Dialectology: Aggregate Dialectal Variation

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Debts

We thank especially:

- Peter Kleiweg (software, visualization ideas)
- Wilbert Heeringa (collaboration on Dutch pronunciation, lexis)
- Bill Kretzschmar (making LAMSAS available)
- Marco Spruit (collaboration on Dutch syntax)

More about dialectometry in Groningen can be found at:
`http://www.let.rug.nl/heeringa/dialectology/`
`http://www.let.rug.nl/kleiweg/lamsas/`

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Course Overview

- Introduction and Overview
- Lexical Analysis — Word Geography
- Pronunciation
- Validation and Meta-Analysis
- Explanation in Dialectology
- Linguistics in Dialectology

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Goals

- Present dialectometry, emphasizing results
- Probe critical points.
  - Foundations
  - Relations to other approaches
  - Puzzle wrt sensitivity and quality
  - Applying explanatory models
  - Role of linguistics

    —so criticize!

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What is dialectology?

- Study of language variation and how it's used to mark geographic provenance.
- Geographic focus distinguishes dialectology from sociolinguistics
- Variation that isn't used (by language users) to mark geographic provenance ultimately falls outside dialectology.
  - Sub-perceptual variation (consider concomitants of fortis/lenis stop distinctions such as rise in F_0, F_1 of vowel following fortis, weaker bursts following lenis, longer duration of vowels preceding lenis, ...)
  - Noise, incl. individual variation, common variation

  But we don't know *a priori* which variation does real work in marking provenance, and which doesn't
- Therefore we *need* aggregating techniques.

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Introduction

Variation of *deur* ‘door’, *potten* ‘pots’ and *wijn* ‘wine’ as perceived by a traveler in Netherlands/Flanders. Extra-short sounds in superscript.

Consequences

- Dialectologists study how language variation is used to mark geographic provenance.
- This may exploit linguistic structure, but it may not.

  linguistic structure syllable-final /r/'s in Eastern New England ([ba] 'bar', etc.); Southern /aɨ/ ([ba] 'buy', etc.)

  haphazard *tonic* 'soda pop' in Boston
- If we first examine all variation, we have a chance at saying how much is linguistically structured.
- Note that comprehensibility may be affected, but only when variation is extreme. There's lots of variation which does not impede comprehensibility.

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Consequences

- Dialectologists study how language variation is used to mark geographic provenance.
- Therefore, dialectology is ultimately grounded in how people perceive one another's speech.
- Basis of Jo Daan's "arrow method"
- Should we therefore turn over dialectology to psycholinguistics?

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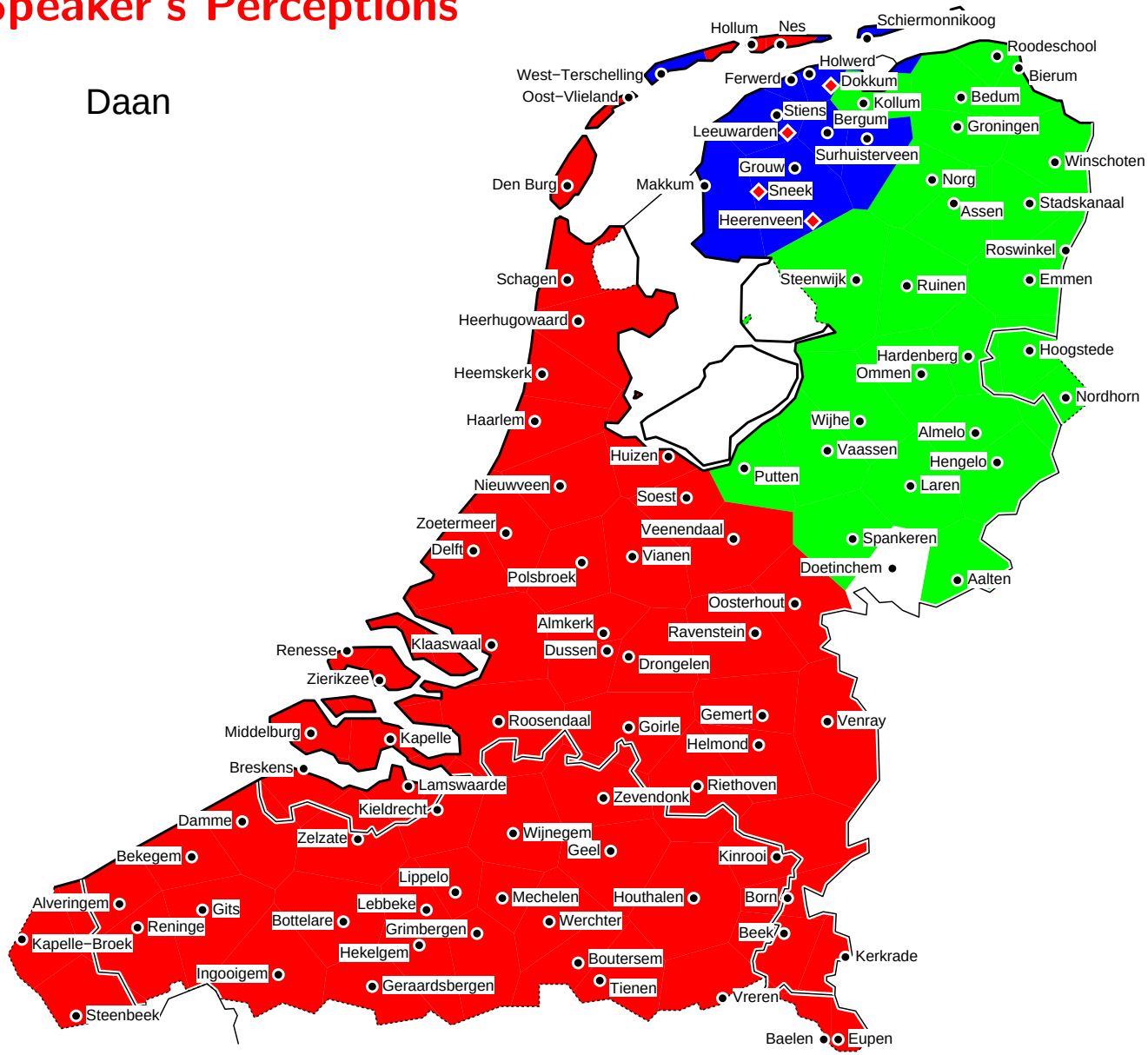
Dialect Speaker's Perceptions

