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The Enigma of Segregation

Future directions in segregation research:

Spatiality, Perceptions, Persistence, Frontiers and Networks

(Gwilym Pryce, UBDC, Glasgow, 29th Nov 2018)

Sheffield Methods Institute. Urban Big Data Centre

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Presented by Gwilym Pryce

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Definitions

- Segregation – spatial separation
- Migrants – those born outside the UK

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Significant advances in Multi-level and distance-based approaches to segregation, integration, exposure

But...

- Spatial relationships within and between lowest level aerial units – **micro-neighbourhood effects & spatial MLMs**
- Assumption of symmetry in spatial effects maybe hide patterns of real importance: **social frontiers**
- Mix vs connections – the challenge of serendipity and circumstance: importance of **perceived homophily**
- How useful are snapshots? – importance of dynamics: **duration dependence**, **homophily horizons** and **spatial persistence**

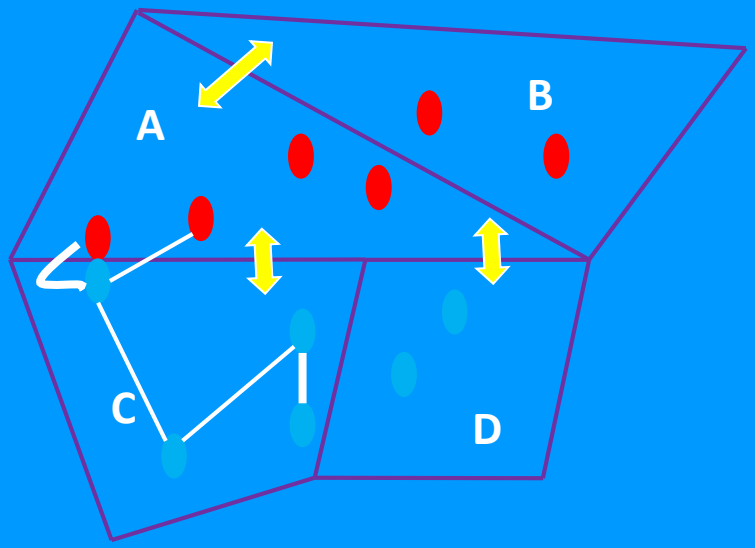
Plan

1. Spatial dependence: micro-neighbourhoods & spatial MLMs
2. Spatial asymmetries: social frontiers
3. Spatial leaps: Perceived Homophily & Wormholes
4. Dynamics: duration dependence & churn
5. Dynamics: homophily horizons & spatial persistence

1. Micro-Neighourhoods & "White Flight" (Easton & Pryce)

- Standard aerial units may overlook important segregation processes and social fragmentation occurring at the truly micro scale

Spatial dependence: micro-neighbourhoods & spatial MLMs



- **Spatial relations between groups**
  1. Spatial relations among individuals in the **same aerial unit**
     - "Micro-neighbourhood effects"
  2. Spatial juxtaposition of **aerial units themselves** at micro, meso and macro levels
  3. Relationships between individuals across **aerial units in close spatial proximity**

❖ Potential for developing a spatial MLM approach to measuring segregation?

(Adapted from Gavin Dong & Gwilym Pryce 2016)

2. Spatial asymmetries: Social Frontiers

- Models of spatial dependence tend to assume symmetry in spatial effects

- But **as**ymmetry, not symmetry, is likely to be the norm
  - Cliffs and slopes in the social landscape…

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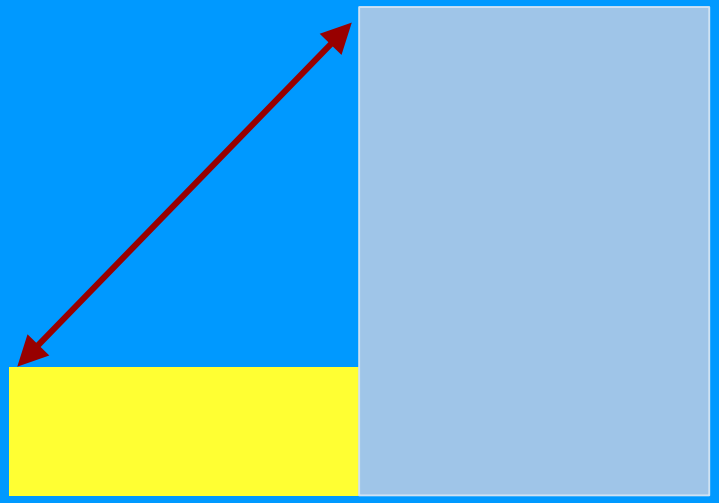
% Muslim in Rotherham (2011)

Why do so few want to live at the frontier?

Dan Olner & Meng Le Zhang (2017)

Social frontiers

- Sharp social differences between areas in close proximity
  - e.g. differences in ethnicity, social class, religion, language, political affiliation.
- Potentially:
  - *Reveal*: processes
  - *Cause*: tensions & crime

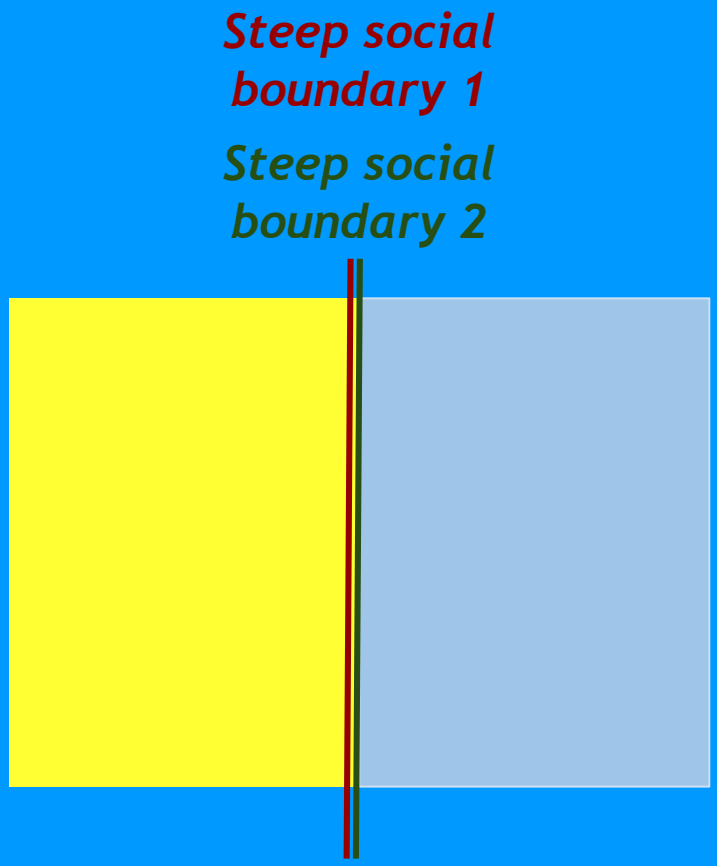


Why are SFs problematic?

1. **Aversion to living beyond the frontier:** Due to communities in conflict, fear of living in enemy territory ⇒ SFs
2. **Absence of bridge-builders:** vital for alleviating inter-group tensions
3. **Frontier development** ⇒ conflict as territories are contested
4. **Social frontiers:** social control least potent ⇒ ↑deviant behaviour, not just inter-group conflict

Overlapping Social Frontiers

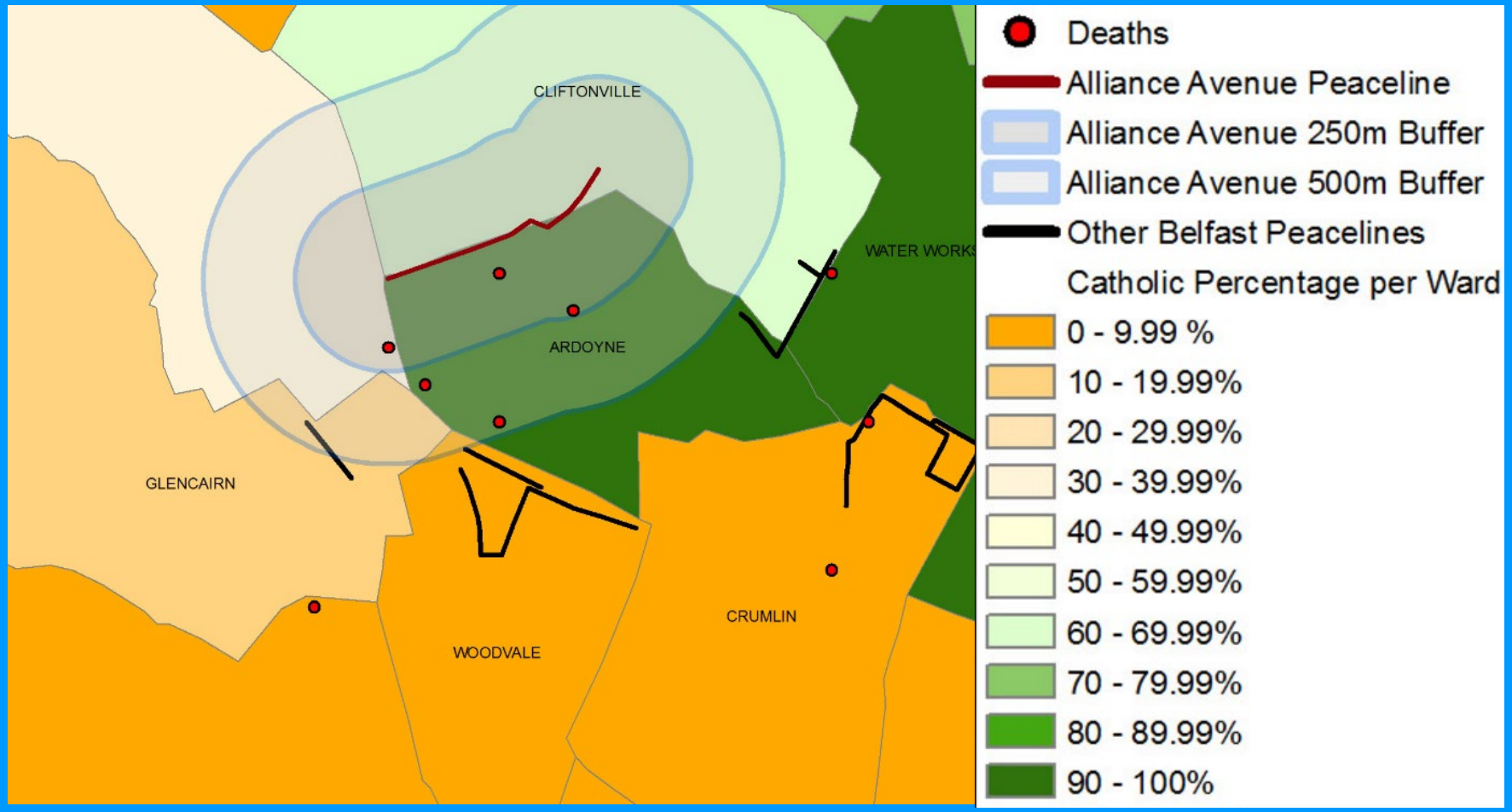
- Multi-dimensional fault-lines
- Overlapping ethnic and socioeconomic boundaries:
  - perceived similarities & dissimilarities
  - ‘resource stress’ makes ethnic differences salient



Empirical Evidence
Detecting Frontiers & Impact

- Not much quantitative research on the detection & impact of social frontiers
  - Studies either tend to ignore the spatial nature of segregation or do not estimate the impact.
- Qualitative & anecdotal evidence on effect of proximity to social boundaries
  - E.g. Belfast peacelines

Deaths due to conflict 1988-1990
prior to establishment of Alliance Avenue Peaceline in 1991



