

# Data-driven urban science

Xiaowen Dong

Associate Professor, Department of Engineering Science  
Fellow and Tutor in Engineering, Lady Margaret Hall



Source: BBC (2019) <https://bbc.in/3EtuYZS>

“...urban science...means here a science of human behaviour as it applies to cities...this is not the science of the physics of buildings or energy flows in cities...**it is the science of people flows, flows of goods, and the flow of information and ideas...**”

— Michael Batty (2019: 998)

## what is urban science?



- affordable housing
- mobility
- provision of services
- ageing
- urban health
- social segregation
- environmental footprint
- climate action

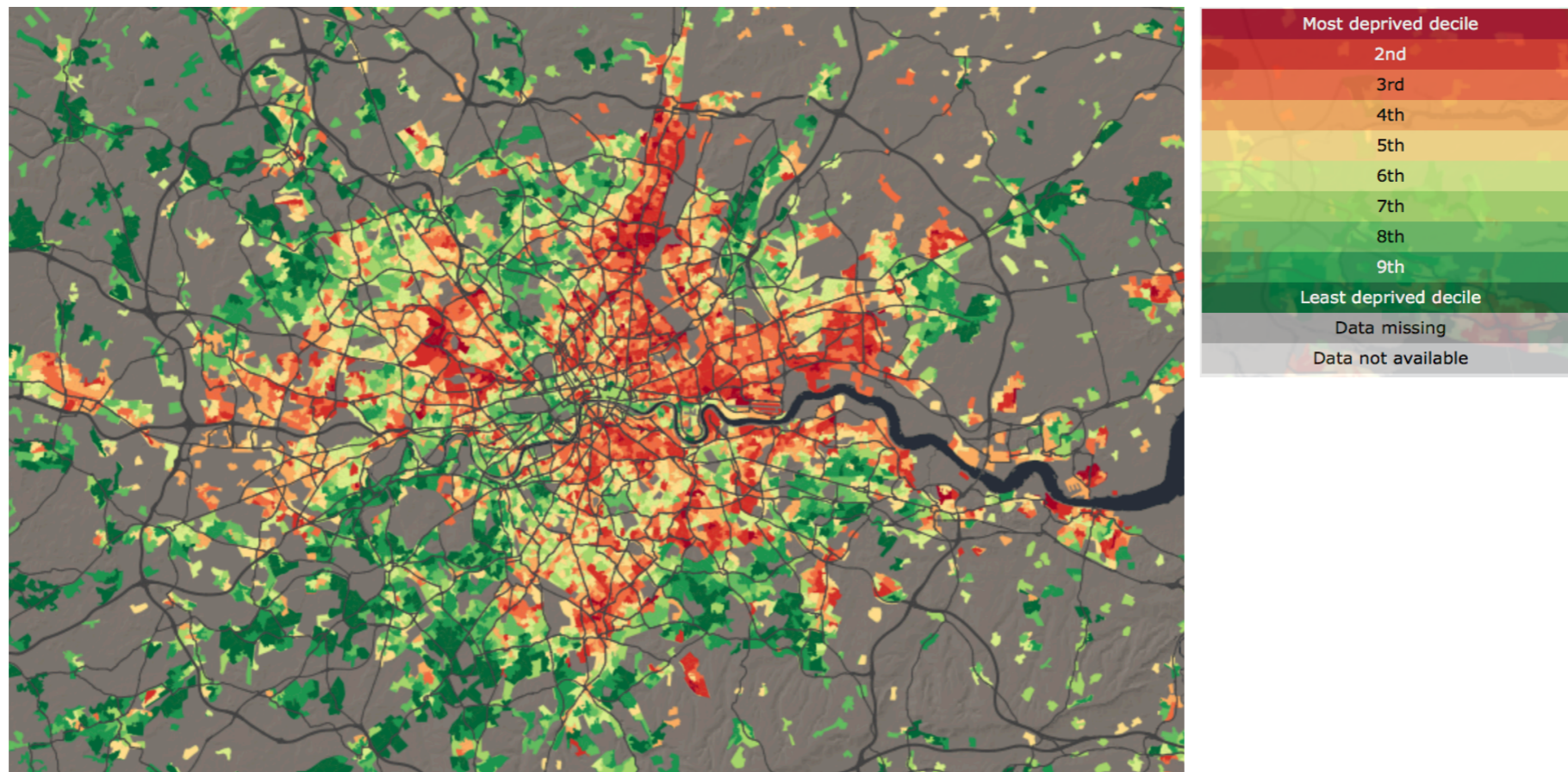


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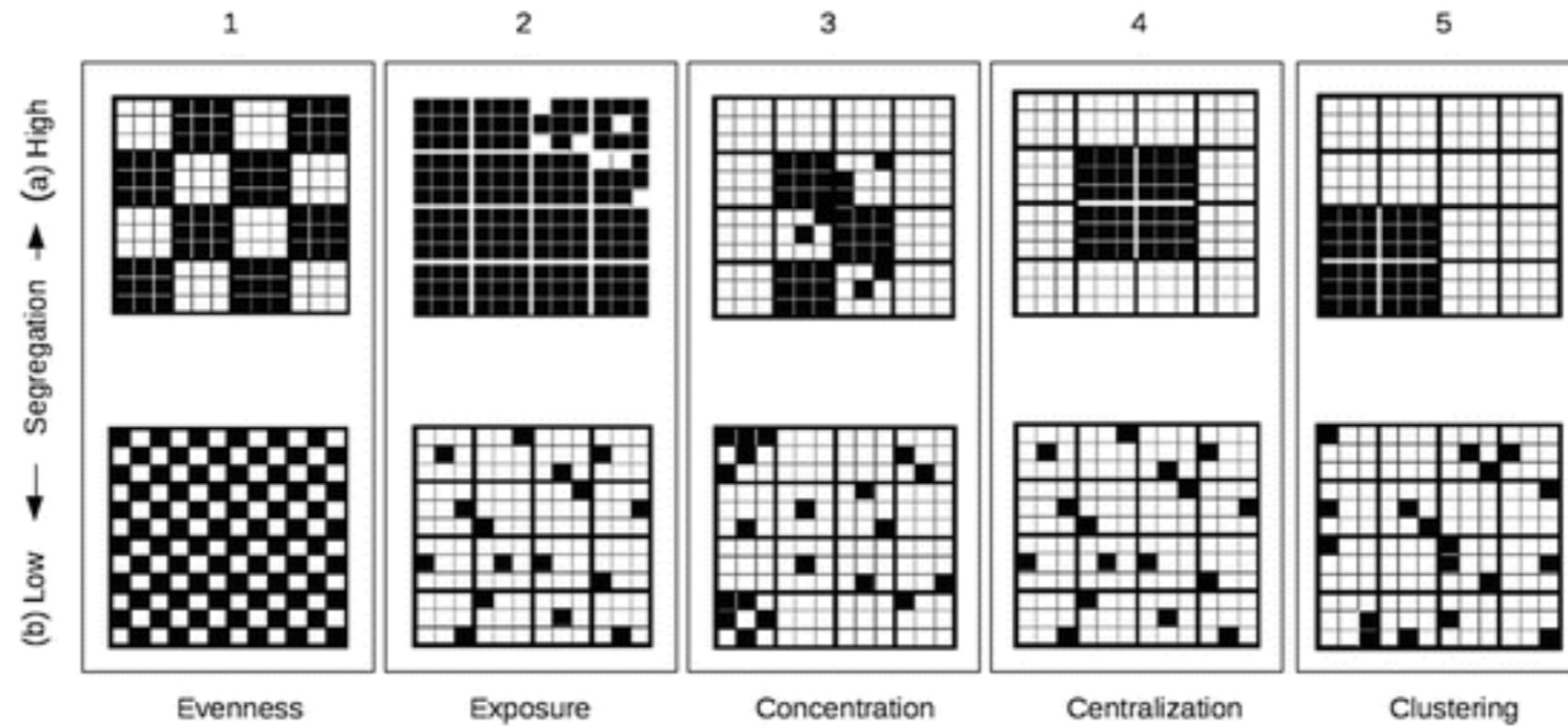
“...unequal distribution of different social groups in the urban space...”