Daan



Perception

- If dialectology studies how language variation is used to mark geographic provenance, which is ultimately grounded people's perception one another's speech, should we therefore turn over dialectology to psycholinguistics?
- There should be a role for perceptual studies in validating dialectological hypotheses and methods.
- But we want a linguistic perspective, not just a psycholinguistic one.
  - Perceptual studies are expensive, but dialect data is available for linguistic analysis.
  - We want to understand the linguistic basis of affinity judgements.

    —once we find that the Mason-Dixon line is important, perceptually, we want to know what linguistic features figure in the sensitivity

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Bloomfield's Historical Perspective

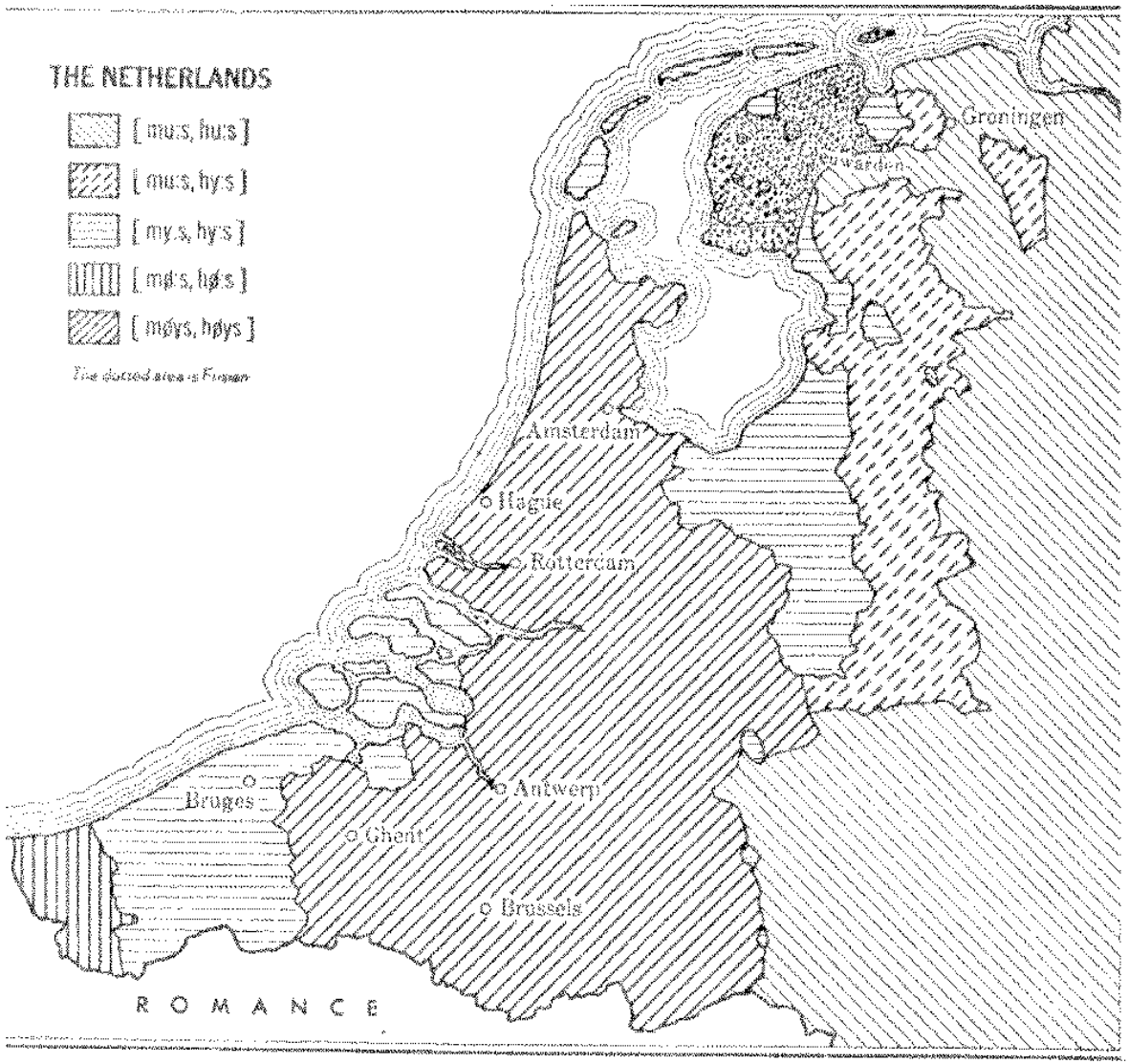

FIGURE 6. Distribution of syllabic sounds in the words *mouse* and *house* in the Netherlands. — After Klocke.

Lessons from Bloomfield et al.

- Simple maps of forms are normally subject to exception, potentially contradicting dialectal trends
- Problem: the more detail one attends to, the less dialects appear to cohere. We need principled ways of aggregating.
- Seeking "isogloss bundles" is on the right track, because it looks to aggregate properties rather than identify small numbers of co-indicting diagnostics, but we need tools to analyse these aggregates.
- Coseriu (1956) also warned against "atomism" in dialectology

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How to Progress in Dialectology

- Goal:
  Method for exploring dialect borders and dialect continua at any degree of detail.
- Objective:
  Find a 'ruler' or dialectometric method with which the linguistic distances between any pair of dialects can be measured in an objective way.

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Alternative Methods

- (19th century) Tribes and intuition
- "isogloss method": no satisfying way to identify *which* isoglosses should be used
- "Structure geographic" method (Moulton, Goosens): phoneme inventories differences are sufficient, but not necessary indicators (e.g., degree of aspiration in Hiberno-English)
- Arrow method (e.g. Daan's map, 1969): only dialects that border on each other can be compared.
- Perception experiment: many (groups of) subjects are necessary.

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Dialectometry

- Jean Séguy
  - Director of the *Atlas linguistique de la Gascogne*.
  - He coined the term *dialectometry* (1973).
  - Dialect distance: number of items of disagreement, expressed as a percentage.
- Hans Goebl and Edgar Haimerl
  - Strongly related to but independent of Séguy in development
  - Goebl explores connections with numerical taxonomy, geography and cartography.
  - Goebl deepened and broadened dialectometry
- Brett Kessler (1995) introduced edit distance as a technique to measure pronunciation differences between individual words.
- Heeringa (2004) deepened investigation into edit distance, developed several novel analytical techniques.

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Analyzing & Illustrating Dialectometric Results

- The result of a dialectometric measurement is a table of place $\times$ place distances, which is often quite large (there are 484 sites in LAMSAS, and 1162 informants)
- We need ways of seeing and interpreting these results
- Today, some visualizations.
- Later, some analytical tools.