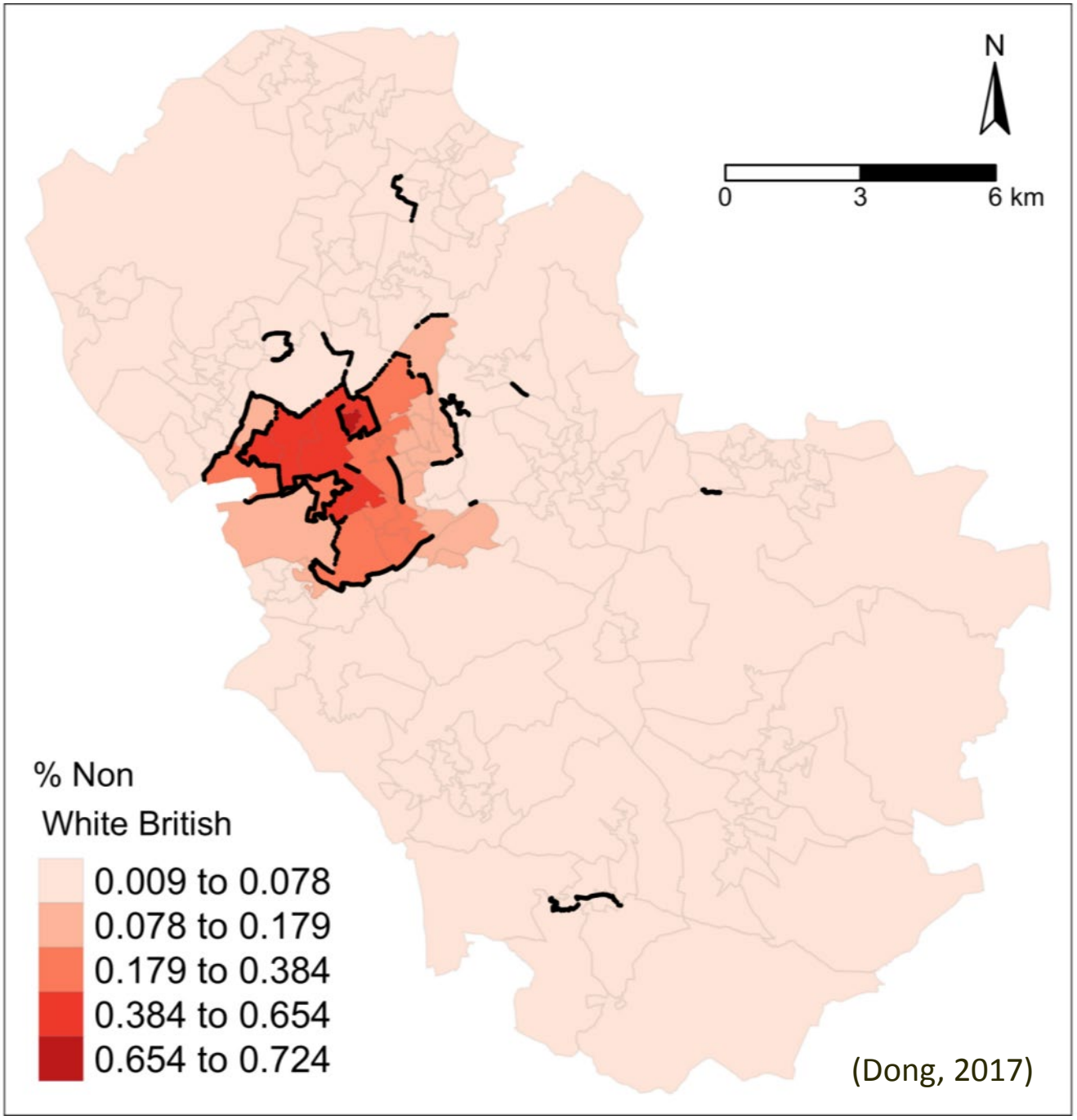
Source: http://cain.ulst.ac.uk/victims/gis/maps/gismaps-21.html#peacelines

Impact on Mental Health (Maguire et al. 2017)

- **Type of segregation matters:**
  - "**unevenness**" (index of dissimilarity) $\Rightarrow$ No measureable impact on mental health.
  - "residence in an **area segregated by a 'peaceline'** increases the likelihood of antidepressant medication by 19% and anxiolytic medication by 39%, even after adjustment for gender, age, conurbation, deprivation and crime."

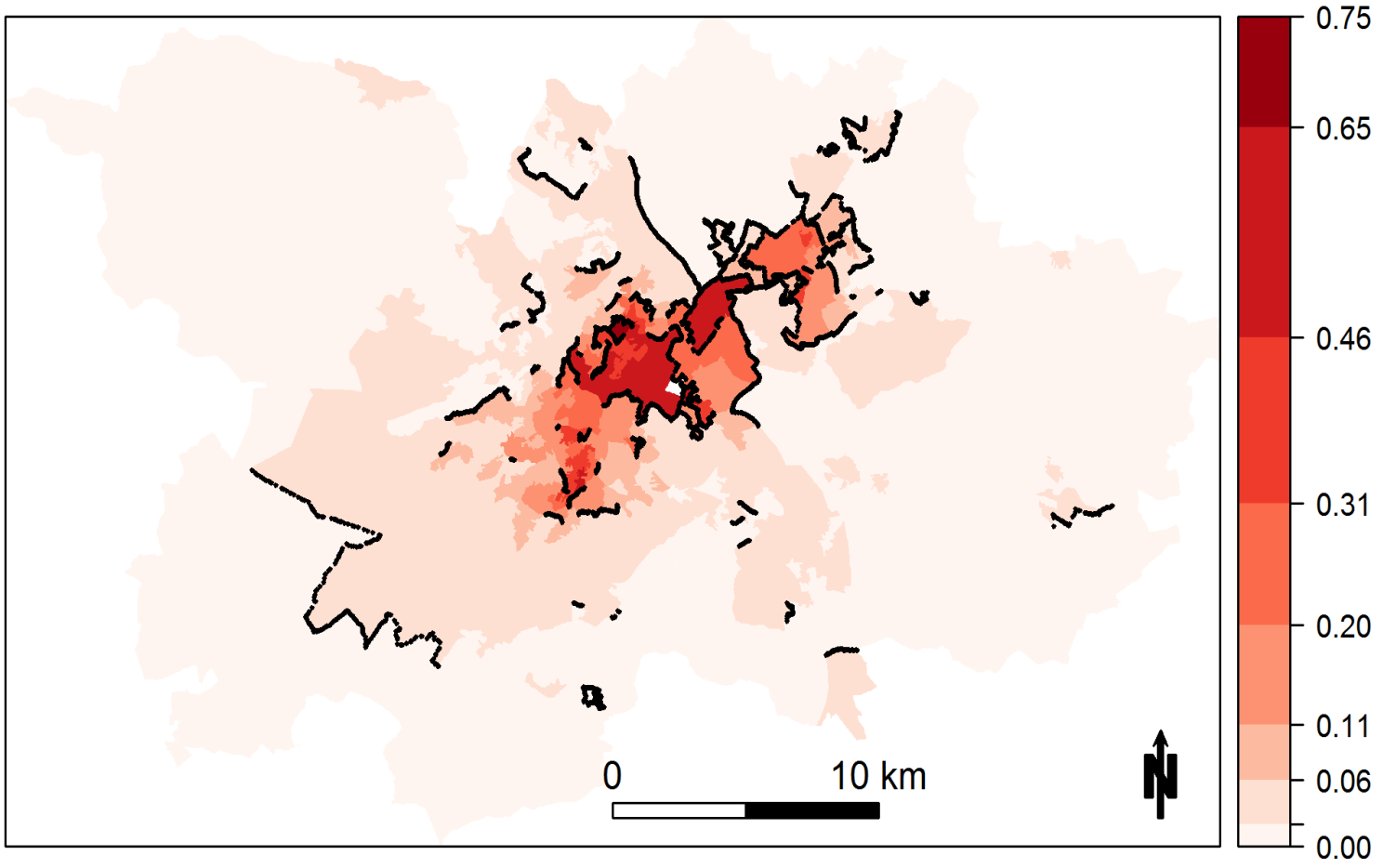
- Detecting “invisible” social frontiers:
  - Frontiers without physical walls or legal boundaries
  - Identified by the thick black lines in the following maps

Frontiers:
Non-white population, Rotherham



Frontiers: Non-white population, Sheffield

(Dean, Dong, Piekut & Pryce)



- Evidence of “open” boundaries

  Confirms prevalence of asymmetry: “cliffs & slopes”

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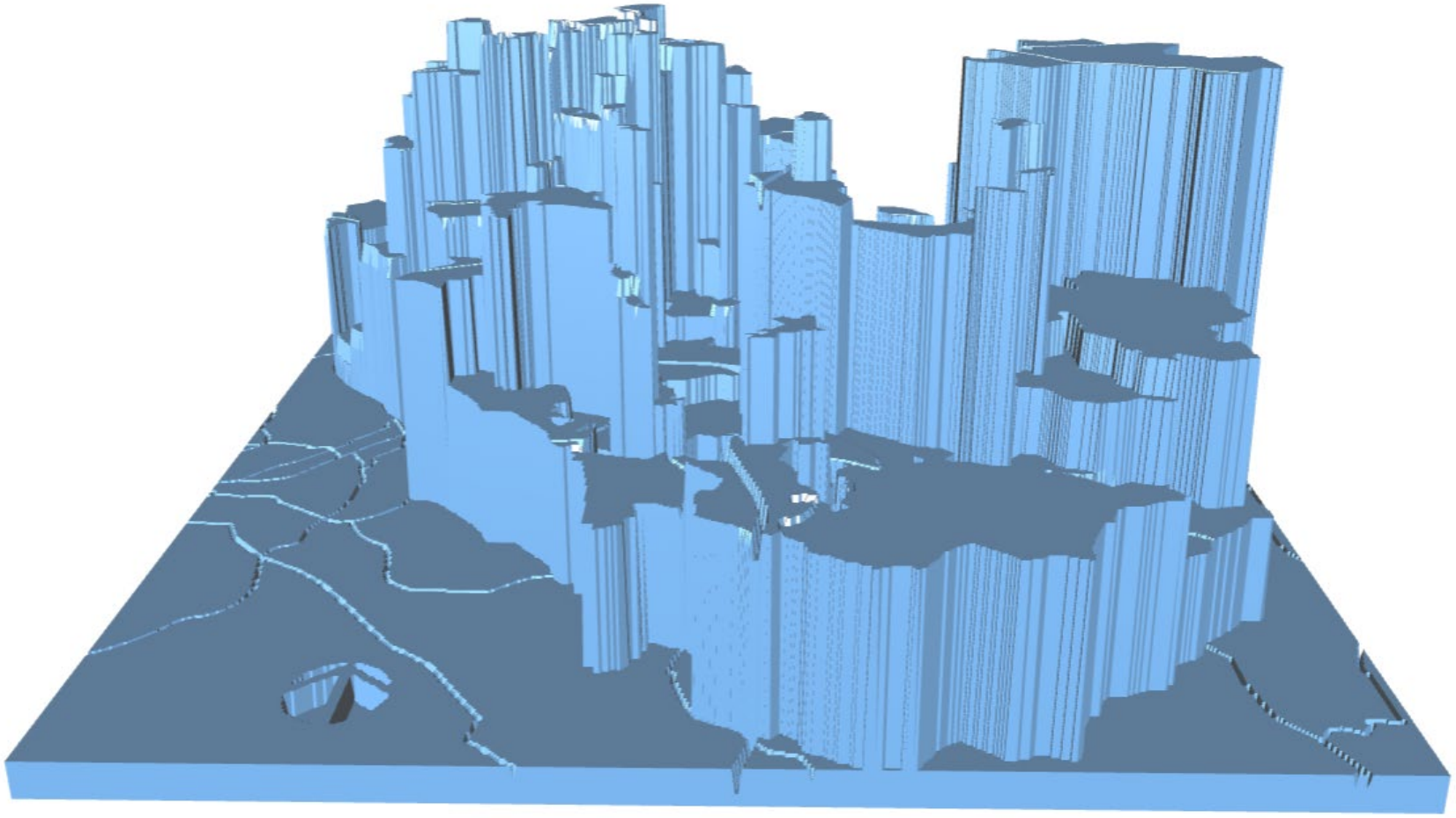
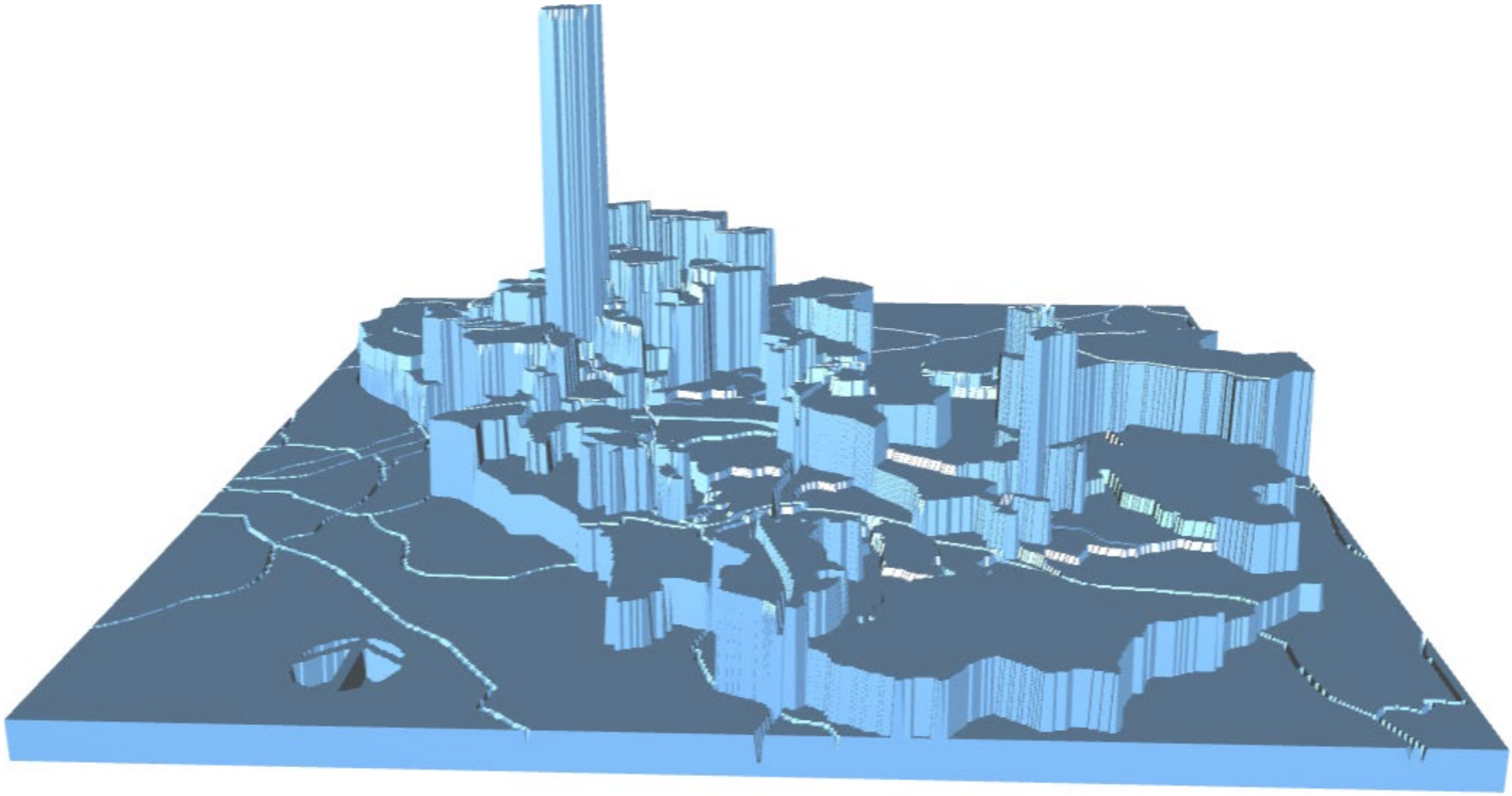


