An aerial photograph of a city, likely London, with a blue overlay that highlights a network of roads or infrastructure. The text is overlaid on the left side of the image in white font on dark rectangular backgrounds.

Open Data for Urban Research Session 4 Presenting Data

frama.link/odur-2018-s4

This **course** · Open Data for Urban Research

**North American cities are innovating on
community-level development indicators**

Civic Tech For Urban Collaborative Governance

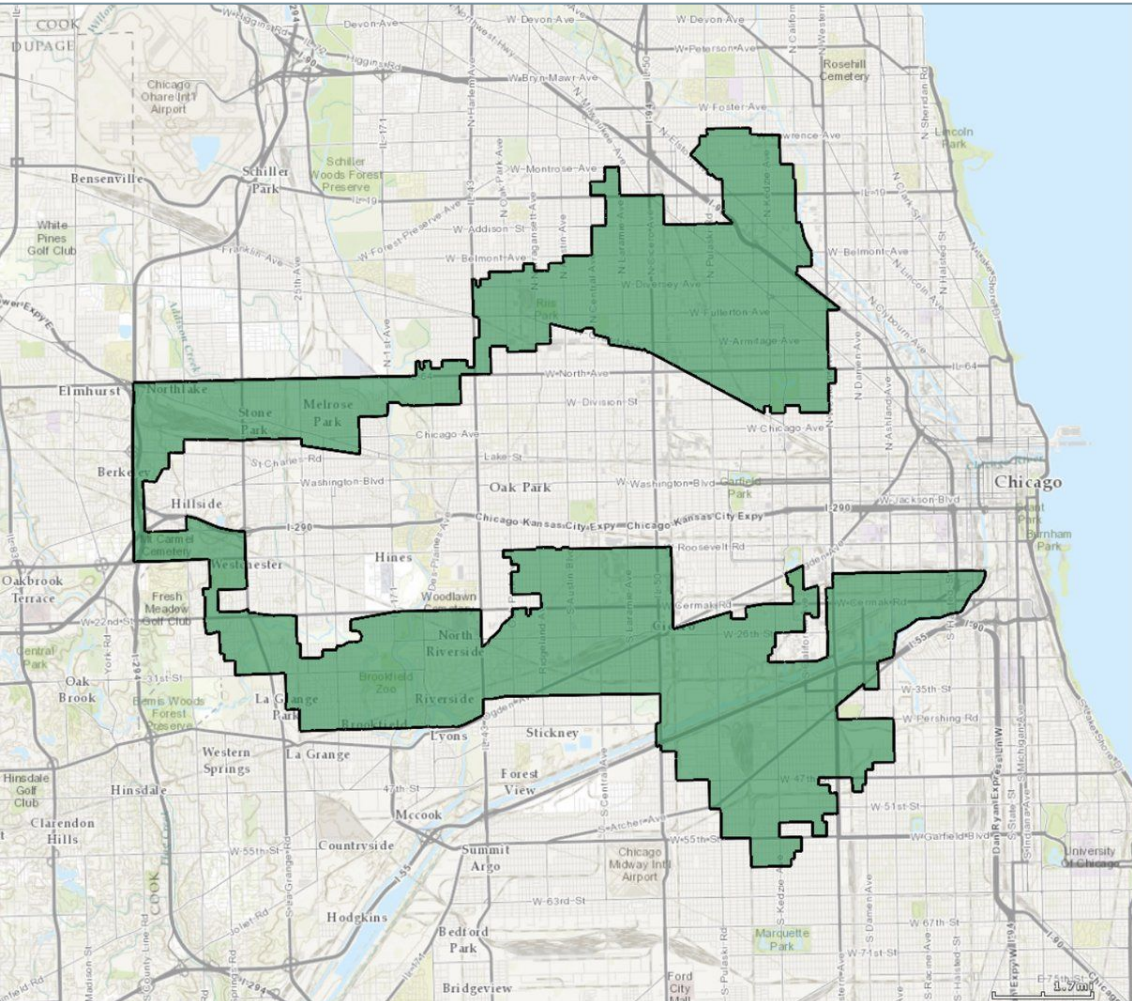
Hollie Russon Gilman, Columbia University, School of International and Public Affairs

Home Office used charity data map to
deport rough sleepers

*Emails show that deal with Greater London Authority helped it target homeless
EU nationals for removal*