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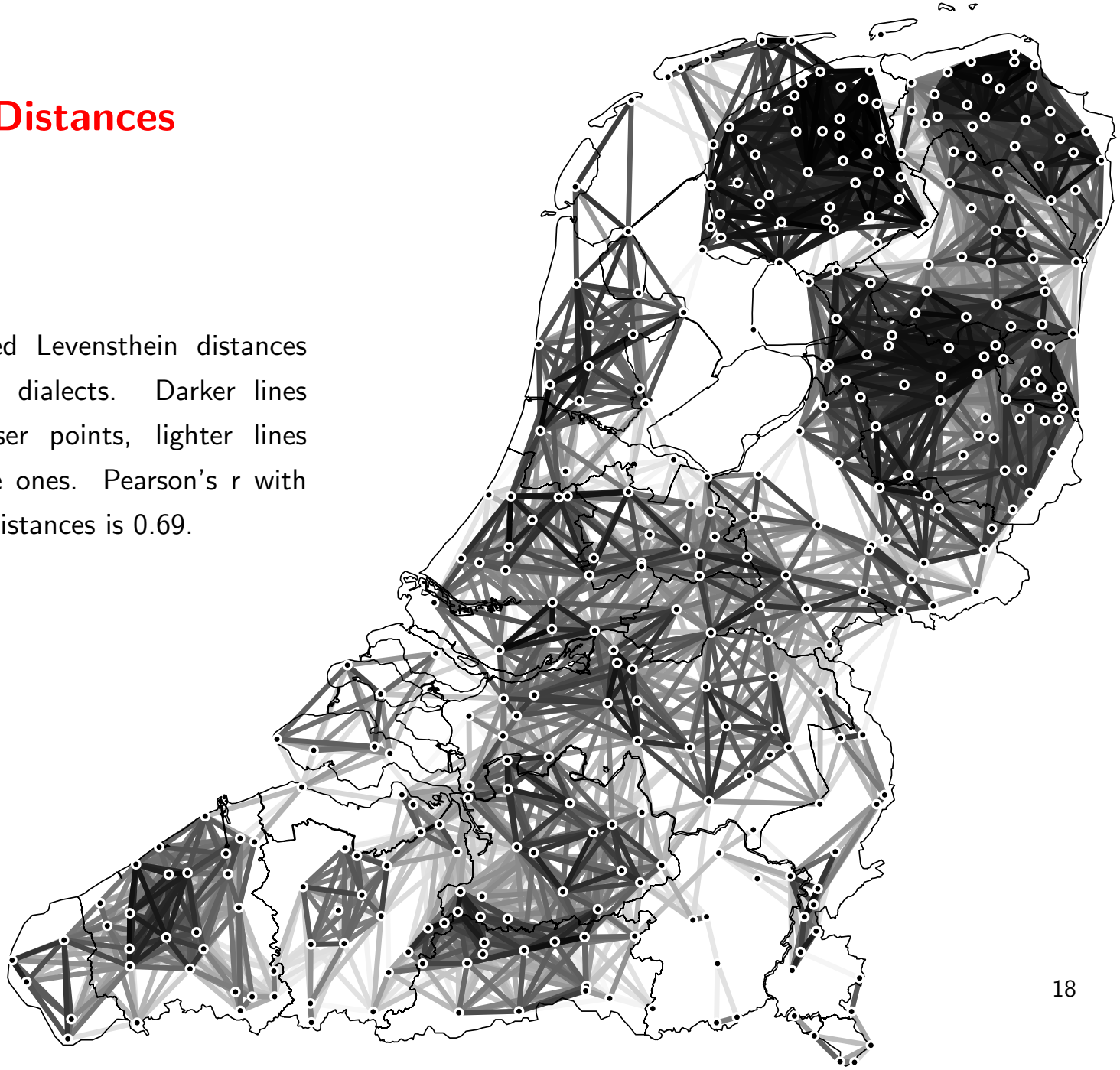
Distances

The averaged Levensthein distances between the dialects. Darker lines connect closer points, lighter lines more remote ones. Pearson's r with geographic distances is 0.69.



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Clustering

	Grouw	Haarlem	Delft	Hattem	Lochem
Grouw	0	41	44	45	46
Haarlem	41	0	16	34	36
Delft	44	16	0	37	38
Hattem	45	34	37	0	20
Lochem	46	36	38	20	0

Apply Johnson's algorithm to the upper half of the matrix (blue values):

- Iteratively,
  1. select shortest distance in matrix,
  2. fuse the two datapoints involved.
- To iterate, we have to assign a distance from the newly formed cluster to all other points (several alternatives, we used UPGMA).
- Repeat until one cluster is left over.

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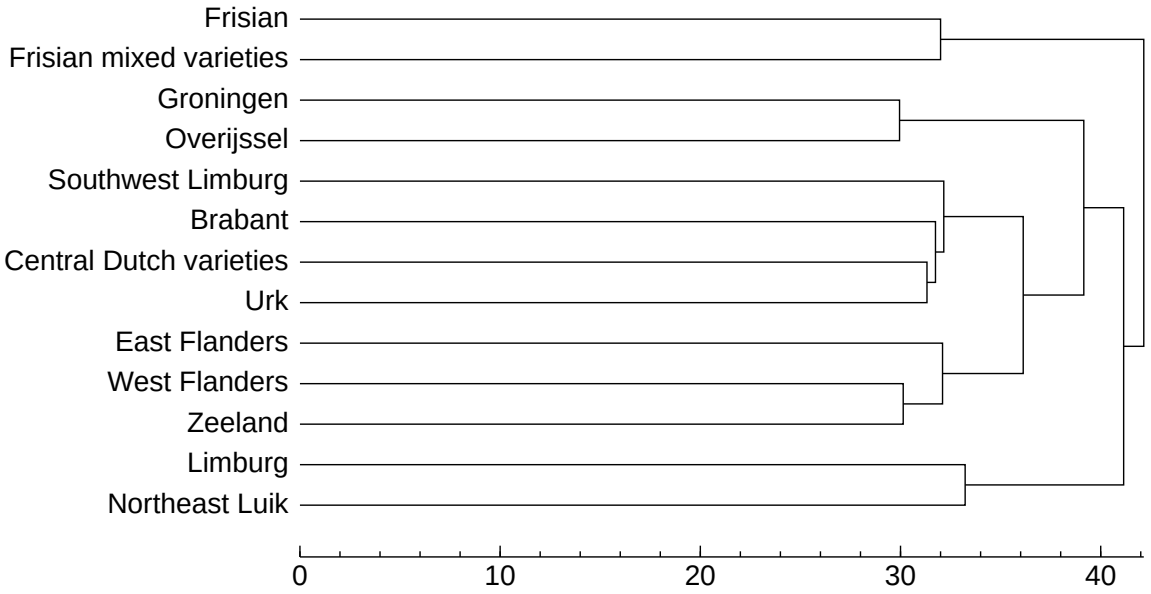
Clustering



Using cluster analysis a dendrogram is derived from the 360 $\times$ 360 matrix. The scale distance shows percentages. Each of the 13 most significant groups is summed in one label.

