Plosives in weak prosodic positions in Jutlandic Danishes

Variation in realization or representation?

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Bij ons leer je de wereld kennen

Overview

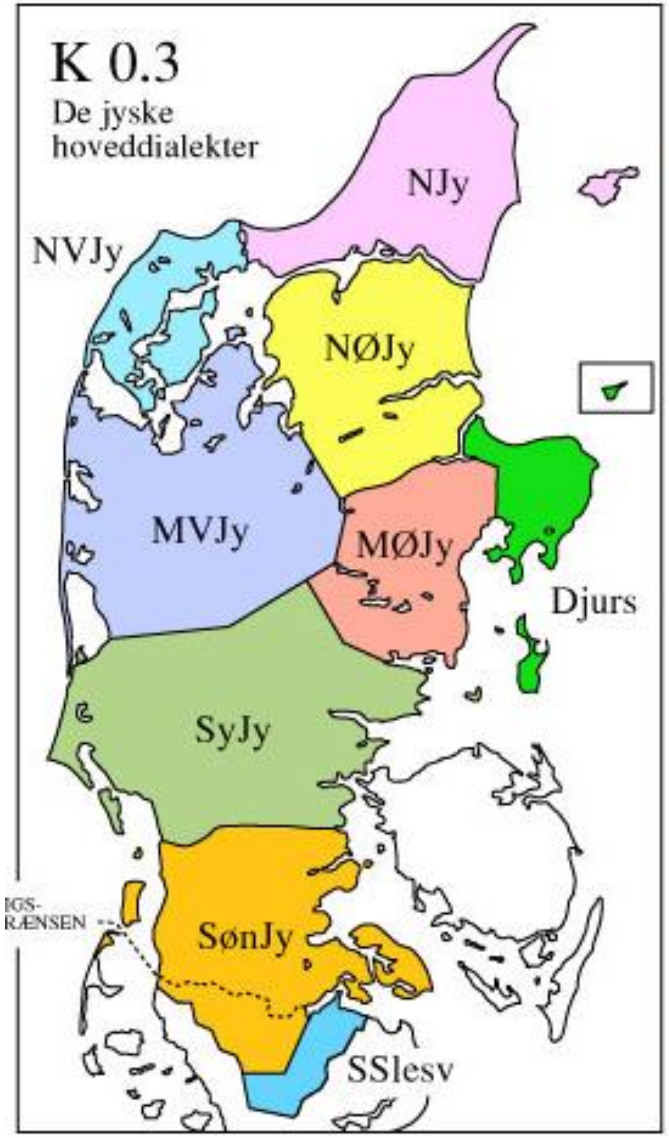
- Background
  - Jutlandic varieties of Danish
  - Variation in plosive realization
- Data
- Acoustic studies
  - Voicing lag
  - Affrication patterns
- Alternations
- Discussion

Dialects in Denmark

- Recent historical development in dialect use in Denmark:
  - ~ 1870: More than 90% of the population are dialect-speakers (Skautrup 1968)
  - ~ 1960: Generally speaking, children no longer learn dialects (Pedersen 2003)
  - This is admittedly an oversimplification
  - Dialects are reported to be alive and well in particularly Southern Jutland, while other areas traditionally strongly associated with dialects have converged at Standard Danish (Maegaard & Monka 2019)
  - Furthermore, in some sites, dialects have been replaced by regionalized versions of the standard (historically High Copenhagen)

Jutlandic at the turn of the 20th century

- Variation abounds at every major level of description
- Parts of phonological and morphosyntactic variation have been well-described and extensively mapped
  - In e.g. Bennike & Kristensen's (1911) *Kort over de danske Folkemaal*
- Many single-dialect grammars were published in the 20th century
- Lexicon is covered in dictionary: *Jysk Ordbog*
- But there are plenty of gaps in our knowledge
  - Very little has been written about e.g. subphonemic variation



Overt subphonemic variation in plosives

- An overt realization pattern that may still be active today is colloquially known as the ‘dry *t*’ of Northern Jutlandic

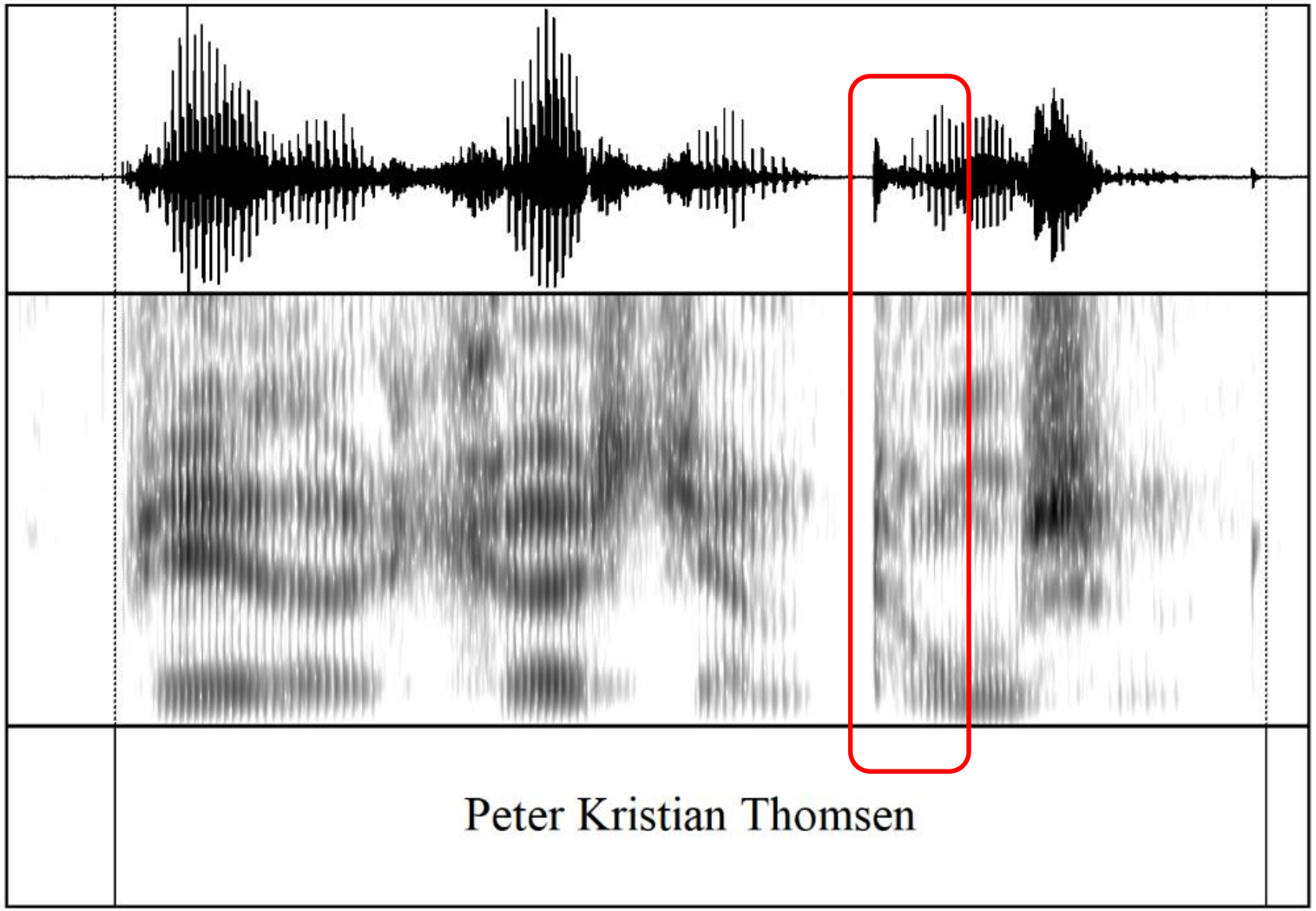
> From large Danish encyclopedia *Den store Danske:*
>
> ”*Danish aspirates are e.g. the sounds* p *and* k *in Standard Danish and the ‘dry’* t *that occurs in certain Jutlandic, particularly Northern Jutlandic, dialects*” (cp. affricated [t^{s}] in Standard Danish)

- In spite of this, the literature very rarely mention it

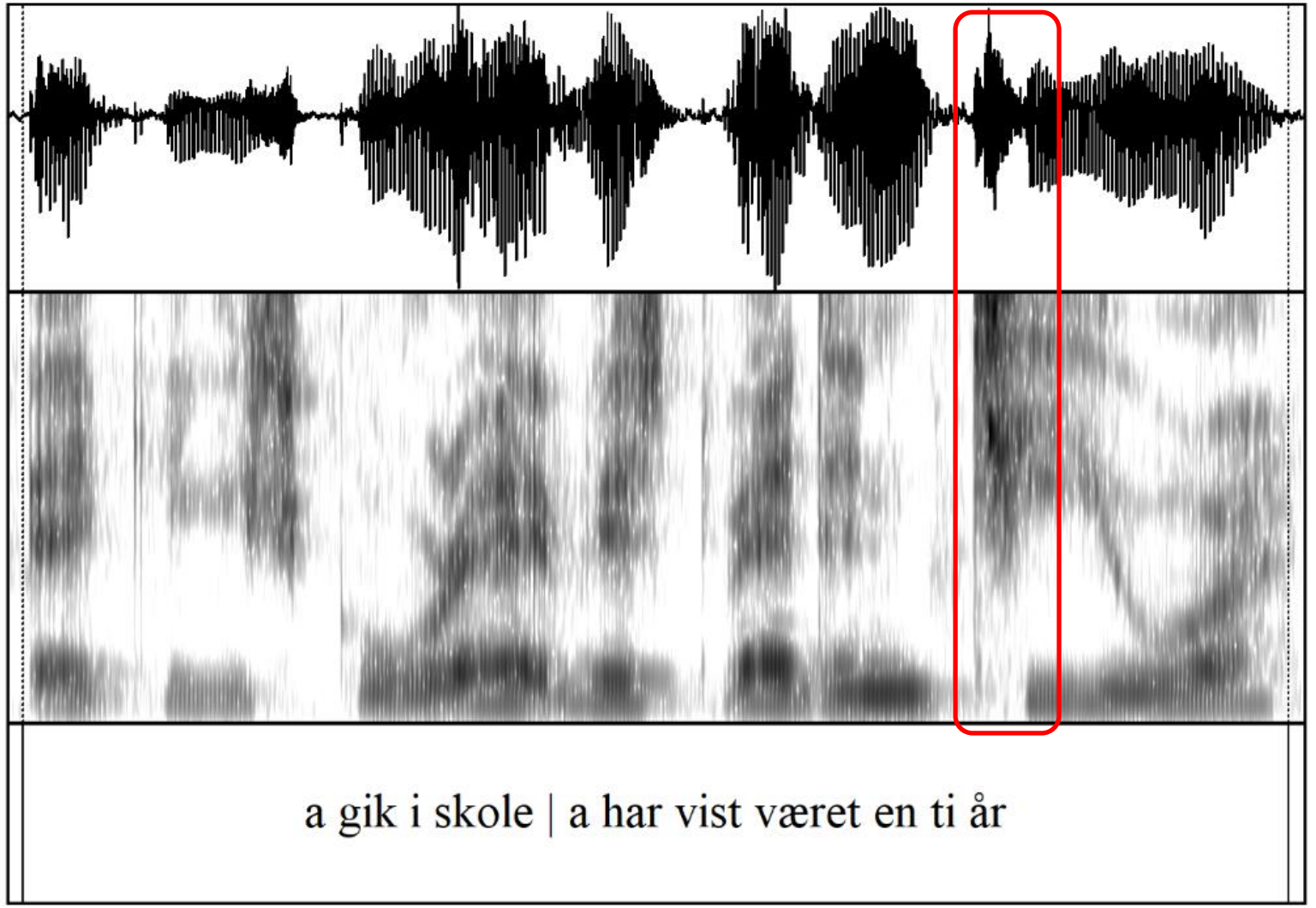
Overt subphonemic variation in plosives

- In a pilot study of this variation (Puggaard 2018), I found that different varieties implemented /t/ in various ways
- Very roughly,
  - Northern dialects never affricated /t/
  - Central dialects sometimes affricated /t/, but only accompanying very long voicing lag / high VOT
  - Southern dialects affricated /t/ regardless of voicing lag
- These findings hint at variation that go beyond Northern Jutland, which prompted the current larger study of plosive realization

‘Dry’ /t/



Affricated /t/



New research questions

- Do the pilot findings hold up when tested with a larger data set?
- What are the patterns of regional variation in plosives?
  - With regards to voicing lag and affrication
- Are patterns in voicing lag and affrication connected? How?
  - If not, are they represented separately at a phonological level?
- Is there evidence that the phonetic patterns in simple onset correspond with phonological patterns?