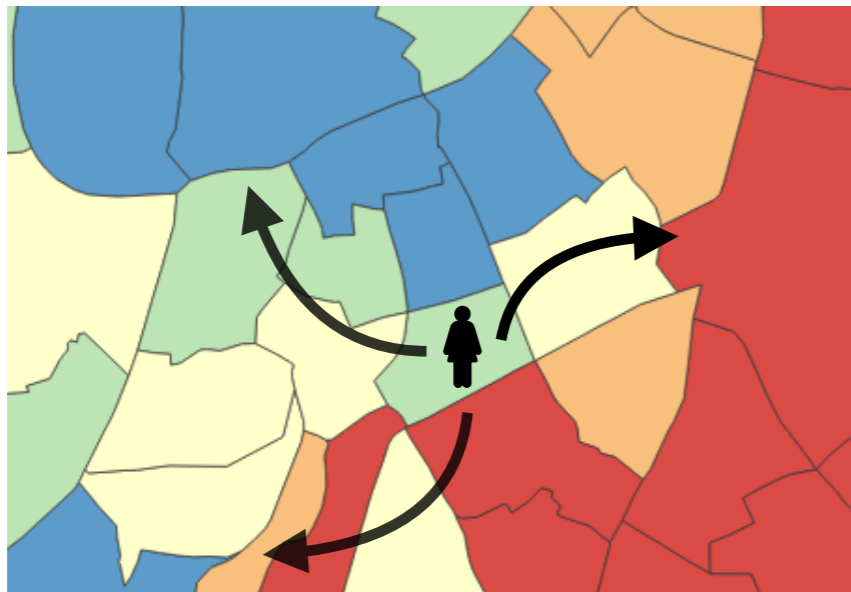




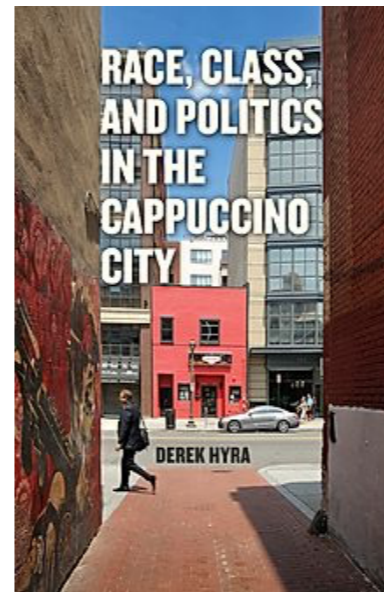
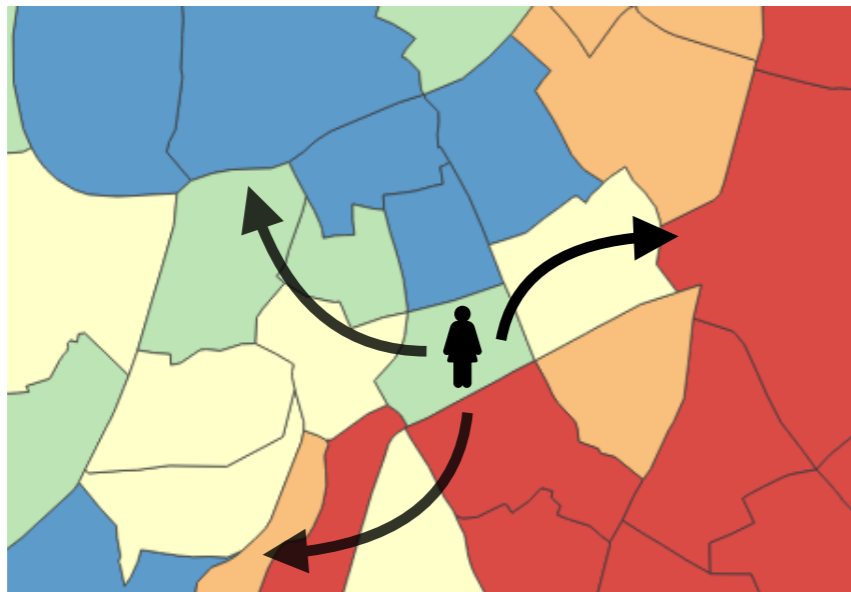
## English Indices of Deprivation (2019)



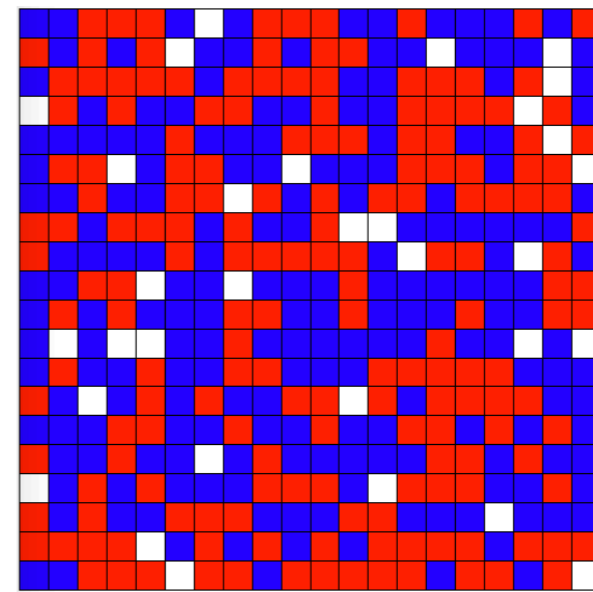
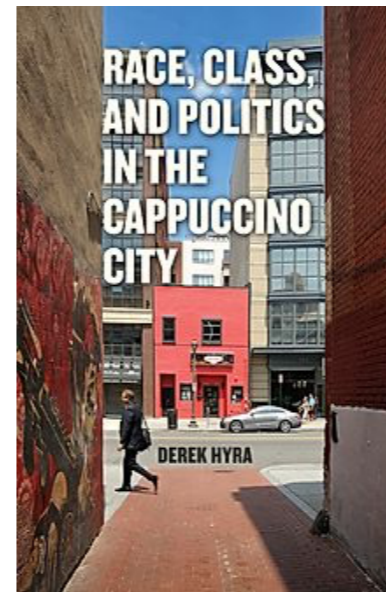
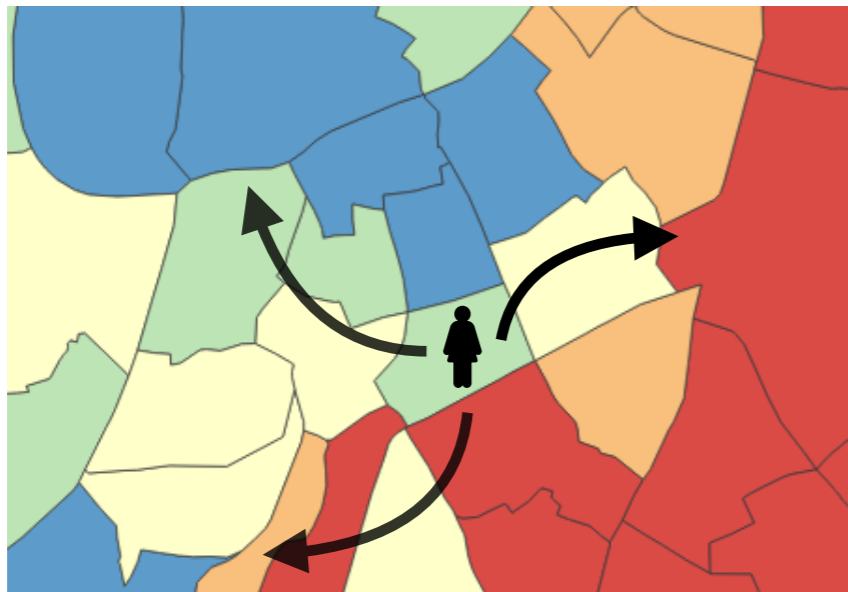
five dimensions of segregation in US census report (2002)



- from **residential** to **behavioural** segregation

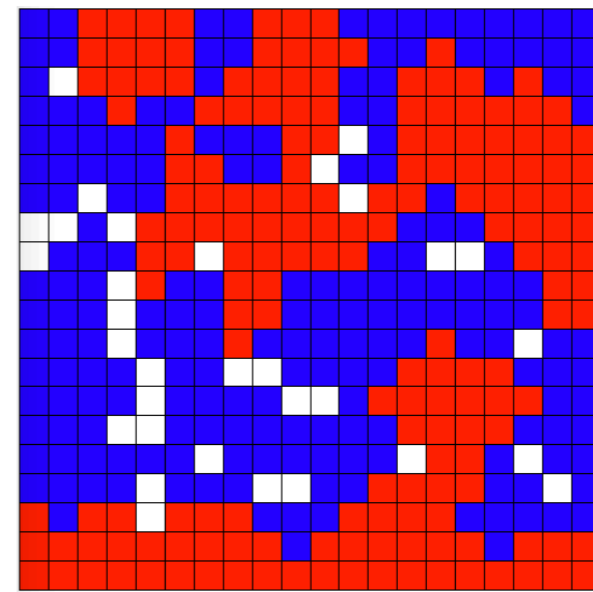
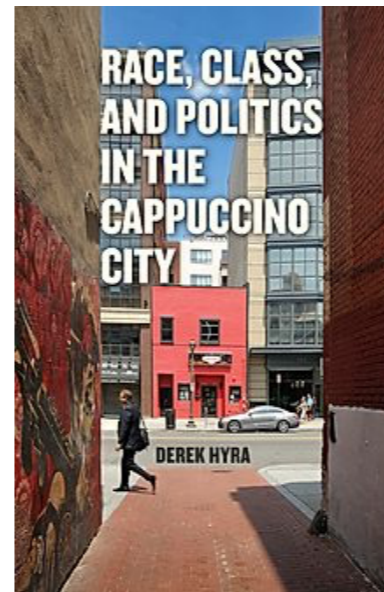
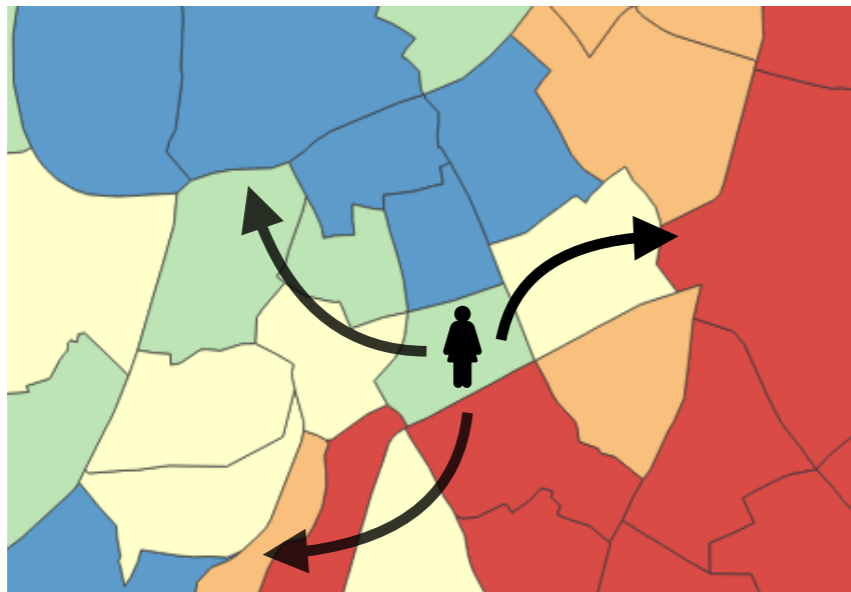


