How does [mi] brain make [mi] talk?: An acoustic analysis of First-Person Possessive and First-Person Object

Carina Ahrens & Anne-Marie Moelders

UNIVERSITÄT DUISBURG ESSEN
Offen im Denken
UNIVERSITY OF OREGON

SociolinguisticsLab

Find us here!

Introduction

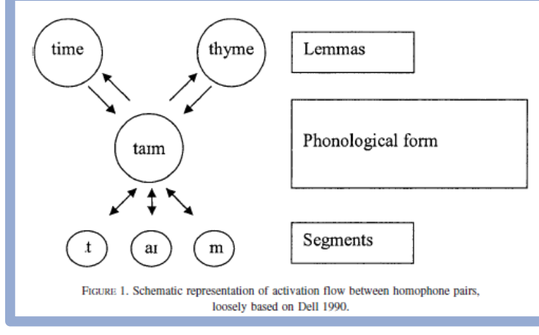


FIGURE 1. Schematic representation of activation flow between homophone pairs, loosely based on Dell 1990.

- Traditional models:
  - Homophones share one phonological representation (e.g., Dell 1990)
- Growing body of study:
  - Perceived homophones do not necessarily share one phonological representation (e.g., Gahl 2008, Drager 2011, Martinuzzi & Schertz 2022)

Research Questions

Is [mi] a phonetic realisation of the 1POS or "an extension of the object form for possessive"? (Anderwald 2004:177)

→ To what extent do lemma-specific realisations of first-person possessive (1POS) [mi] differ from the first-person object (1OBJ) [mi]?

Data & Methods

Tyneside (Northeast of England)
Panel corpus (different age cohorts; total of 25 speakers)
Dyadic interviews (~60 minutes); same pairs at T1 and T2

- Transcribed in ELAN (Max Planck Institute 2021)
- Forced aligned in LaBB-CAT (Formont & Hay 2012)
- Boundaries hand checked in Praat (Boersma & Weenink 2021)
- Formants extracted in 5%-steps
  R-Script (Simon Gonzalez & James Grama): rPraat (Boril 2016) & PraatR (Albin 2014)
- Lobanov normalisation (Lobanov 1971)
- Lmer (Bates et al. 2021)

Analysis of vowel trajectory between 15% and 85%
Double coding for 913/1,153 tokens (79%)
→ Agreement of 834 tokens (91%)

Variable

The phonetic realisation of 1POS

Variants					
[mai]	[mi]	[mɑ]	[me]	[mə]	[mei]
552 (29%)	851 (44.7%)	426 (22.4%)	32 (1.7%)	20 (1.1%)	22 (1.2%)

I walked [mai]/[mi]/[mɑ]/[me]/[mə] dog yesterday.

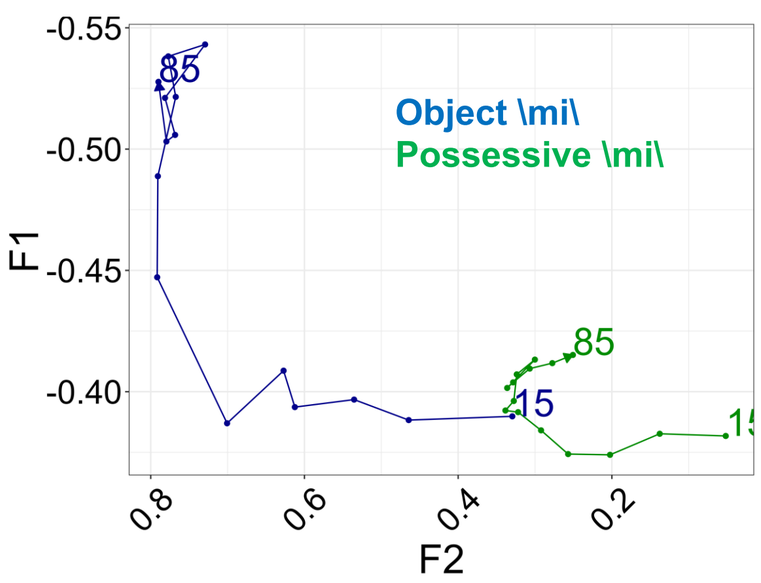
The phonetic realisation of 1OBJ

Variants				
[mi]	[mei]	[me]	[mə]	[mɑ]
236 (57.7%)	140 (34.2%)	30 (7.3%)	20 (0.5%)	1 (0.2%)

