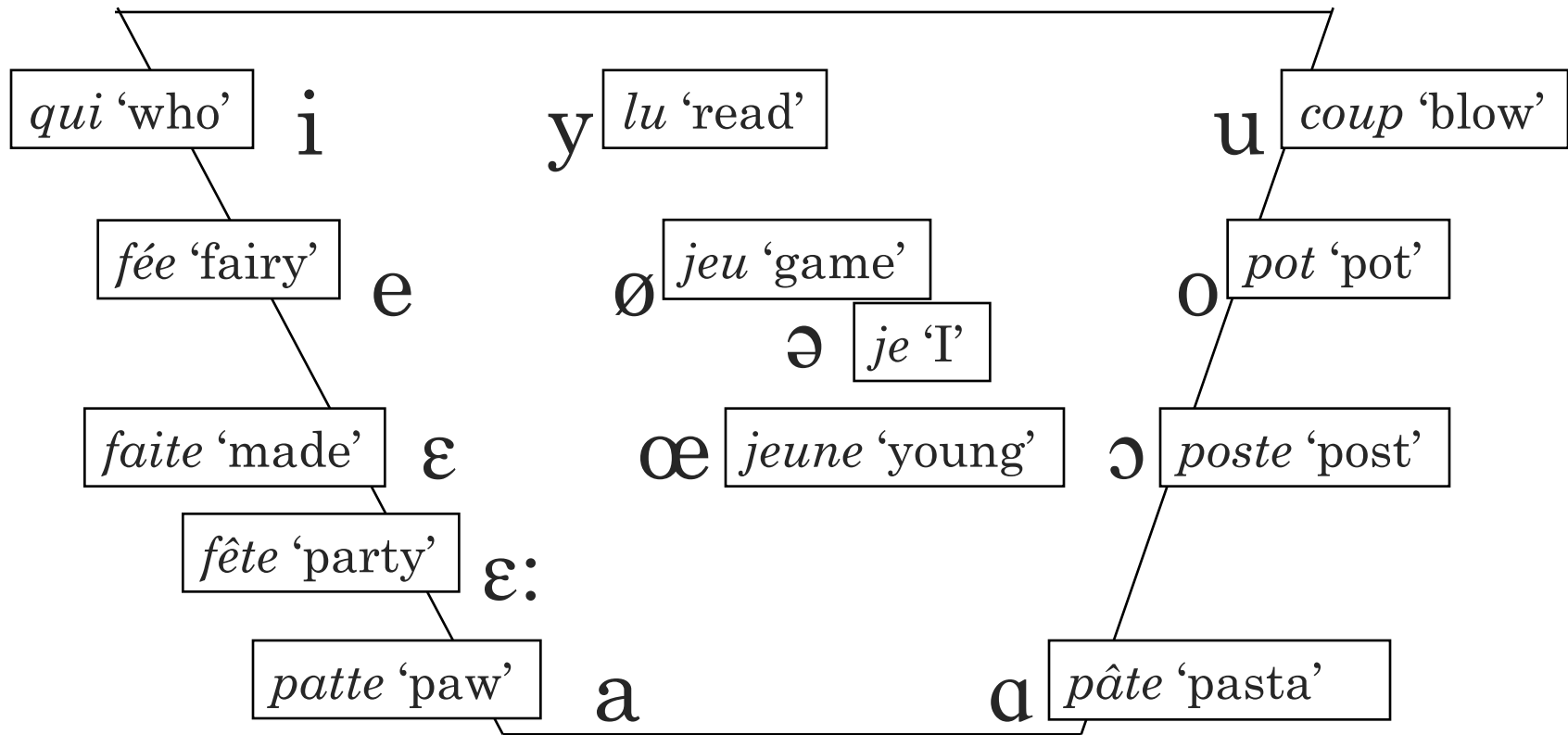
Our sample

- 6 panel speakers
 - All recorded in 1971, 1984, 1995
 - 3 men, 3 women
 - All in their teens or 20s in 1971
- 12 trend speakers
 - 6 recorded in 1971, 6 recorded in 1984
 - Each sample matched for age, sex, class
 - All in their teens or 20s at time of recording

The variable under study

- Diphthongization of long vowels
 - Cf. Cedergren et al. (1981), Yaeger-Dror (1989), Yaeger-Dror (1994)
 - Do individual speakers reflect changes in the degree and direction of diphthongization observed in the community over time?
 - Previous longitudinal work looked at [r] → [R] (Sankoff & Blondeau, 2007); diphthongization is a change from below

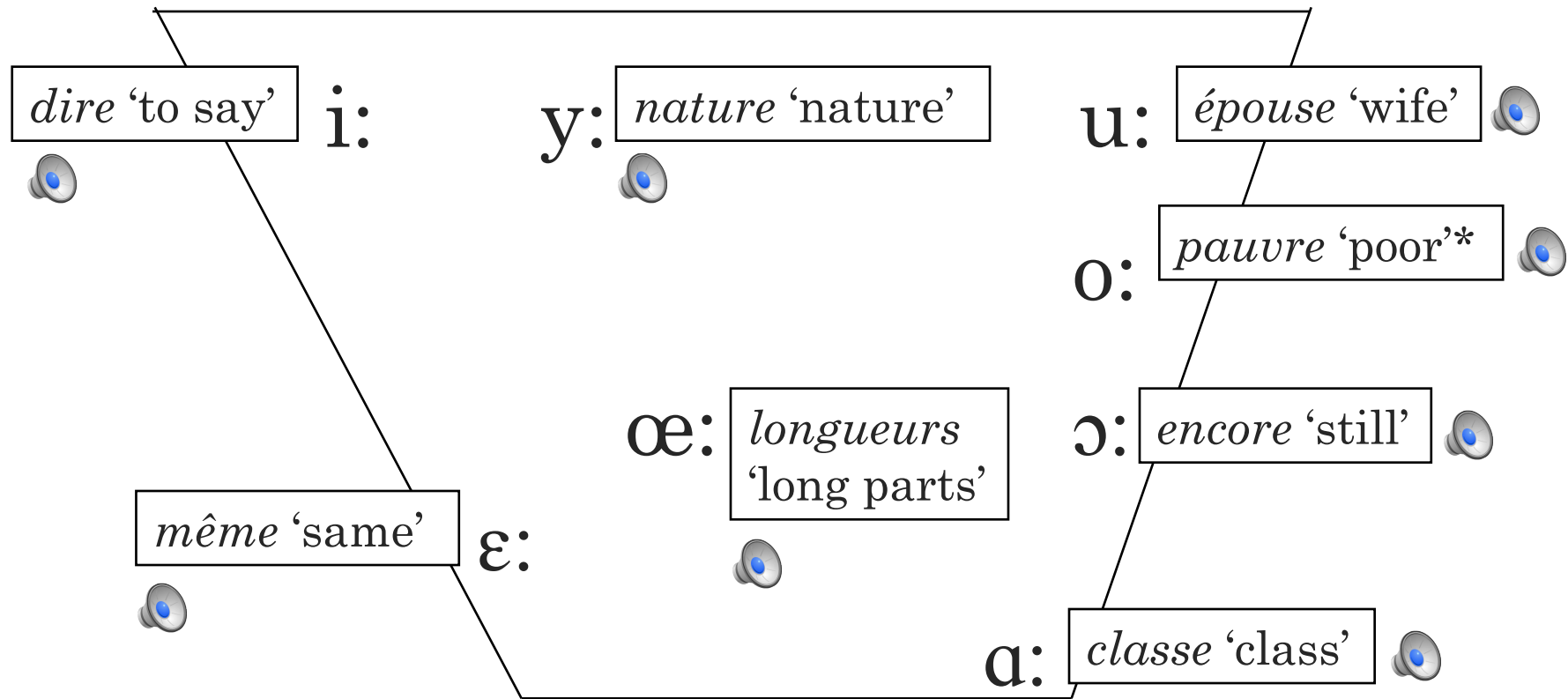
QF vowel inventory: contrastive oral vowels



Two sources of vowel length

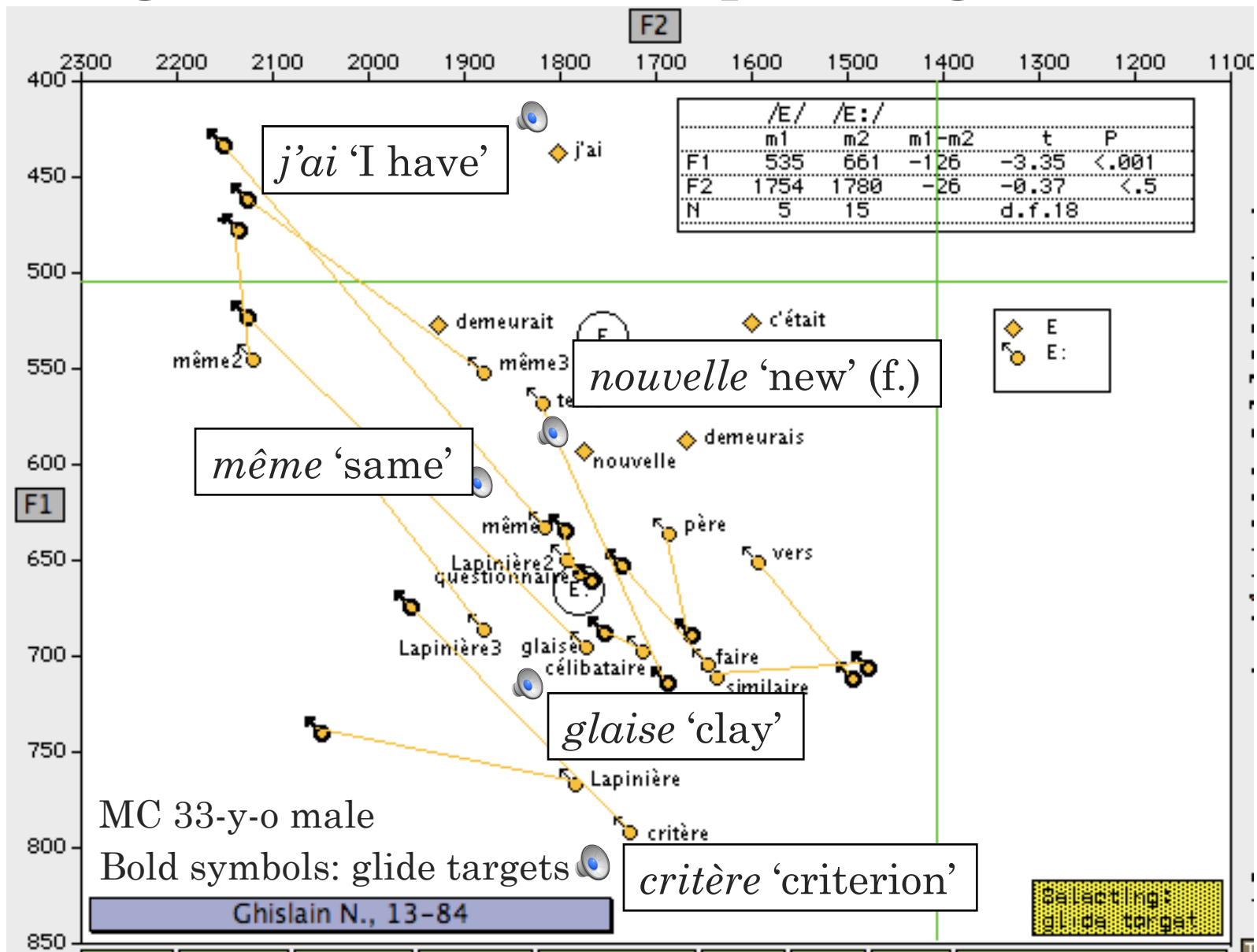
- Compensatory lengthening due to historical loss of /s/ or cluster simplification
 - Length may result in minimal pairs,
e.g. *faite* [fɛt] ‘made’ ~ *fête* [fɛ:t] ‘party’
- Vowels preceding /R/ and the voiced fricatives /z, v, ʒ, vr/ (*consonnes allongeantes*)
 - Length is strictly allophonic