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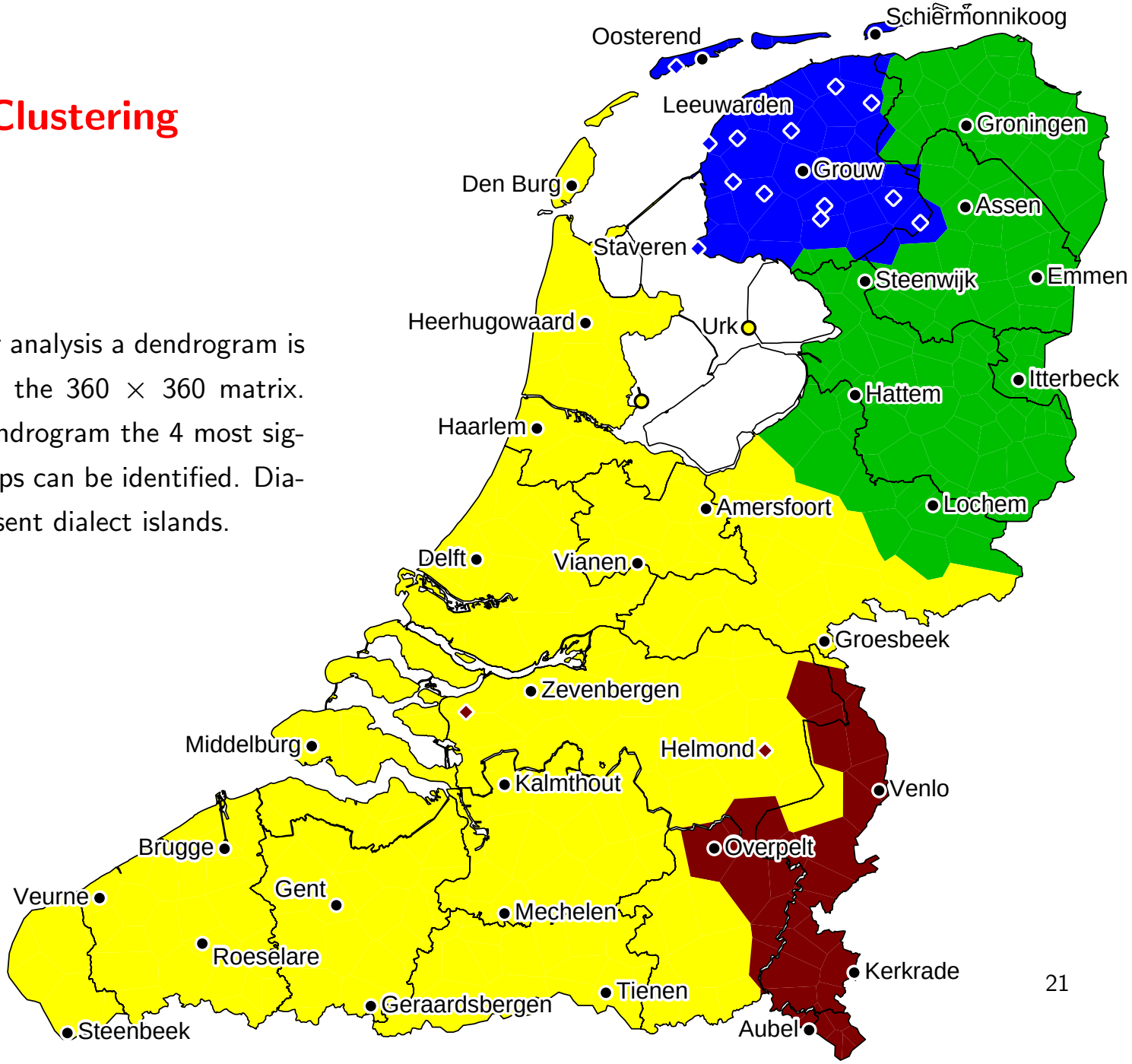
Clustering

Using cluster analysis a dendrogram is derived from the 360 × 360 matrix. From the dendrogram the 4 most significant groups can be identified. Diamonds represent dialect islands.