- from residential to behavioural segregation
- from macro-level (neighbourhood) to micro-level (places) analysis

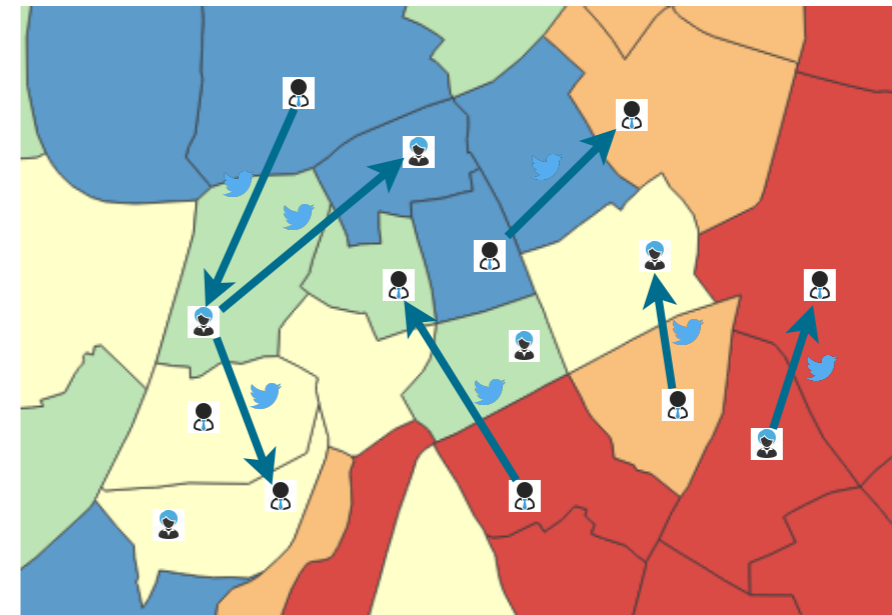
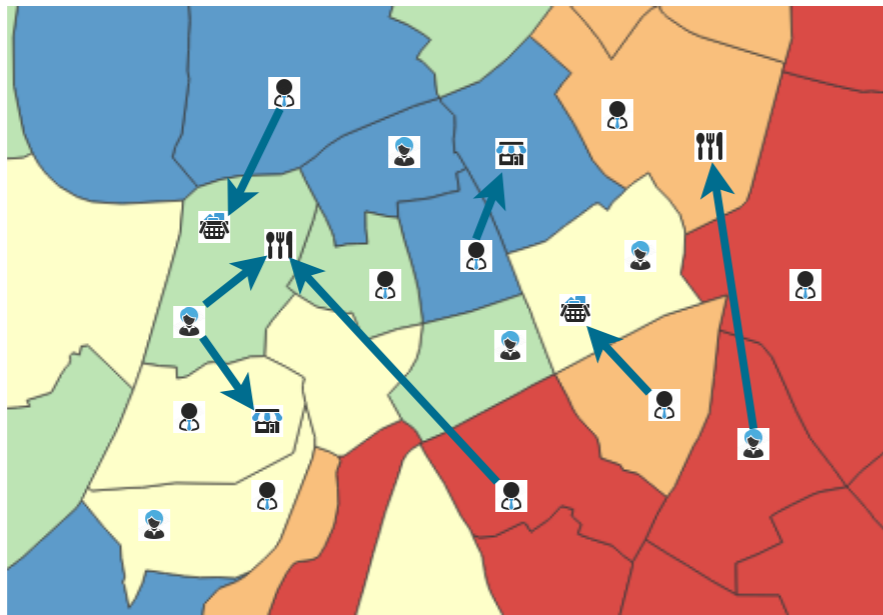


- from residential to behavioural segregation
- from macro-level (neighbourhood) to micro-level (places) analysis
- from quantification to modelling of segregation



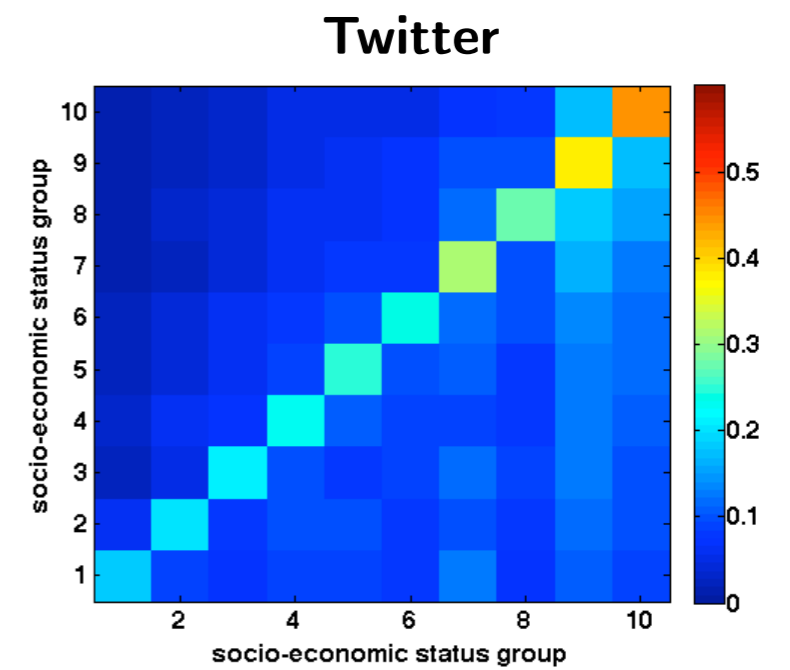
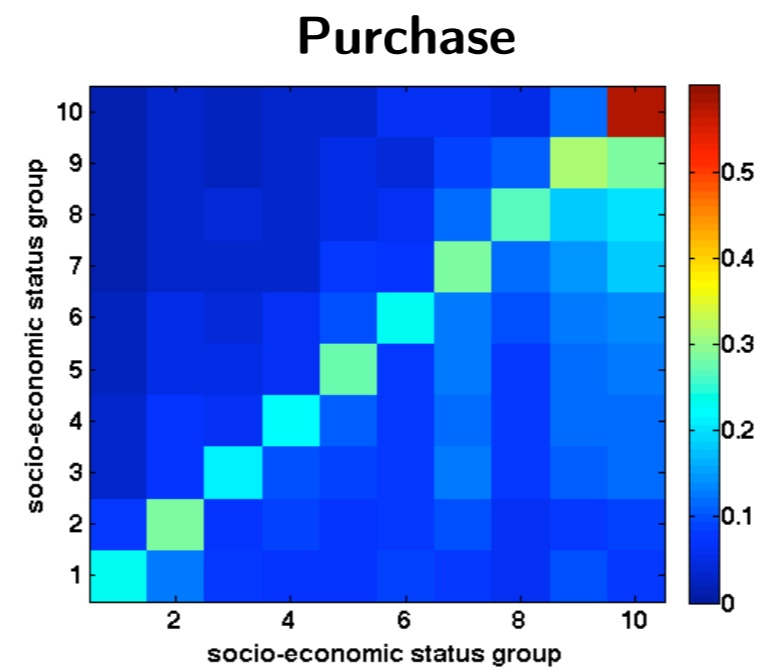
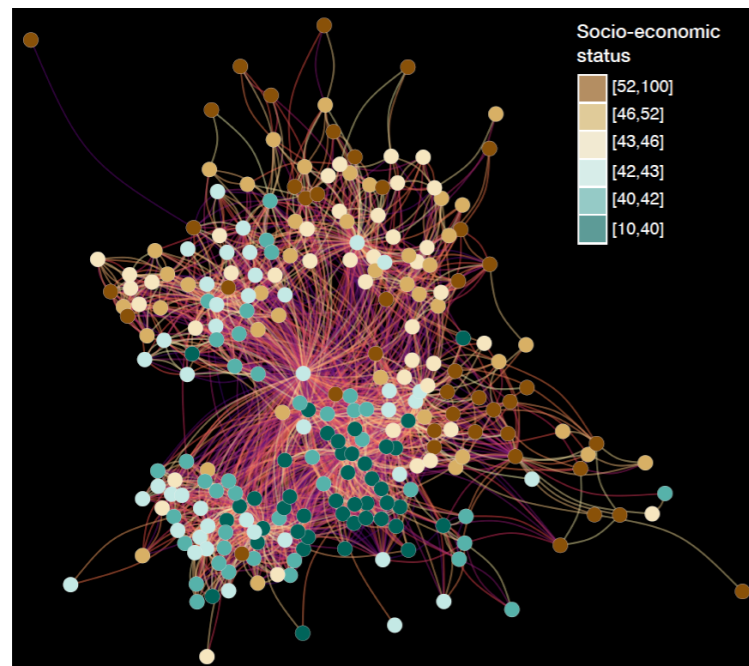