QF vowel inventory: long oral vowels

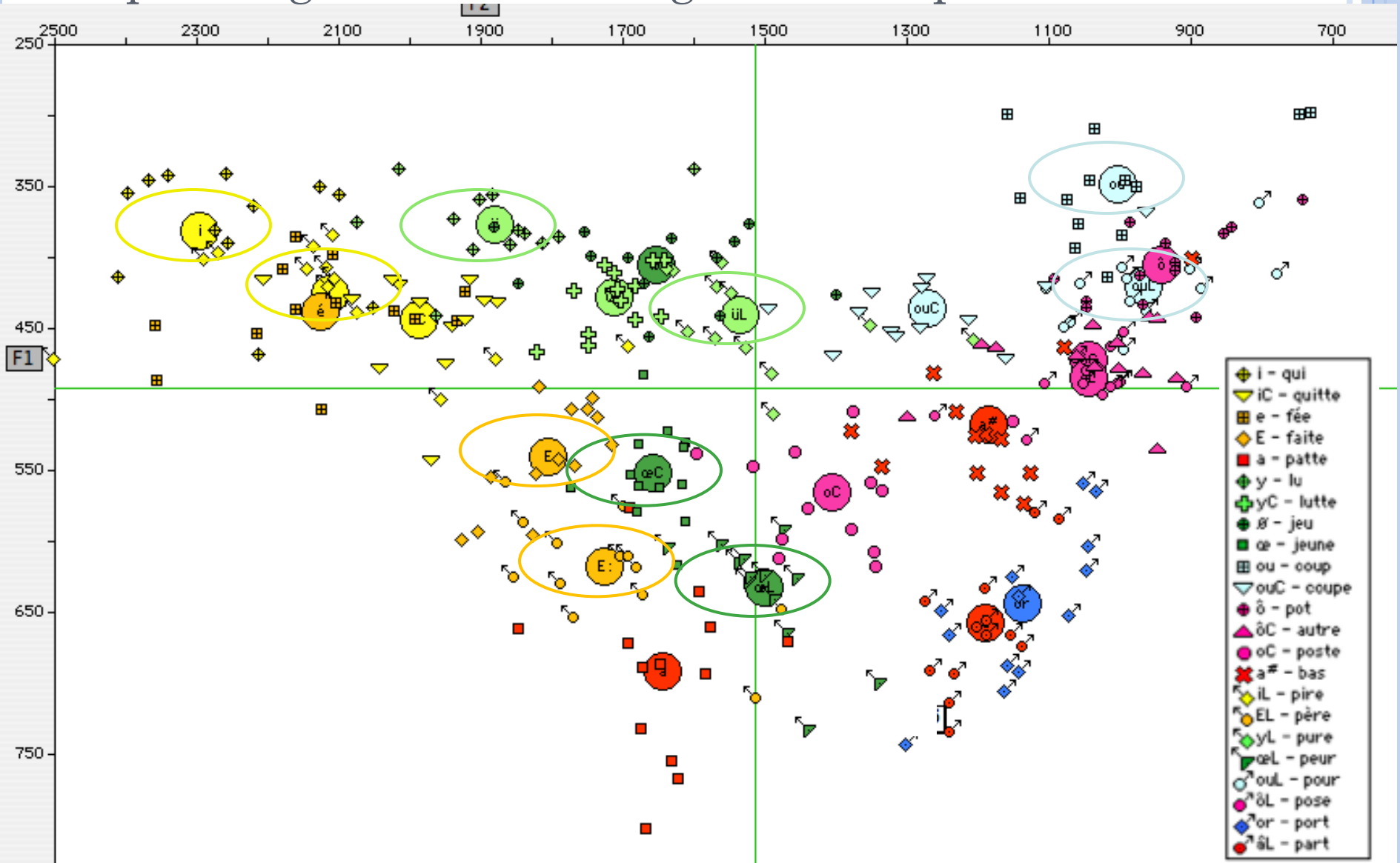


*/o/ is long regardless of phonological environment.

Length manifests as diphthongization

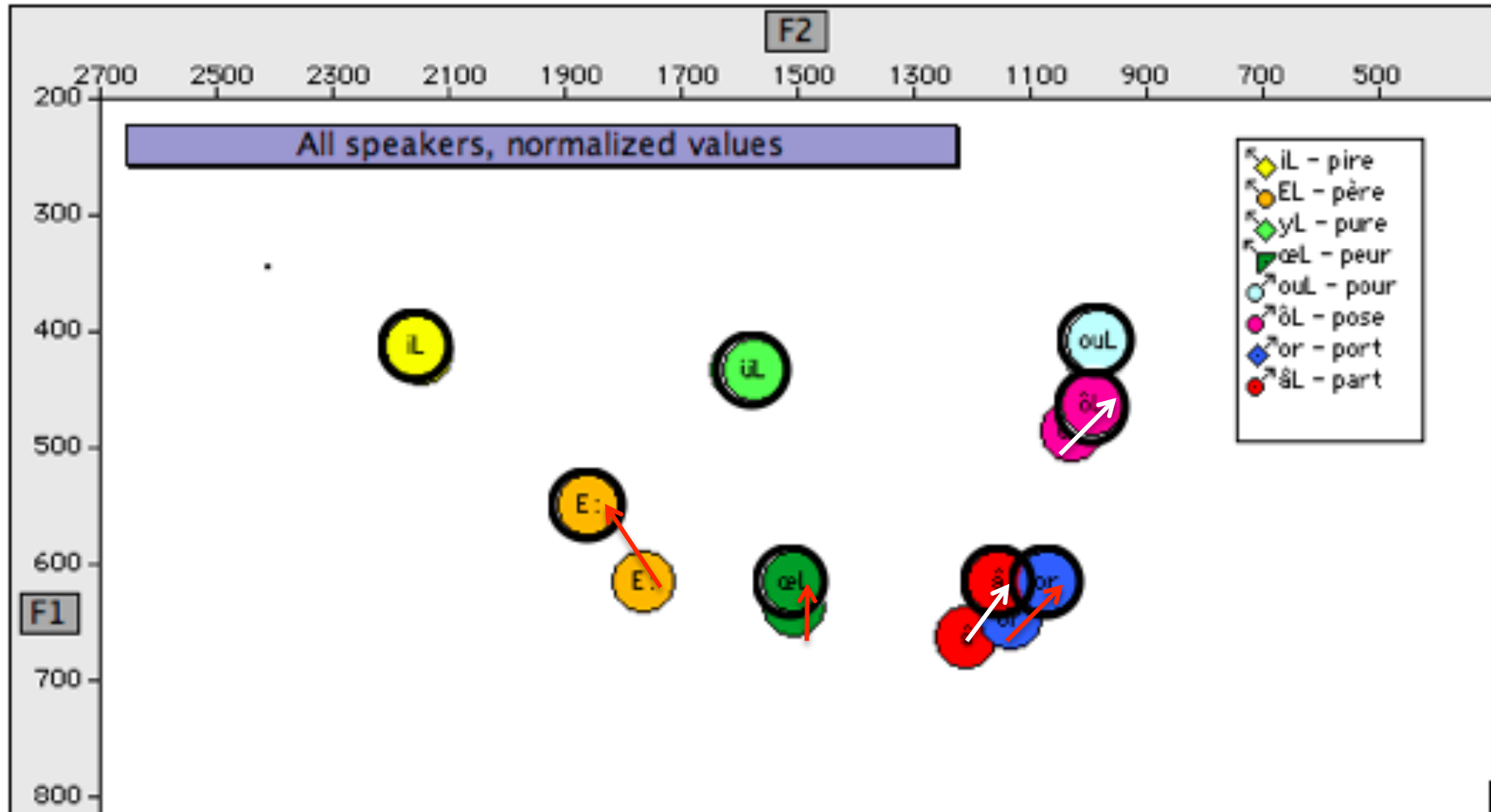


Diphthongization: lowering from free position...