**How open data can help the Global
South, from disaster relief to
voter turnout**

This session · Presenting Data, Spatial Visualization



Illinois US District 4



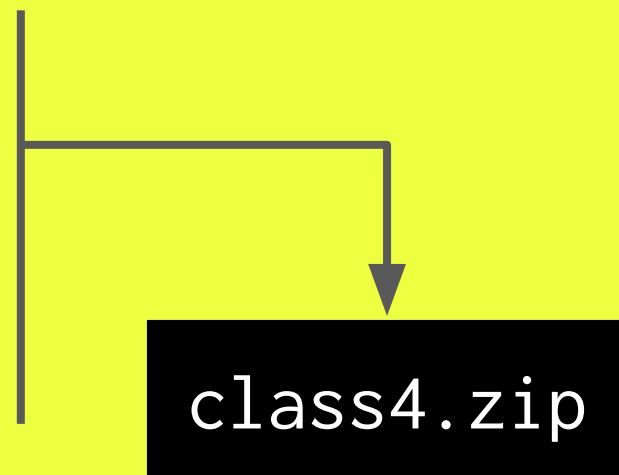
US Congressional districts since 2013
Source: <http://nationalatlas.gov>, 1 Million Scale project.

Replication material

`github.com/dataactivist/`

`sciencespo_odur2018/`

`tree/master/class4`



Required software

R + **RStudio** with `ggplot2` and `rleafmap`

JavaScript via any modern Web browser

Outline

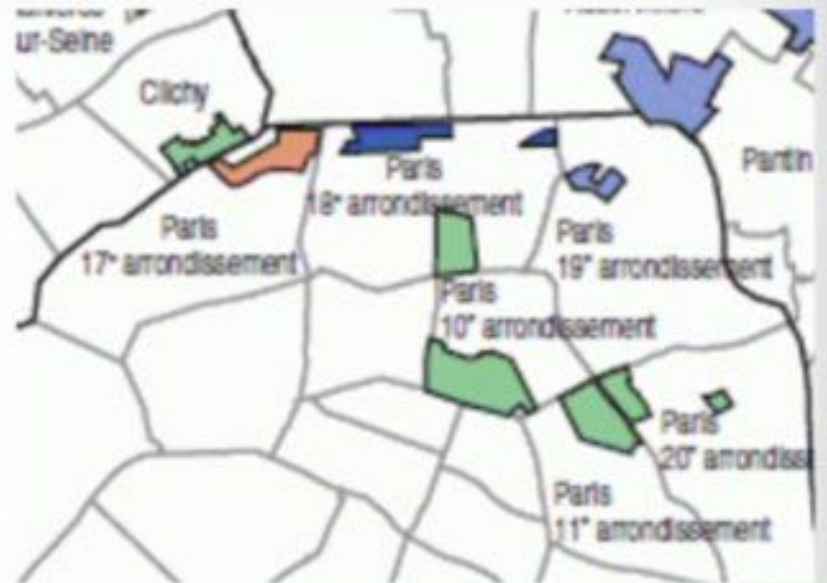
Quantification

Visualization

↳ **Maps** incl. **guest talk**

↳ **Tools**

↳ **Practice**



Special **guest talk**

Who **Elsa Noyons¹** and **Camille Léage²**

See [their respective bios](#) · document previously circulated by email



1

Topic **‘Sensitive cartography’**

See also [‘Cartographies sensibles de la ville’](#) · conferences, in French



2

Quantification

Units

Forms

Tables

Databases

Objects

UNITS



0. AGRICULTEURS

- 00 - agriculteurs
- 01 - propriétaires exploitants
- 02 - fermiers
- 03 - métayers

1. SALARIES AGRICOLES

- 10 - salariés agricoles

2. PATRONS DE L'INDUSTRIE ET DU COMMERCE

- 20
- 21 - Industriels
- 22 - artisans
- 23 - patrons pêcheurs
- 25 - commerçants
- 26 - gros commerçants
- 27 - petits commerçants

3. PROF. LIBERALES ET CADRES SUPERIEURS5. EMPLOYES

- 51 - employés de bureau (secteur privé)
- 52 - employés de bureau (secteur public)
- 53 - employés de commerce