Corpus of Danish dialect recordings

- From a data perspective, the Danish dialects are extremely well-documented
- Two active research centres have been gathering audio recordings for as long as it has been possible
  - Peter Skautrup Centre for Jutlandic Dialect Research (Aarhus University)
  - Department of Dialect Research (University of Copenhagen)

Goldshtein & Puggaard (2019)

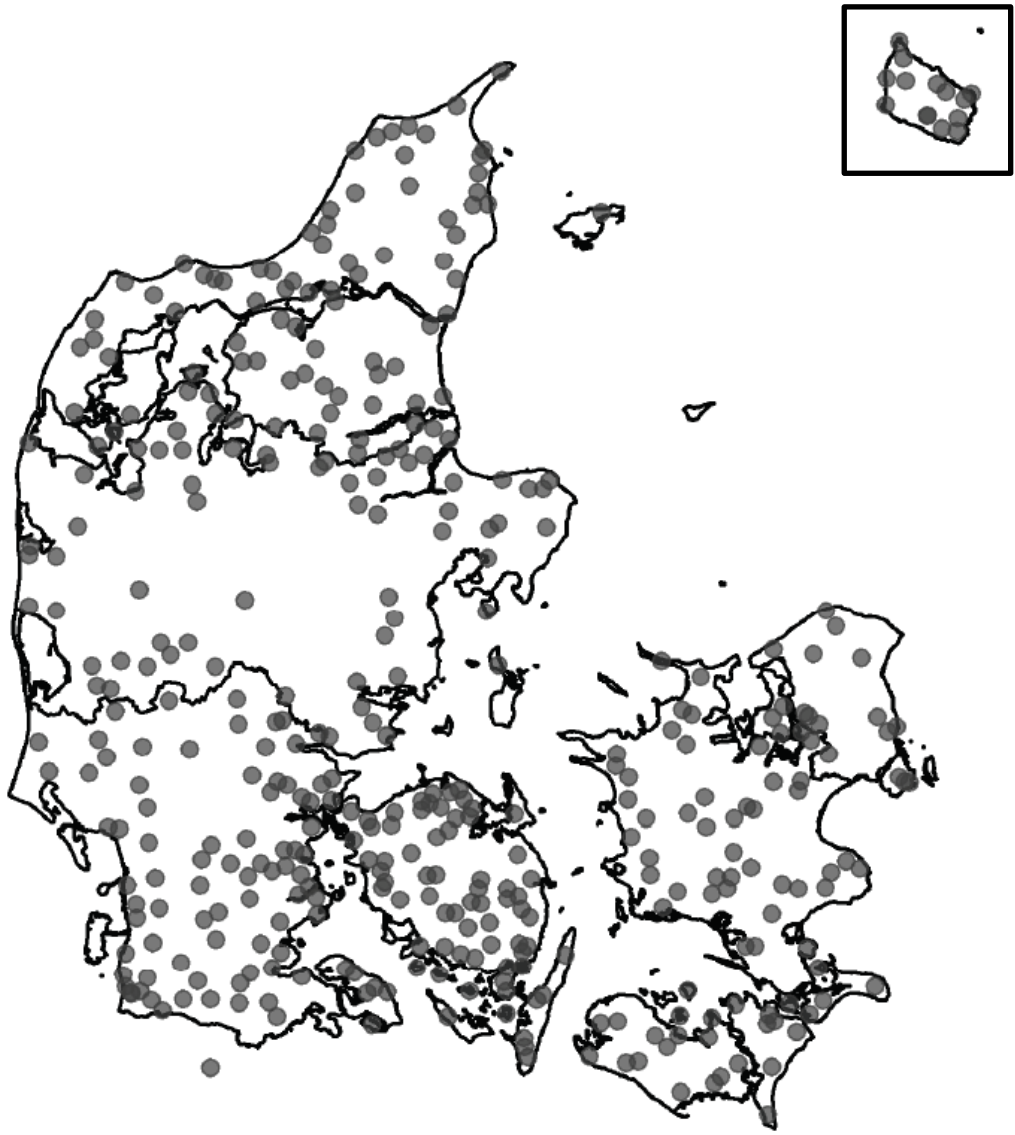
Corpus of Danish dialect recordings

- 2,383 recordings from 1,080 locations
- 2,090 hours = 87 days
- Recorded between 1934-2006
- Highly eclectic
  - Interviews, monologues, book readings, musical performances, etc.

Goldshtein & Puggaard (2019)

Royal Danish Library restorations

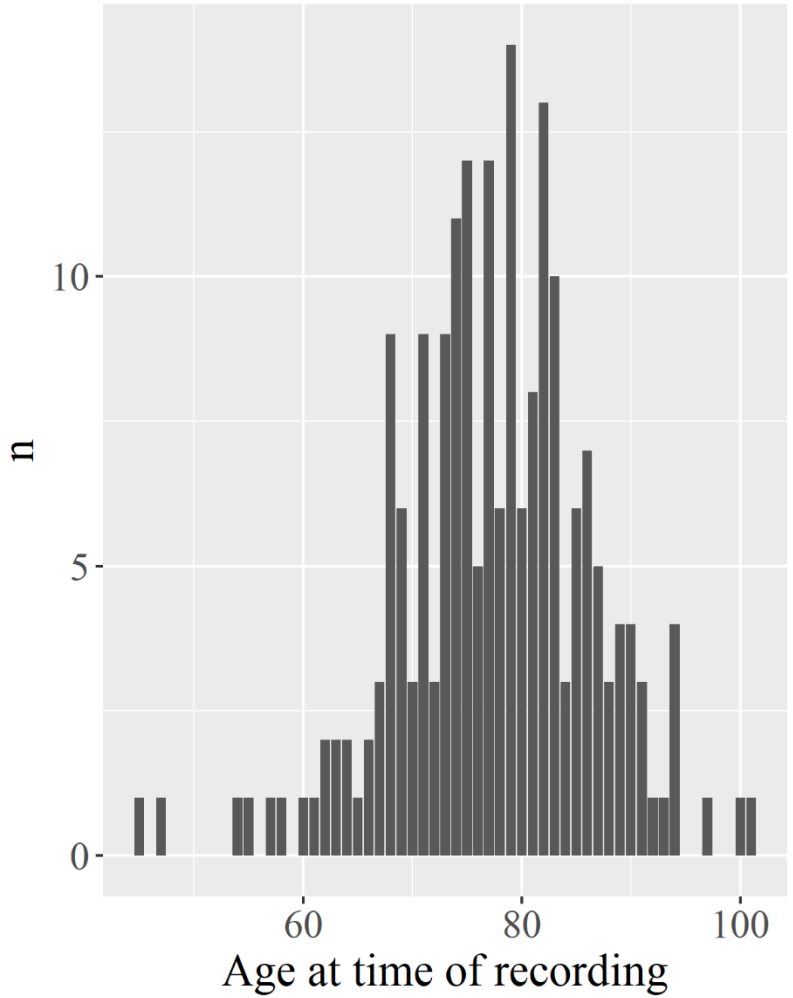
- A significant portion of recordings were made between 1970-1976
  - 524 from 402 locations
- 366 hours (= 15 days)
- Sociolinguistic interviews
  - Similar conditions, relatively stable quality
  - Extensive metadata, including judgment of ‘dialect purity’
- Fully restored and publicly available from Royal Danish Library’s web site

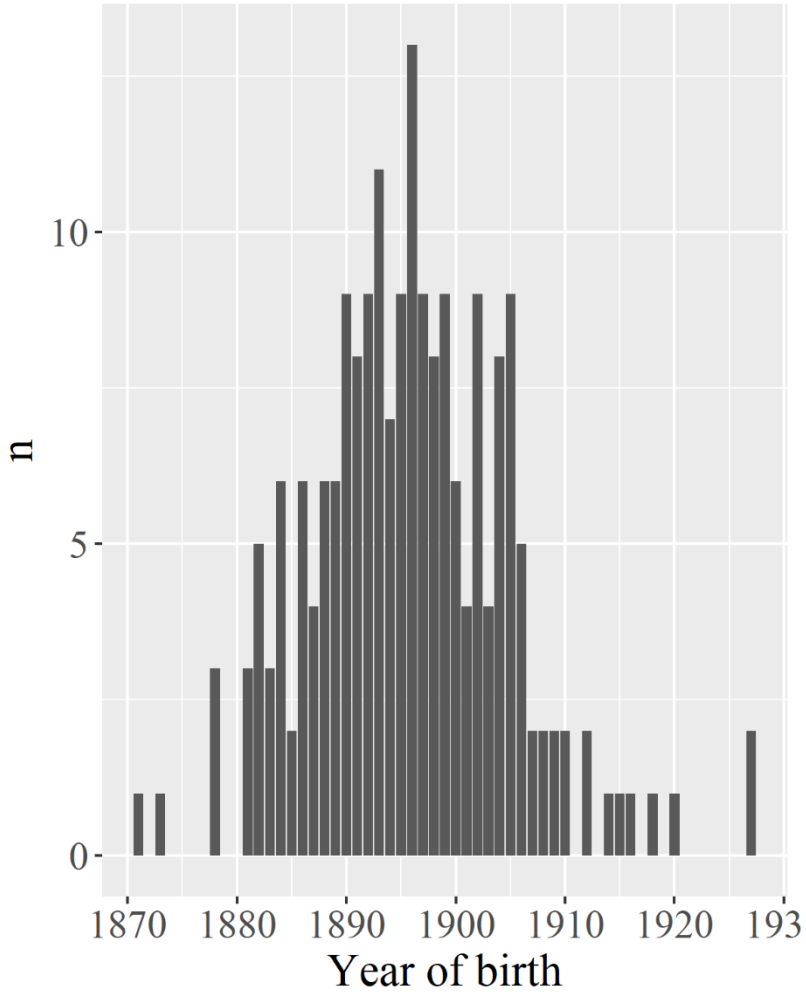


Goldshtein & Puggaard (2019)

Royal Danish Library restorations

- Informants were elderly at time of recording (mean=77.4 years)
- They were generally born around the turn of the century
- As such, the recordings are a good snapshot of the Danish dialect landscape around 1900

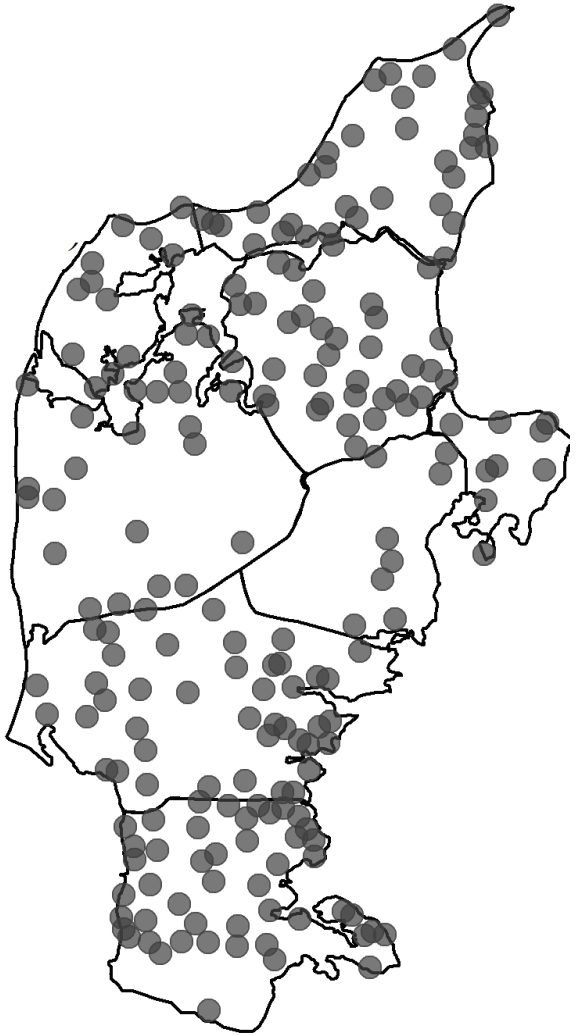


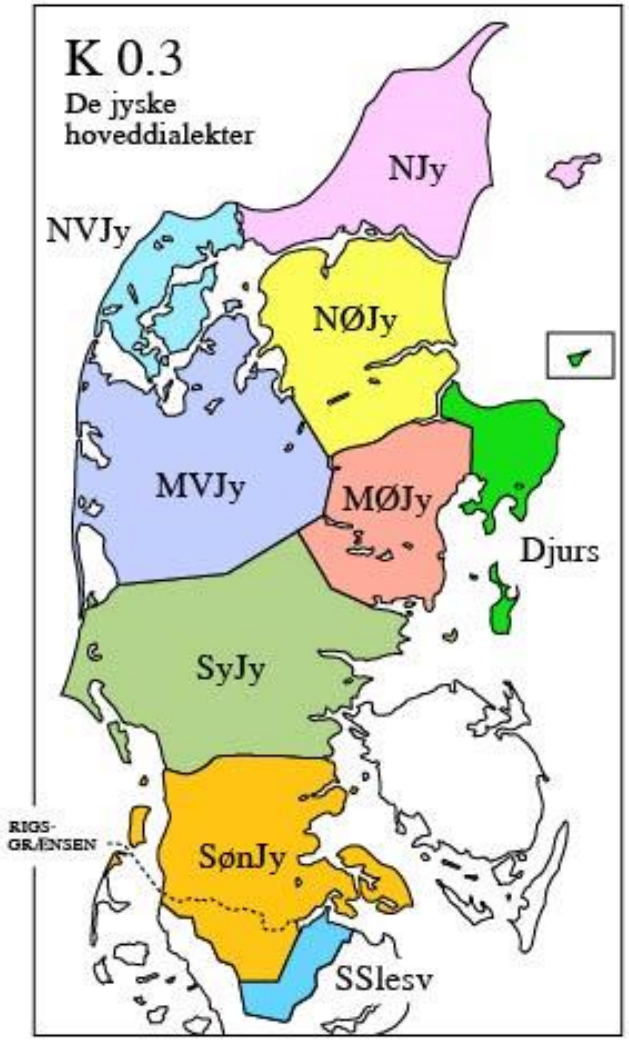


Goldshtein & Puggaard (2019)