Dan Olner & Meng Le Zhang (2017)



Dan Olner & Meng Le Zhang (2017)

Frontiers in Sheffield: Impact on Crime

Significantly higher crime in areas joined by SFs

	Geographically adjacent areas	Model-identified boundary	Difference	*P*-value
Total crime rate	0.096	0.148	0.051	0.021
Burglary crime rate	0.007	0.010	0.003	0.003
Violent crime rate	0.008	0.012	0.004	0.060

- Total crime 54% higher in SF areas
- Burglary 43% higher in SF areas
- Violent crime 50% higher in SF areas

Questions re Impact of SFs on Crime

- Crime seems higher in SF neighbourhoods
- Raises many questions:
  - Who are the victims of the crimes near social frontiers?

    E.g. Are they primarily people from ethnic minorities experiencing forms of racial harassment?
  - How can we ascertain whether the findings imply causation not just correlation?

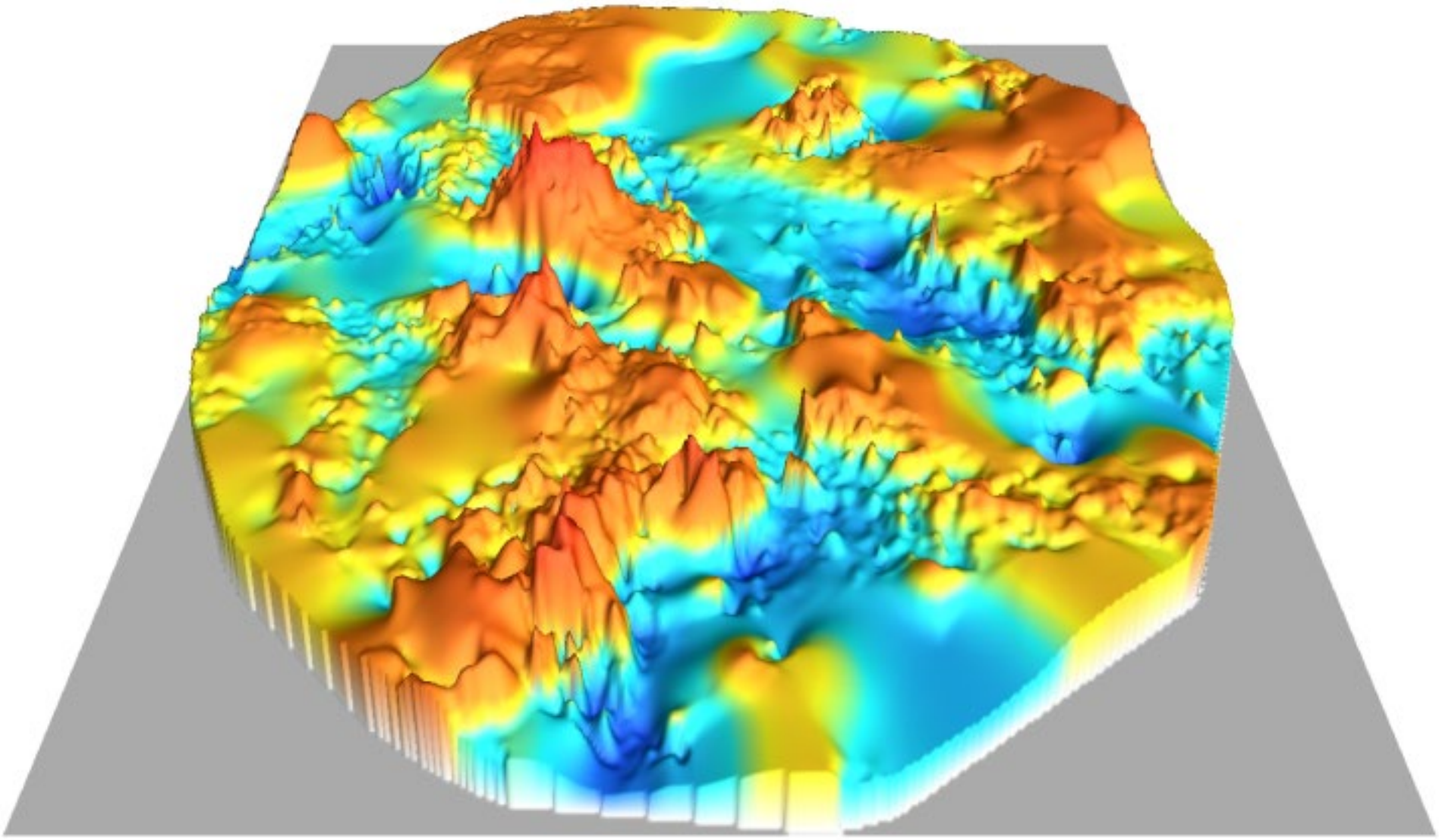
    other aspects of ethnicity & social difference including a multi-variate approach to boundaries?
  - What are the impacts on mental/physical health, educational achievement, & life outcomes?

3. Spatial leaps: Perceived Homophily & Wormholes (Dean & Pryce)

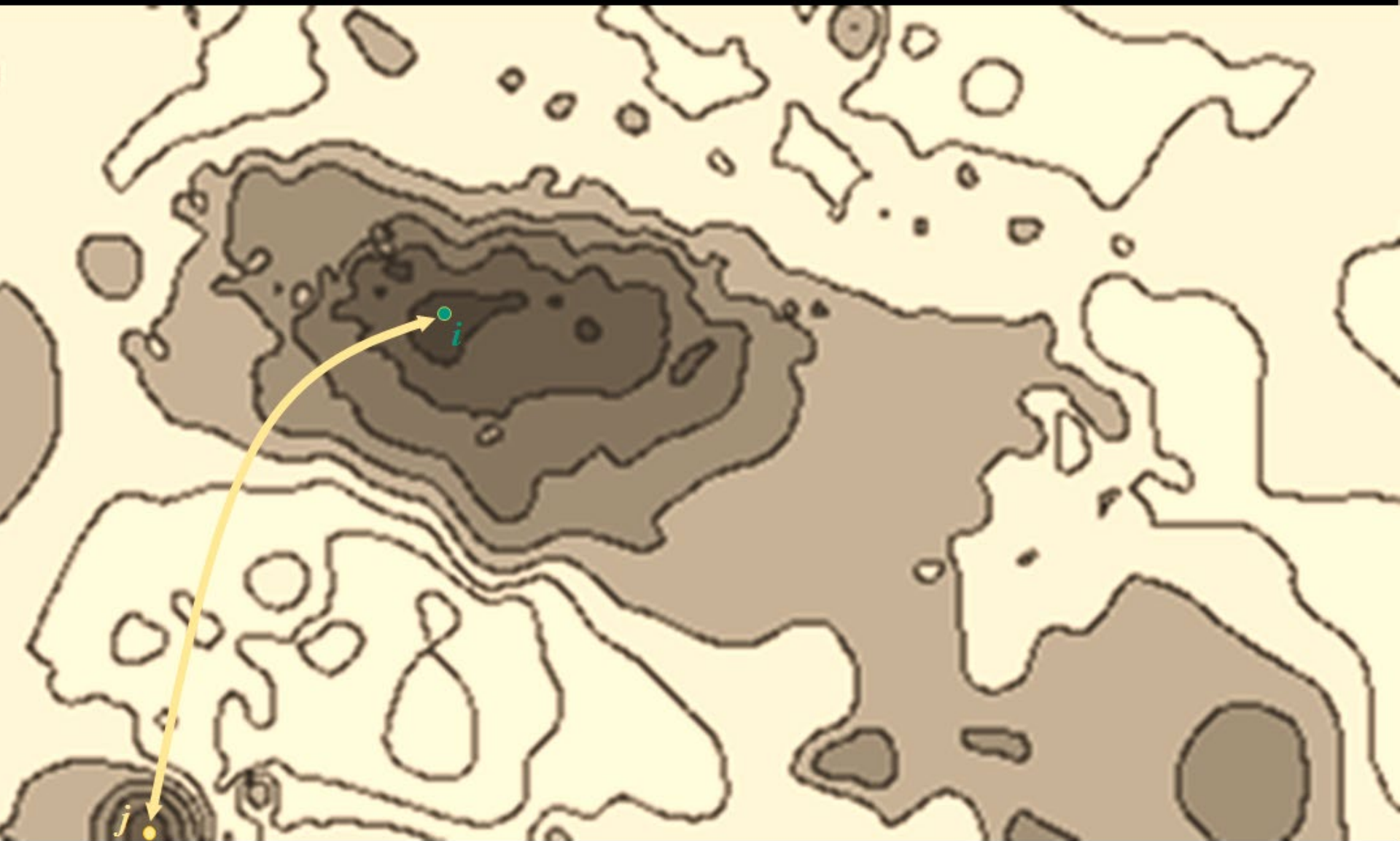
- Mix a poor guide to social relations
  - Negatively related to friendship connections
- But friendship connections can be driven by circumstance and serendipity
  - E.g. age segregation at school
- Want to measure “perceptions” but survey methods would be v. limiting
- Perceived substitutability of neighbourhoods

CPEP Surface

for one postcode…



j is viewed as a close substitute for *i*



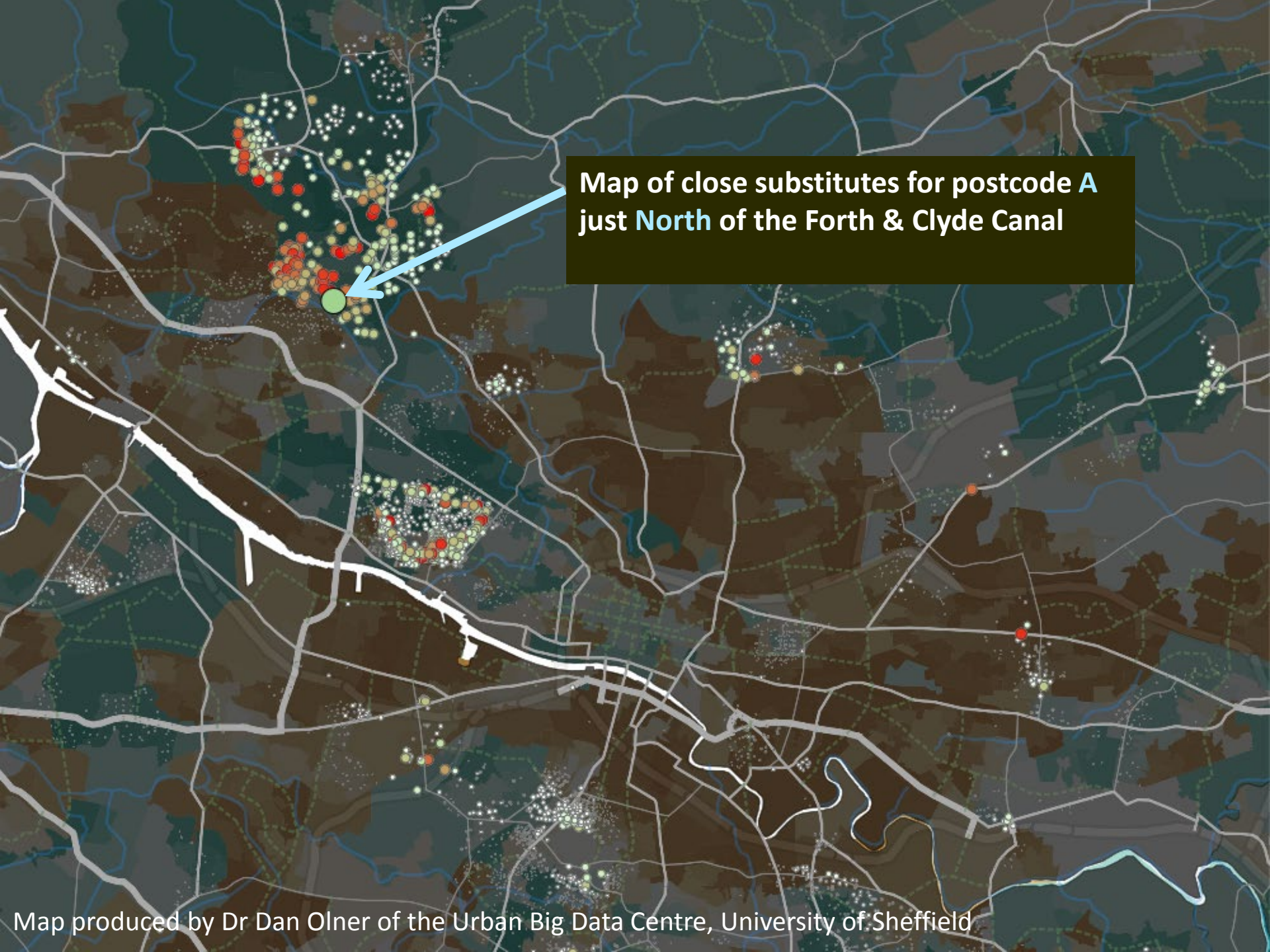

Wormholes in
Cartesian
Space…

Wormholes in Cartesian Space…?

