



# City Research Online

## City, University of London Institutional Repository

---

**Citation:** Slingsby, A. ORCID: 0000-0003-3941-553X (2018). Tilemaps for Summarising Multivariate Geographical Variation. Paper presented at the VIS 2018, 21-26 Oct 2018, Berlin, Germany.

This is the accepted version of the paper.

This version of the publication may differ from the final published version.

---

**Permanent repository link:** <https://openaccess.city.ac.uk/id/eprint/20884/>

**Link to published version:**

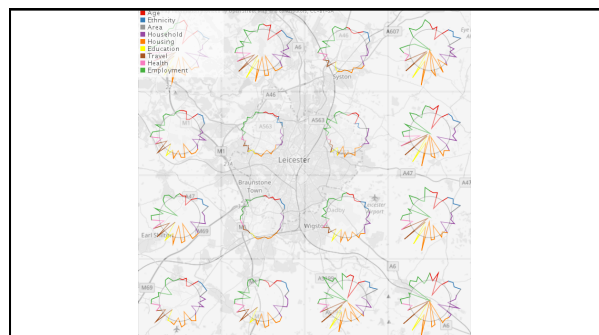
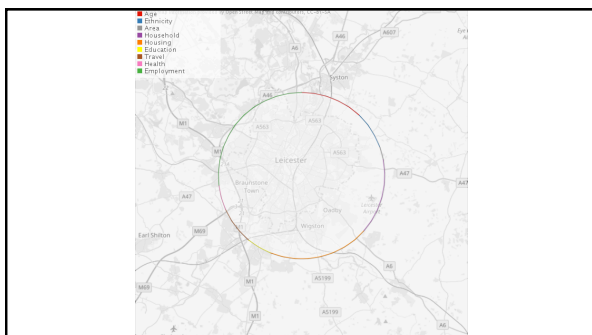
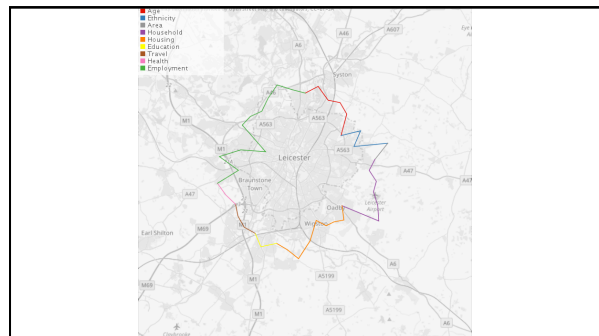
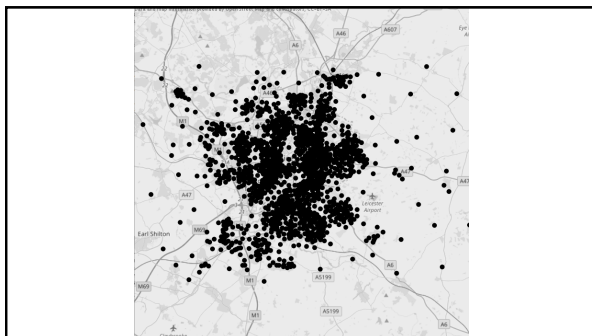
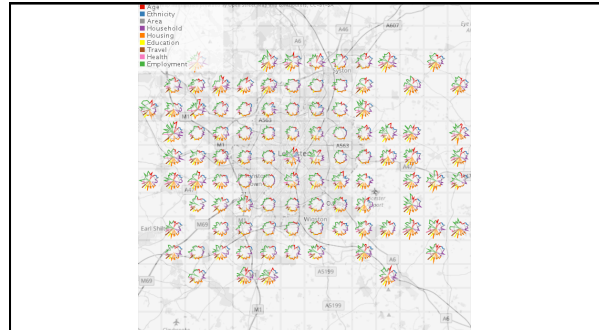
**Copyright:** City Research Online aims to make research outputs of City, University of London available to a wider audience. Copyright and Moral Rights remain with the author(s) and/or copyright holders. URLs from City Research Online may be freely distributed and linked to.