Selection criteria

- Of 230 represented locations, 213 were used.
- A few were excluded due to e.g. audio quality
- If a location was represented by multiple recordings, a decision was made based on
  - audio quality
  - the amount of overlapping talk
  - dialect judgment





Selection criteria

- The acoustic study targets simple onset position
- The first 50 tokens of /p t k/ were segmented for each recording
- All tokens of /b d g/ were segmented up until that time (but not exceeding 50)
- For /b d g/, function words were excluded unless stressed or utterance initial

  - All instances of *det* 'it, that' excluded

Plosive	n
/b/	2.212
/d/	2.369
/g/	2.273
/p/	1.386
/t/	5.169
/k/	4.095
Total	17.504

Acoustic analysis

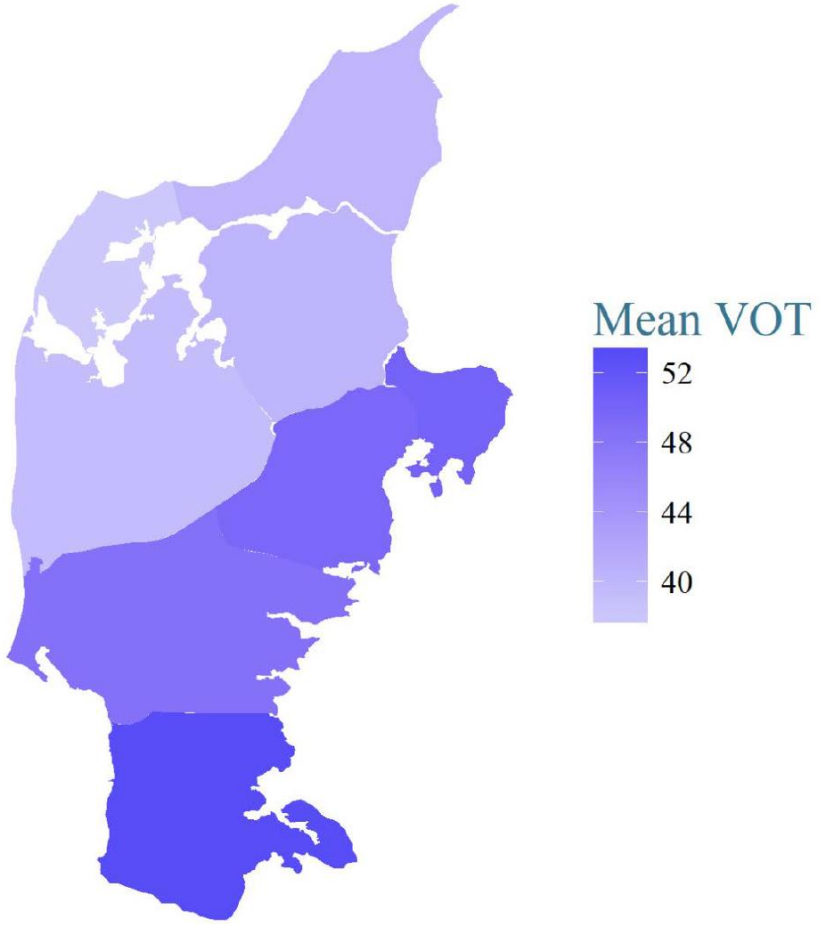
- Voice onset time was extracted for all plosives
  - Technically voicing lag; no negative measures
- Mean center of gravity of release extracted for all /p t k/
  - Taken as a measure of affrication
  - Higher COG approximates the spectral profile of fricatives

Acoustic analysis

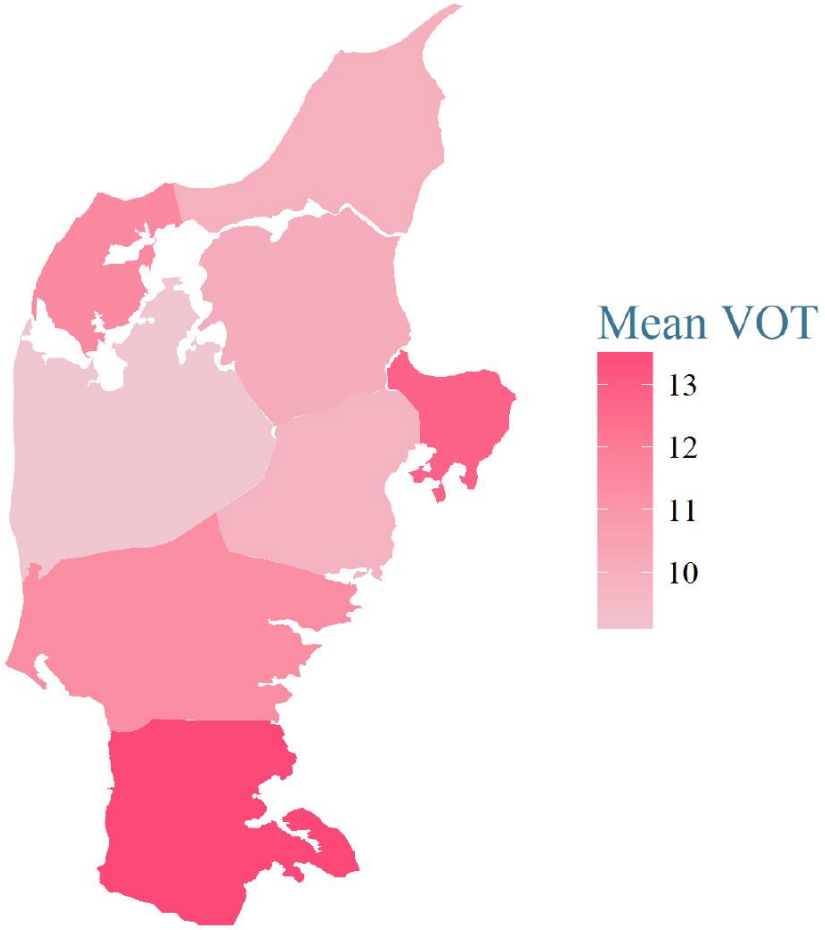
- For each token, the following was noted:
  - Vowel height (3 levels)
  - Vowel rounding
  - Vowel backness (3 levels)
  - Stop palatalization
  - Stress (2 levels)
- Along with speaker gender, these were all used for statistical modeling