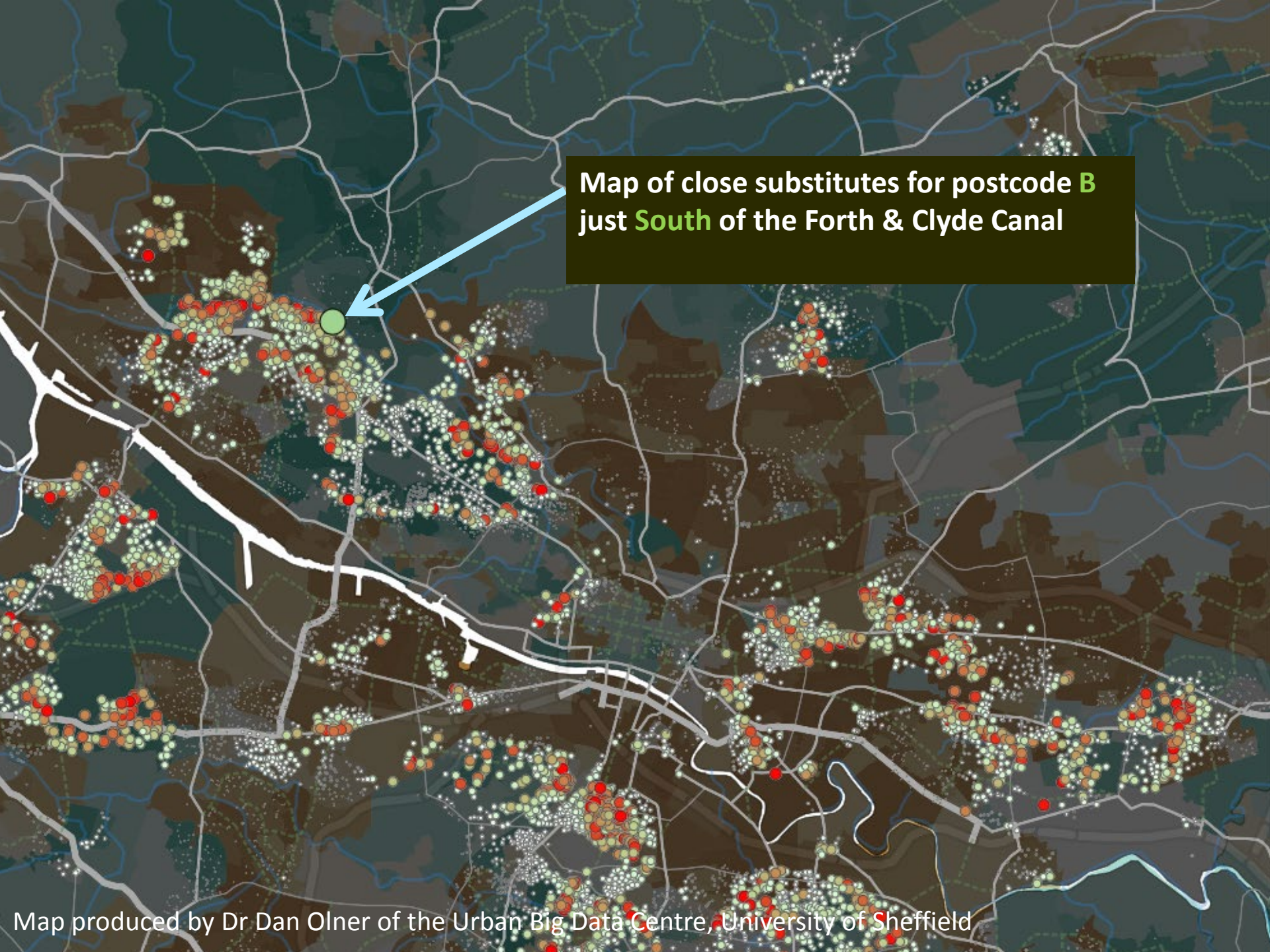
j is viewed as a close substitute for *i*

j is viewed as a close substitute for *i*

And hidden frontiers?

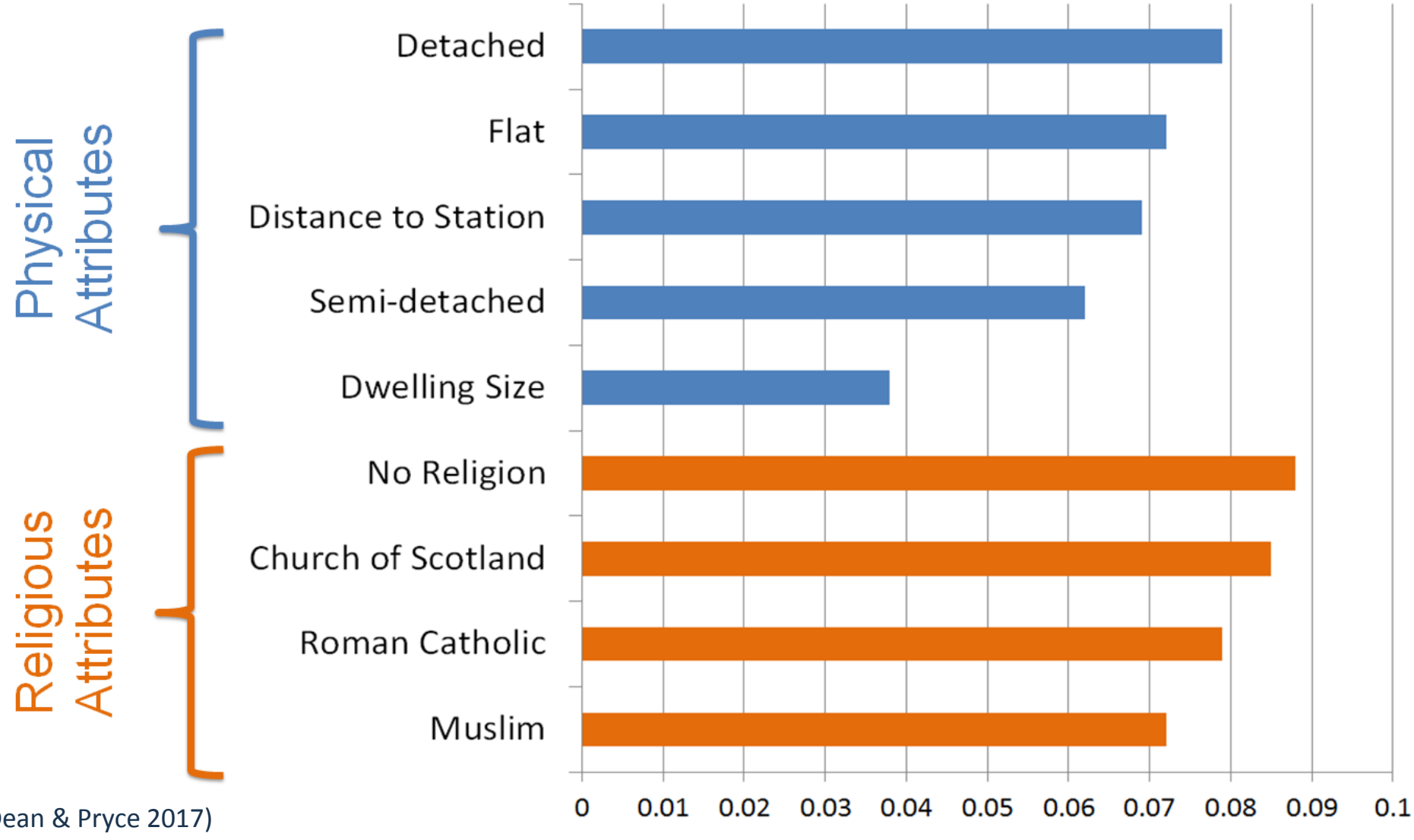


Map produced by Dr Dan Olner of the Urban Big Data Centre, University of Sheffield


Map of close substitutes for postcode B
just South of the Forth & Clyde Canal
Map produced by Dr Dan Olner of the Urban Big Data Centre, University of Sheffield

Measure of Integration

Homophily coefficients



(Dean & Pryce 2017)

Dynamics

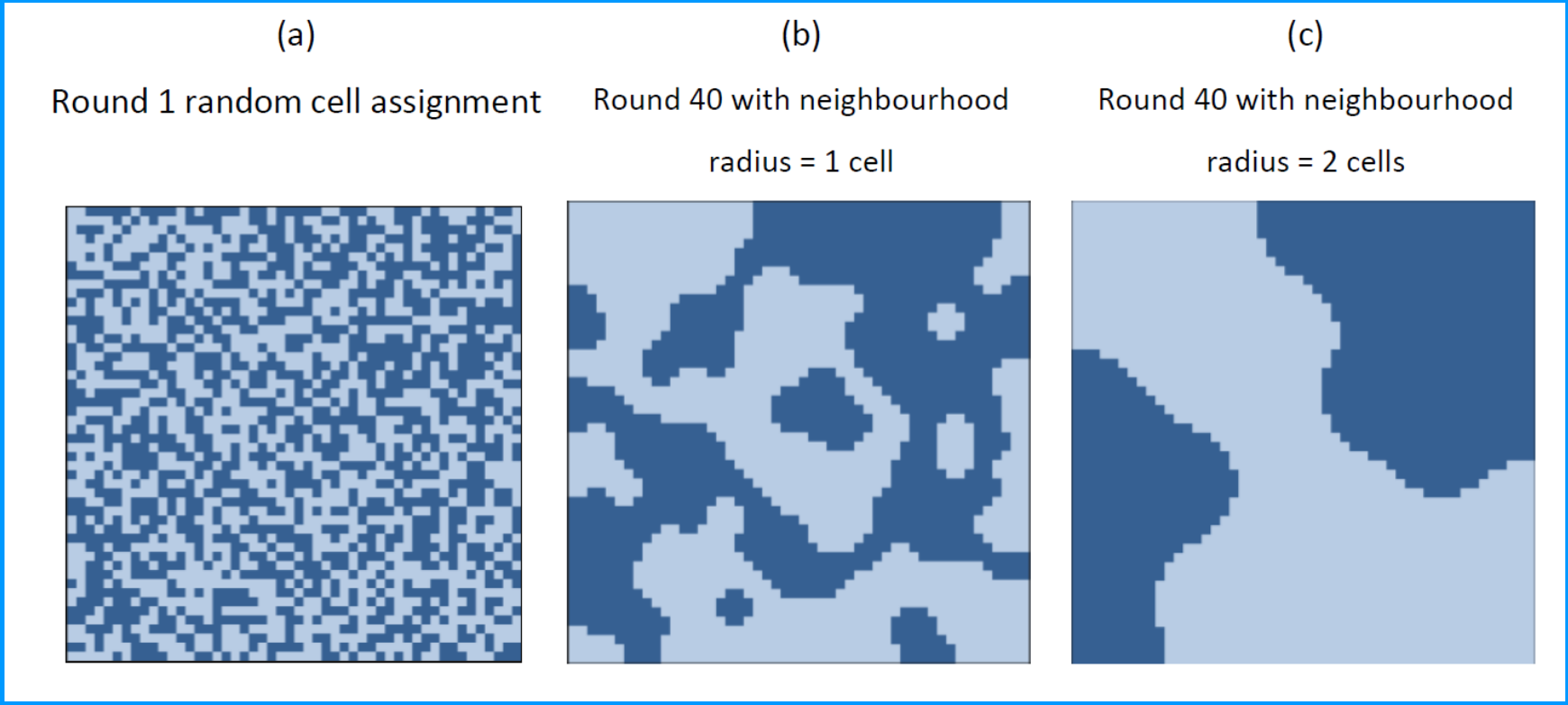
- Snapshots have their limitations
- Some of the most important aspects of human relations and segregation are only revealed by how things change and evolve over time
- How segregation occurs may be more important than the level of segregation at a given time point:
  - E.g. “White flight” – response to inflows tells you something important
  - E.g. Long term trajectory of city segregation (and what determines that trajectory) of greater importance than particular snapshots

