

Between voicing and aspiration

Nina Ouddeken & Marc van Oostendorp

Meertens Instituut

Workshop Maps and Grammar
17-18 September 2014

Introduction

- ▶ Dutch-German dialect continuum
- ▶ Voicing languages vs. aspiration languages
- ▶ Phonology meets phonetics
- ▶ Phonetically continuous, phonologically discrete

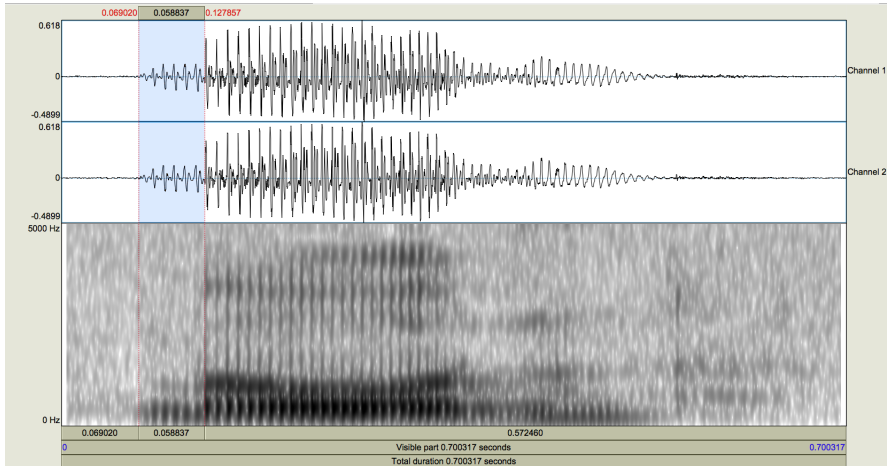
Phonetics vs. phonology

- ▶ Phonetics: physical properties of sounds
 - ▶ Formant frequencies
 - ▶ Pitch
- ▶ Phonology: system behind sounds
 - ▶ Phonological features
 - ▶ Phonological classes
 - ▶ Fortis vs. lenis: /p, t, k/ vs. /b, d/

Voice Onset Time (VOT)

- ▶ Moment of voicing onset relative to moment of plosive release
 - ▶ Negative VOT (prevoicing)
 - ▶ Short lag VOT
 - ▶ Long lag VOT
- ▶ Voicing languages: negative VOT vs. short lag VOT
- ▶ Aspiration languages: short lag VOT vs. long lag VOT
- ▶ For both systems:
 - ▶ Lenis plosives: $\langle b, d \rangle$ (spelling)
 - ▶ Fortis plosives: $\langle p, t, k \rangle$ (spelling)

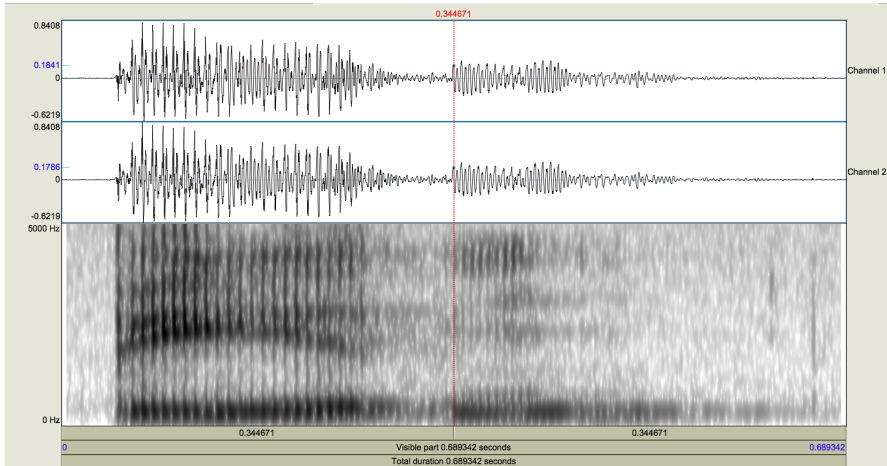
Prevoicing



Voice Onset Time (VOT)

- ▶ Moment of voicing onset relative to moment of plosive release
 - ▶ Negative VOT (prevoicing)
 - ▶ Short lag VOT
 - ▶ Long lag VOT
- ▶ Voicing languages: negative VOT vs. short lag VOT
- ▶ Aspiration languages: short lag VOT vs. long lag VOT
- ▶ For both systems:
 - ▶ Lenis plosives: $\langle b, d \rangle$ (spelling)
 - ▶ Fortis plosives: $\langle p, t, k \rangle$ (spelling)