Circled pairs differ significantly on F1 axis ($p < .001$); N= ~400 for long Vs, ~100 for short Vs

...and (non-high vowels only) addition of a raised offglide



Our research questions

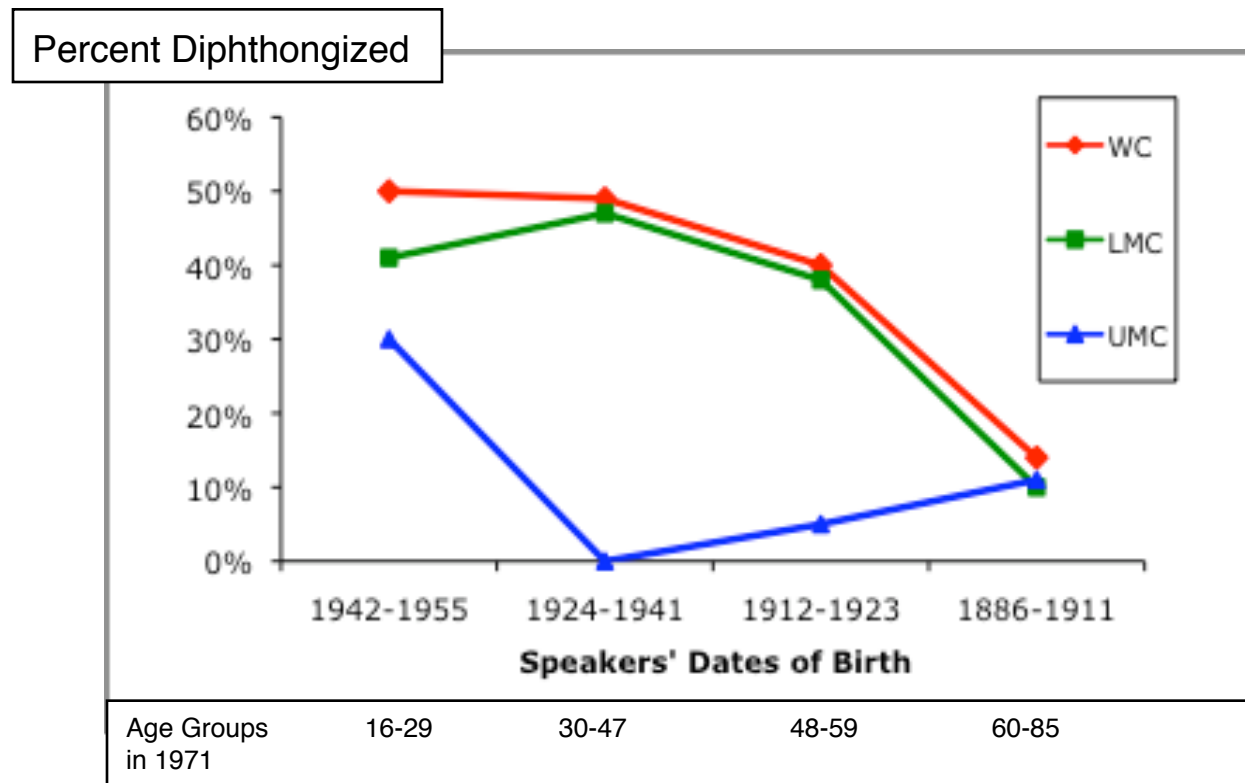
- Have the degree and direction of diphthongization changed in the community over time?
- Do individual speakers participate in such a change as they age?

Our research questions

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Change in apparent time

Diphthongization of [œ:R] → [a:œR] in 1971 for 52 Montréal speakers by date of birth and social class:

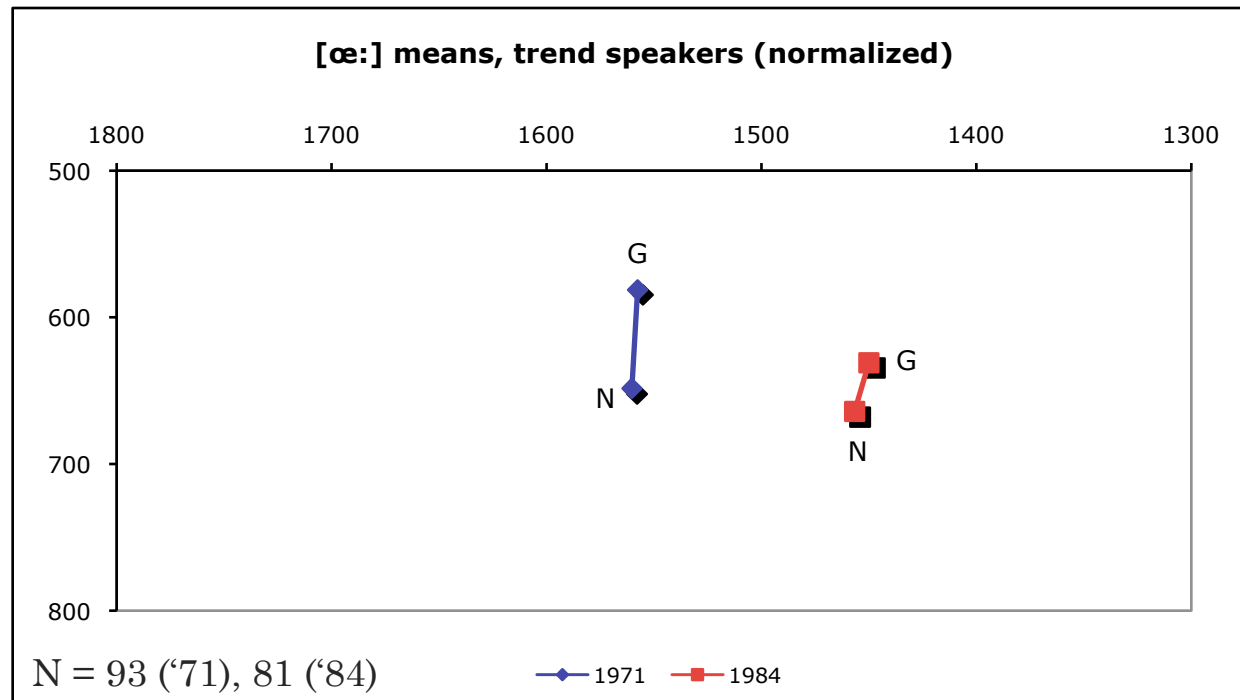


Source: Cedergren, Clermont, & Côté (1981)

Change in apparent time

- Cedergren et al. found increased diphthongization of [œ:R].
- Coded impressionistically:
“diphthongization” = nucleus lowering

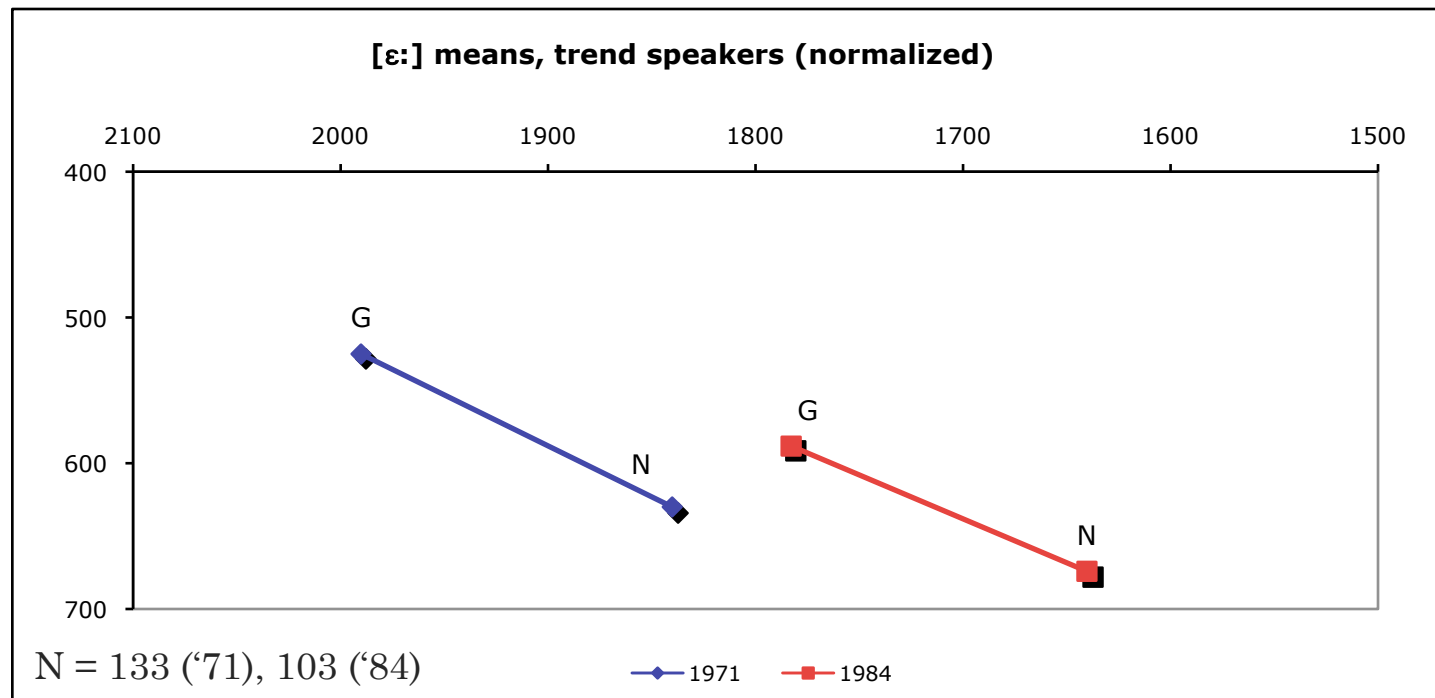
Change in real time – [œ:]



- 13 years later: [œ:] nucleus has stabilized on F1.
- Vowel backs.
- [œ:] glide target lowers, decreasing nucleus–glide distance.

Change in real time – [ɛ:]

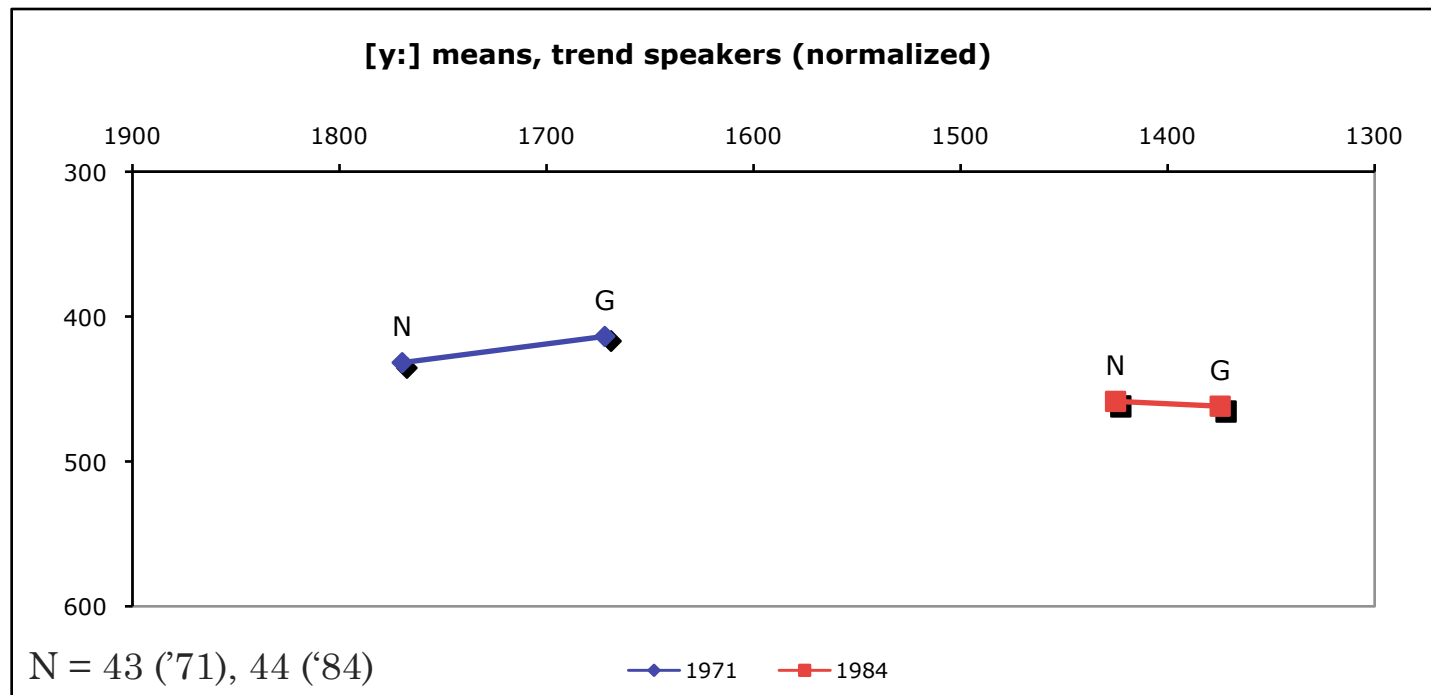
Similar changes in evidence for other long front vowels:



[ɛ:] – backing and lowering but constant diphthongization

Change in real time – [y:]

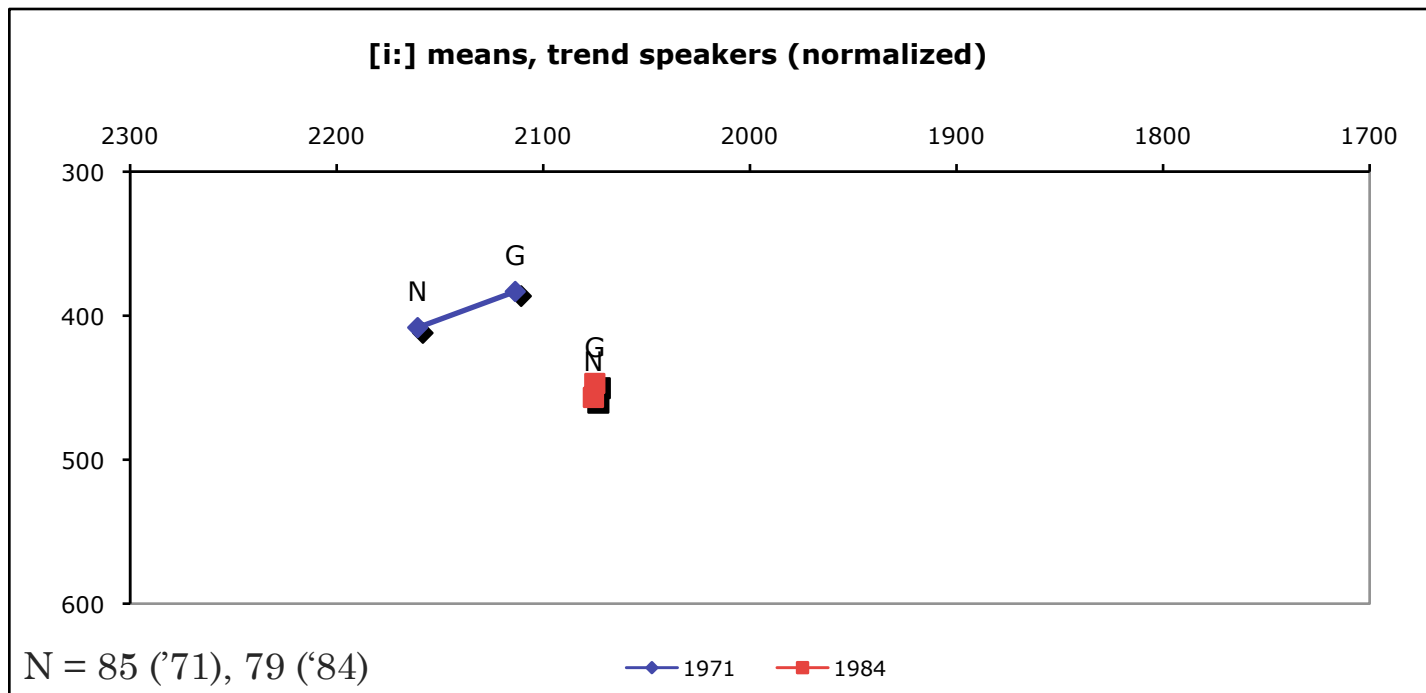
Similar changes in evidence for other long front vowels:



[y:] – backing and lowering, decreased diphthongization

Change in real time – [i:]

Similar changes in evidence for other long front vowels:



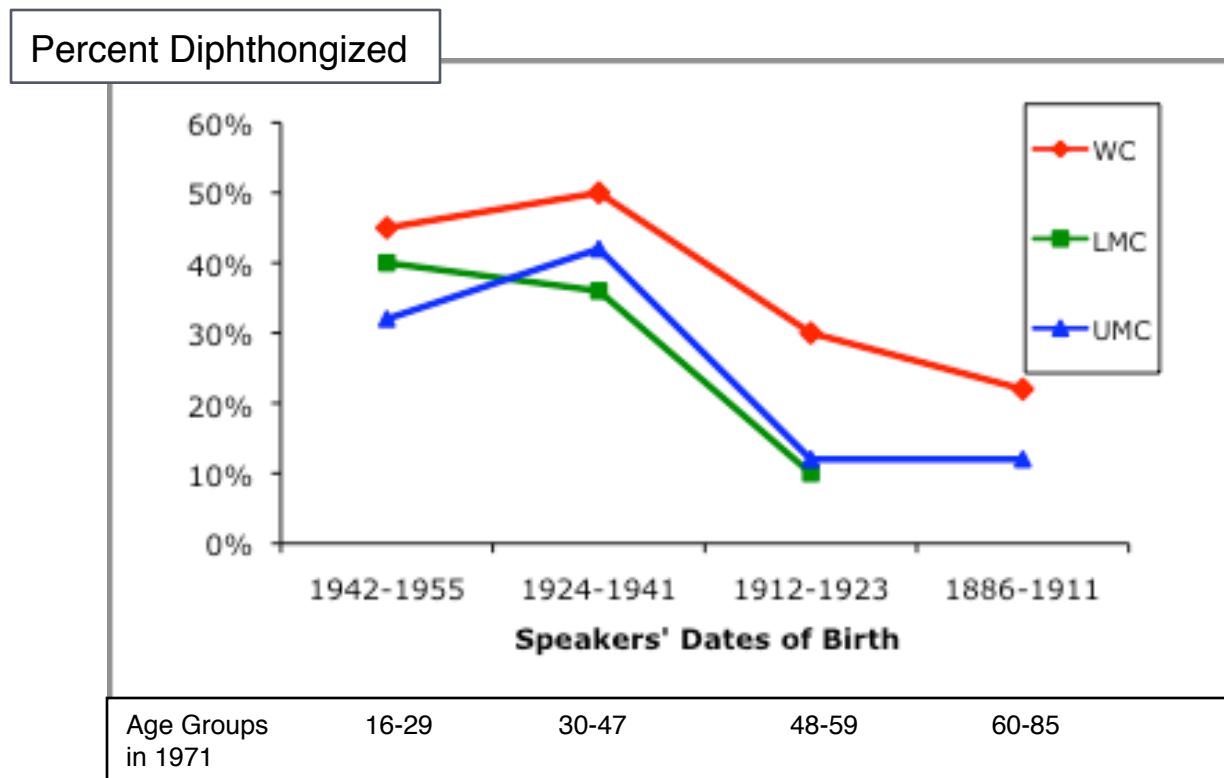
[i:] – lowering, decreased diphthongization

Long front vowel trends

- Lowering
- Backing
- Decreased diphthongization

Change in apparent time

Diphthongization of [o:] → [ɔ:ʊ] in 1971 for 52 Montréal speakers by date of birth and social class:

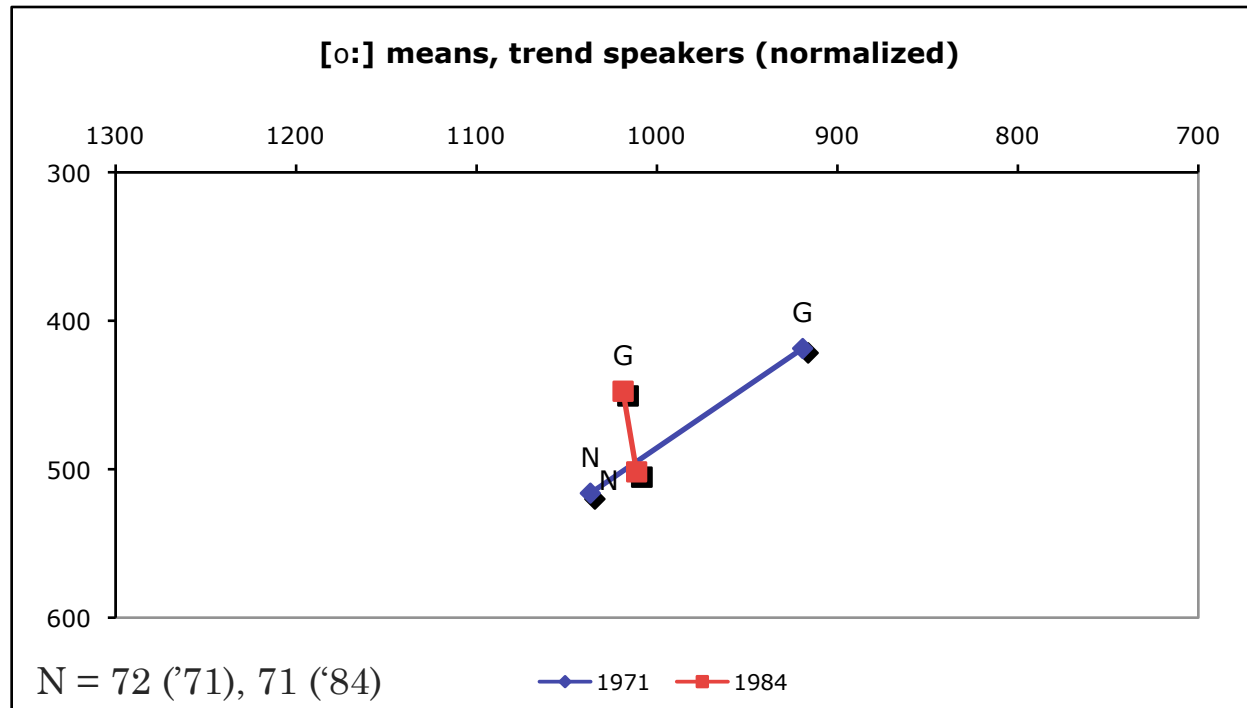


Source: Cedergren, Clermont, & Côté (1981)