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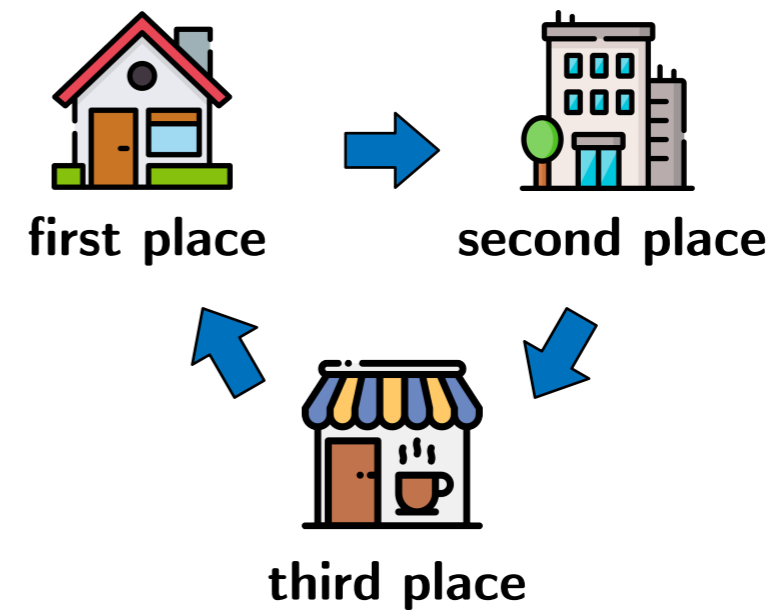
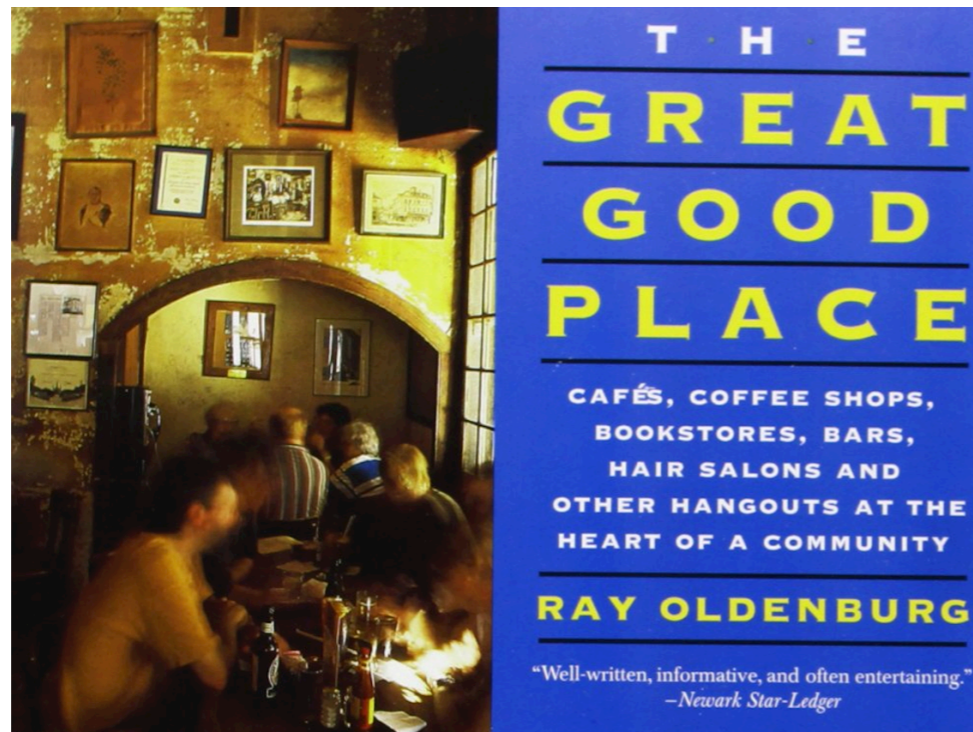


## interaction networks

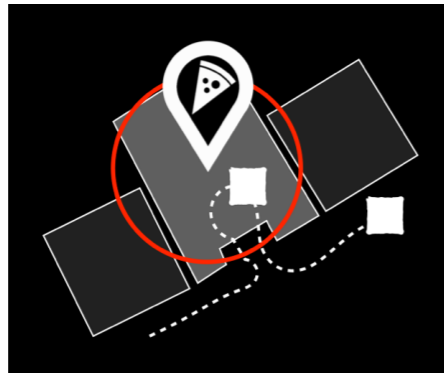
- nodes: neighbourhoods
- edges: # purchases by users in area  $i$  at stores in  $j$  or # mentions by users in area  $i$  to users in  $j$



segregation in behavioural interactions



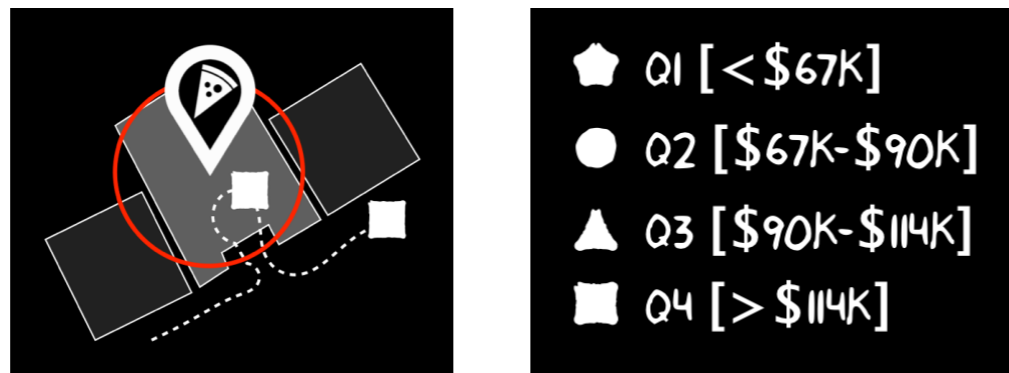
**third places, or micro-level segregation?**



## **segregation at places in cities**

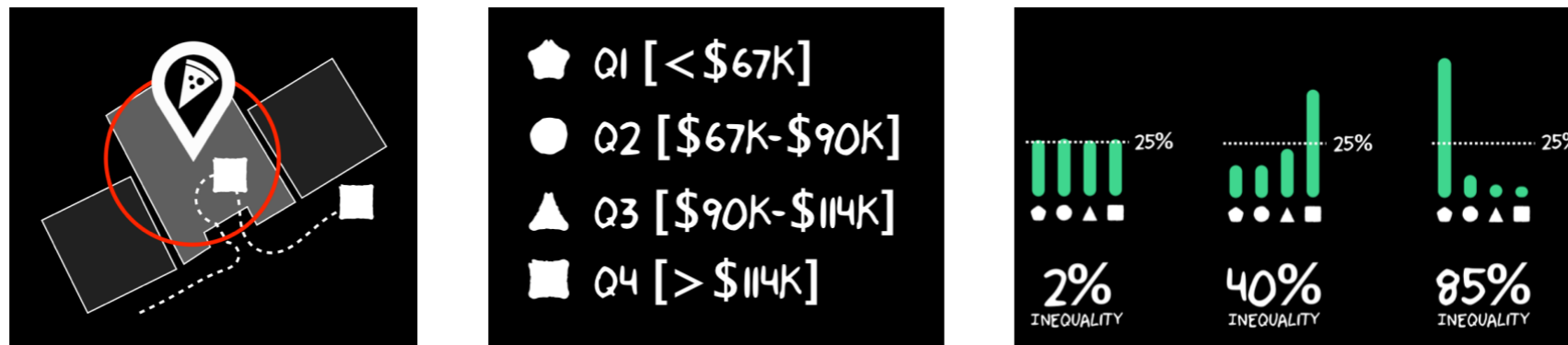
- **extract “stays” and attribute stays to places**