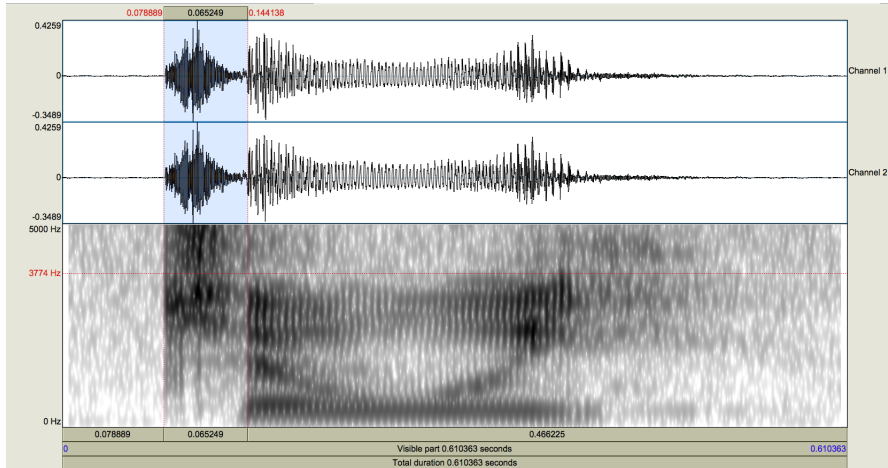
Short-lag VOT



Voice Onset Time (VOT)

- ▶ Moment of voicing onset relative to moment of plosive release
 - ▶ Negative VOT (prevoicing)
 - ▶ Short lag VOT
 - ▶ Long lag VOT
- ▶ Voicing languages: negative VOT vs. short lag VOT
- ▶ Aspiration languages: short lag VOT vs. long lag VOT
- ▶ For both systems:
 - ▶ Lenis plosives: < *b*, *d* > (spelling)
 - ▶ Fortis plosives: < *p*, *t*, *k* > (spelling)

Long-lag VOT



Laryngeal Realism

- ▶ Laryngeal Realism: phonological difference between voicing systems and aspiration systems
 - ▶ Voicing systems: [voice] vs. []
 - ▶ Aspiration systems: [] vs. [spread glottis]

Hypotheses

Phonology

- ▶ [voice] → [spread glottis]
- ▶ [voice] → [voice]/[spread glottis] → [spread glottis]
- ▶ [voice] → [∅] → [spread glottis]

Hypotheses

Phonetics

- ▶ Gradual increase fortis and lenis
- ▶ Gradual increase fortis
- ▶ Gradual increase lenis
- ▶ Abrupt change

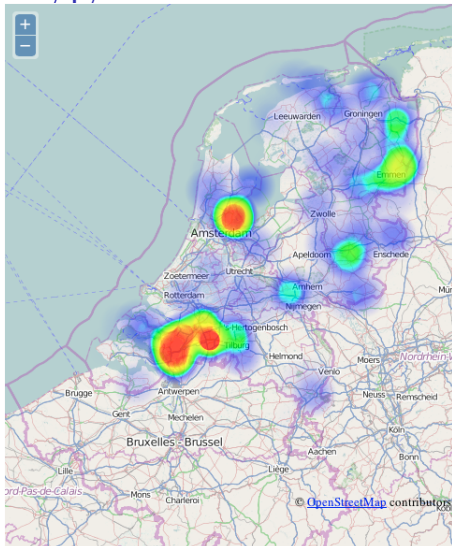
Questions to be answered

- ▶ Phonetics determines phonological features
- ▶ Mismatch between phonology and phonetics
- ▶ Borrowing of phonological features
- ▶ Threshold VOT values for aspirated plosives

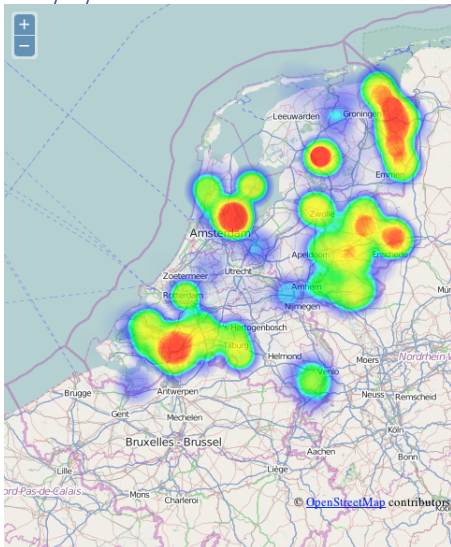
Dutch data

- ▶ Goeman-Taeldeman-van Reenen-Project (GTRP) database
- ▶ 600 locations in the Netherlands and Flanders
- ▶ Transcriptions and audio files available
- ▶ Relative frequency of aspiration in transcriptions