6. OUVRIERS

- 60 - contremaître (sect. privé)
- 61 - ouvriers qualifiés (sect. privé)
- 62 - ouvriers qualifiés et contremaîtres (sect. public)
- 63 - ouvriers spécialisés (secteur privé)
- 64 - ouvriers spécialisés (secteur public)
- 65 - mineurs
- 66 - marins et pêcheurs
- 67 - apprentis ouvriers
- 68 - manoeuvre

BIRTH	GRO Reference No.	District & SD Nos.	Register No.
Z	Date of registration		Entry No.
CONFIDENTIAL PARTICULARS			
<p>The particulars below, required under the Population (Statistics) Acts, will not be entered in the register. This confidential information will be used only for the preparation and supply of statistical information by the Registrar General.</p>			
L	1. Where the father's name is entered in register: Father's date of birth		DAY MONTH YEAR <input type="text"/> <input type="text"/> <input type="text"/>
(i)	2. In all cases: Mother's date of birth		DAY MONTH YEAR <input type="text"/> <input type="text"/> <input type="text"/>
(ii)	3. Where the child is born within marriage: (i) Date of marriage		MONTH YEAR <input type="text"/> <input type="text"/>
G(a) Father	(ii) Has the mother been married more than once?		YES <input type="checkbox"/> NO <input type="checkbox"/>
(va)	(iii) Mother's previous children (excluding still-births now being registered) by her present husband or former husband		(a) Number born alive (including any who have died) <input type="text"/> (b) Number still-births <input type="text"/>
(vb)	X Is this birth one of twins, triplets, etc?		YES <input type="checkbox"/> NO <input type="checkbox"/>
(vc)	If YES, complete (a) and (b)		(a) Total number of live and still-births at this maternity* 2 <input type="text"/> 3 <input type="text"/> 4 <input type="text"/> 5 <input type="text"/> 6 <input type="text"/> 7 <input type="text"/>
(vd)	(b) Entry No. of births Use birth: <input type="text"/>	(b) Entry No. of births Still-birth: <input type="text"/>	
(ve)	Eds Control		(vi)

BIRTH	Register No.	Entry No.
Registration district	District & S. Dist. Nos.	Administrative area
Sub-district		
1. Date and place of birth		CHILD
2. Name and surname		3. Sex
4. Name and surname		FATHER
5. Place of birth	6. Occupation	
7. Name and surname		MOTHER
8. Place of birth	9. Occupation	
10. Usual surname		10.2) Surname at marriage if different from maiden surname
11. Usual address (if different from place of child's birth)		12. Qualification
13. Usual address (if different from that in 10 above)		
14. I certify that the particulars entered above are true to the best of my knowledge and belief		
		Signature of informant
15. Date of registration		16. Signature of registrar

*Total as appropriate

Table 2. OLS regression results, controlling for sex, education, and California zip code.

	Dependent variable					
	Concern for radicalism in the US		Concern for radicalism in the world		Thermometer feelings toward Muslims (negative to positive)	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Attacks (<i>0 = before Paris; 1 = between attacks; 2 = after San Bernardino</i>)	7.741** (-1.500)	7.587*** (-1.505)	4.933** -1.309	5.007*** (-1.311)	-2.064 (-1.220)	-2.328 (-1.214)
Positive past encounters with Muslims (>50 on a 0–100 scale)	2.781 (-1.930)	2.672 (-1.937)	5.400** -1.7	5.281** (-1.700)	28.036** (-1.580)	28.156*** (1.574)
Attacks * Positive past encounters	-4.220* (-1.750)	-4.166* (-1.747)	-3.135* (-1.523)	-3.189* (-1.525)	3.109* (-1.430)	3.149* (1.423)
Female		3.91033** (-1.232)		4.368*** (-1.079)		4.411*** (-1.015)
Education		0.395 (-0.486)		0.526 (-0.426)		-0.704 (-0.402)
California		-2.403 -1.634		0.027 -1.44		3.567** -1.344
Constant	61.604** (-1.640)	58.231*** (-2.660)	66.907** (1.553)	64.779*** (-2.330)	38.418** (-1.330)	38.359*** (-2.175)
R ²	0.02	0.027	0.014	0.022	0.28	0.2918
N	2059	2052	2063	2056	1922	1909

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; N = number.