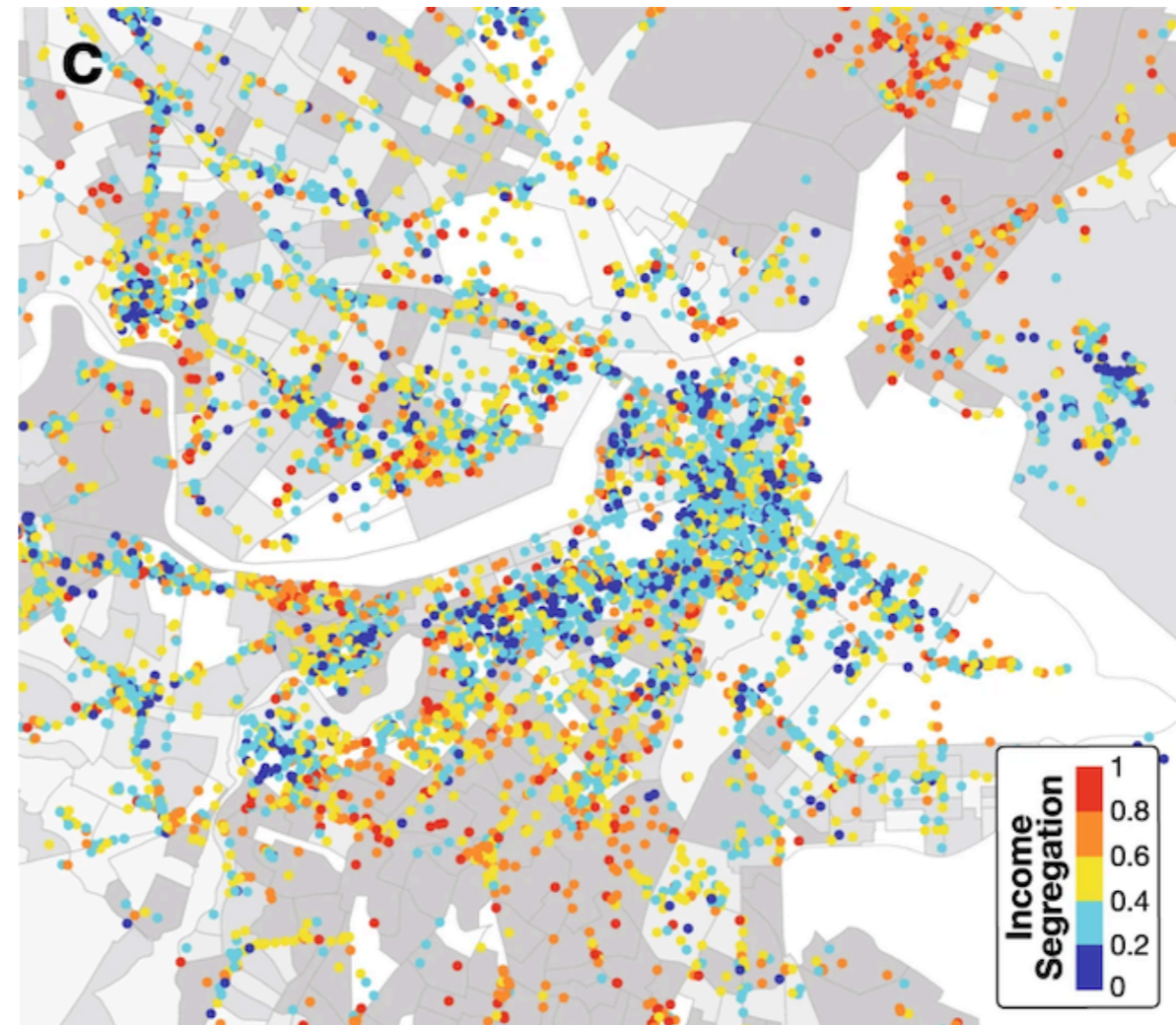
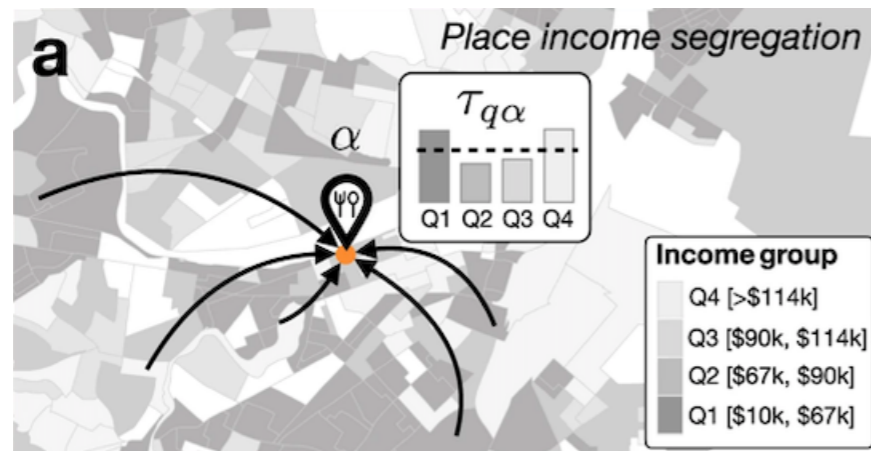
## segregation at places in cities

- extract “stays” and attribute stays to places
- identify user home area and income group

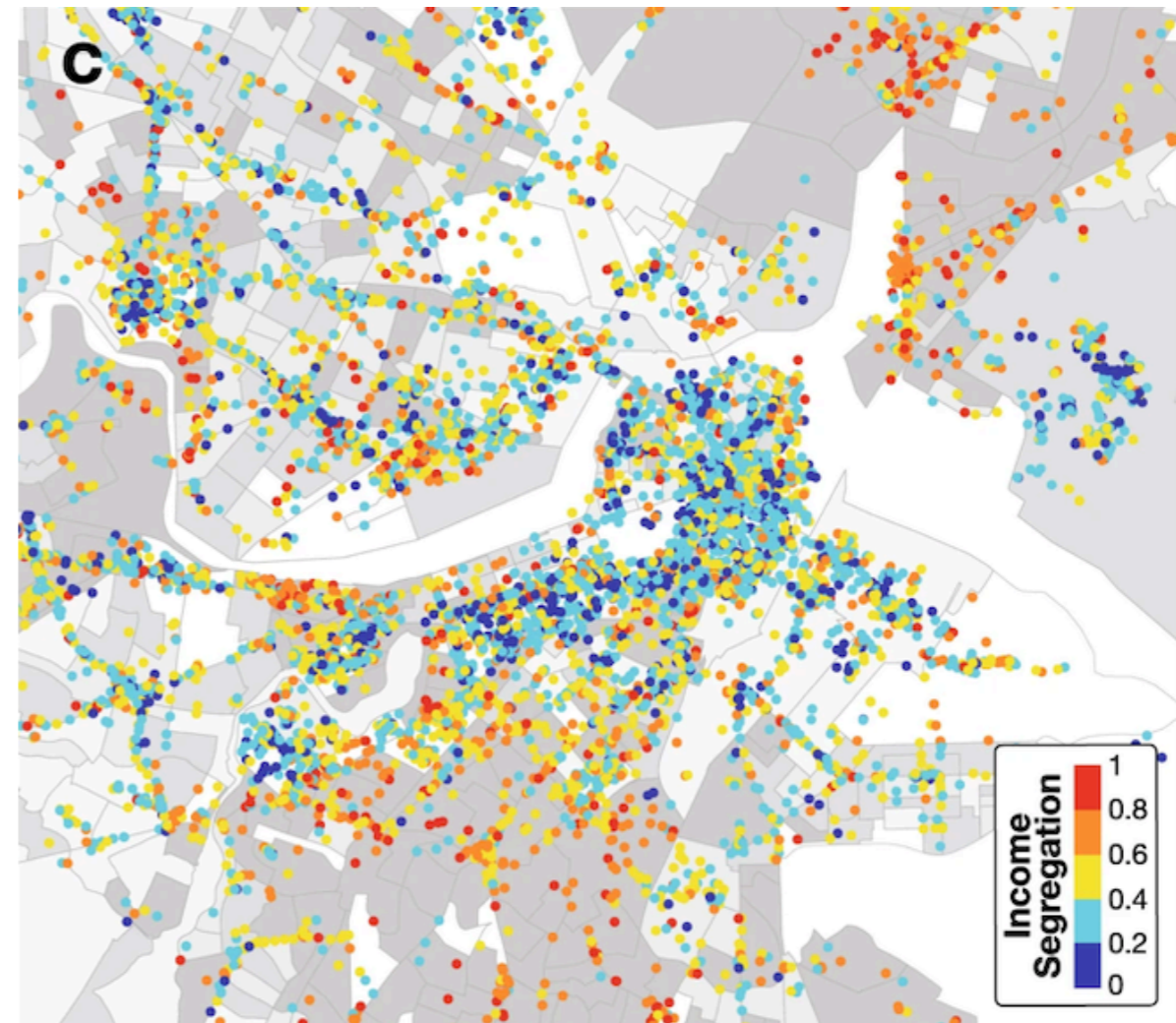
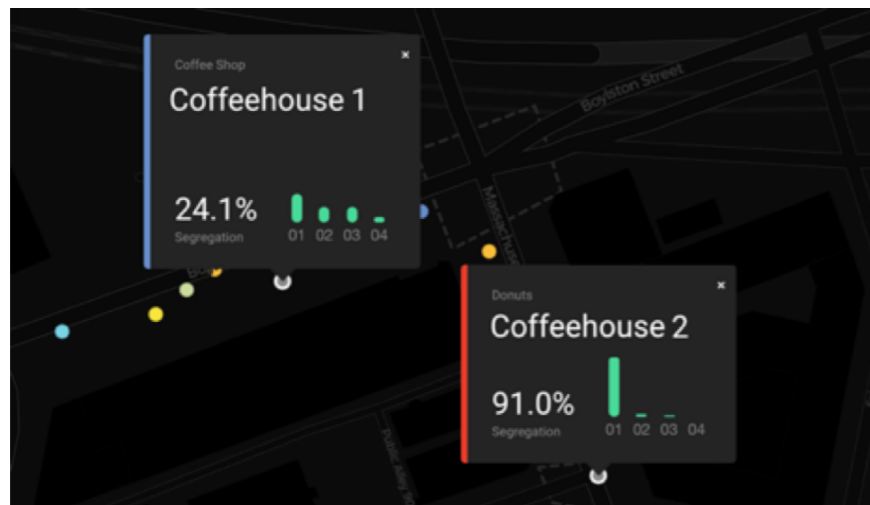


## segregation at places in cities

- extract “stays” and attribute stays to places
- identify user home area and income group
- compute time spent by each income group at given place
- compute segregation measure for each place