Change in apparent time

- Cedergren et al. found increased diphthongization of [o:].
- “Diphthongization” = nucleus lowering + glide raising

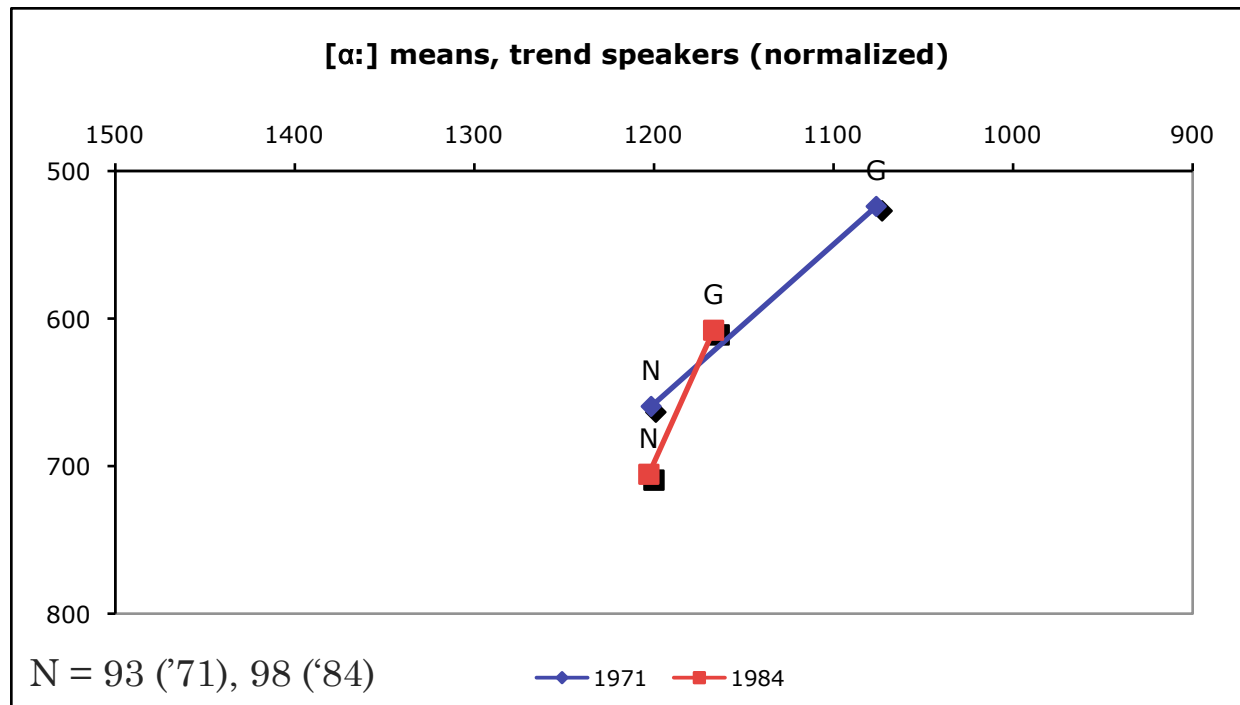
Change in real time – [o:]



- 13 years later: [o:] nucleus has stabilized on F1.
- [o:] glide target lowers, decreasing nucleus–glide distance.

Change in real time – [ɑ:]

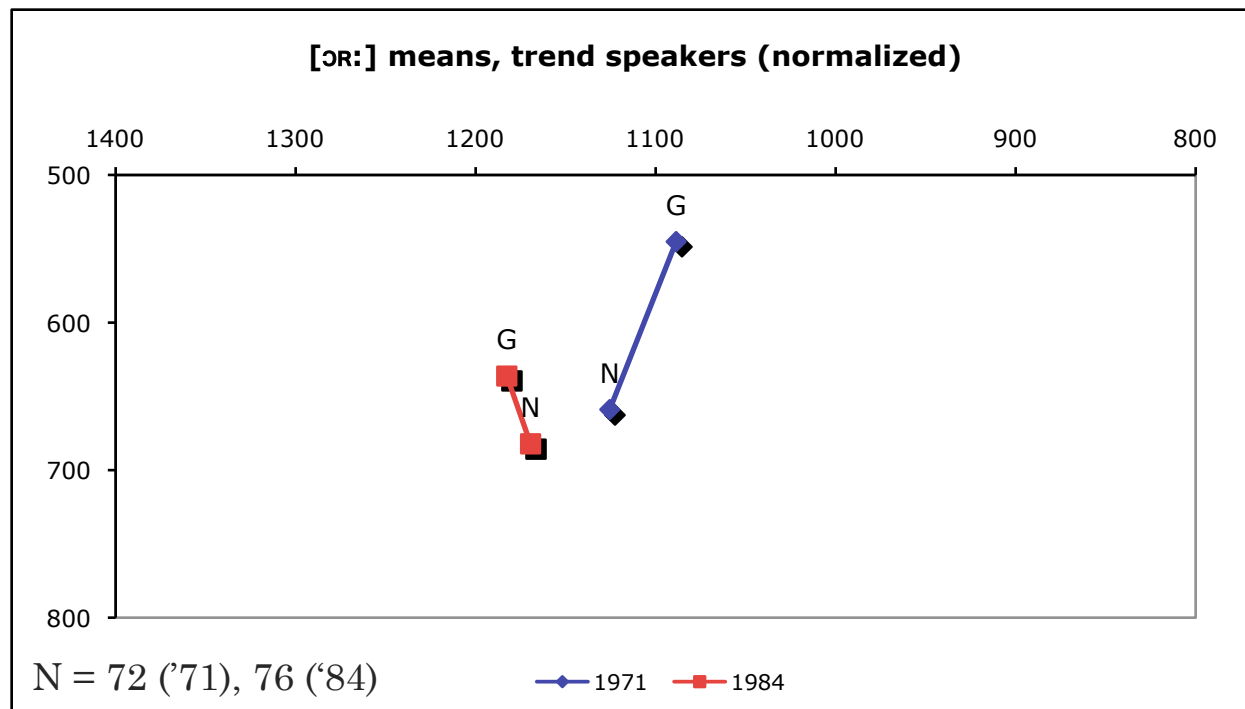
Similar changes in evidence for other long back vowels:



[ɑ:] – nucleus is stable; glide target lowers

Change in real time – [ɔ:]

Similar changes in evidence for other long back vowels:



[ɔ:] – nucleus is stable; glide target lowers

Long back vowel trend

- No change except for decreased diphthongization

Real time community trends

- Long front vowels: backing, lowering, decreased diphthongization
- Long back vowels: decreased diphthongization

Our research questions

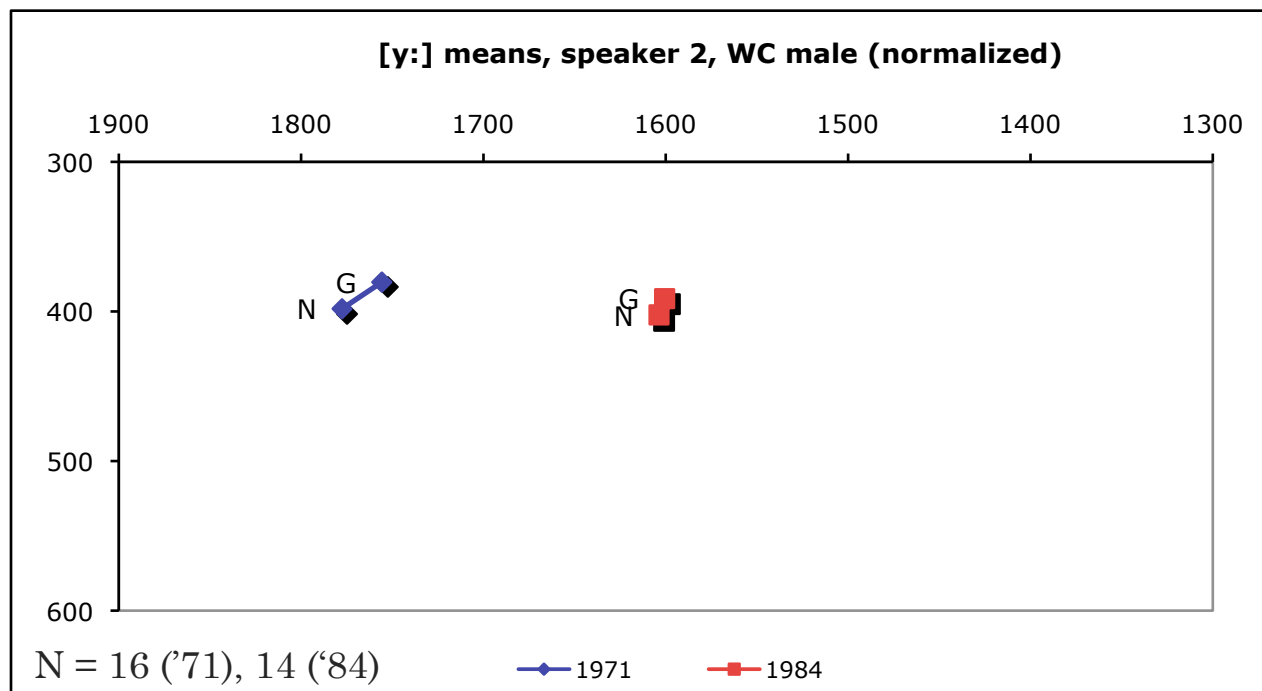
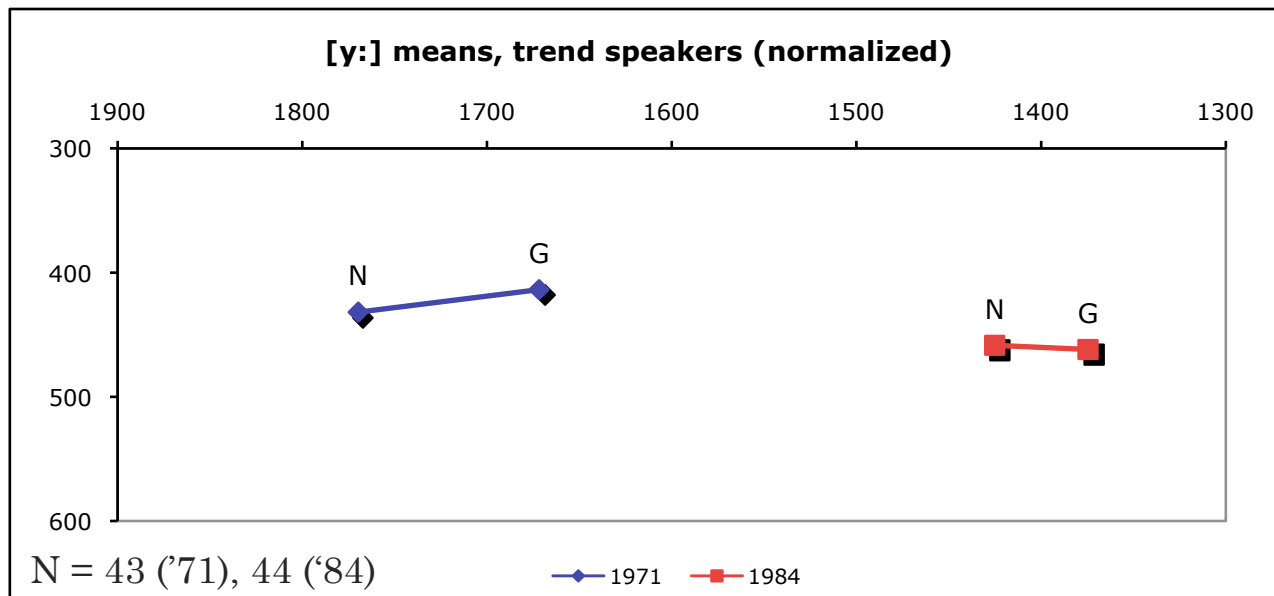
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Panel speakers' participation in community changes: 71–84