Results – first glance at voicing lag

/p t k/

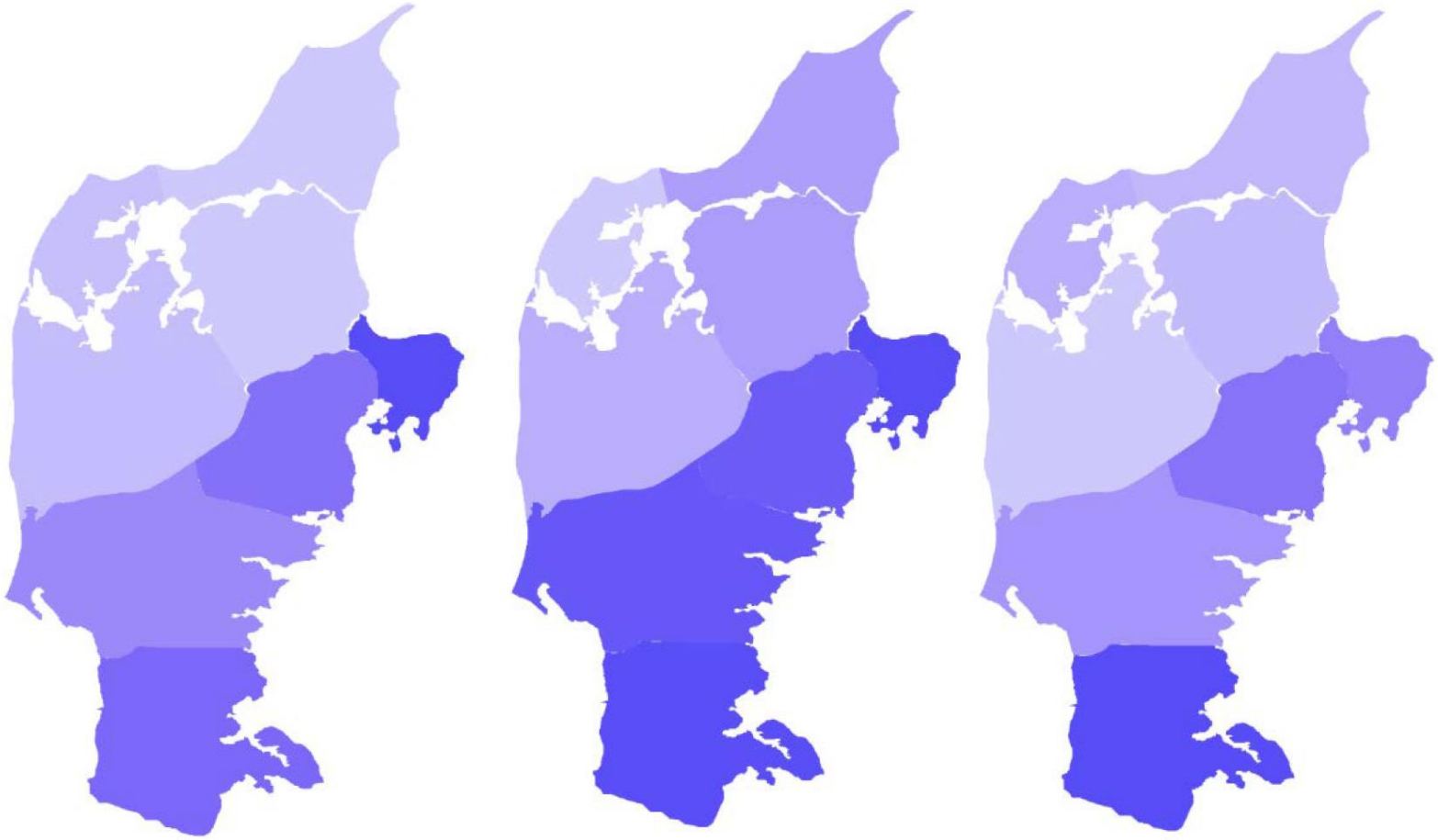


/b d g/



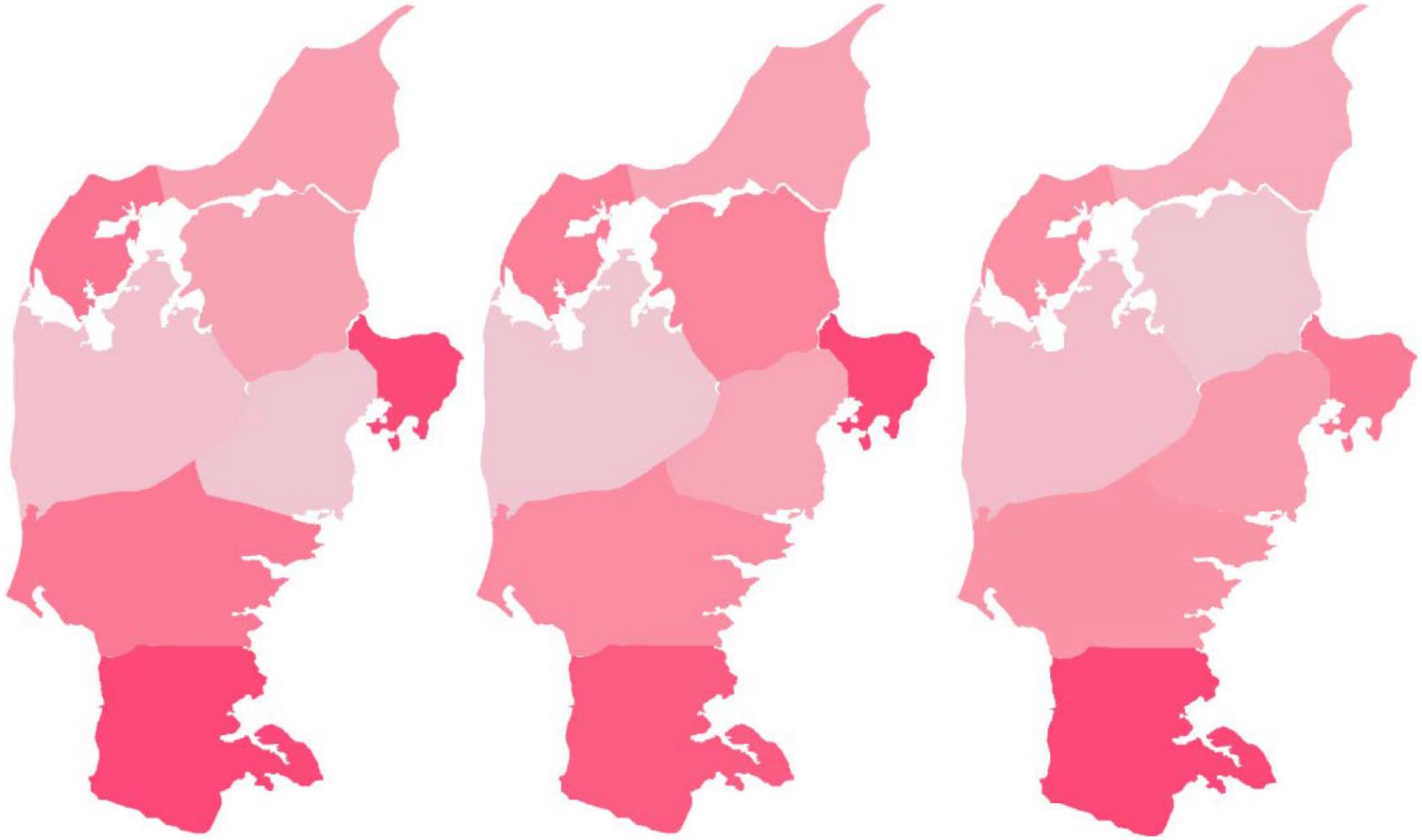
Results – first glance at voicing lag

/p/ /t/ /k/



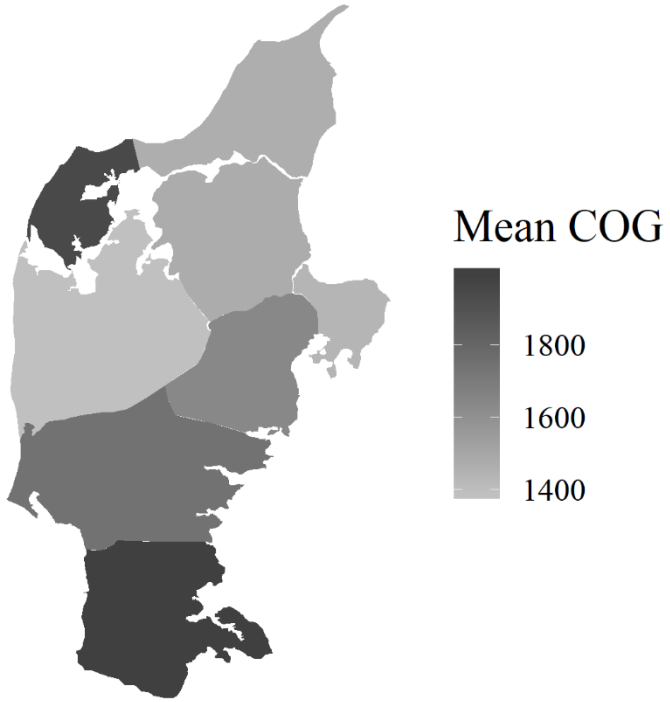
Results – first glance at voicing lag

/b/ /d/ /g/

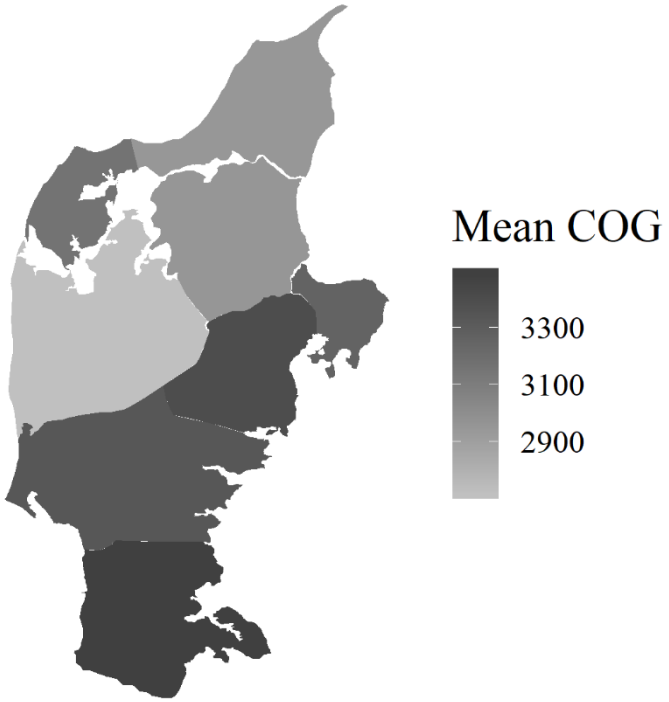


Results – first glance at center of gravity

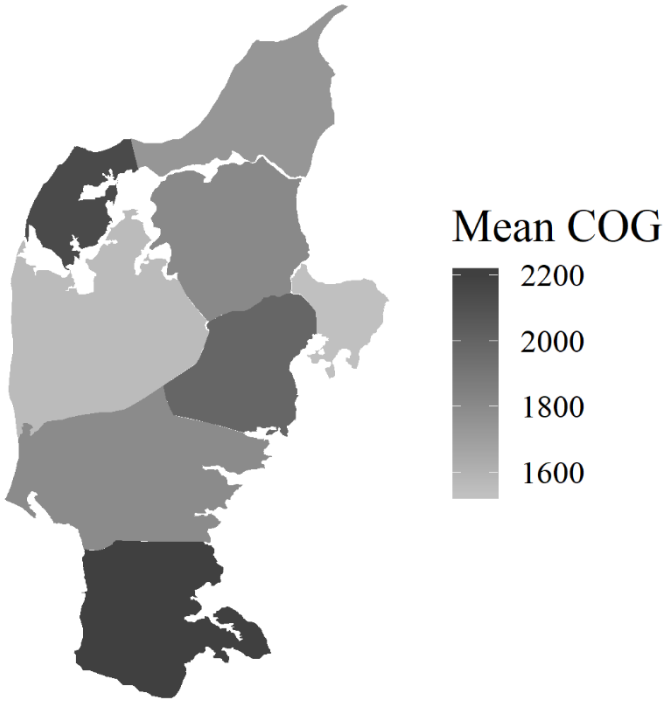
/p/



/t/

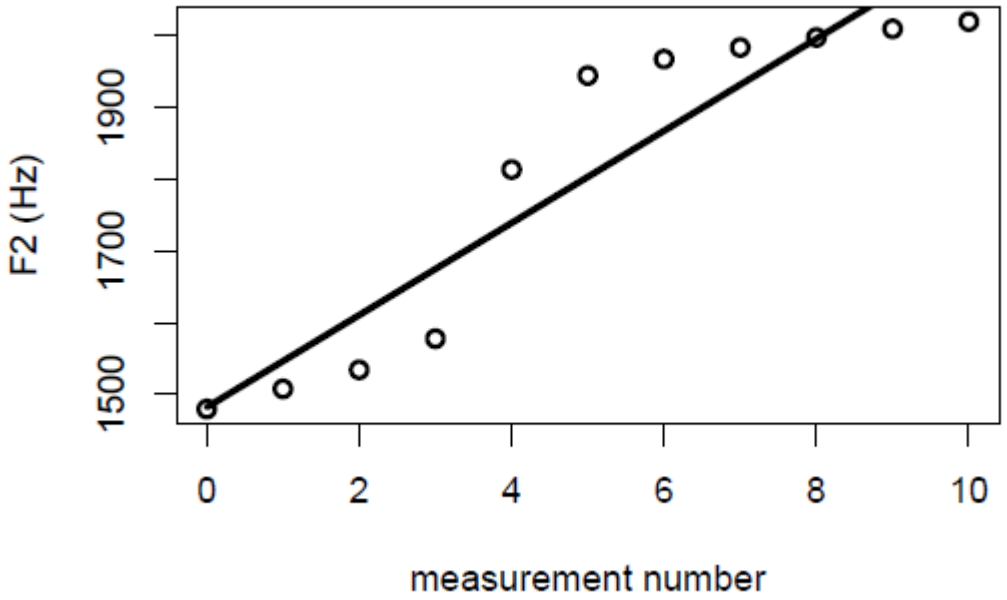


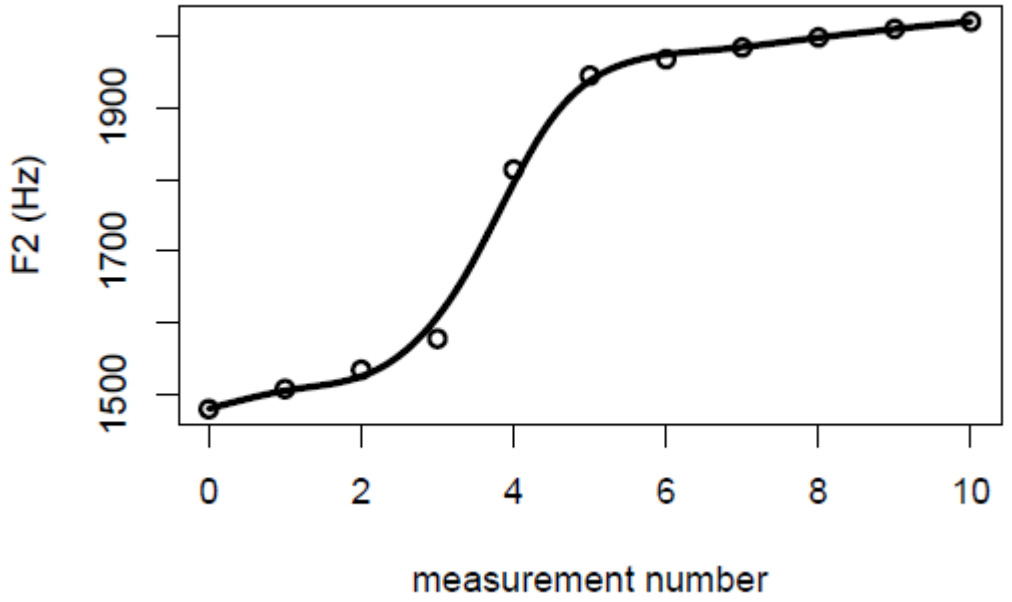
/k/



Statistical modeling

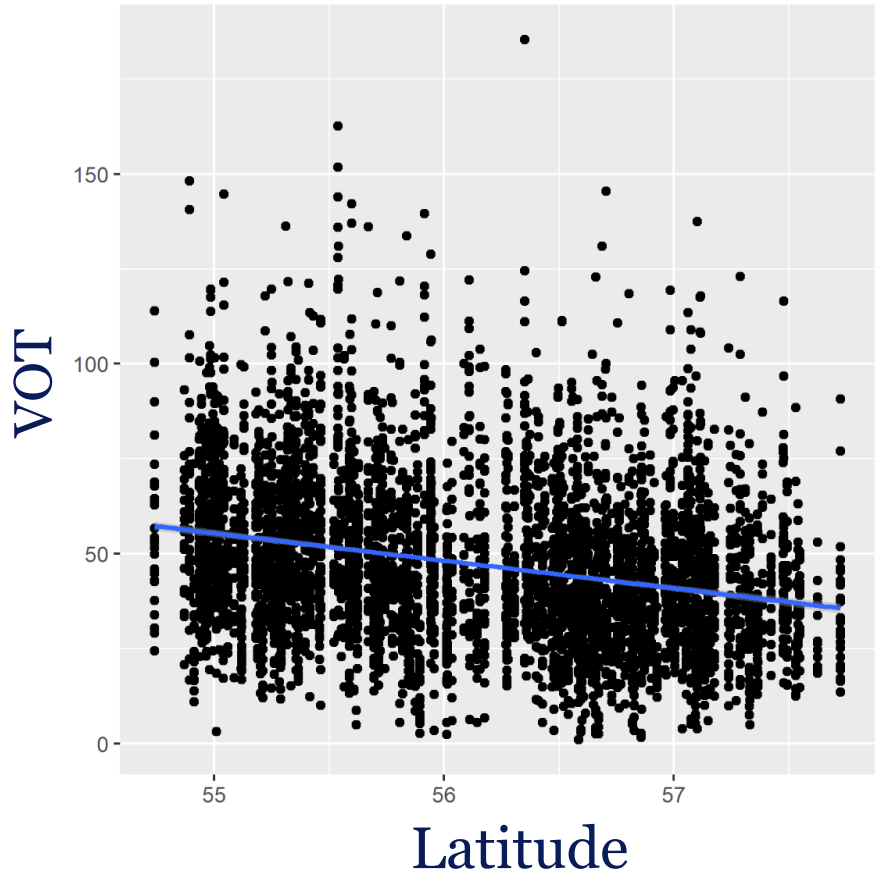
- *Generalized additive mixed model*
  - Models a *non-linear* relationship between predictor and dependent variable (e.g. Sóskuthy 2017)