Clustering

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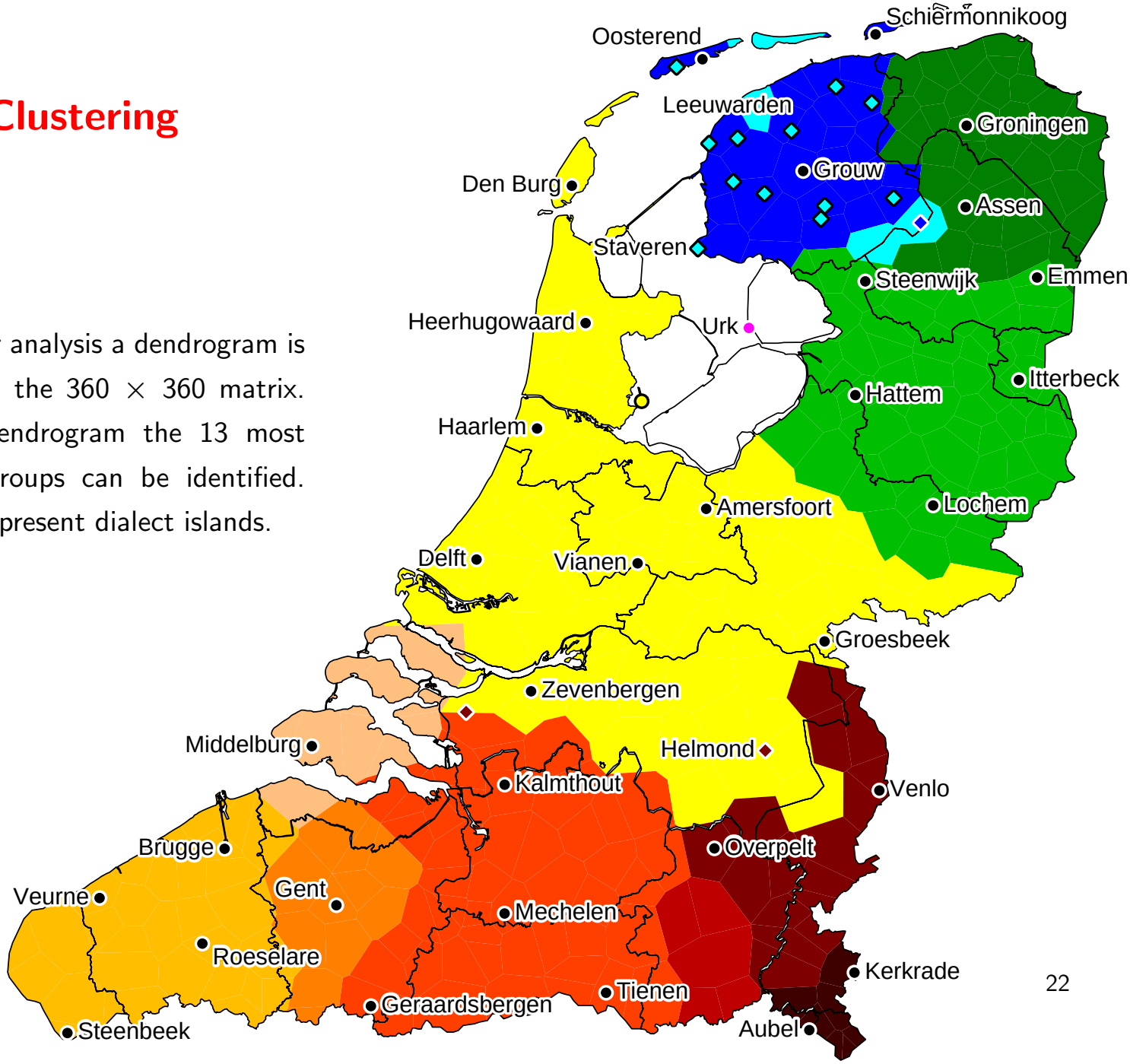
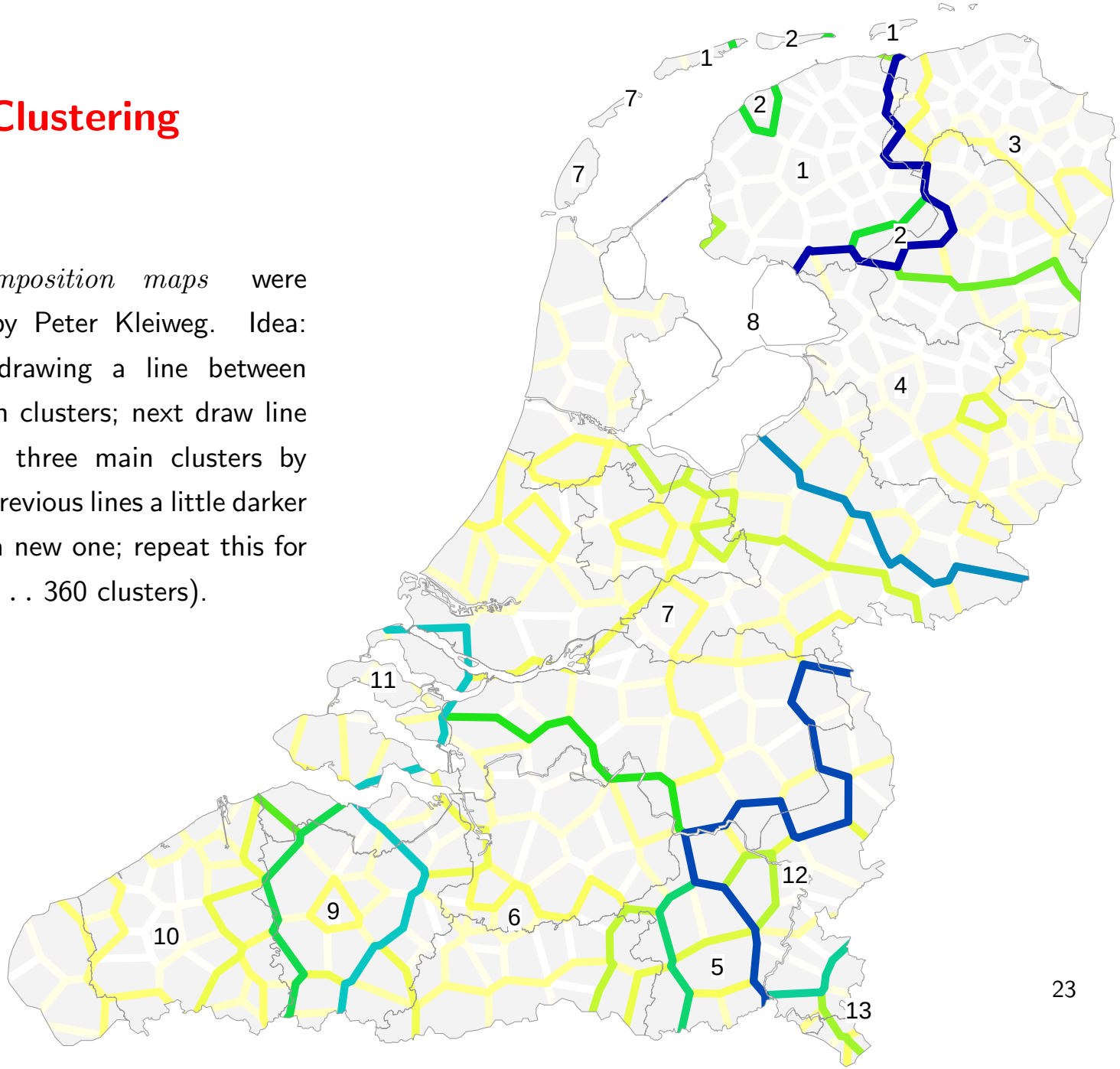