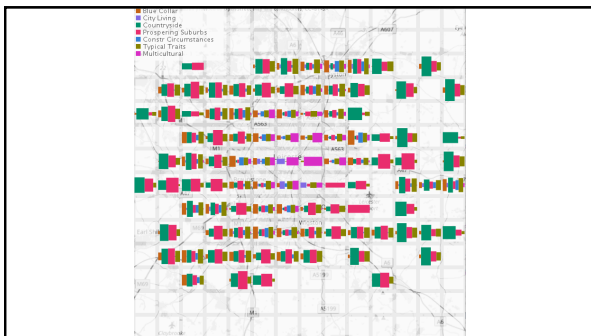
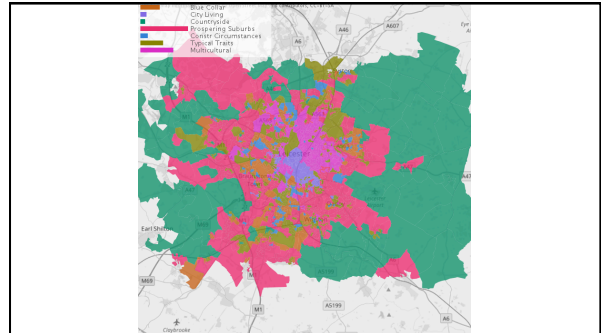
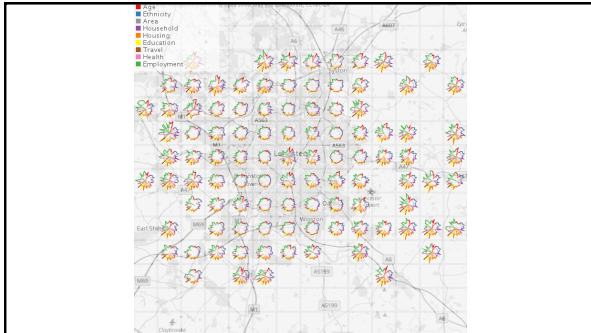
**Reuse:** Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge. Provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

# Tilemaps for Summarising Multivariate Geographical Variation

Depict multivariate variation over geographical space by placing glyphs on maps

Aidan Slingsby  
a.slingsby@city.ac.uk



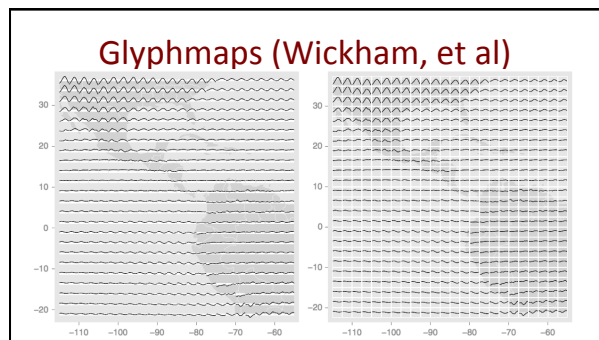
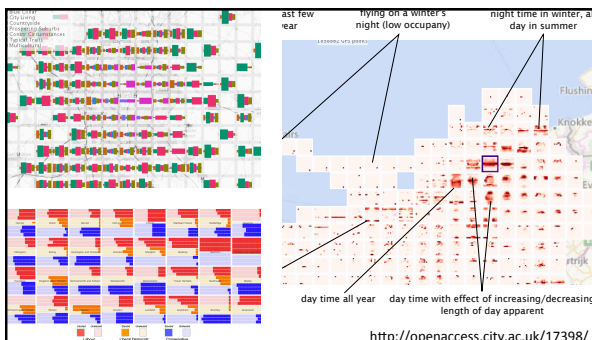
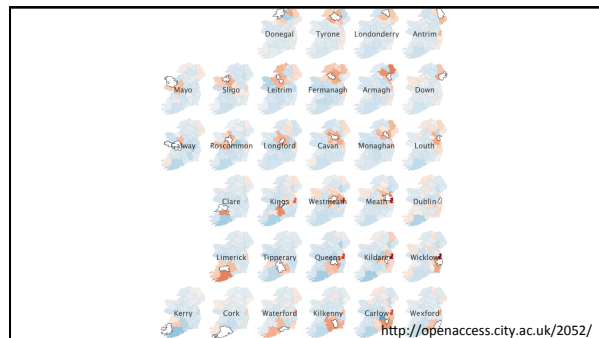
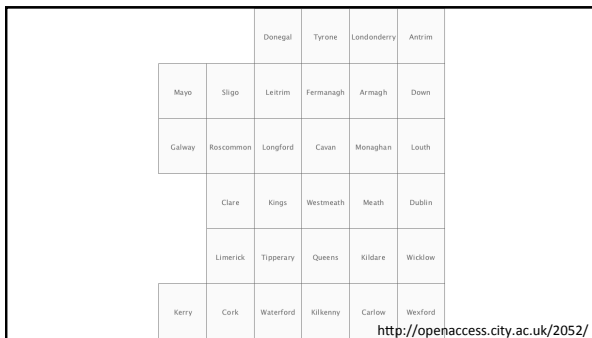
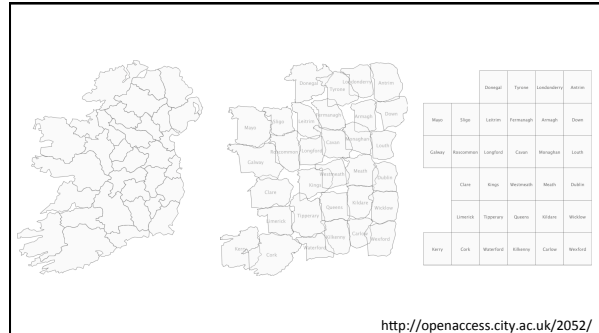
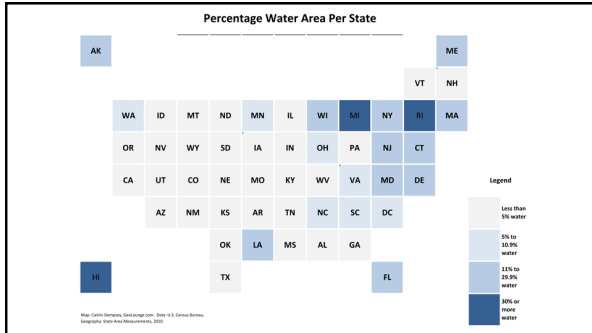