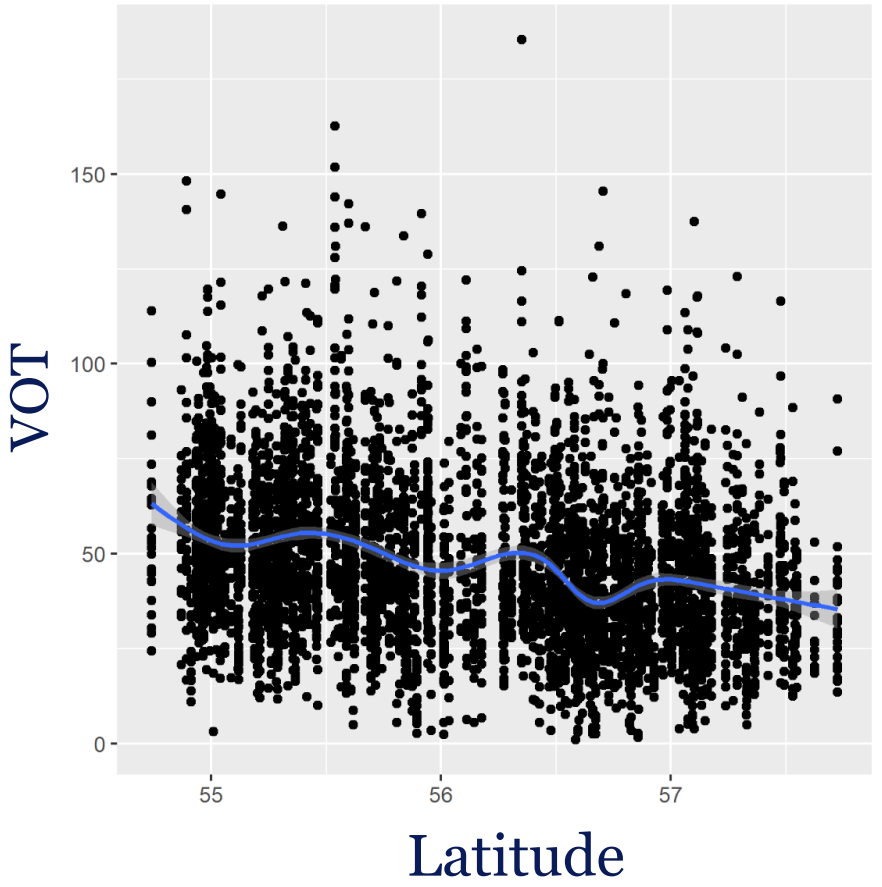


Statistical modeling

- Linear fit

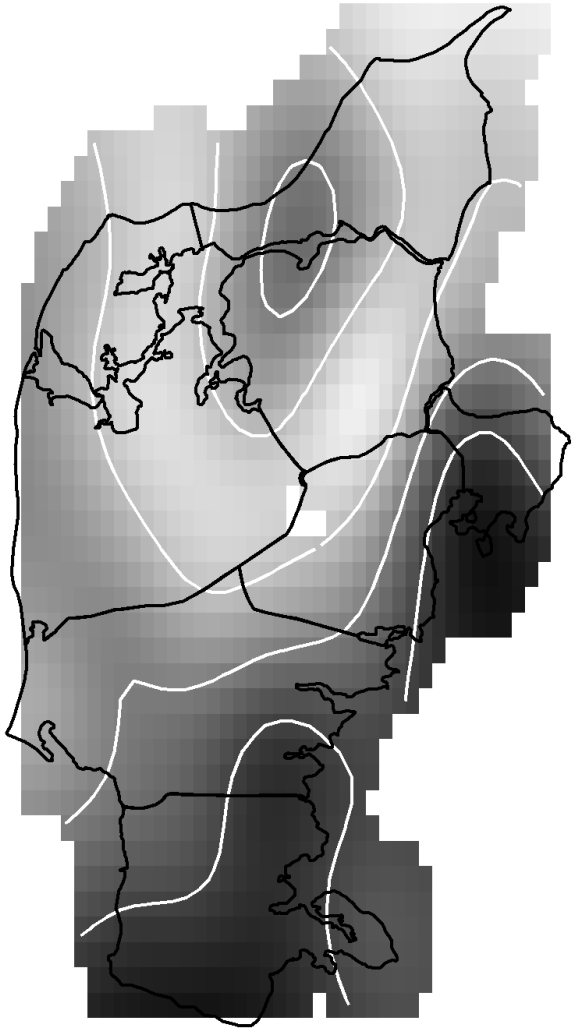


Non-linear fit



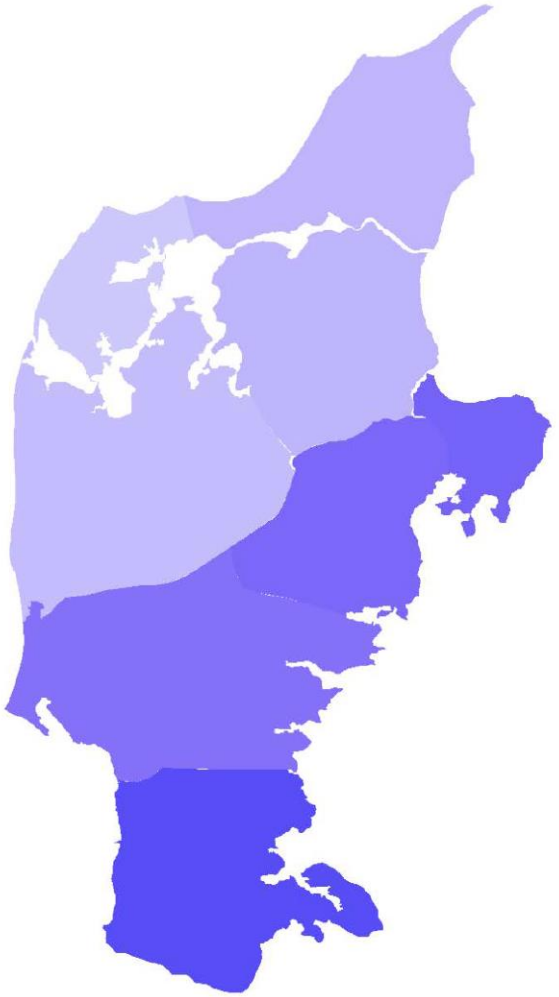
Statistical modeling – voicing lag

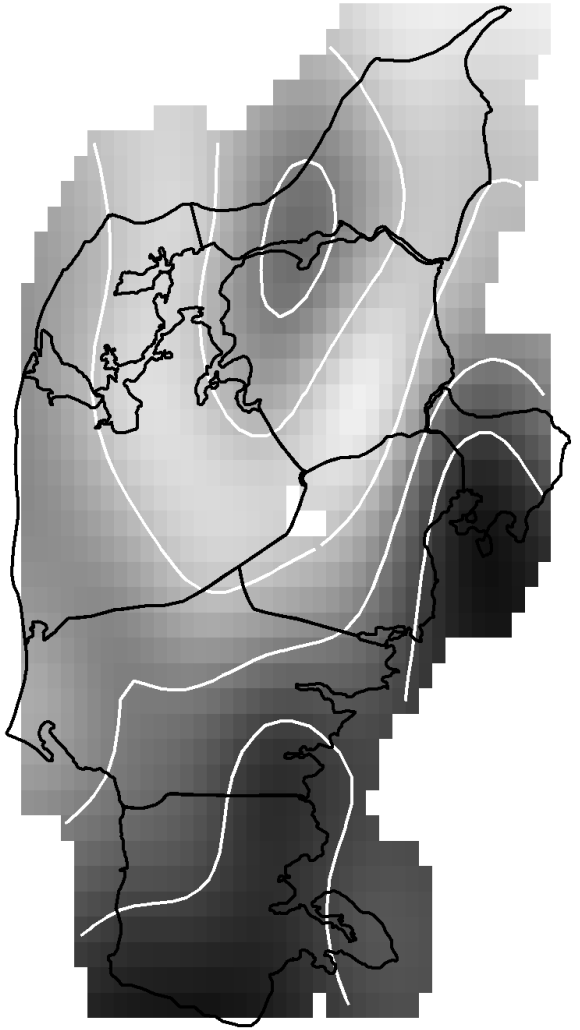
- The voicing lag data were fitted to a generalized additive mixed model
  - Dependent variable: voicing lag
  - Fixed effects: speaker gender, palatalization, vowel height, vowel backness, vowel roundness, stress, plosive
  - Random slopes for informants (=location)
  - Seperate smooths (non-linear predictors) for geographical area by plosive, geographical area modeled by longitude × latitude



Statistical modeling – voicing lag

- All fixed effects significantly influence voicing lag
- An effect of geographical area on voicing lag was found for /g p t k/ but not /b d/.