Visualization

Plots a.k.a graphs

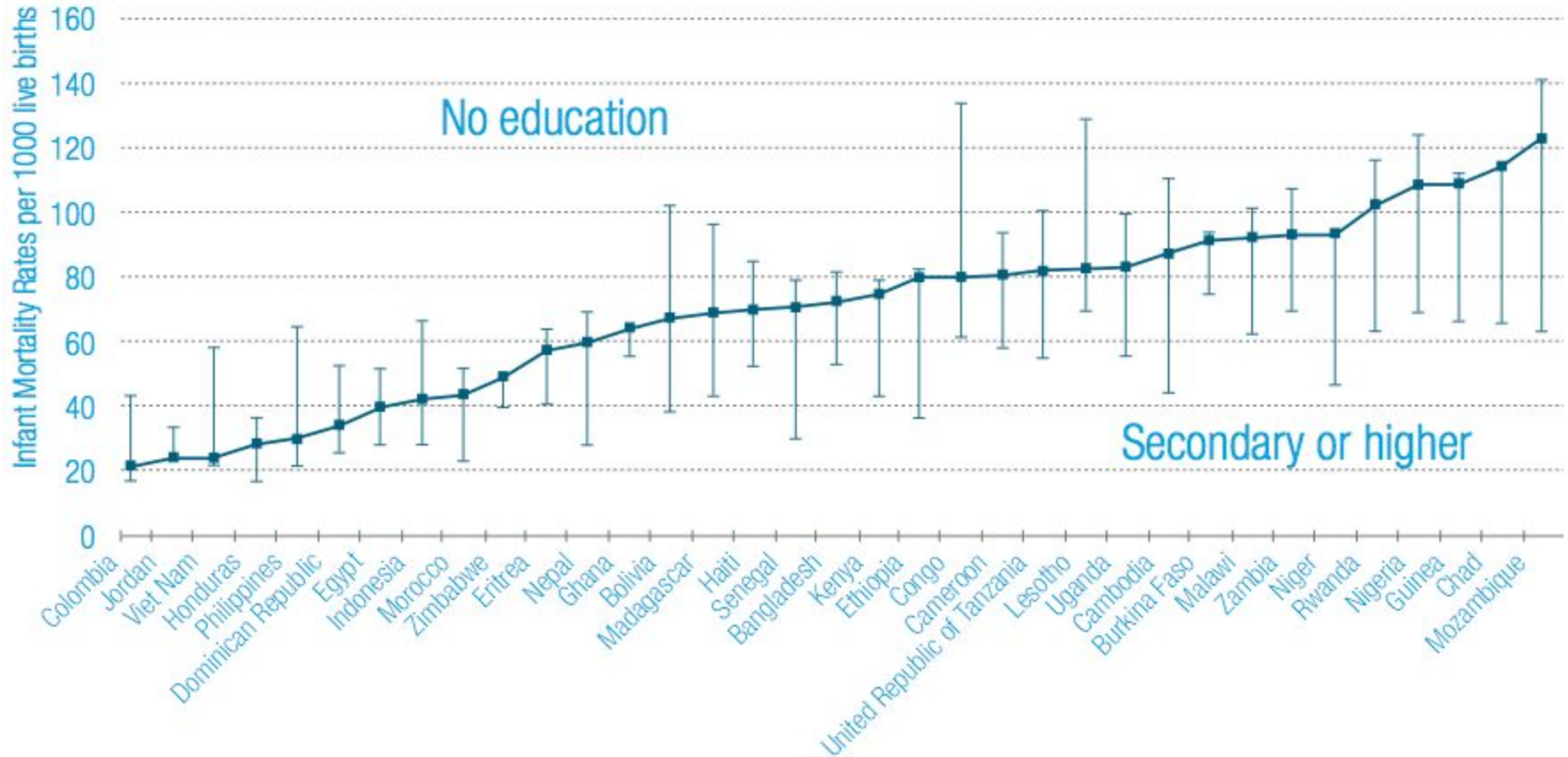
Time series

Networks a.k.a graphs

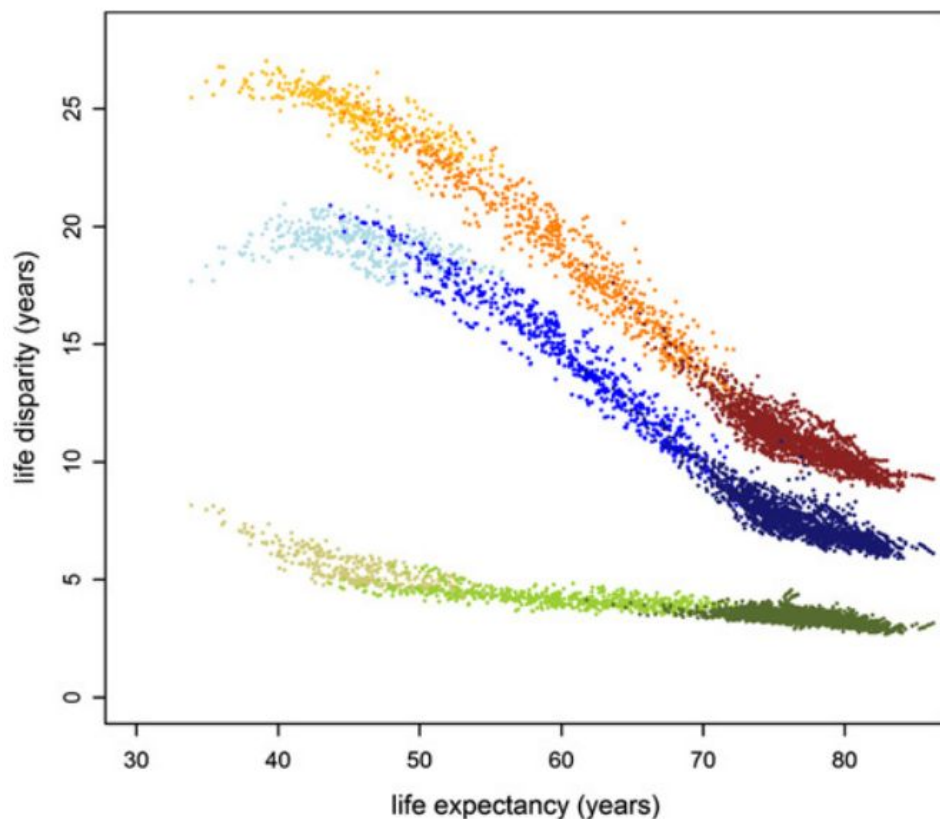
Maps

PLOTS

Figure 2.1: Inequity in infant mortality rates between countries and within countries by mother's education.