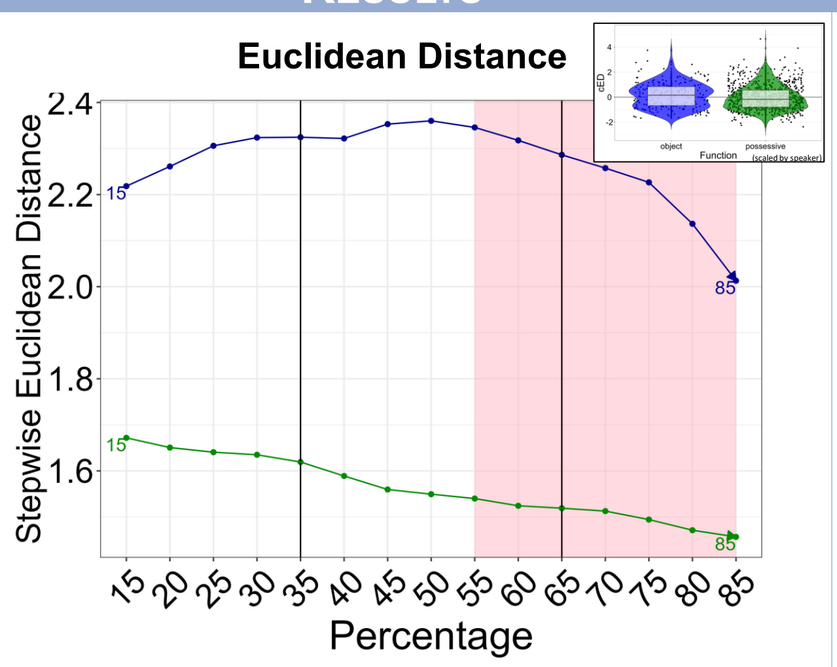
My dog bit <me> yesterday

Results

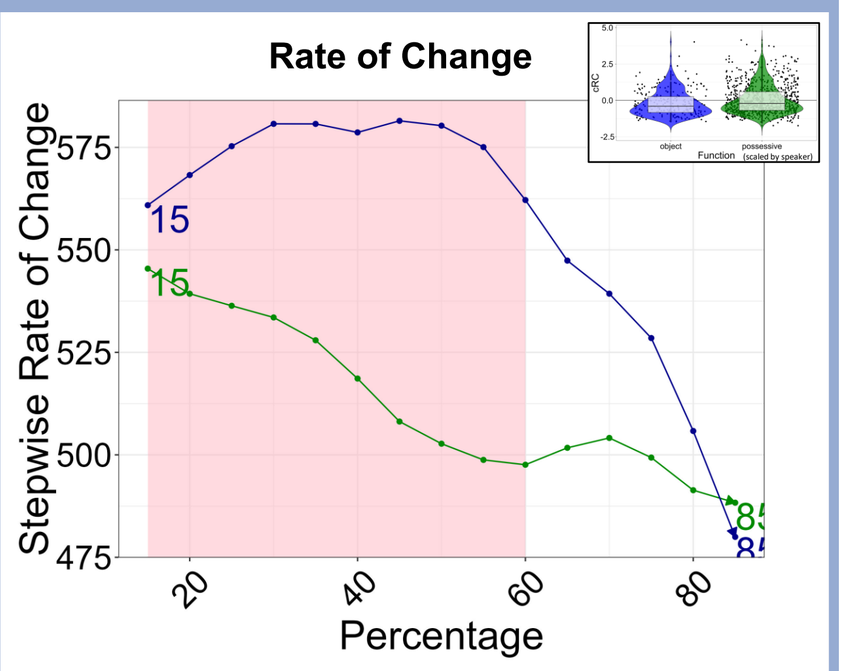
Trajectories of [mi]



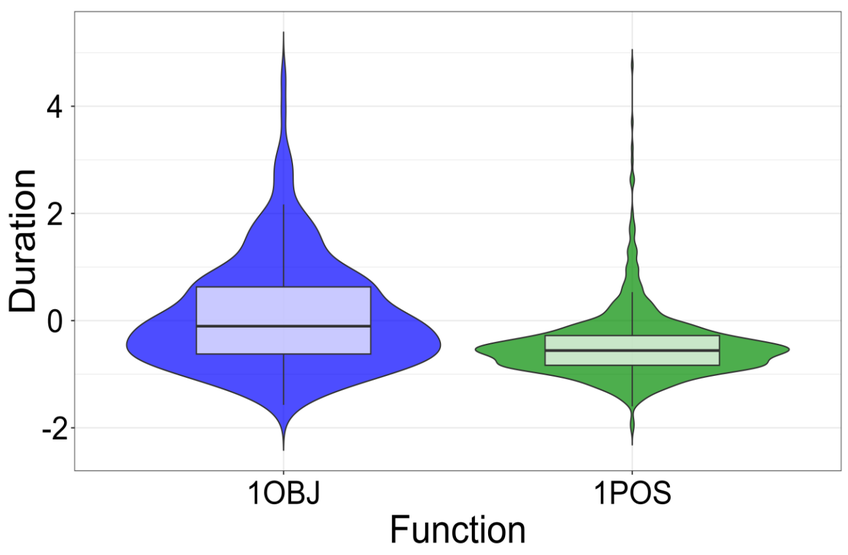
Euclidean Distance



Rate of Change



Duration (log transformed)



Findings Duration:

- 1OBJ appears to be slightly longer than 1POS
- Mixed Effect Models:
  - Stress: stressed tokens tend to be longer
  - Stress*Function: stressed 1OBJ shorter than stressed 1POS
  - No main effect of function (1POS vs. 1OBJ)
  - Following Sound: following vowels and consonants trigger shorter duration
    → Phrase-final tokens longer?