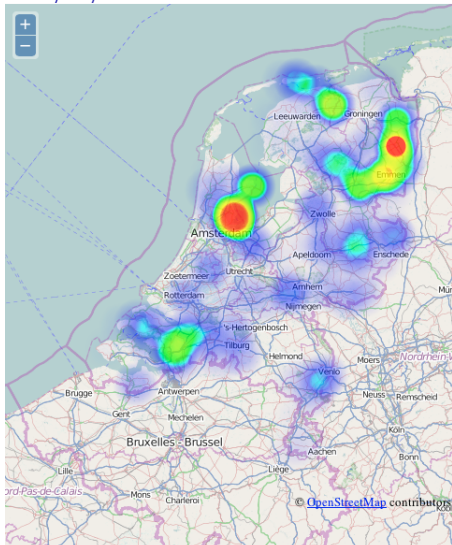
Initial /p/



Initial /t/



Initial /k/

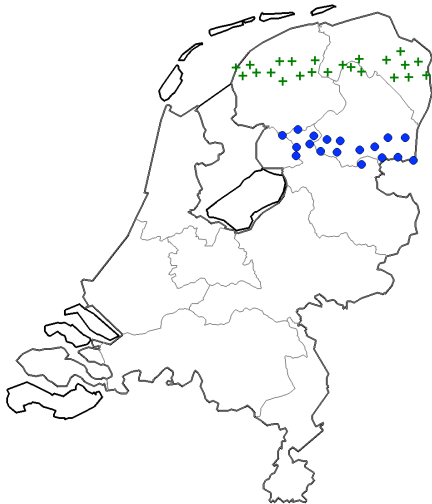


Locations

- ▶ Frequent aspiration in northeastern part of the Netherlands
- ▶ Contact with German dialects
- ▶ Two west-east regions chosen: Groningen-Friesland (north) and Drenthe-Overijssel (south)
- ▶ Signs of both voicing and aspiration found

Regions

- South (18)
- + North (23)



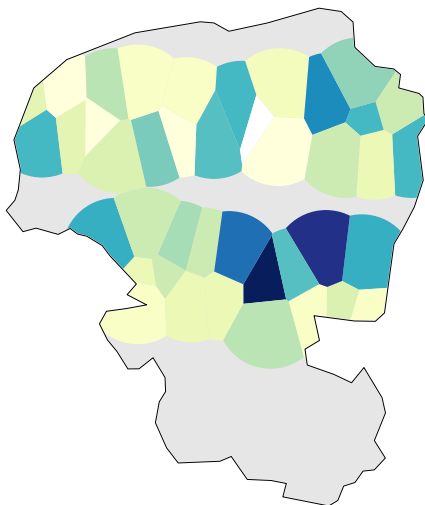
Measurements

- ▶ For each place: initial /p, t, k, b, d/
- ▶ Stressed syllable
- ▶ No preceding vowel or nasal
- ▶ Identical items where possible
- ▶ Praat 5.3.80
- ▶ Filtering if necessary

Visualisation

- ▶ Gabmap
- ▶ Fortis: average VOT of /p, t, k/
- ▶ Lenis: average VOT of /b, d/
- ▶ Visualisation of north and south together: similar colours = similar values

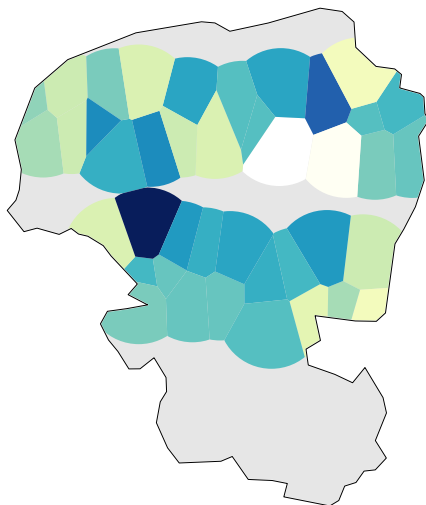
Fortis



Lenis



Distance (VOT fortis - VOT lenis)



Analysis

Standard tools offered by Gabmap do not seem relevant:

- ▶ Difference maps
- ▶ Multidimensional scaling
- ▶ Clustering

Problem: designed for analysing multiple variables

Methods

- ▶ Gradual transition: no significant changes in VOT values between neighbouring places (fortis, lenis, distance)
- ▶ Differences in mean VOT values
- ▶ Differences in median VOT values

Future work

- ▶ More data (Dutch and German)
- ▶ Mapping of phonological data
- ▶ Comparison of phonological and phonetic data