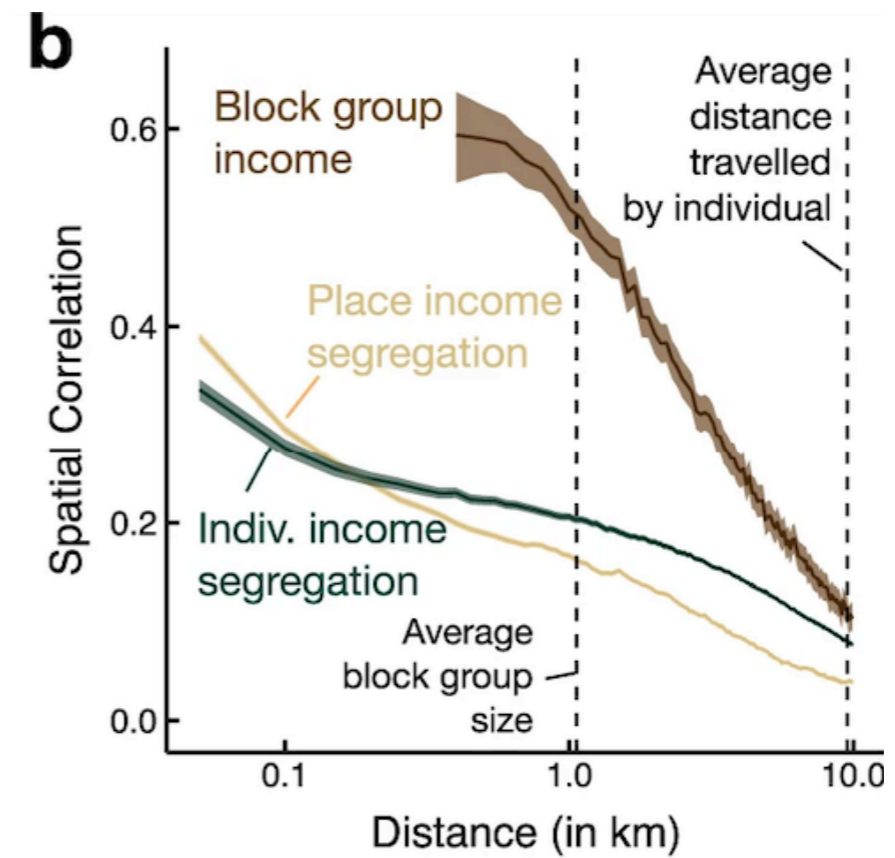
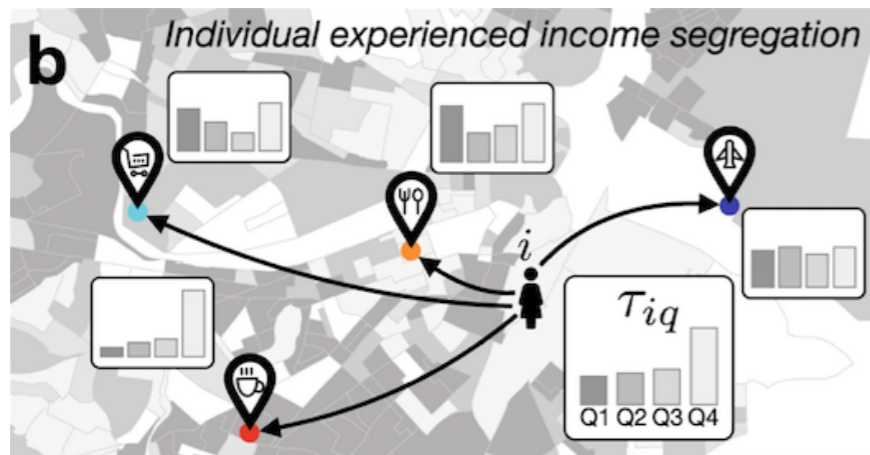


place segregation occurs at micro level (within 25 meters)



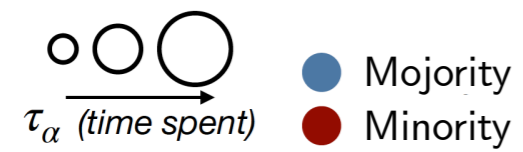
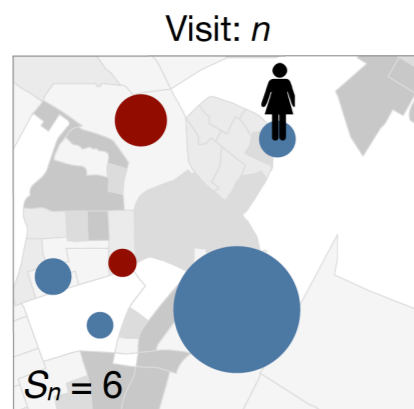
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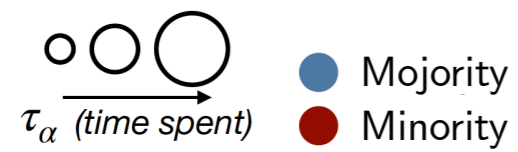
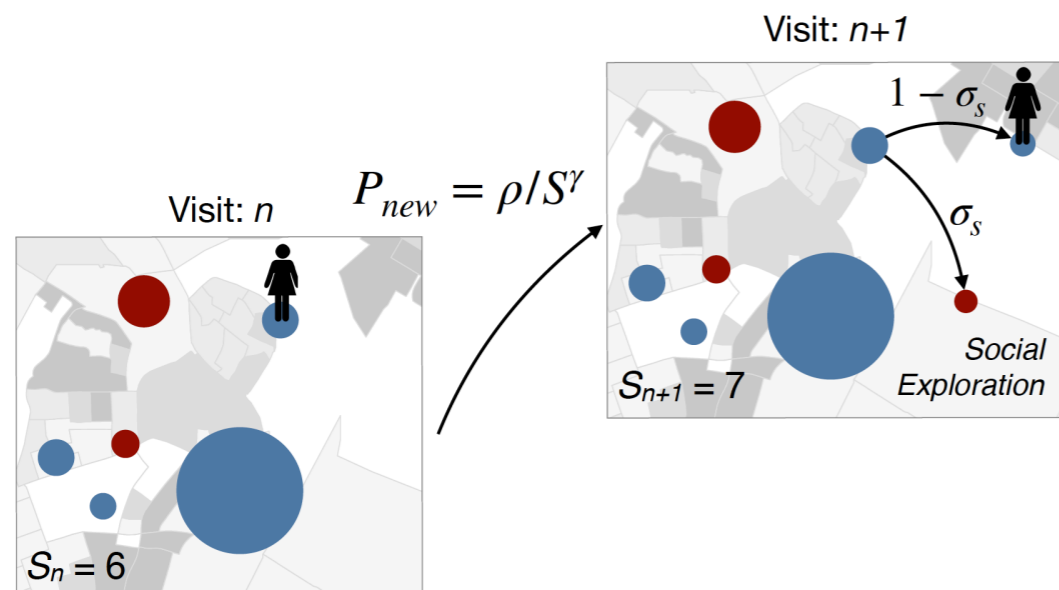