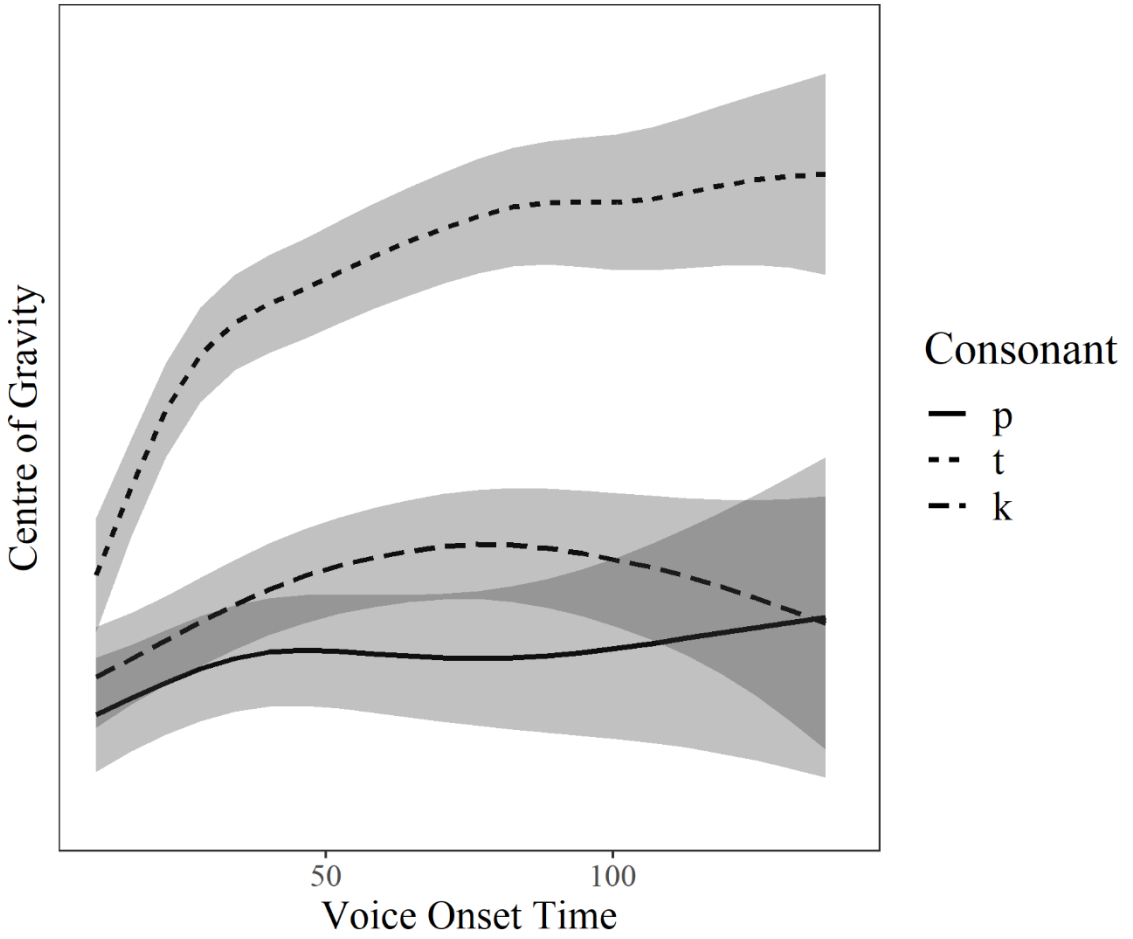


Statistical modeling – affrication

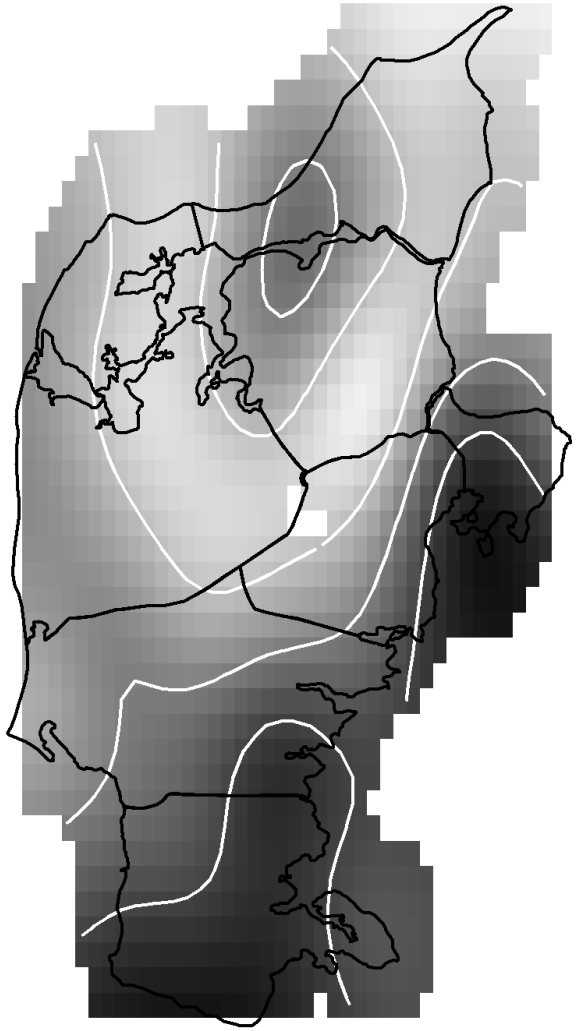
- The COG data were fitted to a generalized additive model with the same effects structure

  - All effects significant

- Non-linear predictor added to test for relationship between affrication and voicing lag
- A certain amount of voicing lag found to be a *necessary* but not *sufficient* condition for affrication

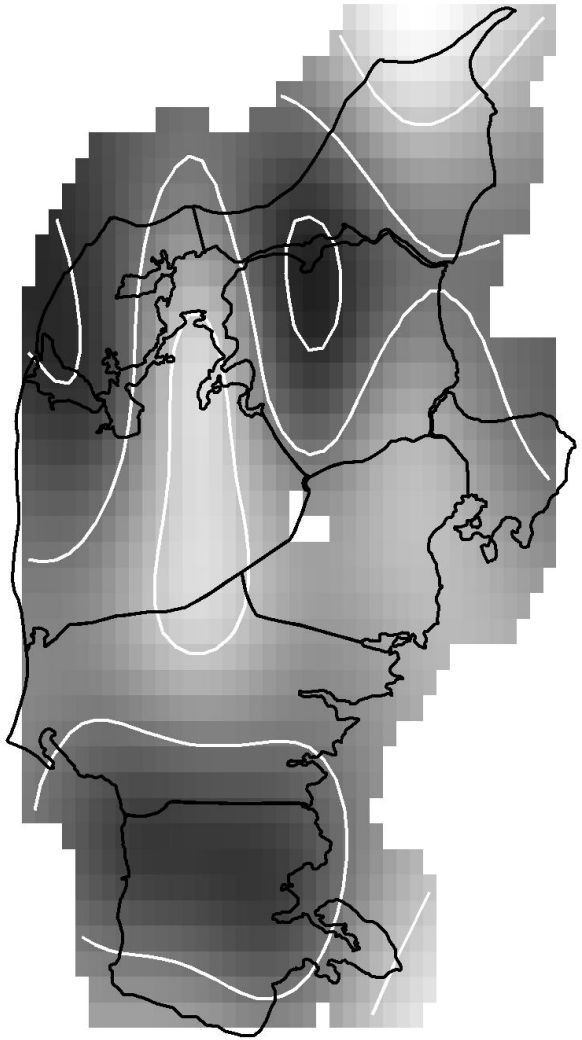


Statistical modeling - affrication



Voicing lag

Affrication



Interim conclusions 1

- Gradient patterns of variation in plosive realization
  - Throughout Jutland
  - For all fortis plosives (showing roughly similar patterns)
- Patterns of variation do not correspond to established dialect boundaries
- Relatively long voicing lag is a necessary but not sufficient condition for affrication

Phonological processes (work in progress!)

- From a traditional viewpoint, none of this might be assumed to have an influence on underlying representations
  - It might just be a matter of [±sg] or [±voice], the rest being up to phonetic implementation
  - Phonetic implementation: a) a different grammar, or b) not part of grammar
- Patterns of allophone selection suggest that the phonetic variation has seeped into phonology

  - These patterns are lifted from extensive notes made during data analysis

Fortis stop categorization

- Short or medium-long voicing lag <> Long voicing lag
- Very low affrication <> Some affrication <> Much affrication

- Only indirect correspondences between voicing lag and affrication
- Fortis stop realization predicts allophone selection for all stops
  - Lots of variation in lenition phenomena
  - Coda, unstressed onset

Allophone selection

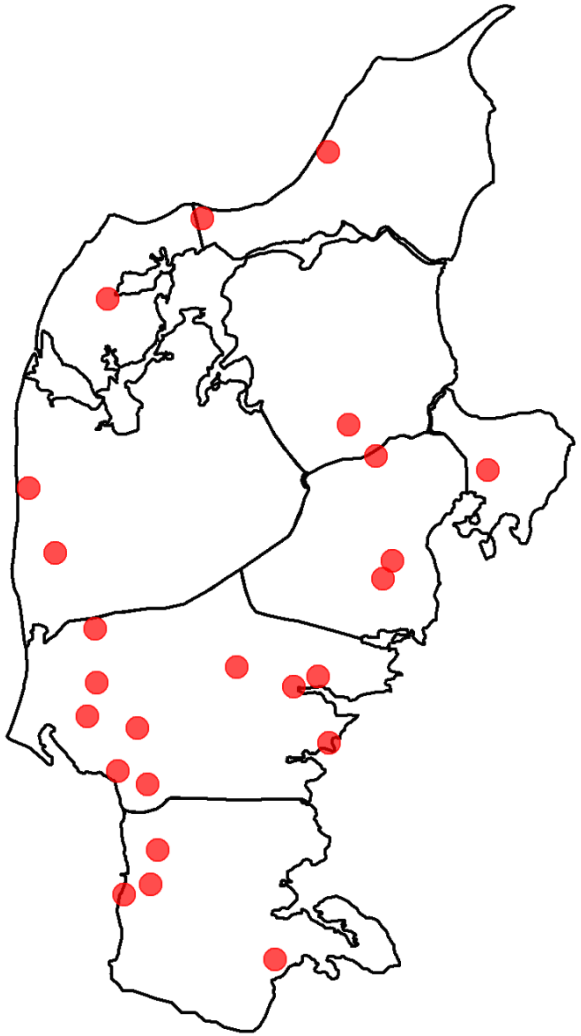
- High degree of voicing lag
  - Lenis stops → voiceless fricatives

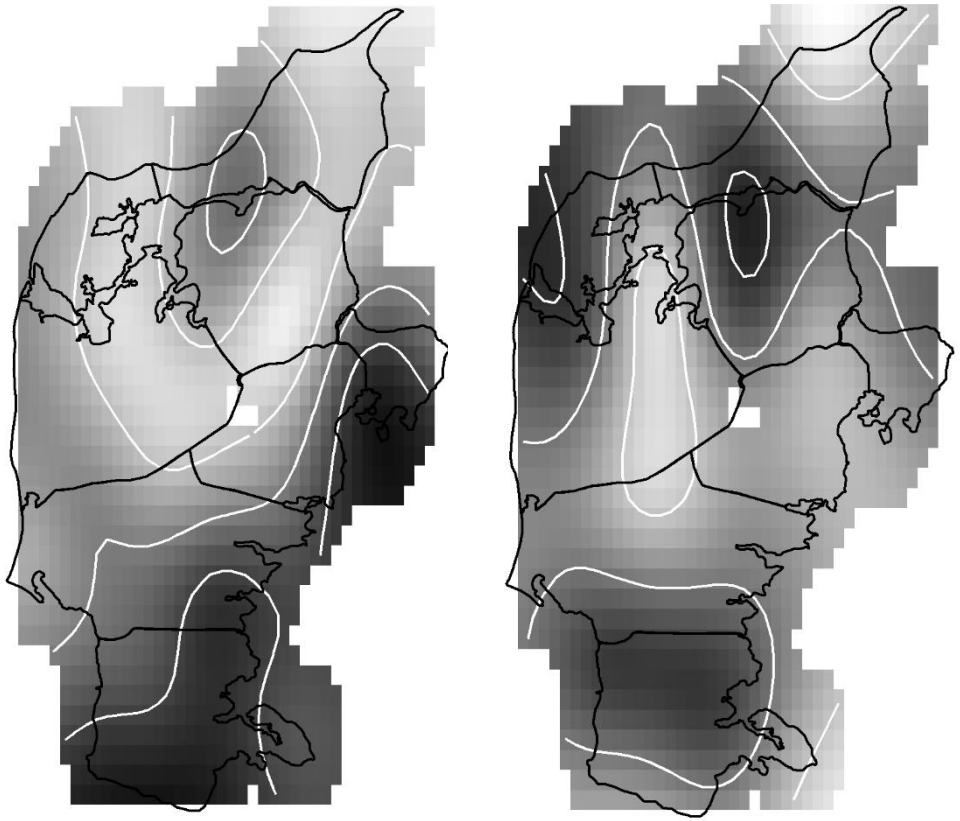
- Low/medium voicing lag
  - Lenis stops → voiced fricatives
  - (Fortis stops → [ʔ])

Allophone selection

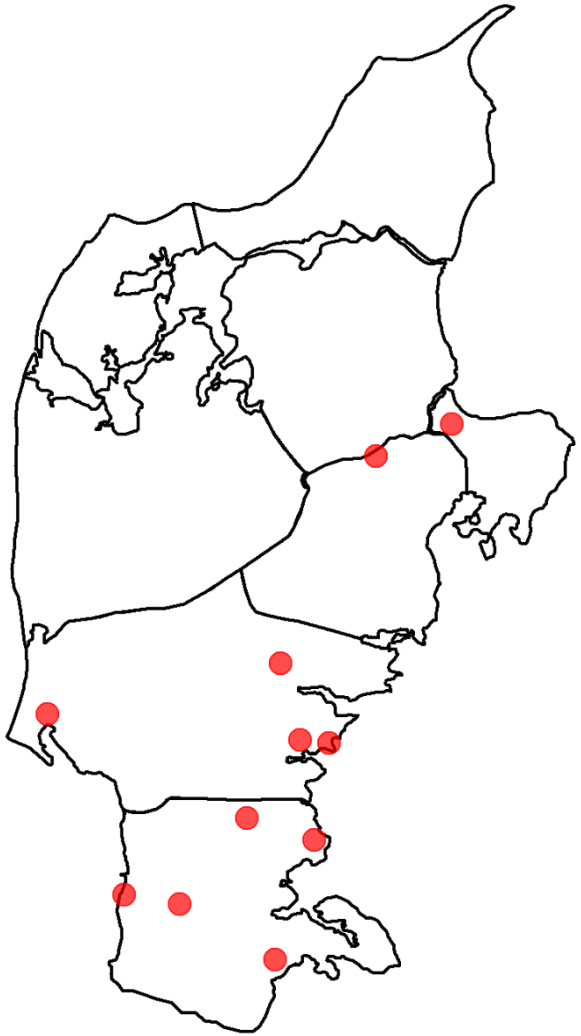
- Much affrication
  - Fortis stops → Voiceless fricatives
  - Partial neutralization between fortis <> lenis
- Some affrication
  - /k/ → [x ~ χ]
  - Partial neutralization between /k/ and /g/
- Very low affrication
  - No spirantization of fortis stops