**WHAT FOR?**

**What for?**

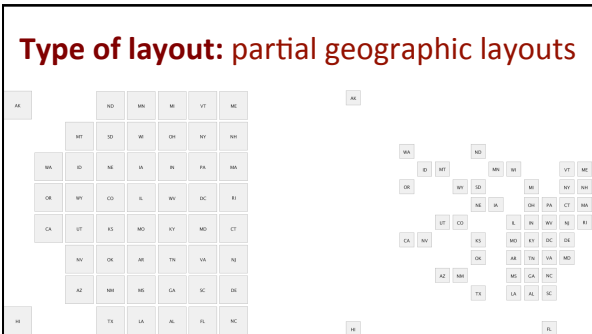
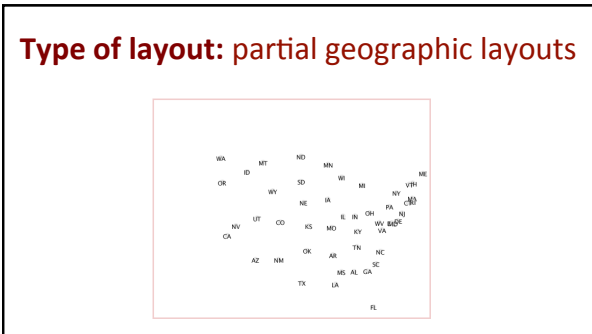
- Multivariate data
- Different measures
- Statistical distributions

**CONTIGUOUS AND  
NON-CONTIGUOUS LAYOUTS**

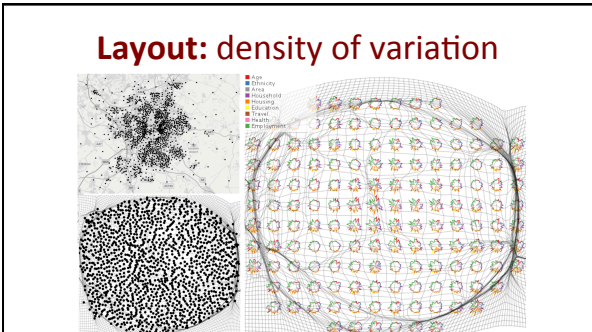


# DESIGN SPACE

- ## Design space
- **Type of layout:** contiguous or non-contiguous, partial geographic layouts, sq/rect/hex
  - **Layouts:** MAUP, density of variation
  - **Glyph design:** can be anything... but: shape, ease of comparison, geographic precision and glyph complexity tradeoff



- ### Layout: Modifiable Areal Unit Problem
- Re-aggregating data in tiles can deal to artefacts
    - The “Modifiable Areal Unit Problem” (MAUP)
  - Possible ways to deal with this
    - Interactively move the grid around
    - Allocate data points at edges of cell to all adjacent cells using inverse-distance-weighted function



### Glyph design: shape

- Glyphs that fit inside tiles

### Glyph design: ease of comparison

- Facilitate comparison in all directions
- Consistent layout
- Symmetrical

### Glyph design: geographic precision and glyph complexity tradeoff



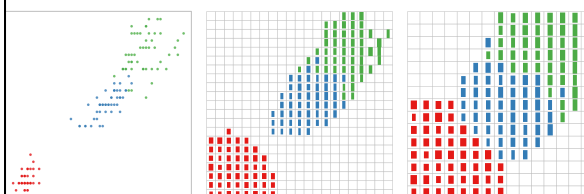
### (Possible) disadvantages

- Glyphs break up geographical continuity
- Modifiable Areal Unit Problem
- Geographical distortion may vary (for non-contiguous layouts)
- Are they readable?

### (Possible) advantages

- Depict multivariate data across space
- Associations between variables (at locations)
- Rich summaries possible
  - Multivariate data
  - Different measures
  - Statistical distributions
  - Geographically-weighted statistics

### Also works for non-geographical space



<http://openaccess.city.ac.uk/15167/>

More rich **geographical** summaries  
of multivariate data please!