user segregation is not only determined by where people live

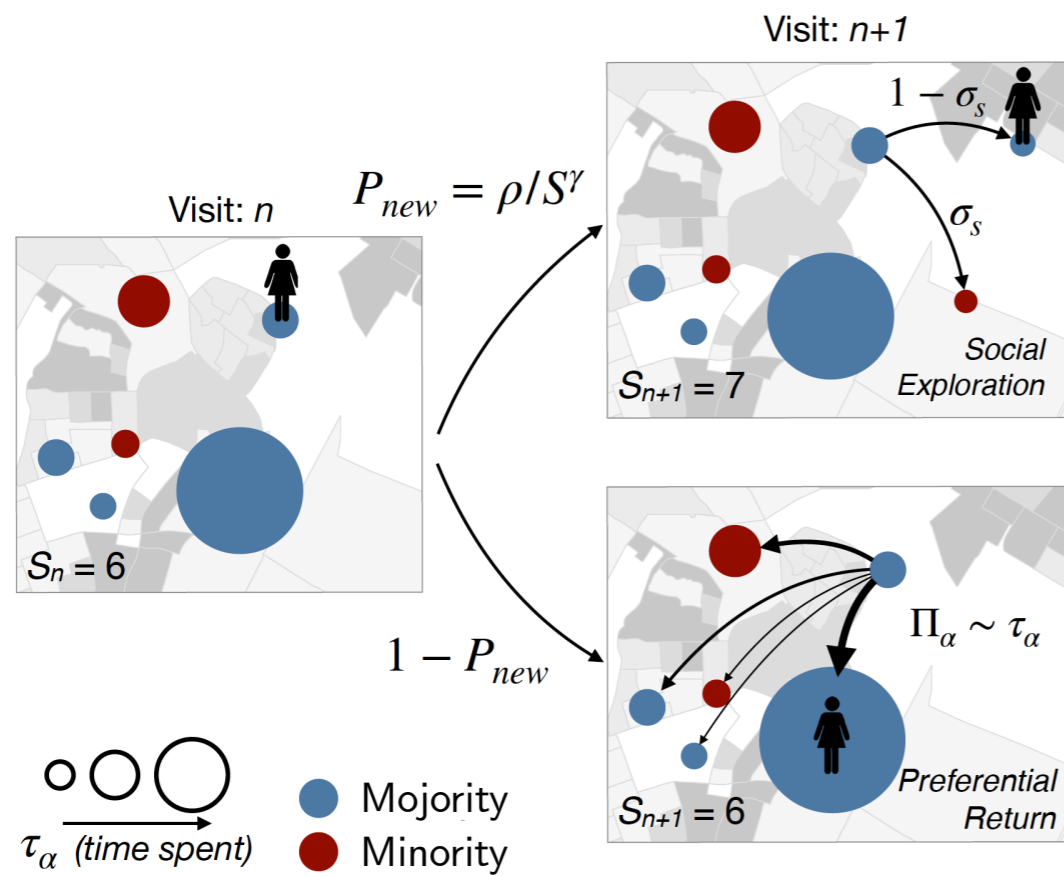




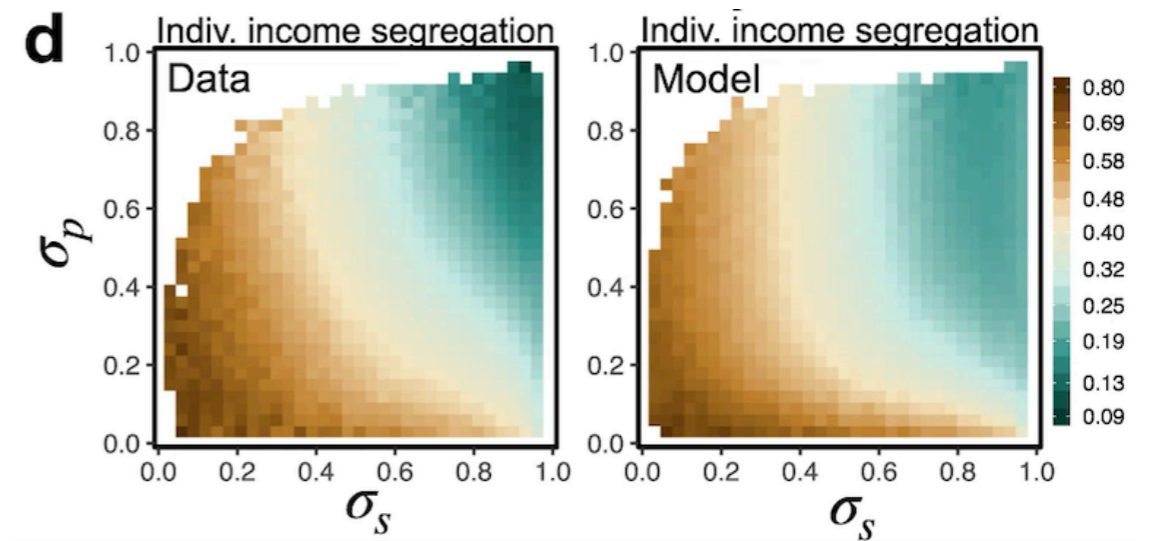
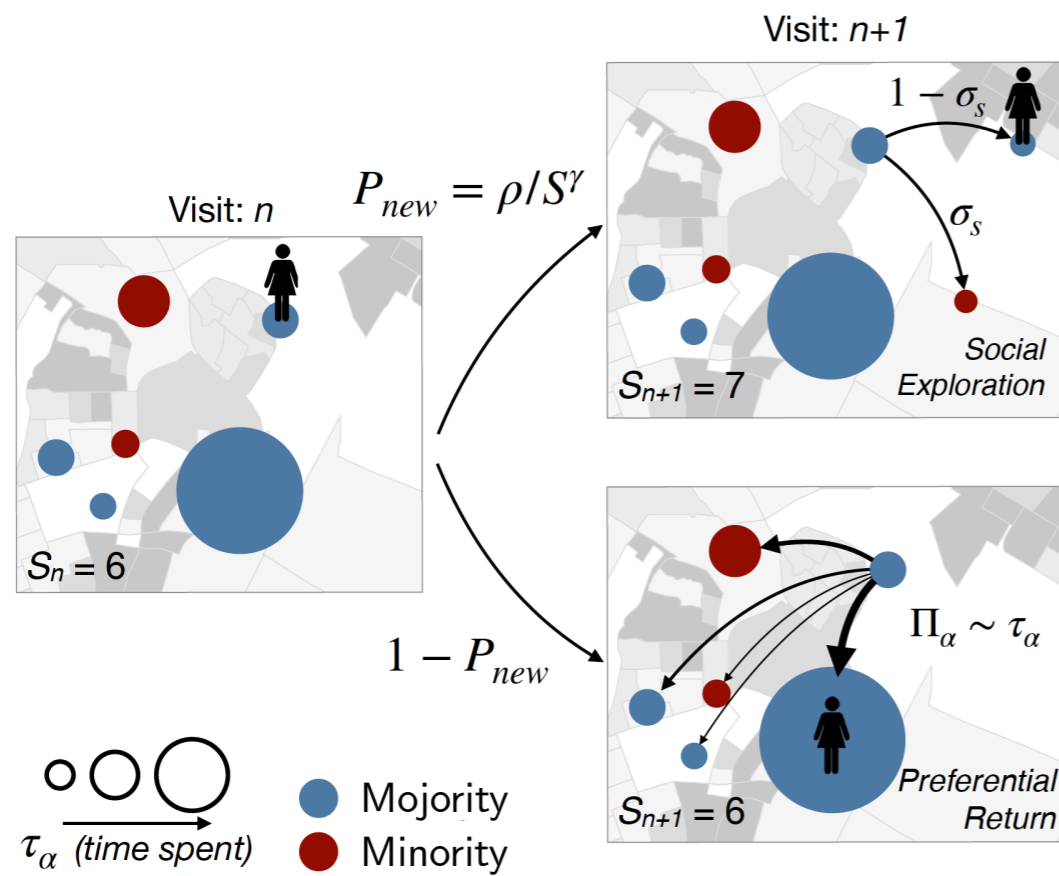
**modelling of segregation dynamics**



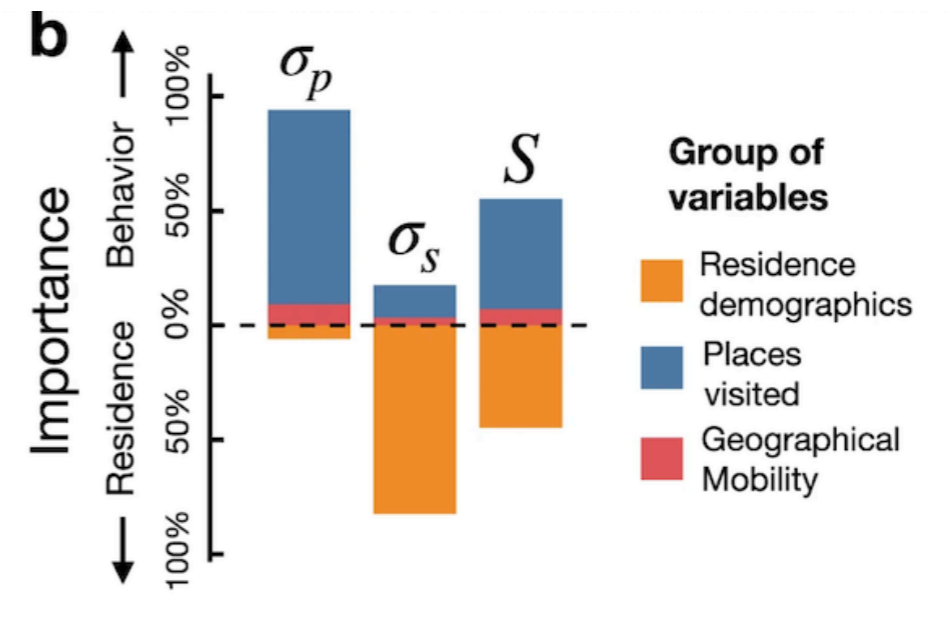
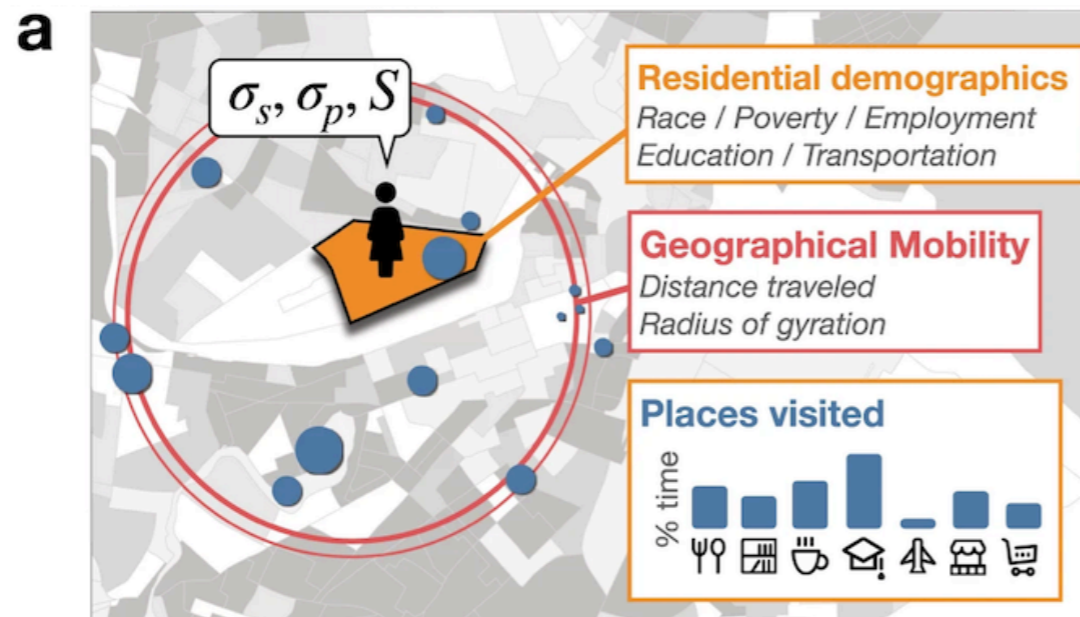
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## modelling of segregation dynamics