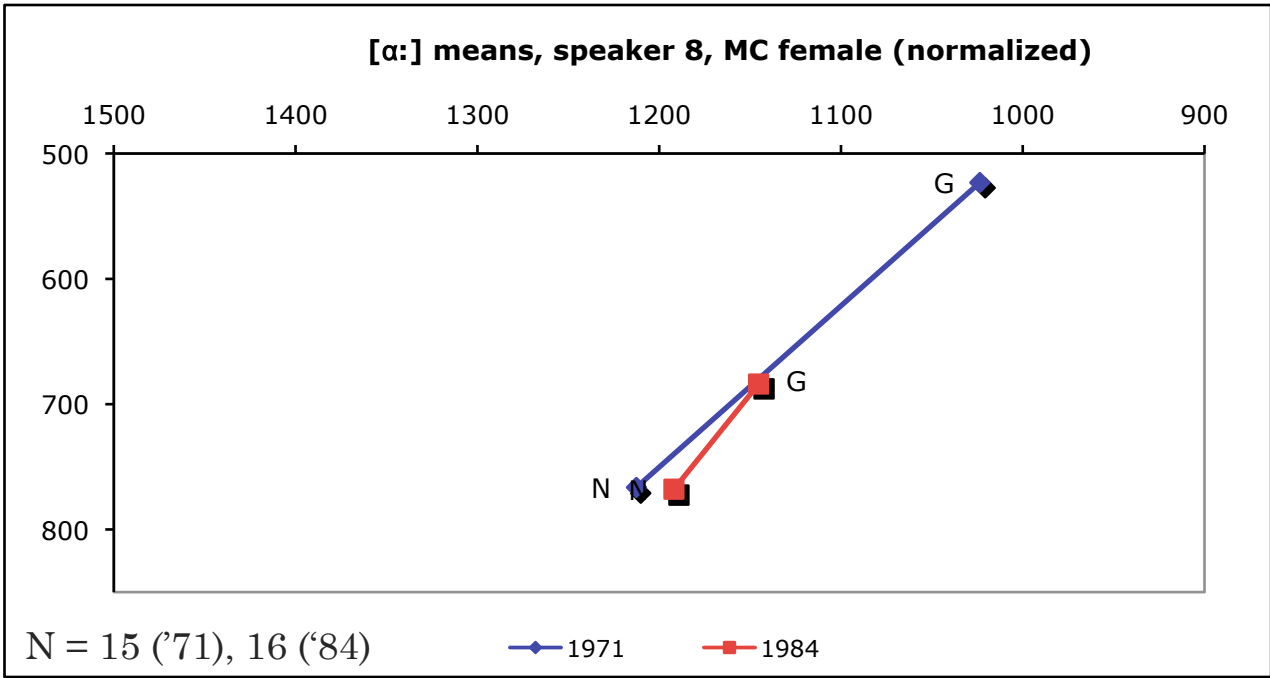
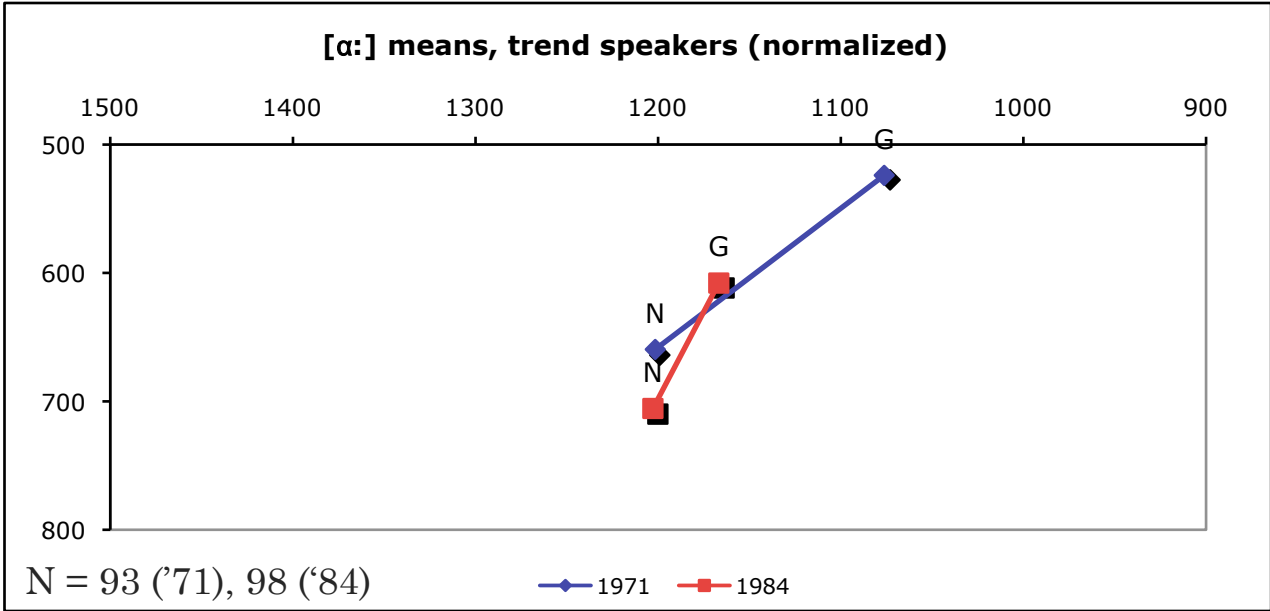
Changes identified in trend study, 1971–1984	002 Paul (WC)	007 Lysiane (WC+)	008 Louise (MC)	013 Ghislain (MC)	049 Claire (UMC)	117 Charles (UMC)
[i:] lowering					√	
[y:] backing & lowering	√		√		√	√
[ɛ:] backing & lowering	√			√	√	
[œ:] backing	√					
[ɑ:]**			√			
[ɔ:] **						
[o:] **						

** glide fronts & lowers; nucleus stable

y:



a:



Panel speakers' participation in community changes: 71–84

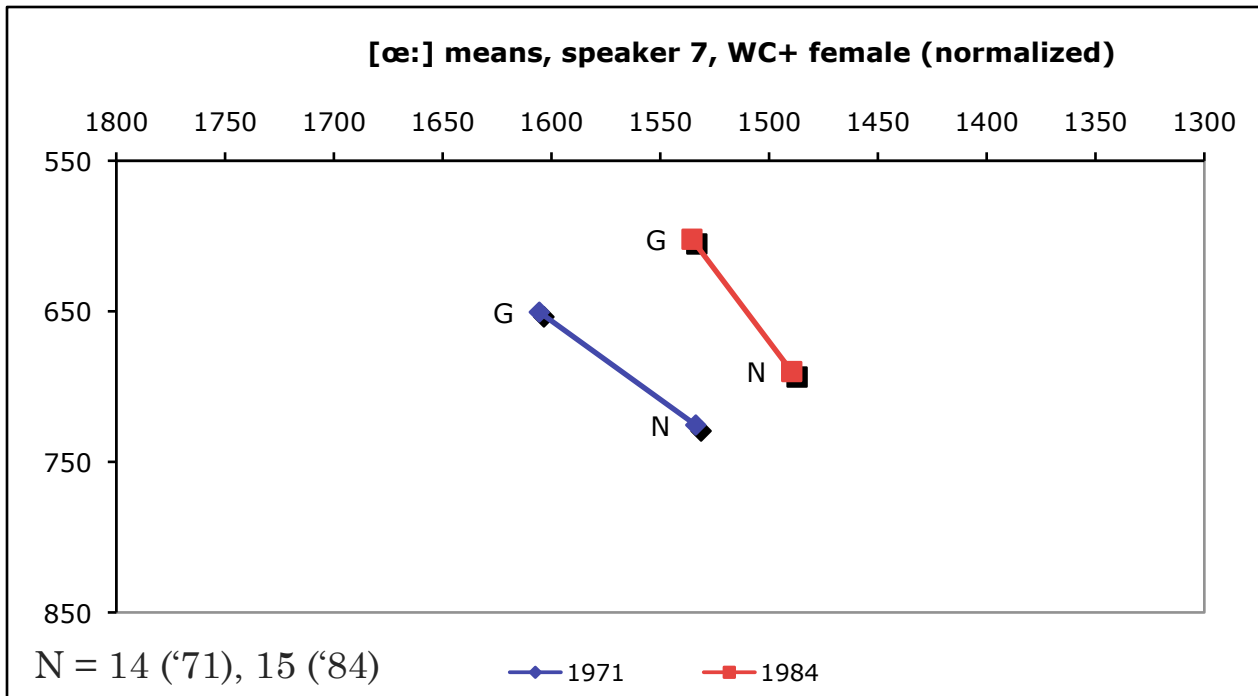
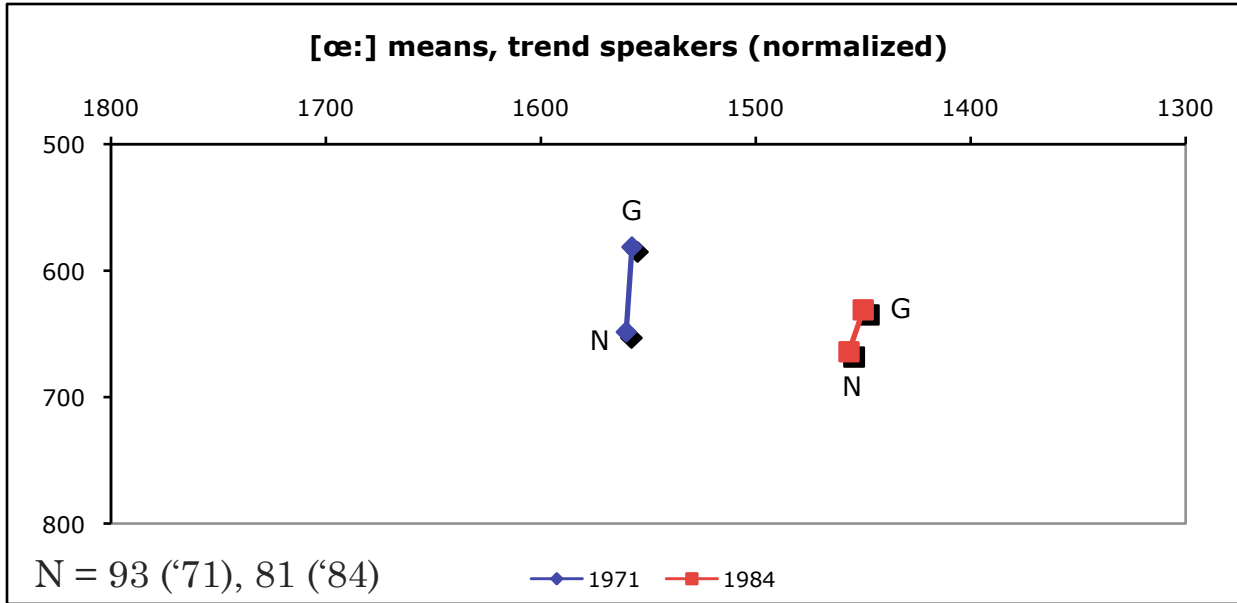
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[i:] lowering					√	
[y:] backing & lowering	√		√		√	√
[ɛ:] backing & lowering	√			√	√	
[œ:] backing	√					
[ɑ:]**			√			
[ɔ:] **						
[o:] **						

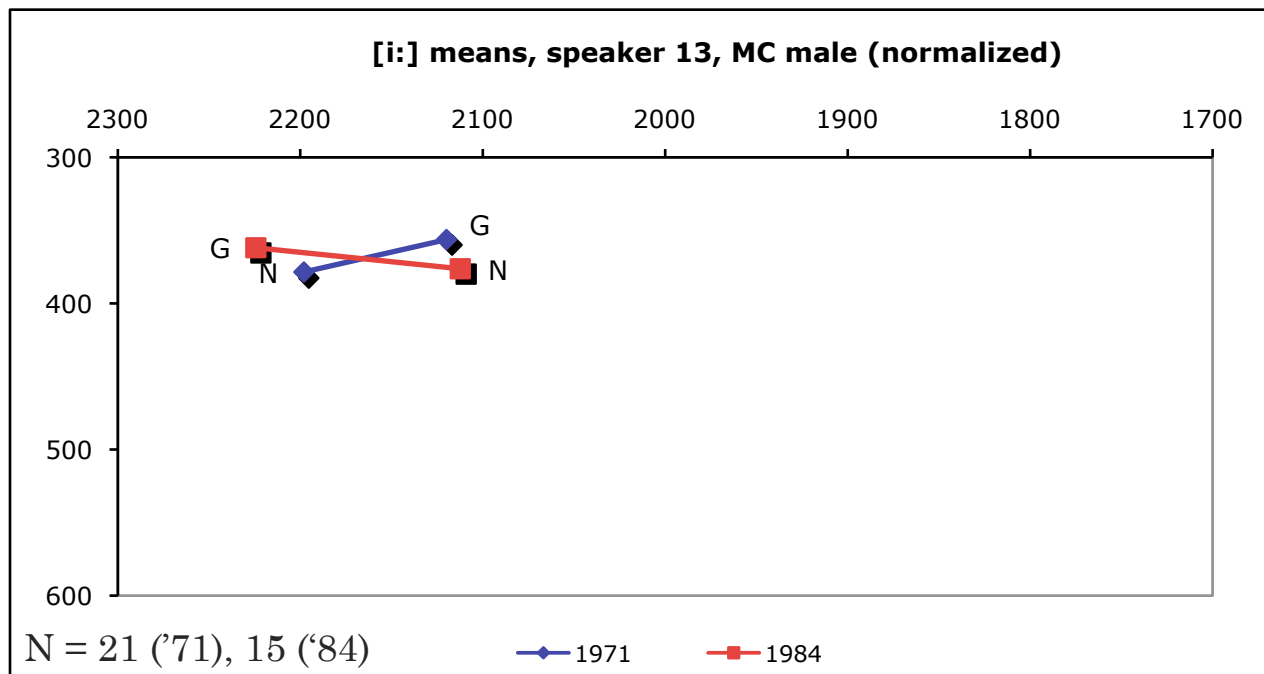
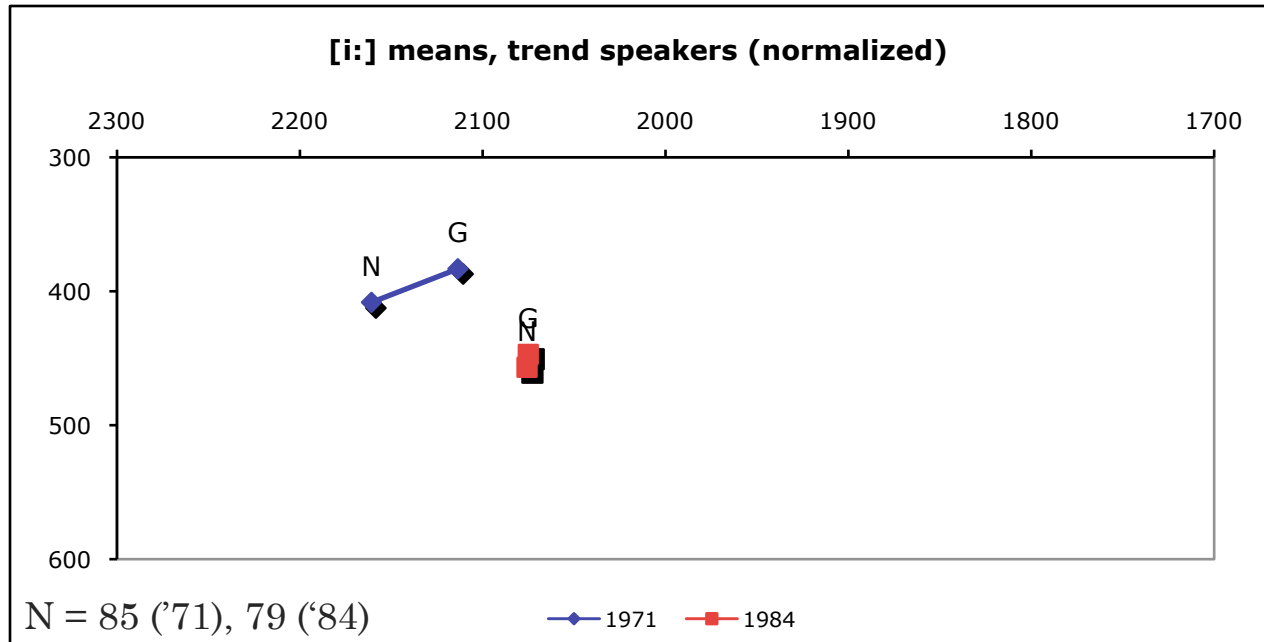
** glide fronts & lowers; nucleus stable

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[i:] lowering				STABLE	√	
[y:] backing & lowering	√	STABLE	√	STABLE	√	√
[ɛ:] backing & lowering	√	STABLE		√	√	STABLE
[œ:] backing	√	STABLE		STABLE		STABLE
[ɑ:]**	STABLE		√	STABLE		
[ɔ:] **		STABLE	STABLE	STABLE		STABLE
[o:] **		STABLE	STABLE	STABLE		STABLE