Clustering

Cluster composition maps were introduced by Peter Kleiweg. Idea: Start with drawing a line between the two main clusters; next draw line between the three main clusters by making the previous lines a little darker and adding a new one; repeat this for all levels (2 . . . 360 clusters).



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Multidimensional scaling

- Given a geographic map, distances between locations can be measured.
- Multidimensional scaling: given distances, locations on a map can be inferred.
- In our case: from n $\times$ n distances we infer coordinates in 2- or 3-dimensional space. So n dimensions are reduced to two or three.
- We use Kruskal's Non-metric Multidimensional Scaling.

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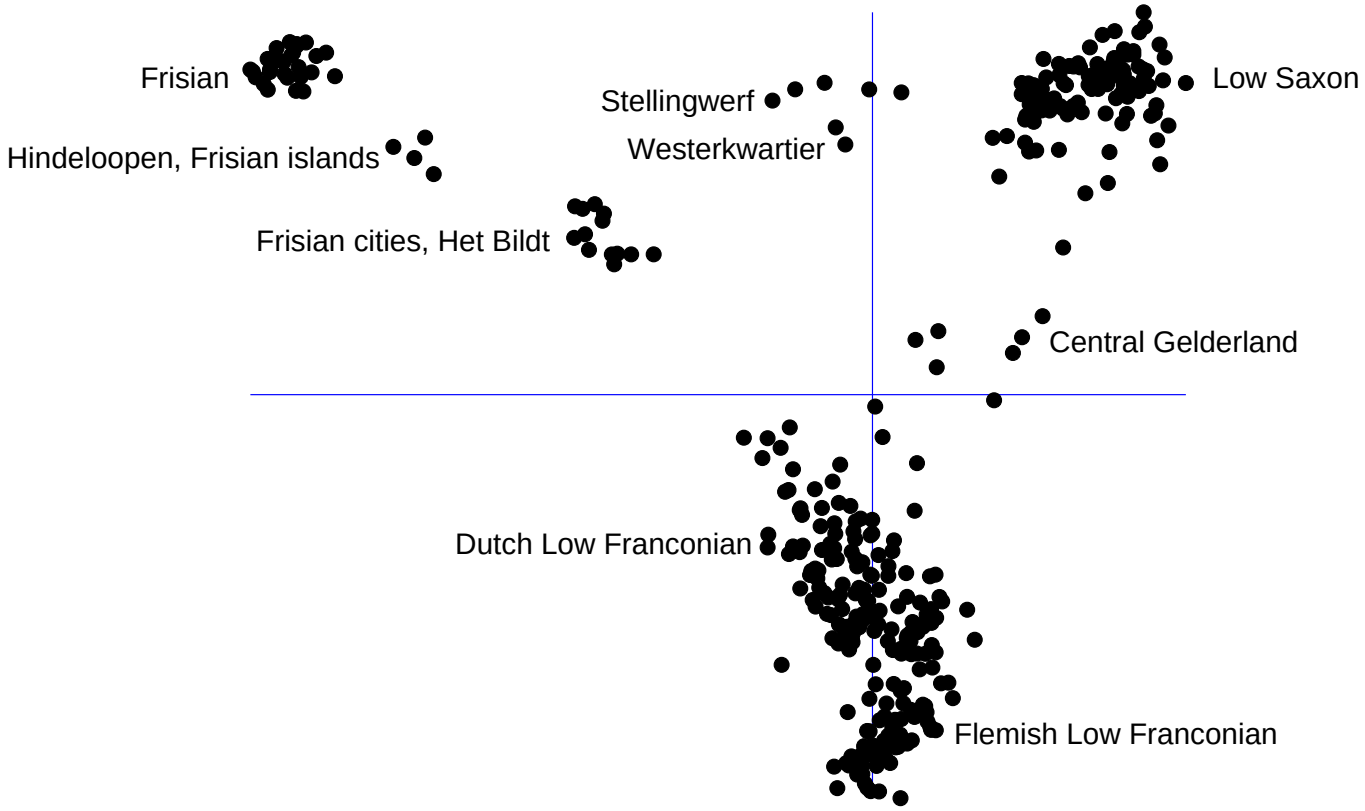
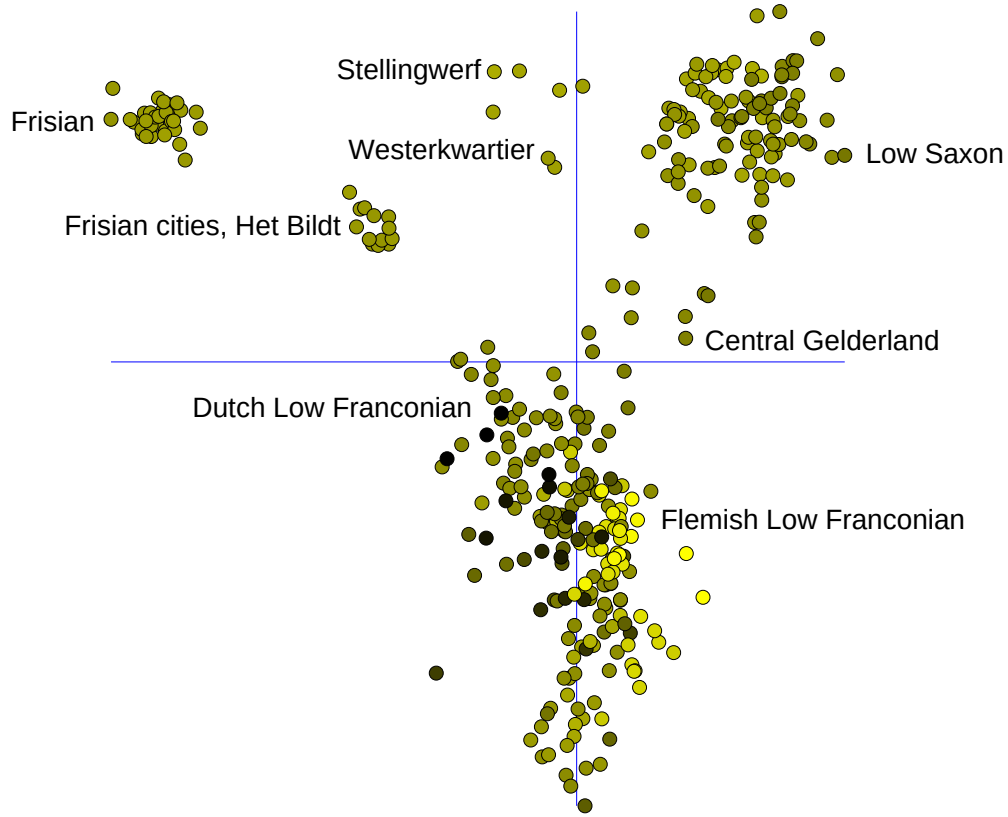
Multidimensional scaling



Using MDS the 360 dimensions are reduced to 2. Y-coordinates represent the first and X-coordinates inversely represent the second dimension.

Multidimensional scaling



Using MDS the 360 dimensions are reduced to 3. Y-coordinates represent the first, X-coordinates inversely represent the second, and greytone represents the third dimension (distinct in the South).

Conclusions

- We need aggregation techniques to make sense of dialectological data.
- Dialectological reality is ultimately grounded in the indications dialect speaker communicate about geographic provenance.
- A wealth of techniques is available, leading to questions of how to choose.

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Final remarks

Indebtedness (again):

- Wilbert Heeringa (general collaboration)
- Peter Kleiweg (software, visualization software)

More about dialectometry in Groningen:
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`http://www.let.rug.nl/kleiweg/lamsas/`

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