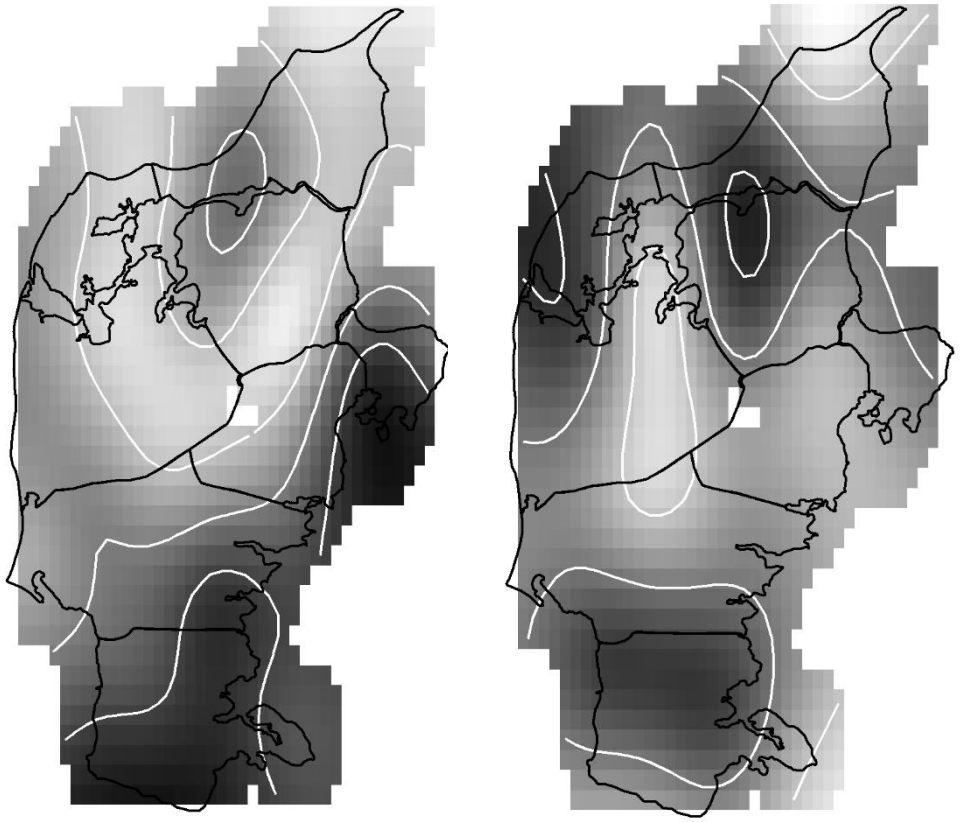
/b/ → [v]



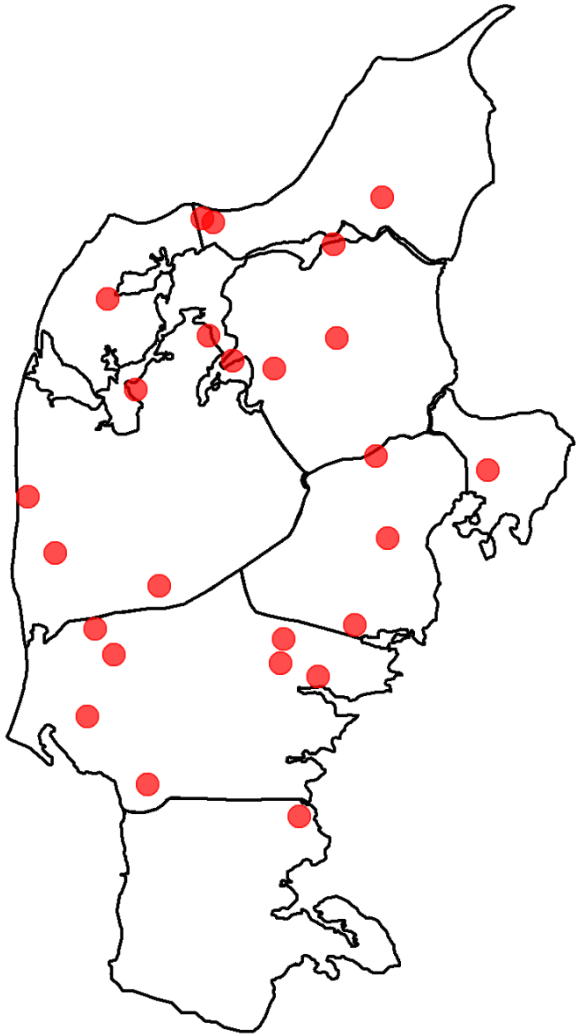


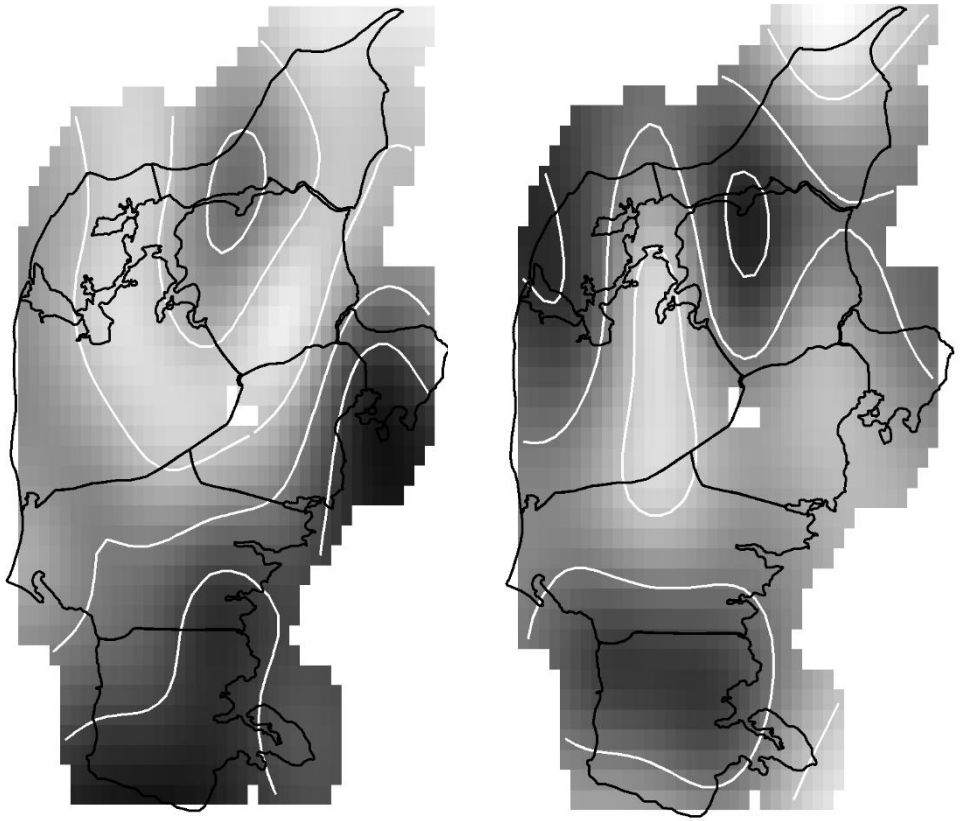
/b/ → [f]



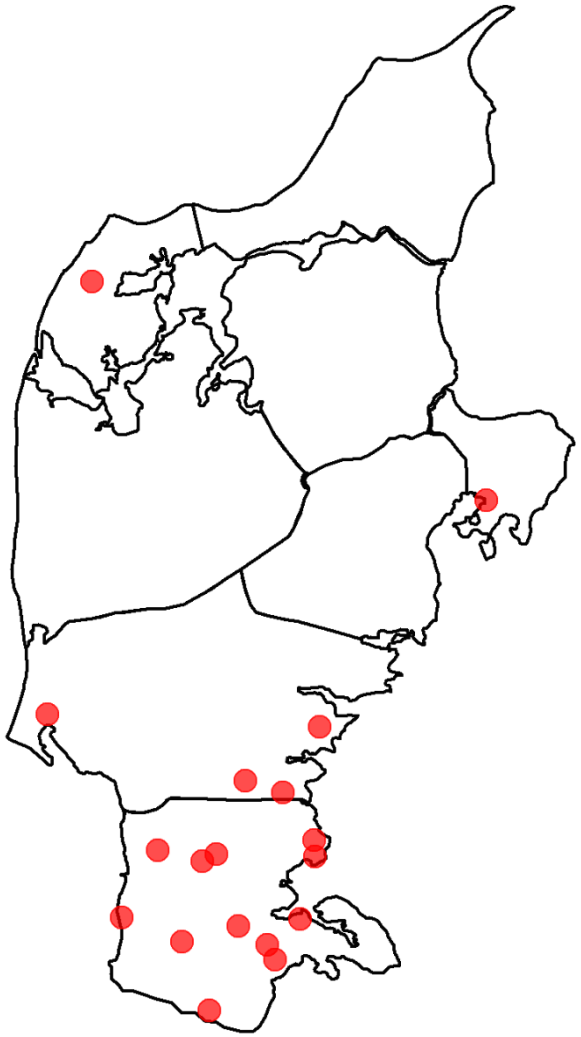


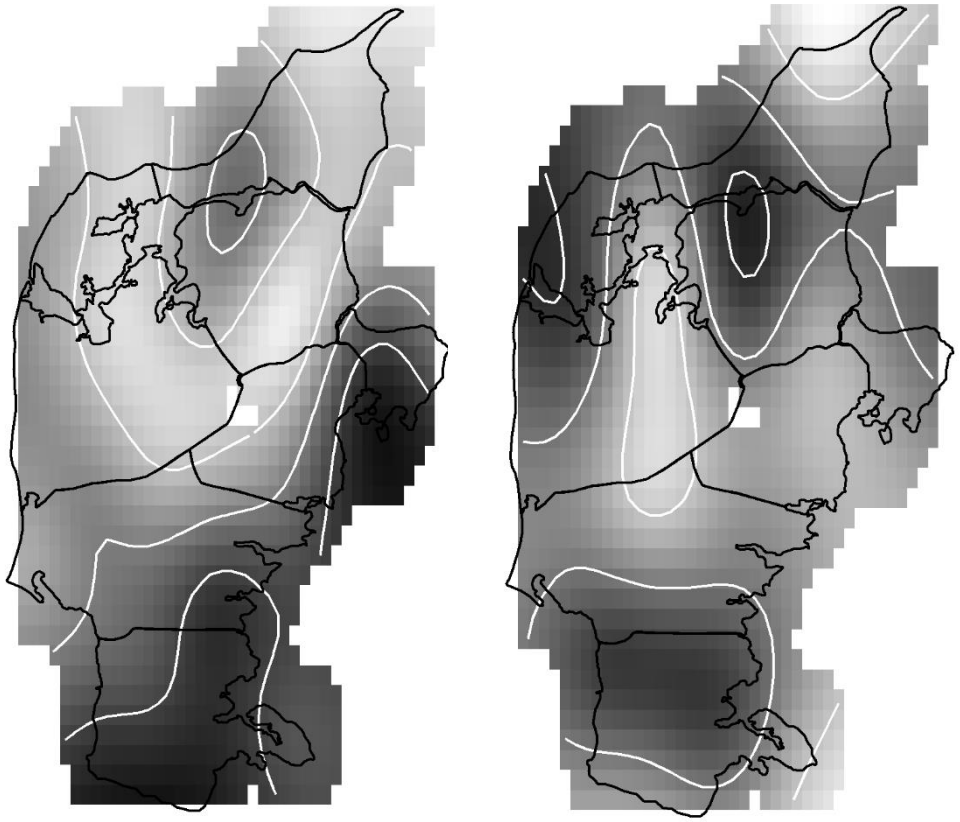
/g/ → [ɣ]