4. Dynamics: duration dependence (Easton & Pryce)

- Relationships have a strong time dimension
  - How embedded you are in a neighbourhood
  - How well you know someone
- E.g. “White flight” – studies often overlook the importance of duration dependence
  - Survival analysis of heterophobia in Glasgow

5. Dynamics: homophily horizons (Bakens & Pryce)

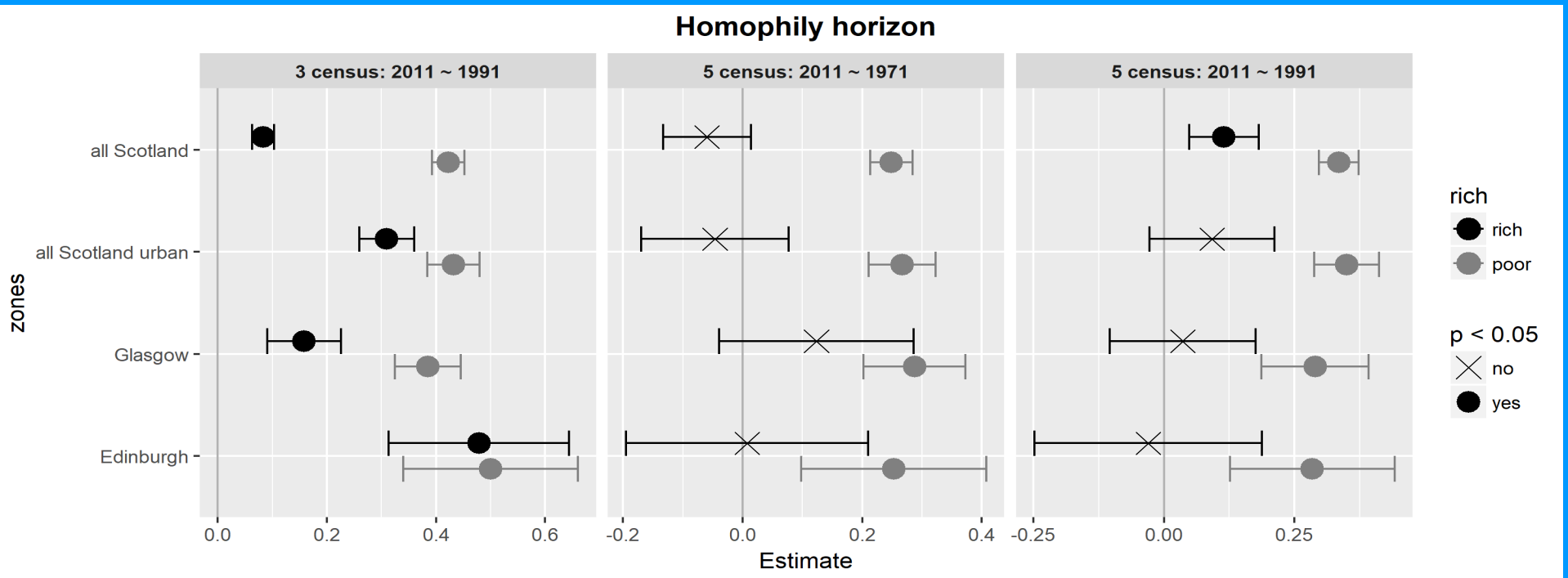
- Impact of homophily horizon on Schelling model:



- Affects a city's long-term segregation trajectory

Spatial persistence: Poor vs Non-Poor

(Dan Olner & Geoff Meen)



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Future Directions

1. **Spatial dependence: micro-neighbourhoods & spatial MLMs**
2. **Spatial asymmetries: social frontiers**
3. **Spatial leaps: Perceived Homophily & Wormholes**
4. **Dynamics: duration dependence & churn**
5. **Dynamics: homophily horizons & spatial persistence**

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Thank you for listening!

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Appendix

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Dynamics: spatial persistence

- Segregation is not just about inflows & outflows in the short run.
- It’s also about long-term spatial persistence

Path dependence

- Pr(migrant chooses location k) = f(distribution of migrants already in k)
  - Homophily + path dependence $\Rightarrow$ spatial persistence
- Early stages of urban development: proportions of migrant groups will be volatile
  - But then stabilise over successive rounds of migration & relocation

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Explaining spatial distribution of migrants

$$x_{ijt} = \gamma_0 + \gamma_1 x_{ijt-k} + \gamma_2 W.x_{ijt-k} + \gamma_3 \sum_{r \neq i}^{I} x_{rjt-k} + \gamma_4 Z_{jt} \quad + \quad + \varepsilon_{ijt}$$

x_{ijt}	=	share of migrants from country of birth (*i*) in local authority district (*j*) at time (*t*).
W	=	spatial weights matrix
Z	=	vector of housing and labour market variables, *PH, DENSITY, CROWD, EMP*
PH	=	index of local house prices
DENSITY	=	number of dwellings per acre
CROWD	=	total population/total number of dwellings
EMPL	=	local employment
ε	=	error term.

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Meen's results for London:

- Strong evidence of homophily & spatial persistence
- Migrants from **poor** countries:
  - Attracted to areas with
    - low housing costs
    - high % of same nationality
  - Also higher spatial persistence

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- Application to Scotland & RUK
  - Geographical linkage of Censuses 1971-2011
  - Use smaller spatial units

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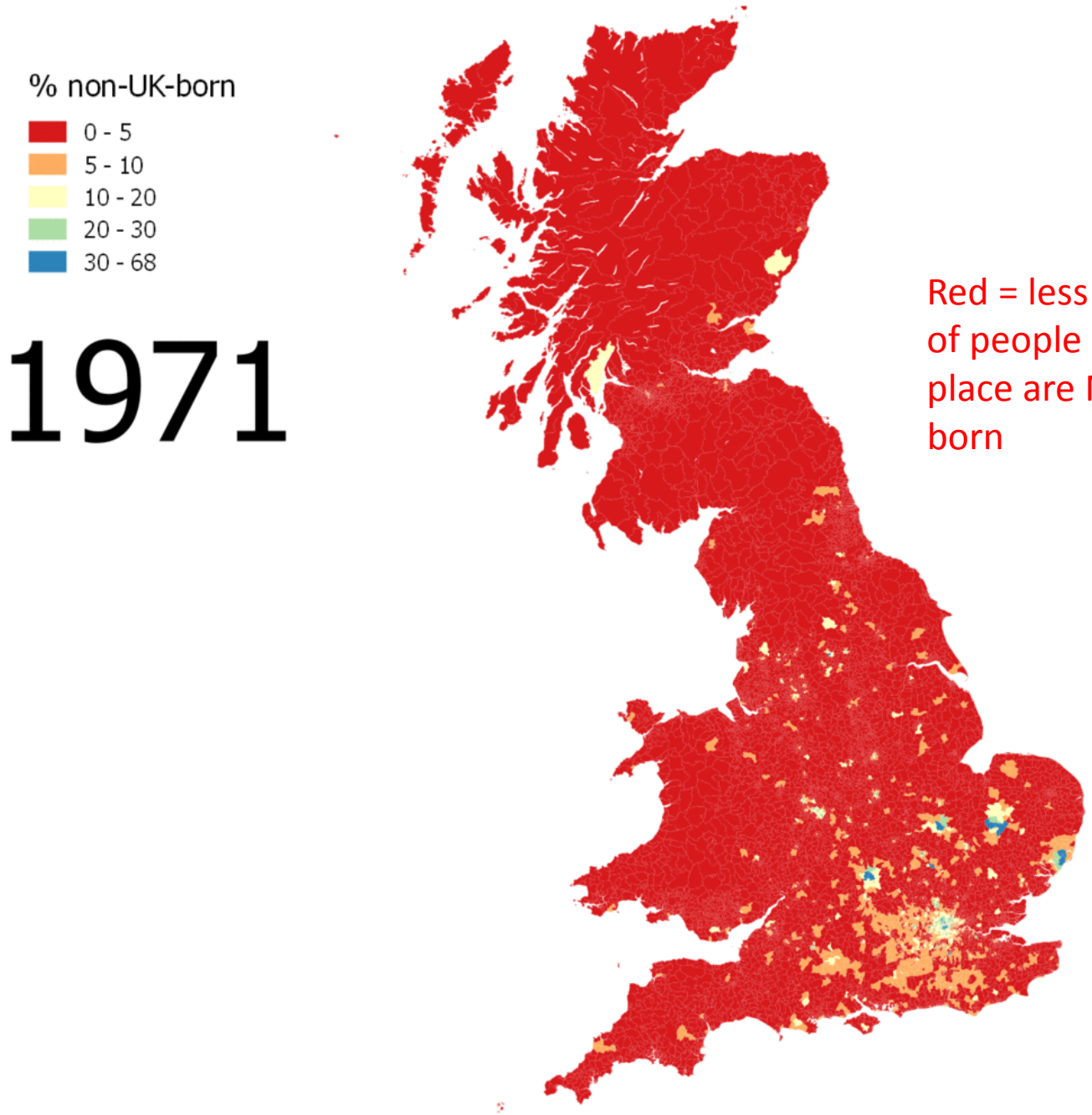

Red = less than 5% of people in that place are Non-UK born

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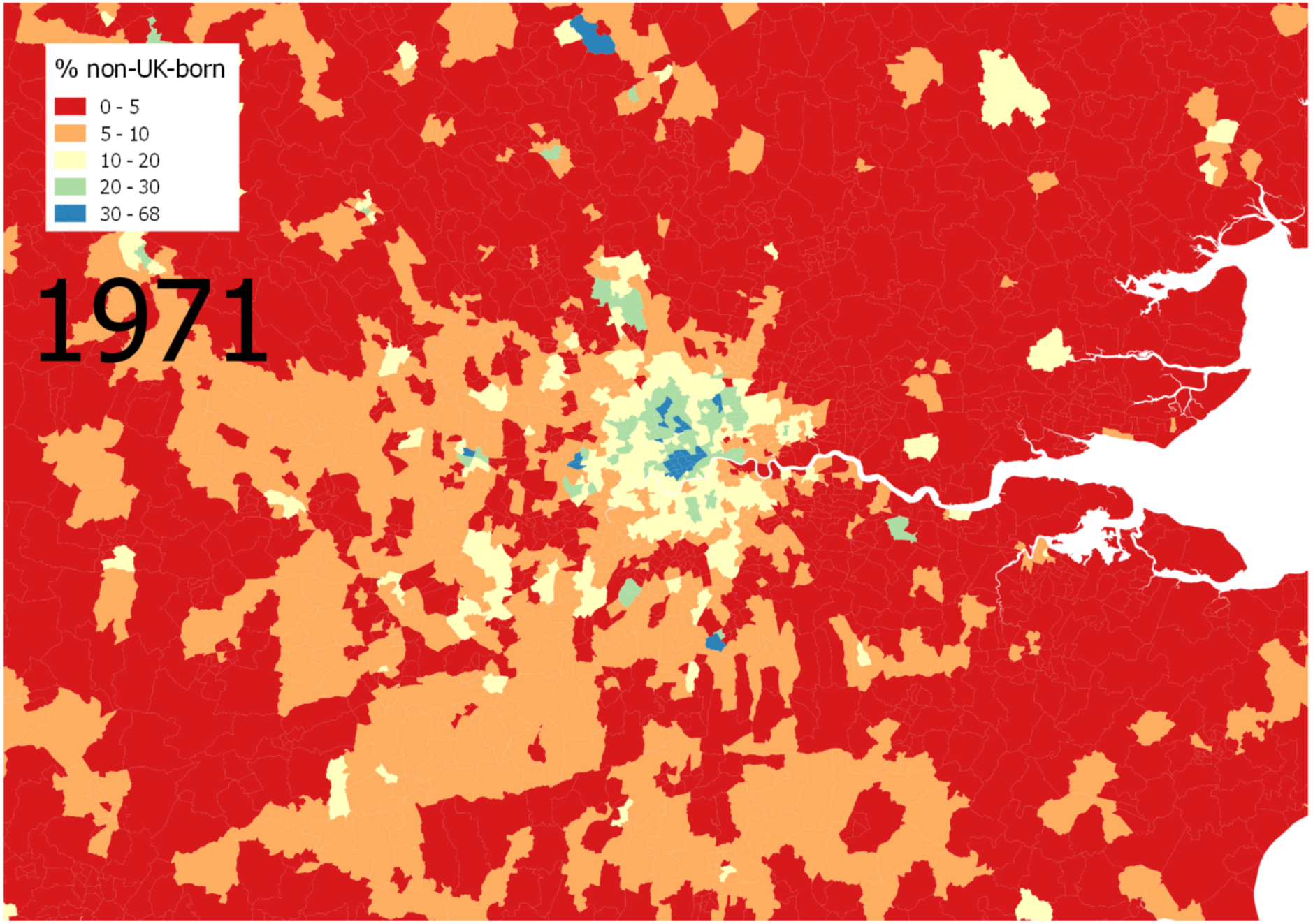
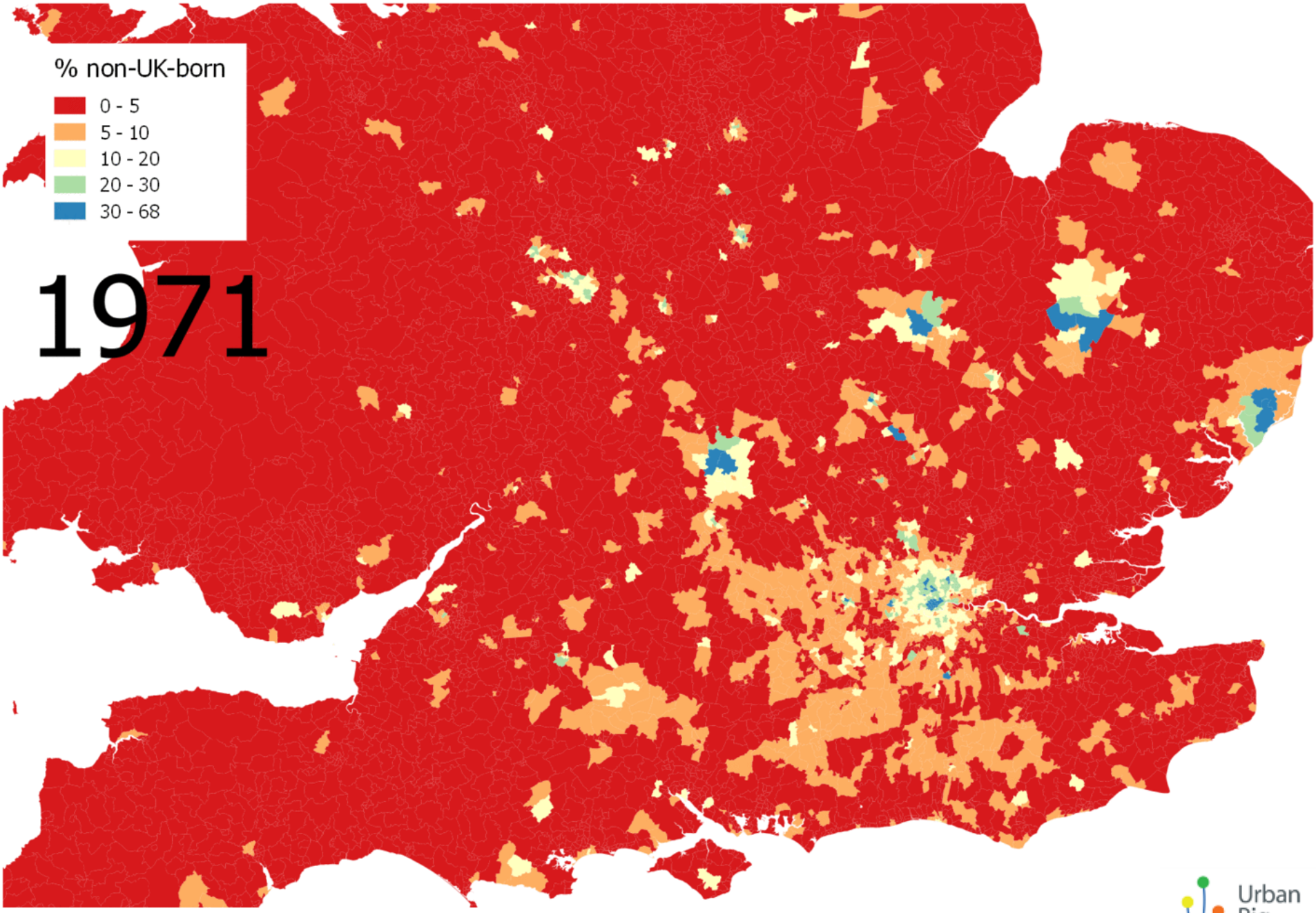