** glide fronts & lowers; nucleus stable

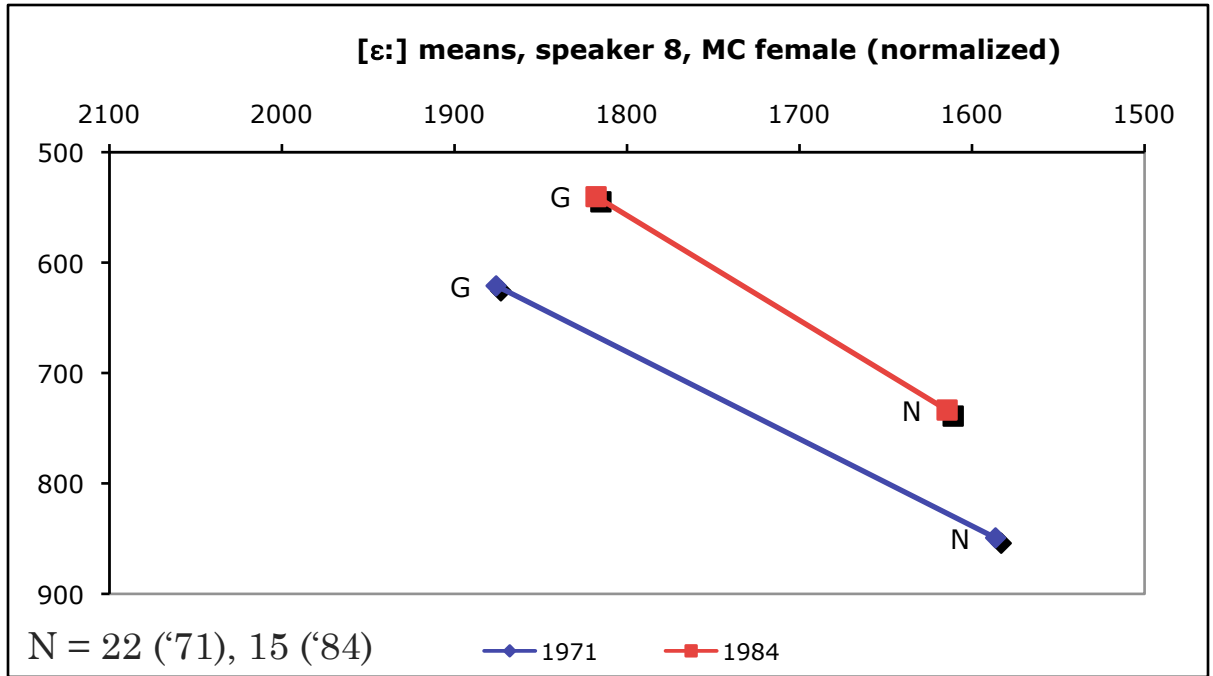
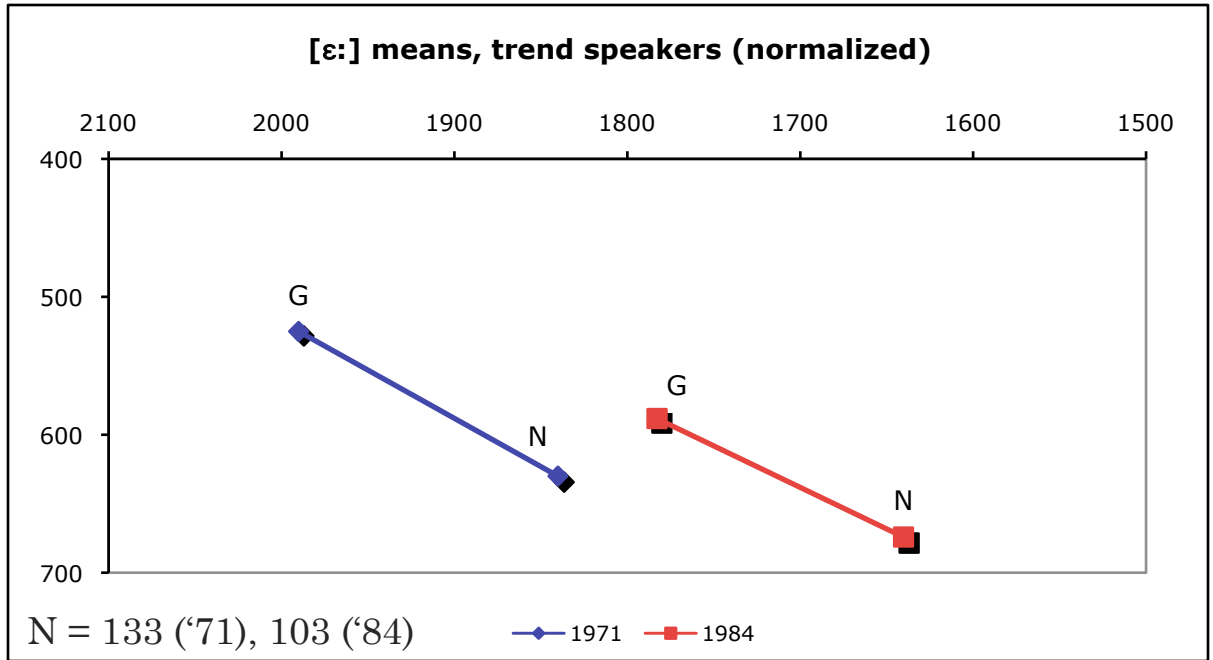




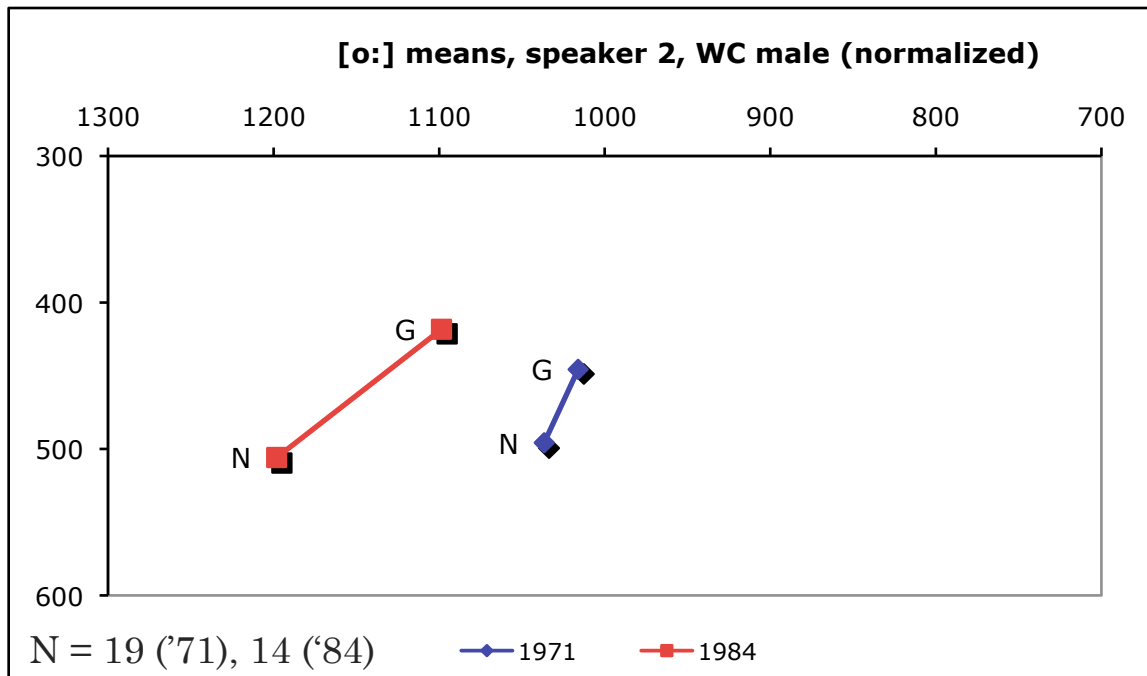
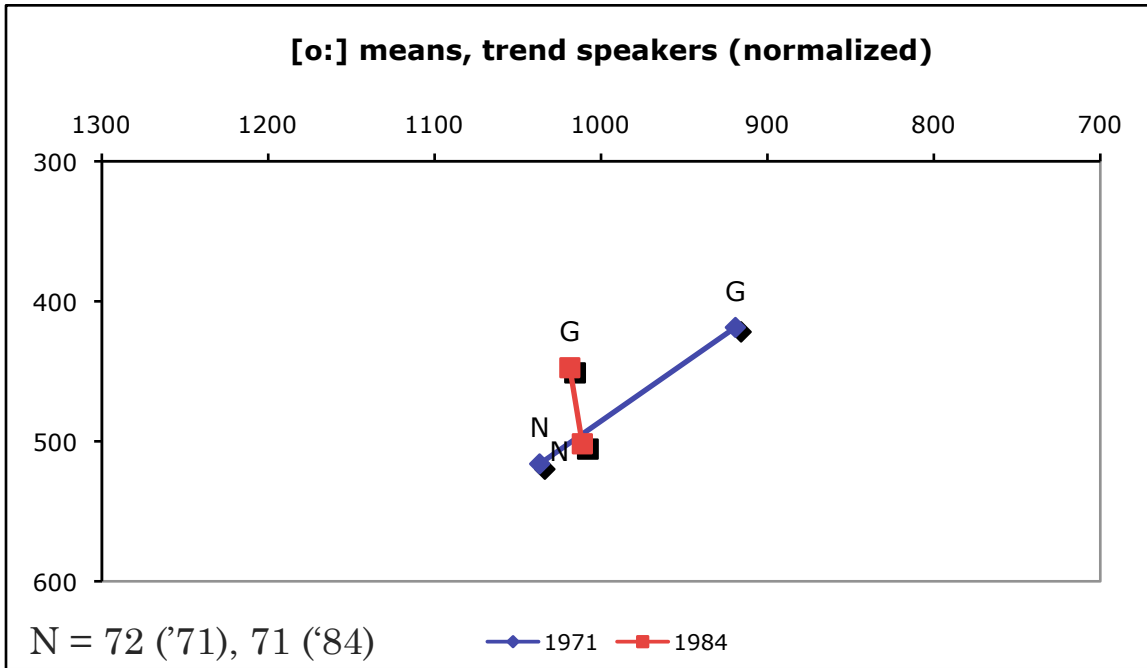
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[i:] lowering	backs	fronts	backs	STABLE	√	raises glide
[y:] backing & lowering	√	STABLE	√	STABLE	√	√
[ɛ:] backing & lowering	√	STABLE	raises	√	√	STABLE
[œ:] backing	√	STABLE	lowers	STABLE	lowers	STABLE
[ɑ:]**	STABLE	backs	√	STABLE	lowers & fronts	raises & backs
[ɔ:] **	lowers & fronts	STABLE	STABLE	STABLE	lowers & fronts	STABLE
[o:] **	fronts	STABLE	STABLE	STABLE	lowers	STABLE

** glide fronts & lowers; nucleus stable



O:



Individual patterns

- Participating in community change (e.g. #2)
- Stability across the lifespan (e.g. #7, #13)
- Movement of entire system (e.g. #49: lowering of all long vowels)
- Anomalous movements

Anomalous movements

- A result of physiological changes due to the aging process?
 - Harrington (2006): formant frequencies *decrease* with age.
 - This may explain anomalous raising or backing.

Anomalous movements

- Community change we can't see yet?
 - Not likely: anomalous movements are typically specific to one speaker, not a group of them

Anomalous movements

- Noise in the data?
 - Possible: ~15 tokens coded per vowel per speaker in the panel.

The take-home message

- Clear patterns are evident in the community: lowering/backing of long front vowels and stability of long back vowels.
- Some speakers participate in these changes as they age, but true lifespan change needs to be disentangled from the effects of aging.
- More data may help clear up anomalous results.

Merci!

- to the National Science Foundation for grant BCS-0132463, 2002-2005, “Language Change Across the Lifespan” that supported the initial work on diphthongization carried out by Michael Friesner, Damien Hall and Gillian Sankoff
- to Bill Labov for designing the French version of Plotnik (Plotnik v.f.), and for working closely with us in adapting it to the needs of the present analysis.
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