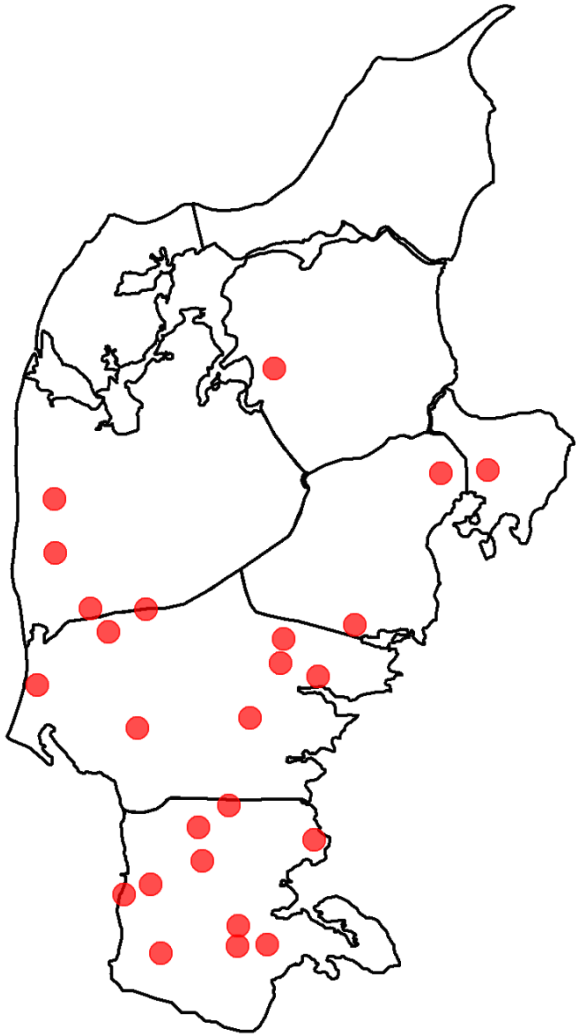


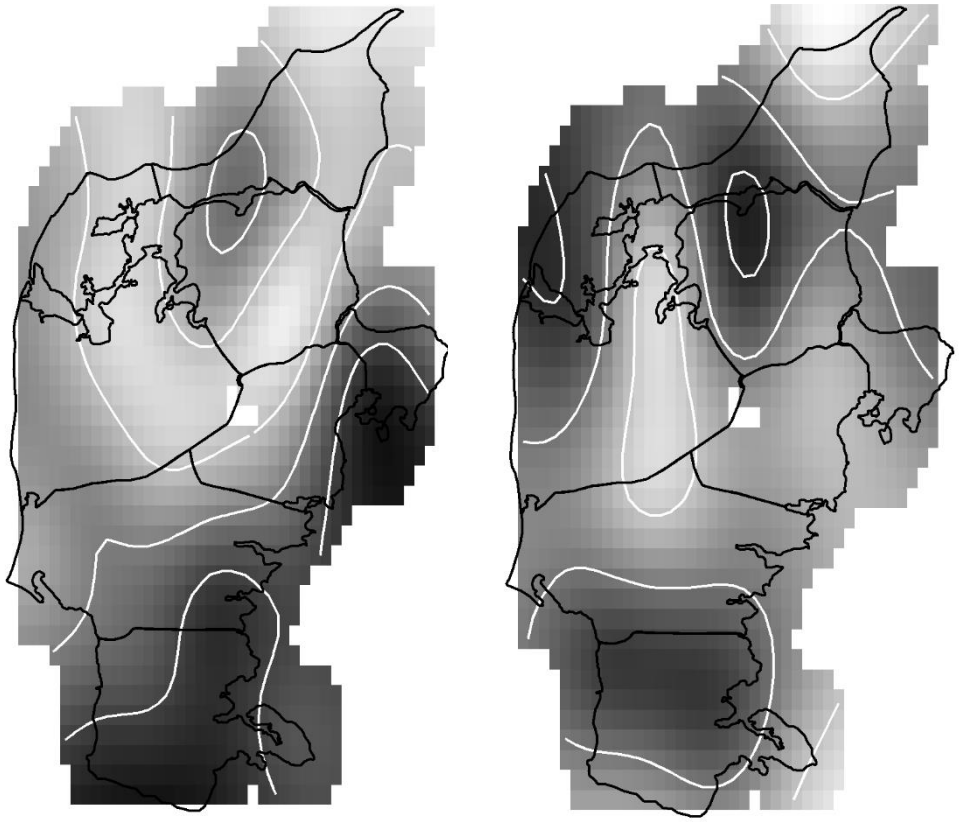
/g/ → [x ~ χ]



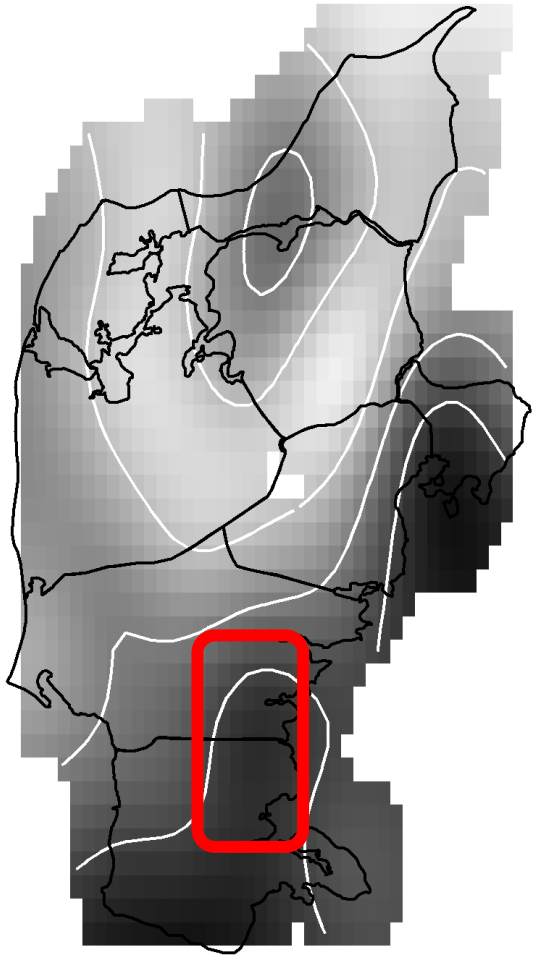


/k/ → [x ~ χ]



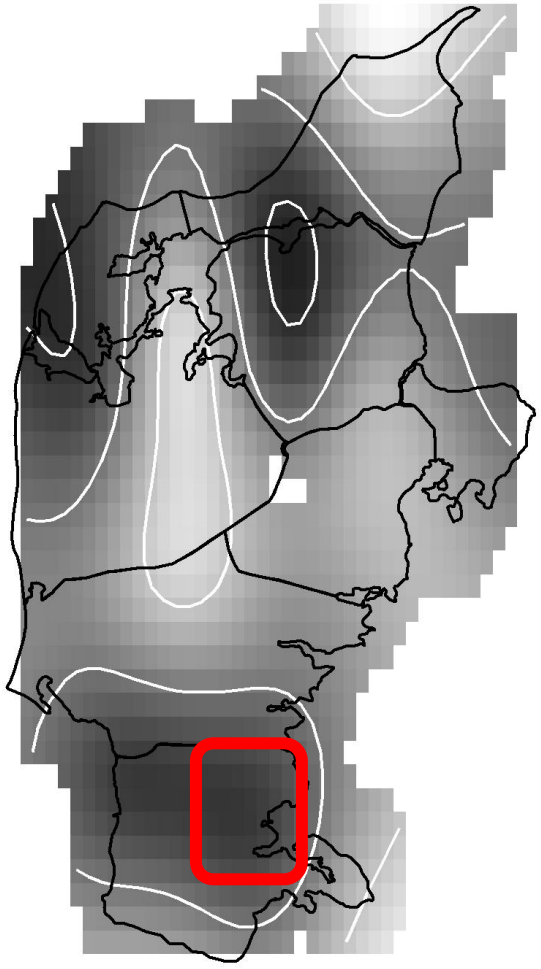


Other patterns



« /t, k/ → [ʔ]

/t/ → [s] »



Phonological representation: aspiration

- Stop → Fricative can be analyzed as an increase in aperture
  - Any voicing setting seems to be stable (so P[α voi] → F[α voi])
- Some dialects are assumed to have active voicing, some not
- Diagnostic: Dialects without active voicing are susceptible to laryngeal neutralization in lenition contexts

Phonological representation: affrication

- Two possible implementations of Fortis stop → Fricative
  - 1: Increase in aperture
  - 2: Loss of closure
- Option 2 is only possible if affrication is present
- Since Fortis stop → Fricative always correlates with (at least some) affrication, Option 2 is assumed to be most likely
- This indicates that affrication is phonological

Interim conclusions 2

- Voicing lag and affrication are partly connected, but also individually have an influence on allophone selection
  - Indicating that they may be separately specified
- Some dialects have active voicing, which is retained in fricative alternations. Some don't, resulting in laryngeal neutralization in fricative alternations.
- Spirantisation of fortis stops is analyzed as loss of closure, since it targets affricating dialects

Interim conclusions 2

- The gradient variation in phonetic realization is intricately connected with patterns of lenition
  - A theoretical caveat…
  - I *am* claiming that the phonetic realization is connected to the sounds' underlying representations
  - I am *not necessarily* claiming that the phonetic realization of the sounds affect their phonology in any synchronically meaningful sense
  - Rather that their diachronic trajectory are responsible both for their synchronic phonetic realization and allophone selection

To be continued

- This work remains in progress! Still to be done:
- A more systematic categorization of alternations
- A more firm theoretical grounding
  - Representations using a segment-internal framework such as Q-theory (e.g. Shih & Inkelas 2019)

References

- Bennike, Valdemar & Marius Kristensen. 1912. *Kort over de danske folkemål med forklaringer*. Copenhagen: Gyldendalske Boghandel.
- Maegaard, Marie & Malene Monka. 2019. Patterns of dialect use. Language standardization at different rates. In Marie Maegaard, Malene Monka, Kristine Køhler Mortensen & Andreas Candefors Stæhr (eds.), *Standardization as sociolinguistic change. A transversal study of three traditional dialect areas* (Routledge Studies in Language Change), 27–46. London & New York: Routledge. doi:10.4324/9780429467486-2.
- Pedersen, Inge Lise. 2003. Traditional dialects of Danish and the de-dialectalization 1900-2000. *International Journal of the Sociology of Language* 159, 9–28. doi:10.1515/ijsl.2003.012.
- Puggaard, Rasmus. 2018. Realizations of /t/ in Jutlandic dialects of Danish. *Linguistica Lettica* 26, 368–393.
- Shih, Stephanie S. & Sharon Inkelas. 2019. Autosegmental aims in surface-optimizing phonology. *Linguistic Inquiry* 50(1), 137–196. doi:10.1162/ling_a_00304.
- Skautrup, Peter. 1968. *Det danske sprogs historie IV. Fra J.P. Jacobsen til Johs. V. Jensen*. Copenhagen: Gyldendal.
- Sóskuthy, Márton. 2017. Generalised additive mixed models for dynamic analysis in linguistics. A practical introduction. arXiv:1703.05339v1.

Tak for jeres opmærksomhed!

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Bij ons leer je de wereld kennen

Appendix – Parametric coefficients, VOT

	estimate	SE	t	p	
(Intercept)	8.085	0.924	8.749	<.001	***
gender=male	-3.627	0.916	-3.961	<.001	***
palatalized=yes	7.380	0.559	13.192	<.001	***
height=low	-2.090	0.291	-7.175	<.001	***
height=mid	-2.309	0.278	-8.294	<.001	***
backness=central	1.612	0.466	3.464	<.001	***
backness=front	2.511	0.379	6.623	<.001	***
roundness=round	2.481	0.360	6.891	<.001	***
stress=yes	3.048	0.206	14.807	<.001	***
consonant=d	4.388	0.383	11.457	<.001	***
consonant=g	4.963	0.386	12.869	<.001	***
consonant=p	27.693	0.452	61.335	<.001	***
consonant=t	36.848	0.332	110.851	<.001	***
consonant=k	37.412	0.341	109.743	<.001	***

Appendix – Parametric coefficients, COG

	estimate	SE	t	p	
(Intercept)	2008.14	61.71	32.542	<.001	***
gender=male	-150.61	48.2	-3.125	0.002	**
palatalized=yes	465.49	41.98	11.087	<.001	***
height=low	-130.17	22.5	-5.784	<.001	***
height=mid	21.13	20.86	1.013	0.31	
backness=central	-79.9	36.1	-2.213	0.03	*
backness=front	245.94	28.42	8.653	<.001	***
rounded=yes	-429.78	27.61	-15.567	<.001	***
plosive=p	-231.51	27.61	-8.385	<.001	***
plosive=t	1099.94	18.27	60.193	<.001	***
stress=yes	74.88	15.95	4.695	<.001	***