Euclidean Distance: Distance between measurement points

- Longer distance = traveling further

Cumulative Euclidean Distance:

- Euclidean Distance of whole trajectory: sum of all EDs between all percentage points
  - 1OBJ seems to have a longer cED
  - Stressed vowels = longer cED
    → traveling further
  - No main effect of function (1POS vs. 1OBJ)
  - No interaction between stress and function

Stepwise Euclidean Distance:

- Euclidean Distances between individual percentage steps
  - **Onset**: age cohort
  - **Nucleus**: stressed & 1OBJ predict longer distances
  - **Offglide**: stressed, consonants and no following sounds & 1OBJ predict longer distances

Rate of Change: Euclidean Distance / Duration

- Higher rate of Change = traveling further in same amount of time

Cumulative Rate of Change:

- Rate of Change of whole trajectory: cED / duration of full trajectory
  - Age cohort
  - Stressed & 1OBJ predict lower cRC (slower change off the trajectory)

Stepwise Rate of Change:

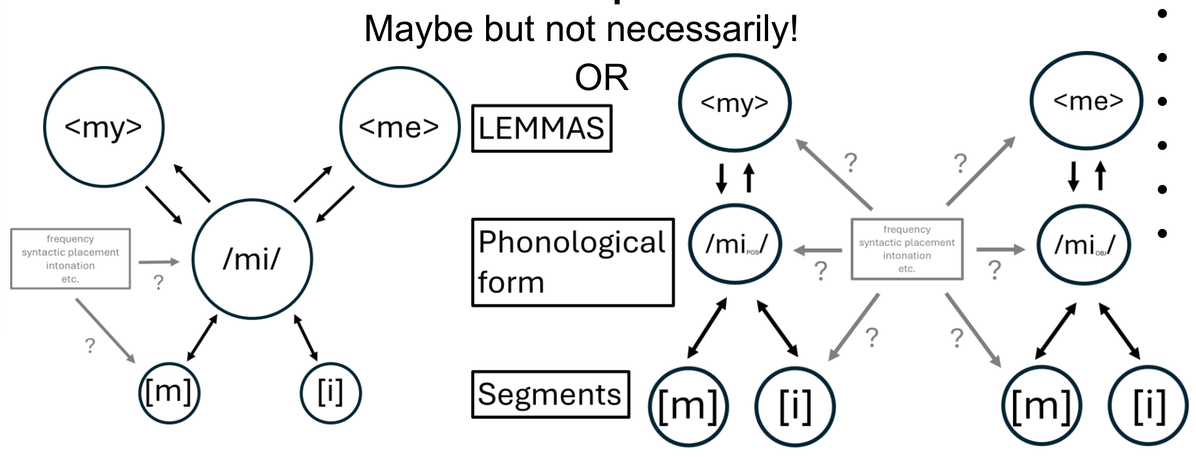
- Rate of Change between individual percentage steps
  - **Onset**: following consonants predict higher sRC; stressed & 1OBJ predict lower sRC
  - **Nucleus**: stressed & 1OBJ predict lower sRC
  - **Offglide**: stressed predict lower sRC

Conclusion

	Cumulative	Stepwise
Duration	Function*Stress: Stressed 1OBJ shorter than stressed 1POS	
Euclidean Distance	No main effect	Nucleus: 1OBJ = longer ED Offglide: 1OBJ = longer ED
Rate of Change	1OBJ lower RC (slower change of trajectory)	Onset: 1OBJ = lower RC Nucleus: 1OBJ = lower RC

➔ 1POS and 1OBJ do not behave in the same way
➔ Different measures show different behaviour at different regions of the vowel

Different mental representations?
Maybe but not necessarily!



Future study:

- Frequency
- Predictability
- Informativity
- Syntactic placement
- Targets in sRC
- Generalised Additive Mixed Models

Getting in Touch & Thank you

Contact us here: cahrens@uoregon.edu & anne-marie.moelders@uni-due.de
www.carinaahrens.com

Thank you to the organisers and our panel speakers!

DFG Deutsche Forschungsgemeinschaft

Marie Skłodowska-Curie Actions

Newcastle University

References upon request!