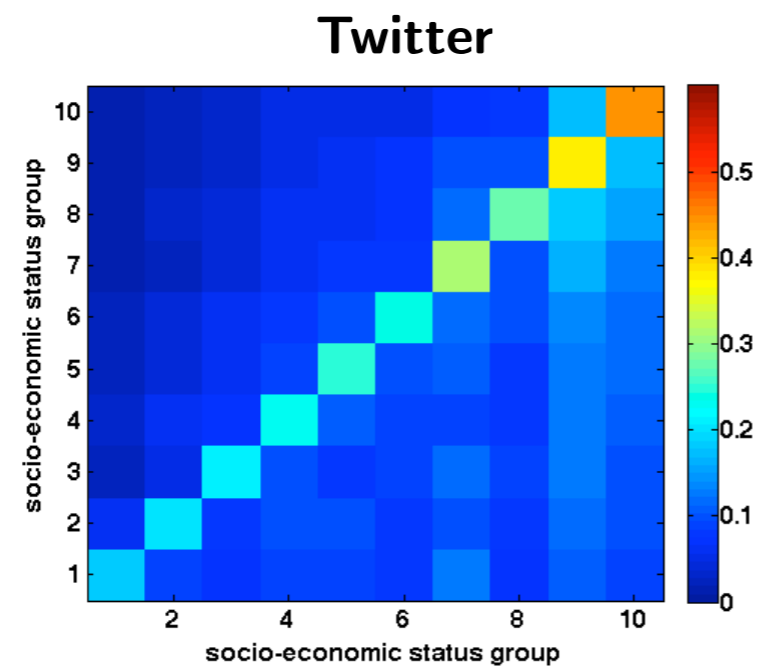


**modelling of segregation dynamics**



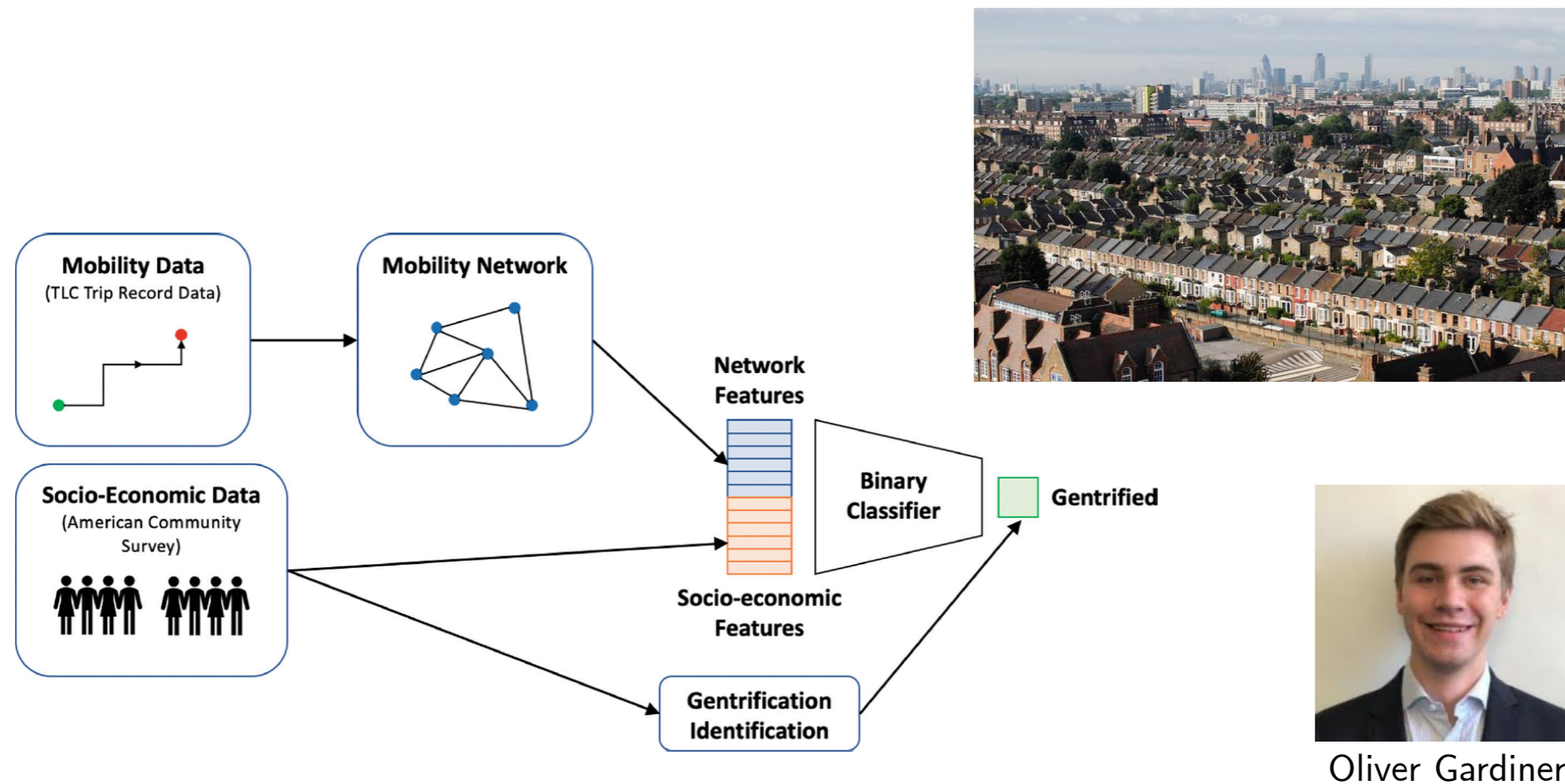
user segregation = behaviour (55%) + residence (45%)



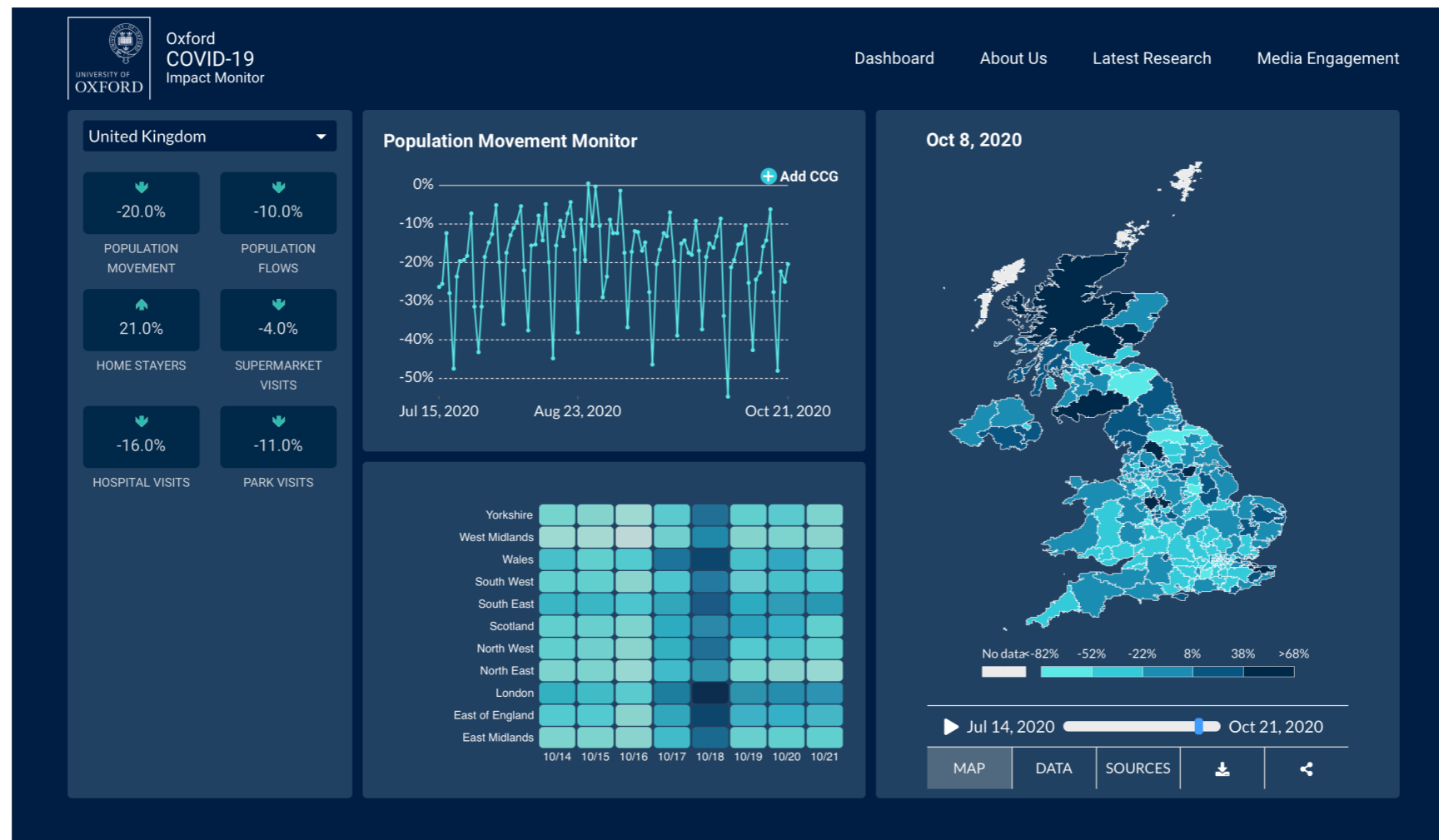


Source: Nautilus (2016) <https://bit.ly/3tPBrt3>

**new EPSRC project on cohesion and fragmentation in online forums**



## mobility networks for gentrification prediction



<https://www.oxford-covid-19.com>

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Contact: [xdong@robots.ox.ac.uk](mailto:xdong@robots.ox.ac.uk)