Large jump in places with more than 30% of people born outside the UK (blue)



South as whole: low key changes cw cities, but still remarkable

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Next: European-born (excluding UK)

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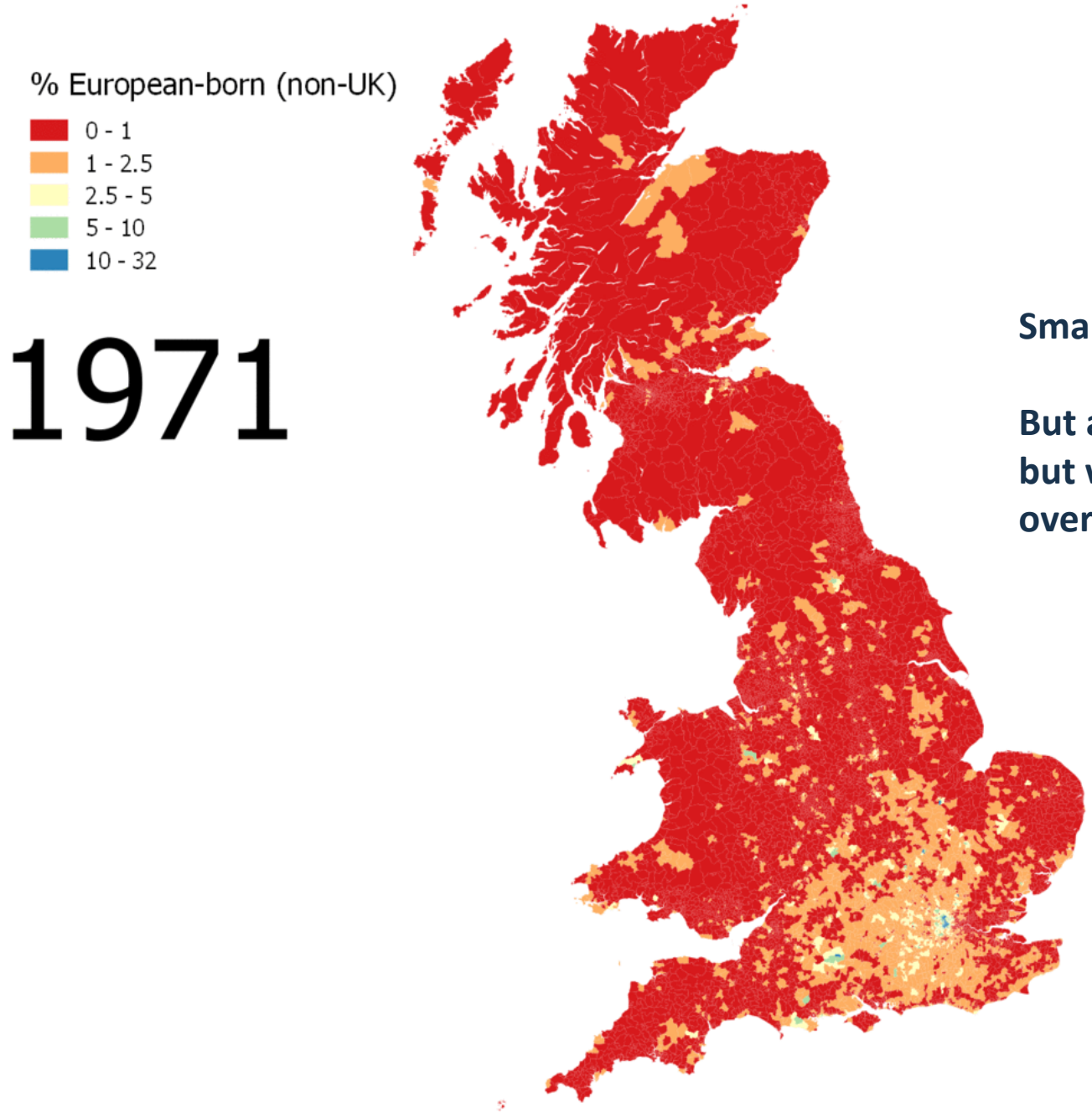

Smaller %s overall (obvs)

But again this lower-key but widespread change over the whole GB

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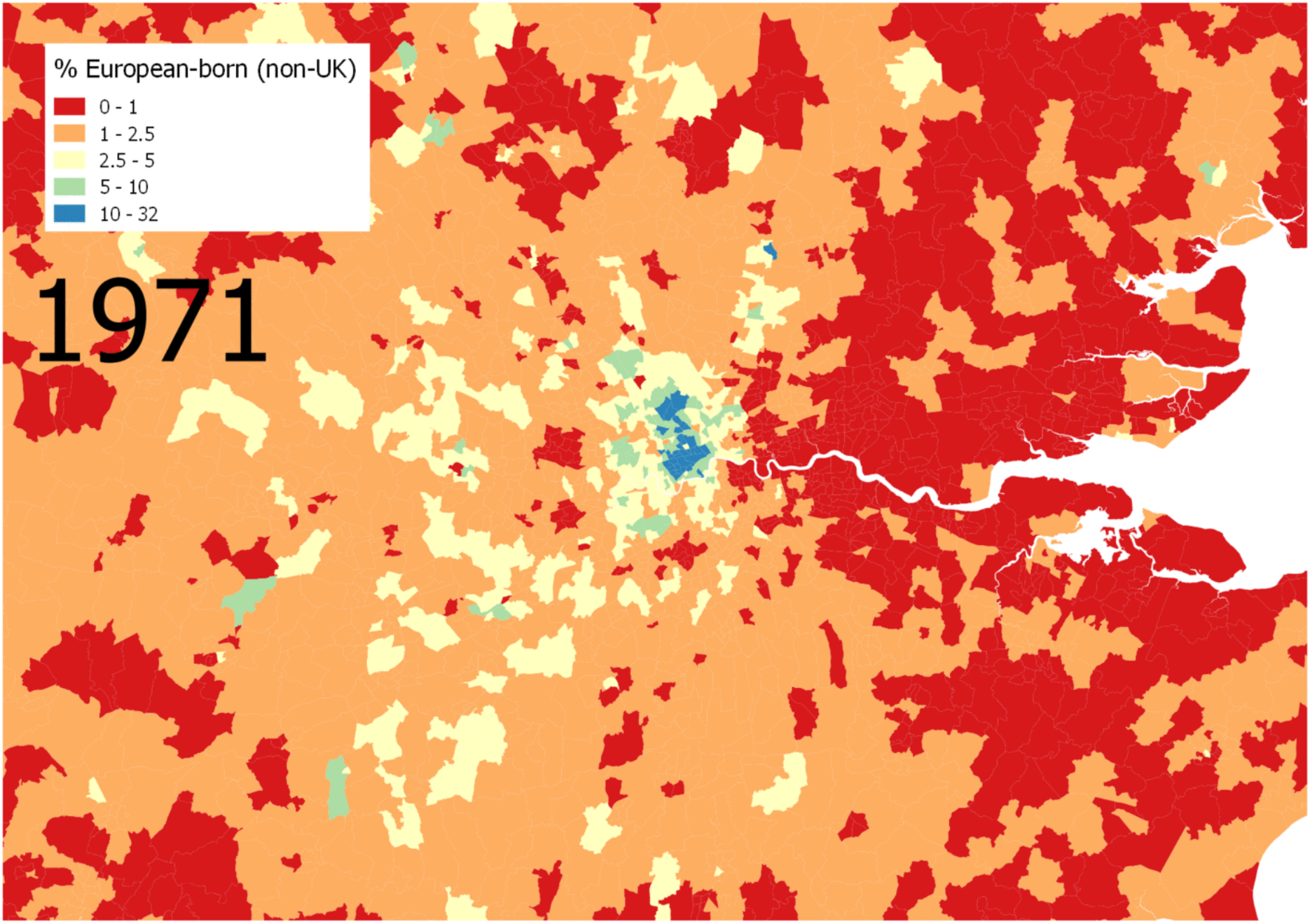
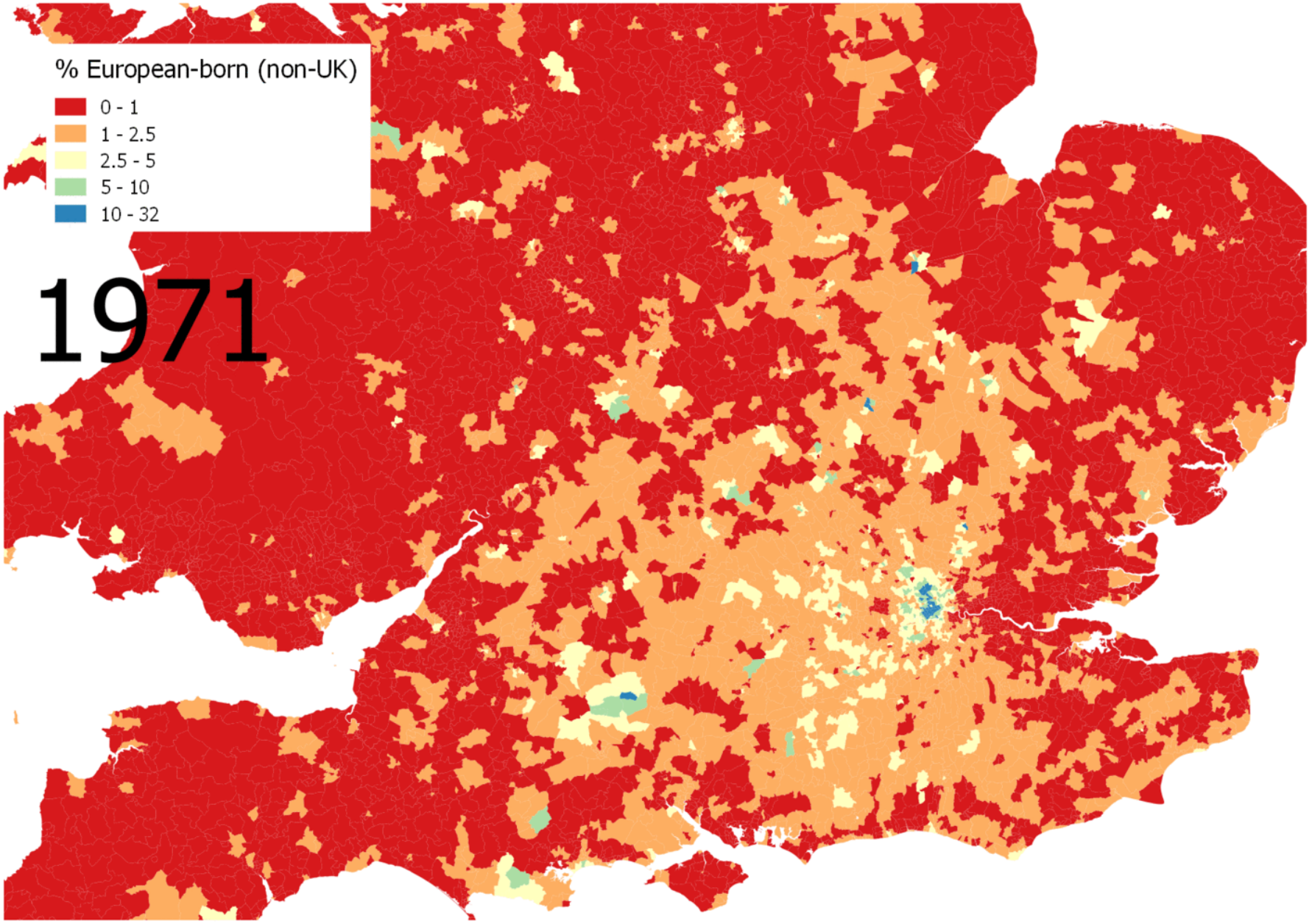


London again striking...



more widespread change from red (less than 1%) to orange, though this is still a London-centric thing: note growth of 2.5-5%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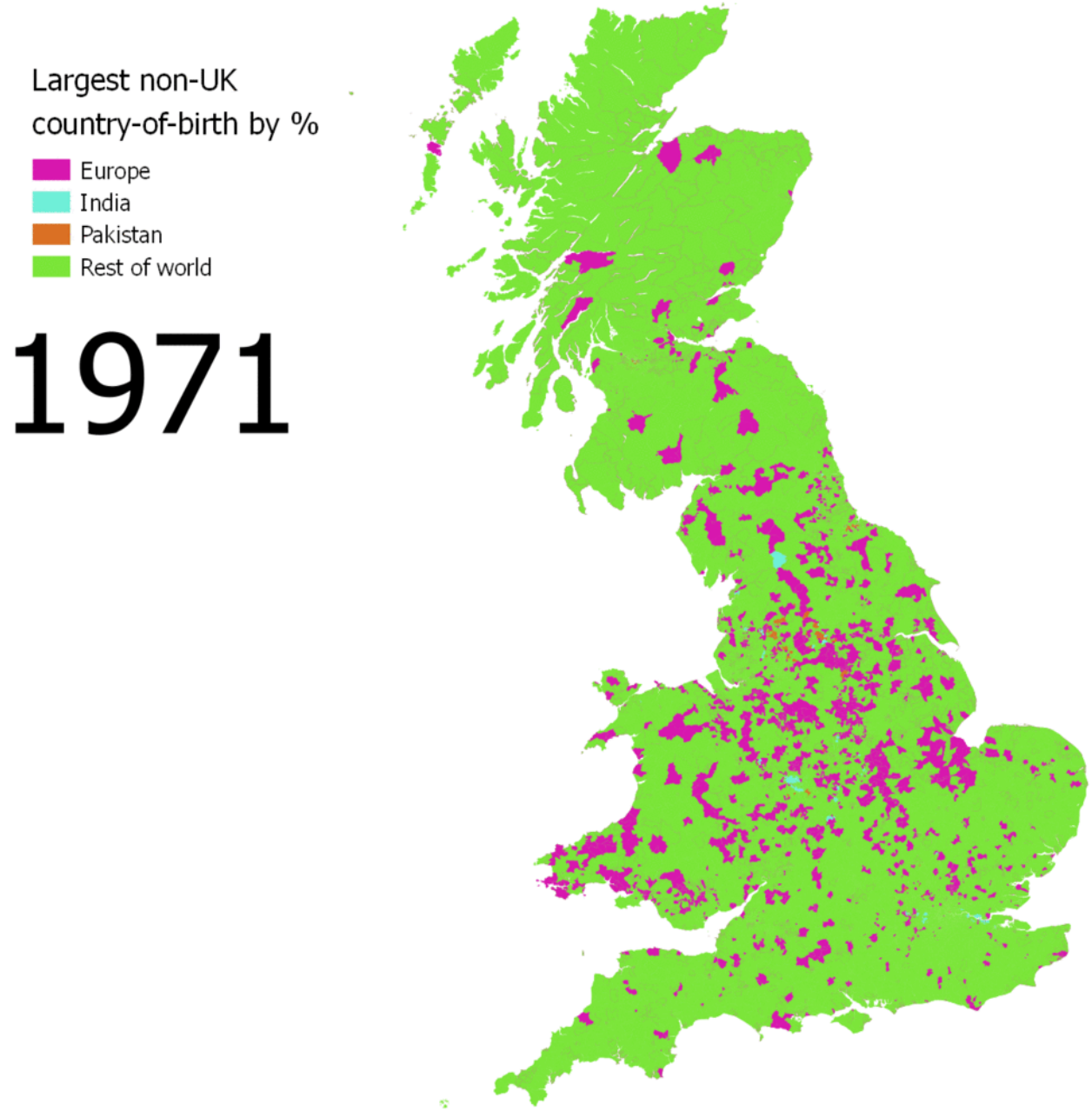
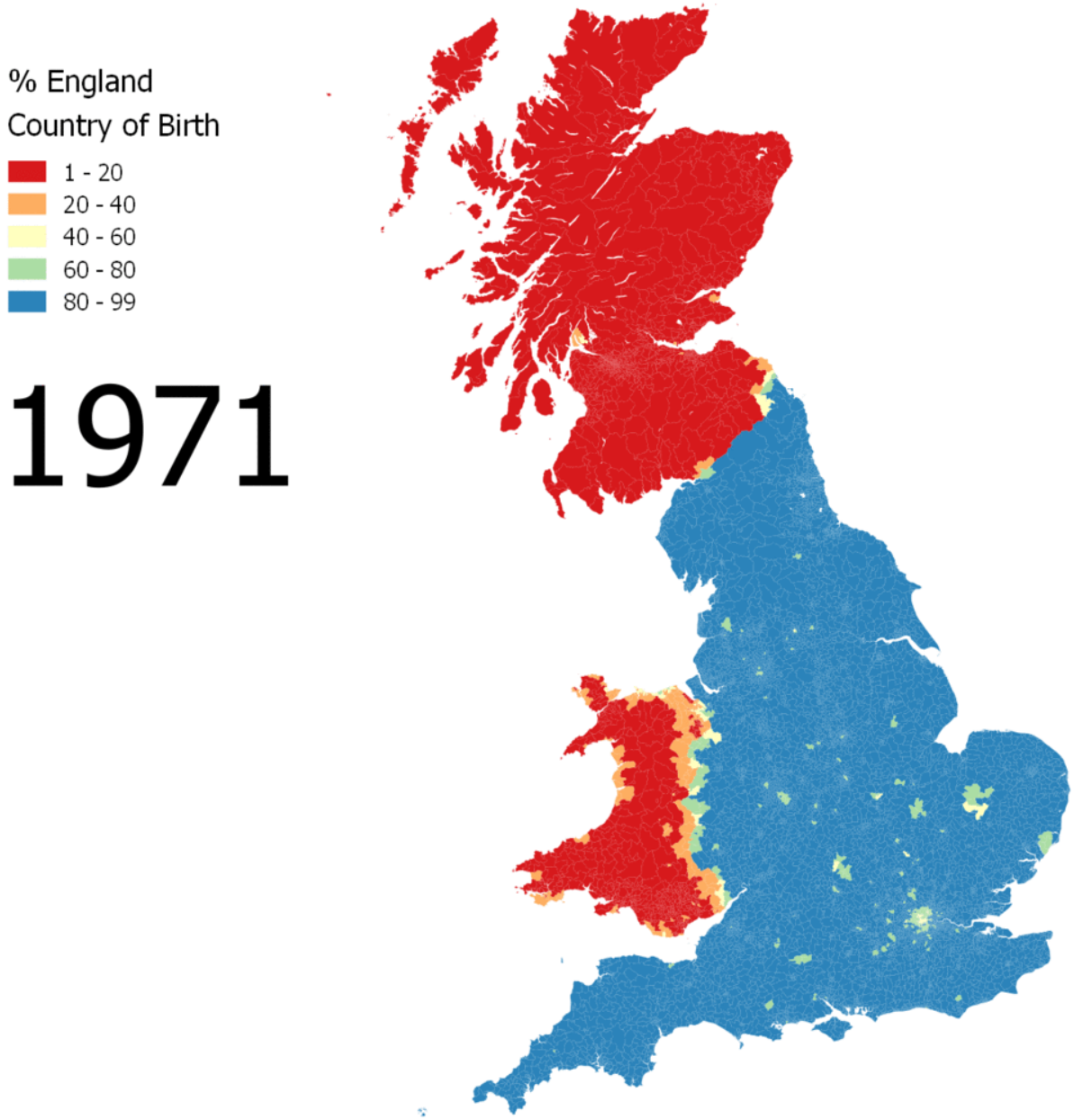


So e.g. purple: in these places, the largest non-UK-born group is “European“
Five census - Mainly contrasts Europe and ‘rest of world’



The English: flooding Wales and Scotland... e.g. 40-60% in Wales 2011

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Spatial Persistence: Scotland

- Spatial Persistence of Migrants in Scotland (1971-2011)
- Impact of country of birth: poor vs rich
- By Scottish City:

  Glasgow, Edinburgh, Aberdeen

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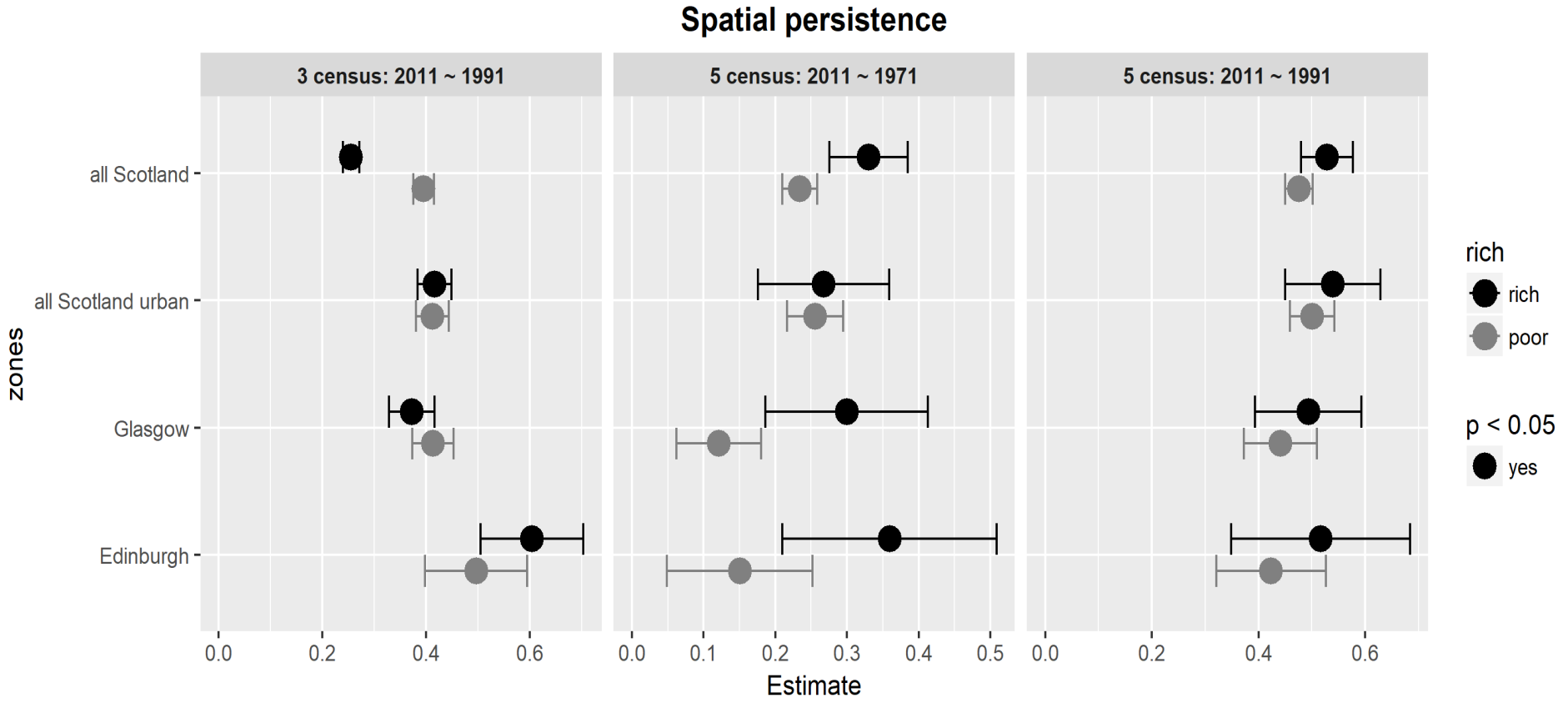

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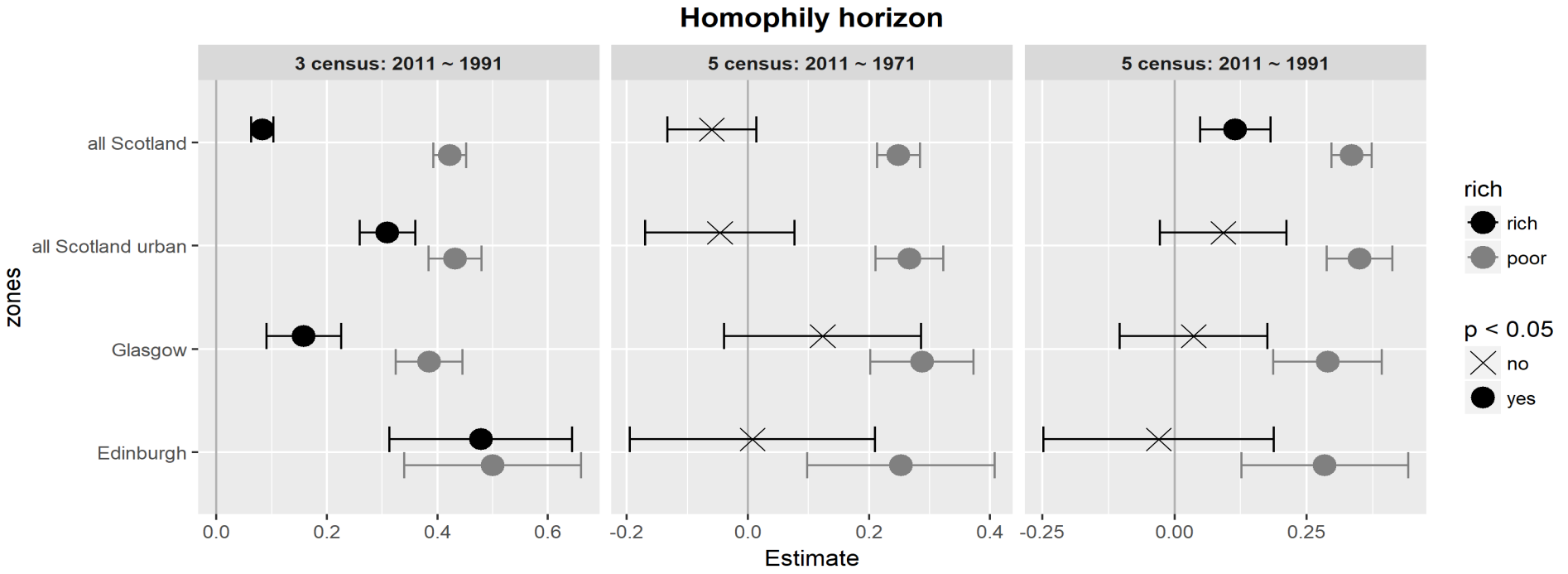
Homophily horizon
3 census: 2011 ~ 1991
5 census: 2011 ~ 1971
5 census: 2011 ~ 1991
zones
all Scotland
all Scotland urban
Glasgow
Edinburgh
0.0
0.2
0.4
0.6
-0.2
0.0
0.2
0.4
-0.25
0.00
0.25
Estimate
rich
rich
poor
p < 0.05
no
yes

Some implications for Spatial Inequality: some reflections

- Migrant groups from poorest countries tend to have greatest spatial persistence
  - Broader homophily horizons $\Rightarrow \uparrow$Schelling
  - Generate greater perceived homophily?
  - More persistent long-term concentrations
  - Least geographically mobile

Impact of migrants on employment?

- Initial results suggest that EU migrants possibly are the only group to have a net positive effect on employment
  - Migrants from all other countries have a zero or negligible effect.
- Combined with homophily and spatial persistence this could mean that migration overall exacerbates spatial inequality

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Migration from variety of rich/poor origins

+ Market sorting

⇒ ↑Segregation + ↑Concentration of poverty

⇒↑neighbourhood effects

⇒ ↑spatial inequality of outcomes

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Some areas benefit from mi others lose out

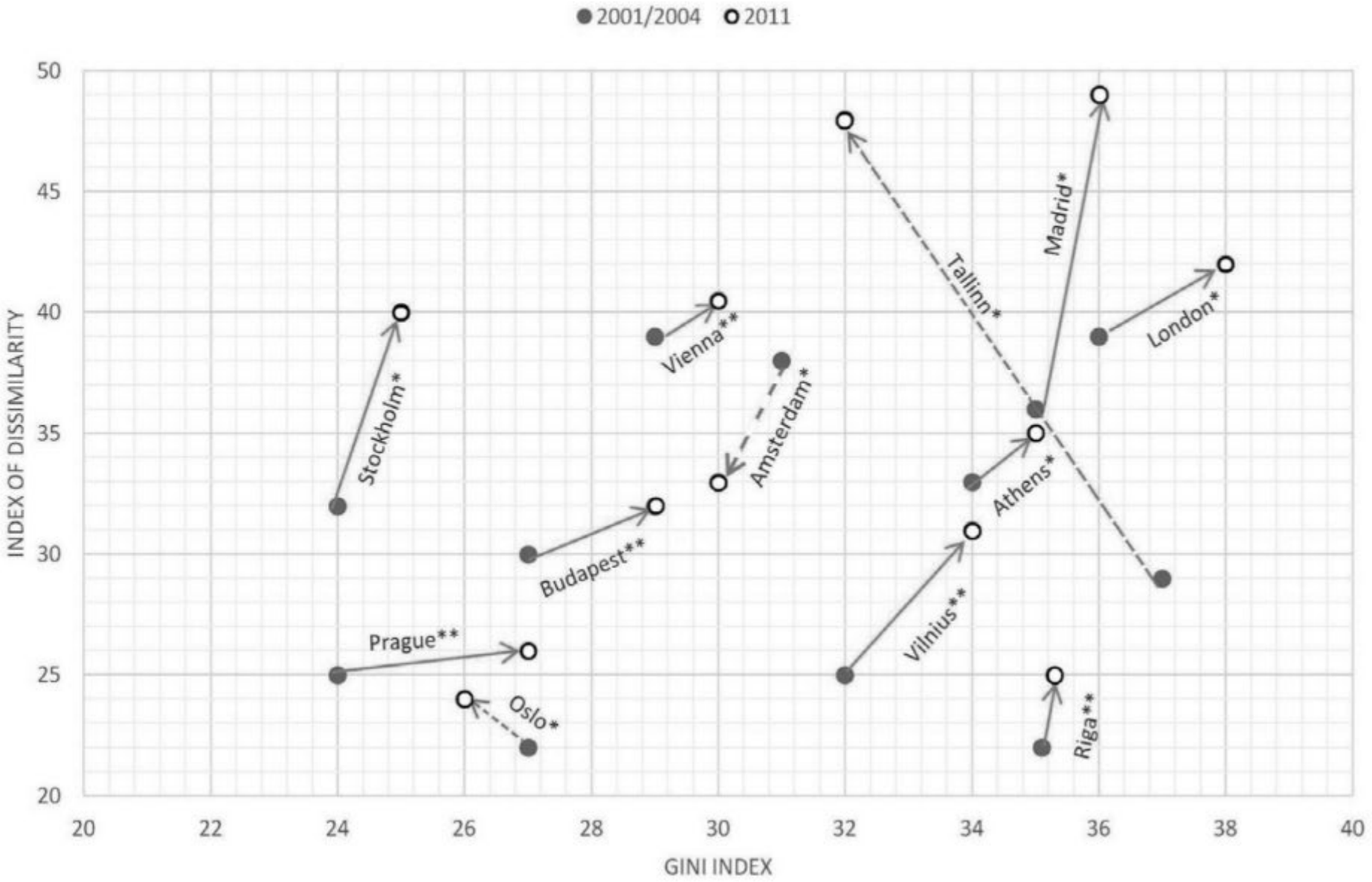
- Areas that attract low skilled migrants from poor countries
  - Little or no net employment generation,
  - Possible negative house price effect,
  - plus more persistent segregation/clustering
- In contrast, areas that attract skilled EU migrants likely to benefit from net employment creation

Rising segregation & Inequality:

Not just a UK problem…

Lessons from a pan-European comparative study

Marcińczak, et al., 2016, Inequality and rising levels of socio-economic segregation



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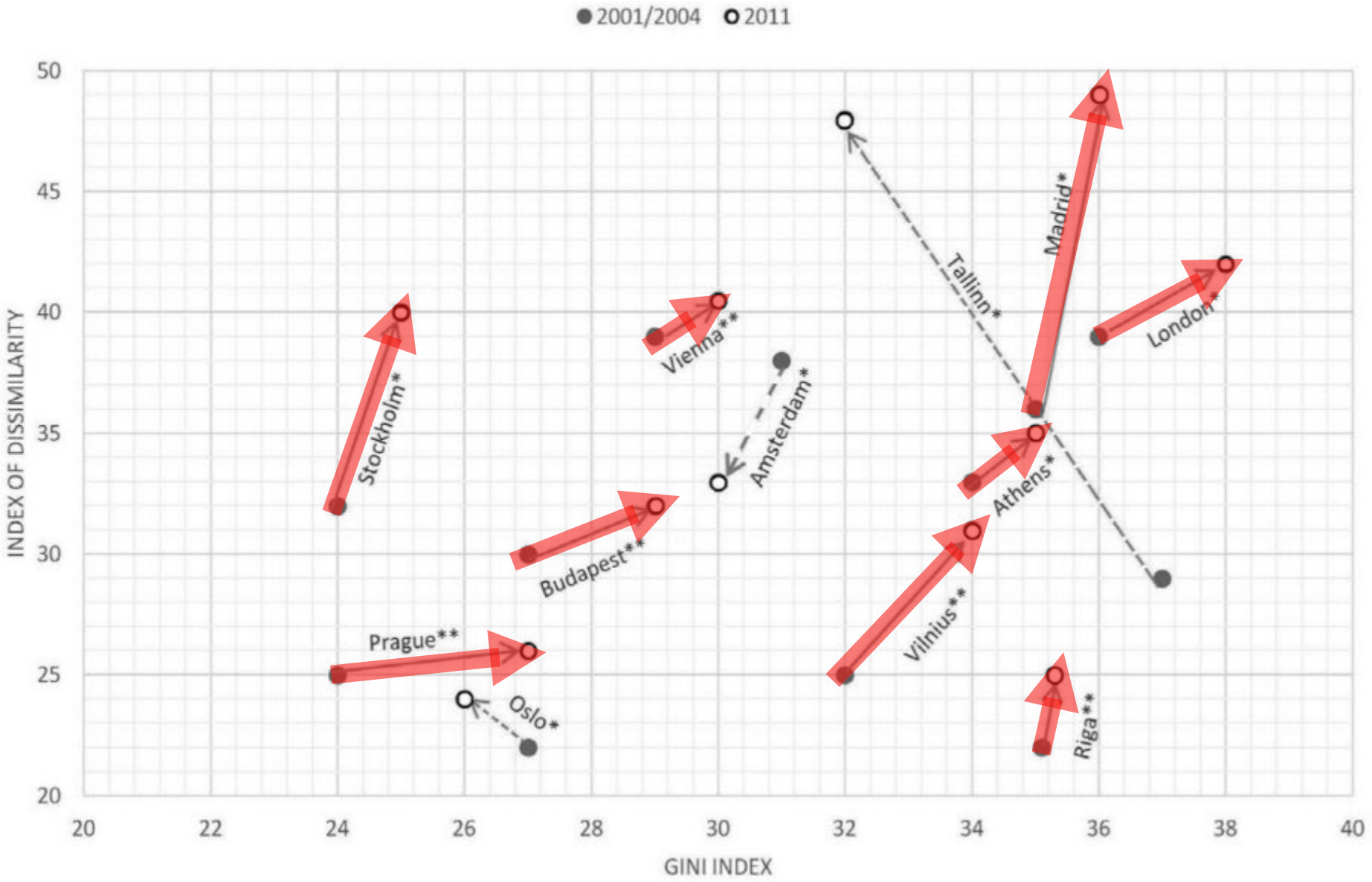

Conclusion

- High**lighted some complex/nuanced features of segregation**
  - **Illustrate the enigma of segregation**
  - features not typically captured by standard measures:

    Spatial links within & between units -- micro-neighbourhood flight,

    Cliffs & slopes -- spatial asymmetries & social frontiers

    Underlying perceptions -- perceived homophily & wormholes,

    LT dynamics of urban social structures -- homophily horizons & variable spatial persistence
- But that may all be important in affecting the **impact of segregation…**

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Future Directions

- **Impact of segregation**:
  - What types/aspects of segregation are most harmful or beneficial?

- **Methods:**
  - Dynamic spatial multi-level models
  - ERGMs
  - Morphology of social frontiers

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Thank you for listening!