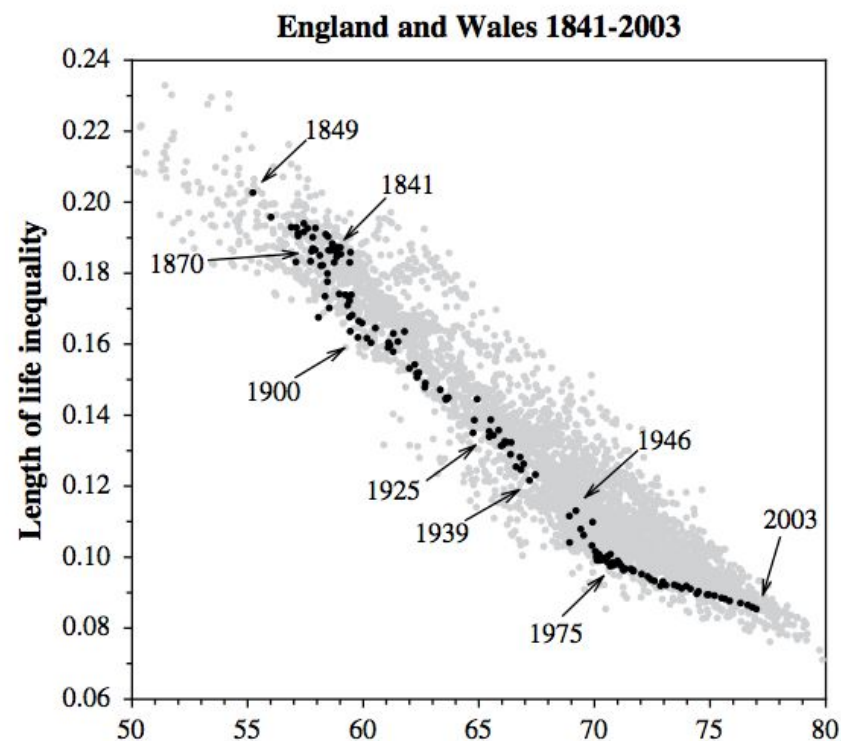
Life expectancy and disparity

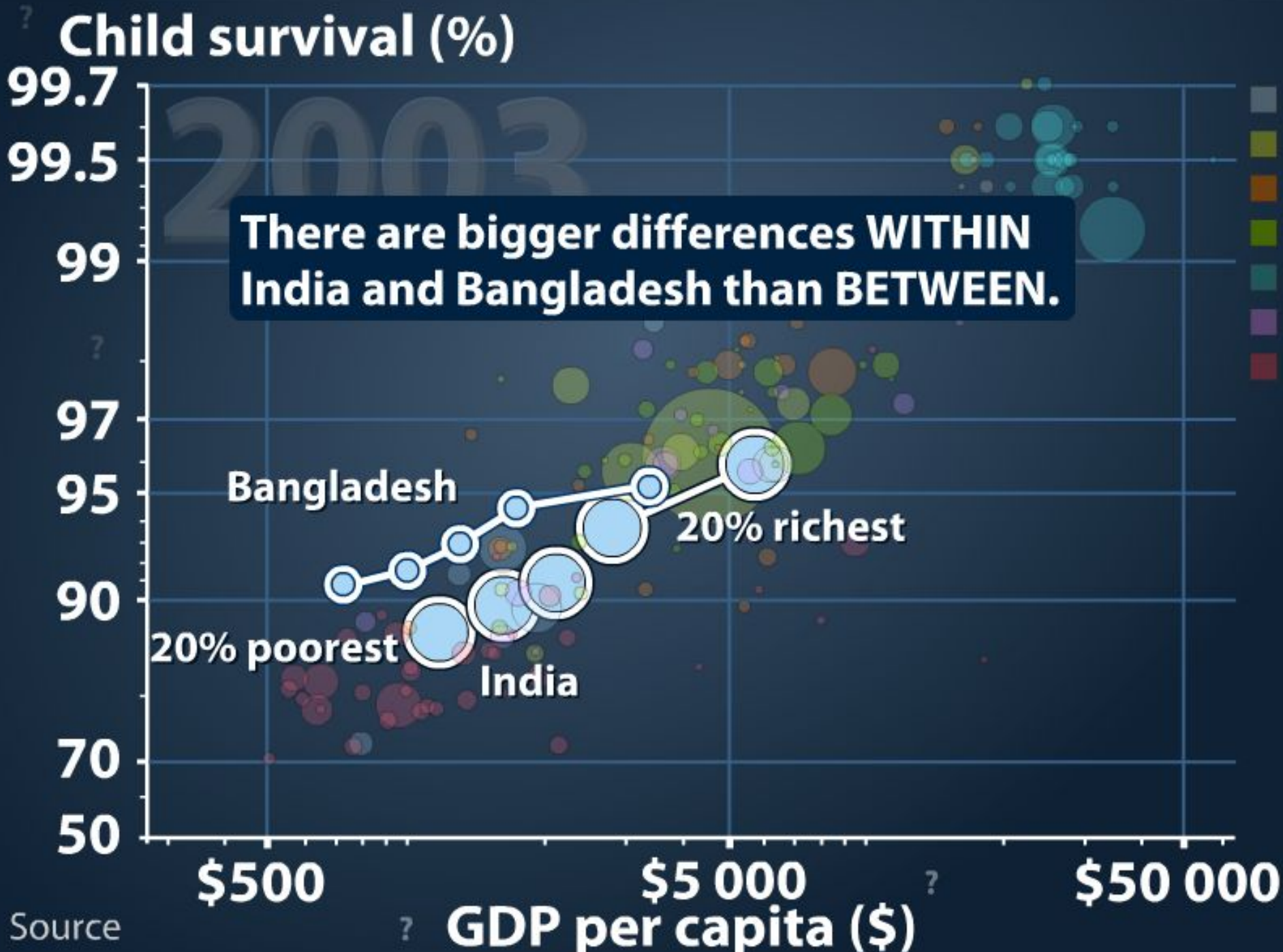


Life expectancy and disparity: an international comparison of life table data

James W Vaupel,¹ Zhen Zhang,¹ Alyson A van Raalte^{1,2}

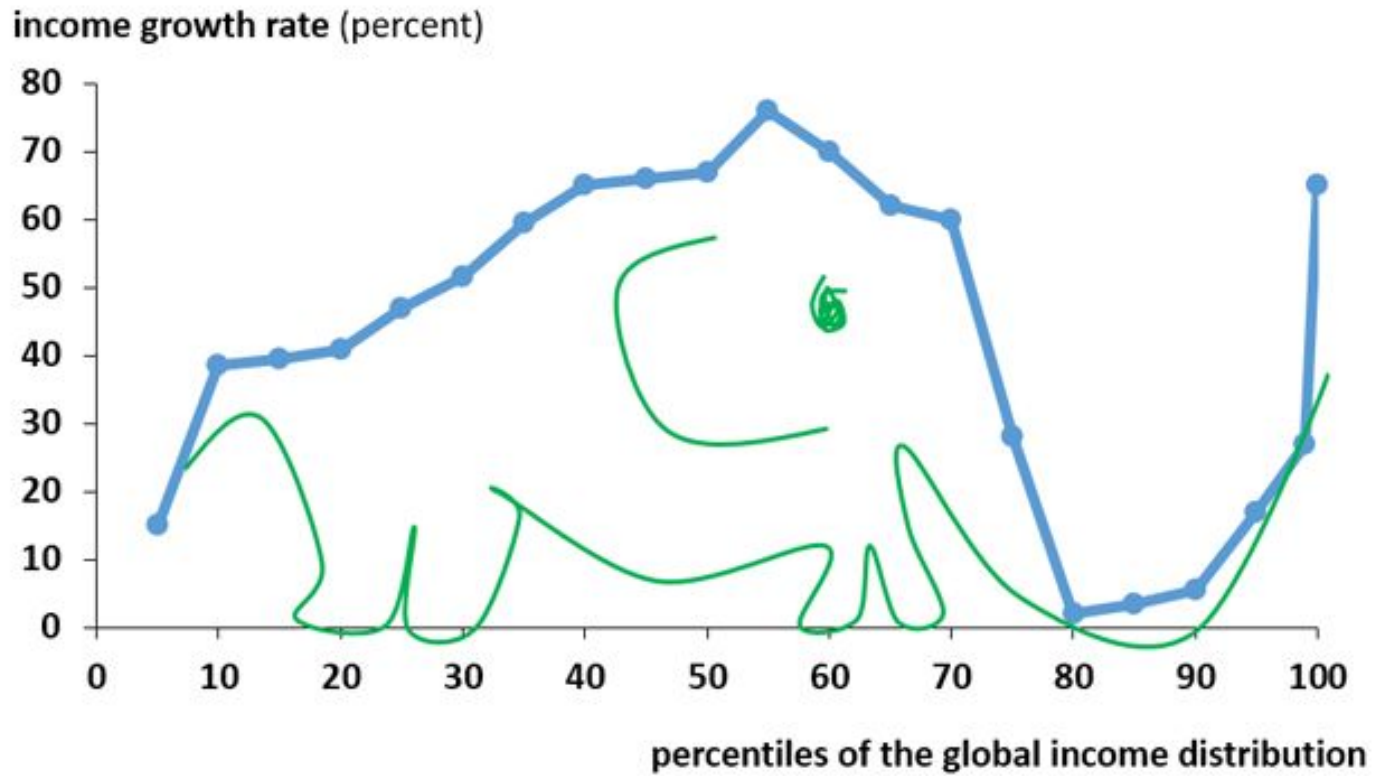
Figure 2 The relationship between total life disparity (red), early-life disparity up to the threshold age (blue) and late-life disparity after the threshold age (green). The darkest hues relate to data from 1950–2009, middle hues 1900–1949 and lightest hues 1840–1899. Total disparity is an additive function of early-life disparity and late-life disparity. Since 1840 the decrease in total life disparity has resulted from reductions in early-life disparity. The correlation coefficient between early-life disparity and total life disparity is 0.997 (95% CI 0.997 to 0.997). Late-life disparity has remained remarkably constant at about 5 years across a wide range of life expectancies. Hence, according to this measure, there has been neither a marked compression nor expansion of mortality at advanced ages as life expectancy has increased. Data are for females from the 40 countries and regions of the Human Mortality Database (see online supplementary table 1).





Source

Global inequality has declined: Growth incidence curve, 1988-2008



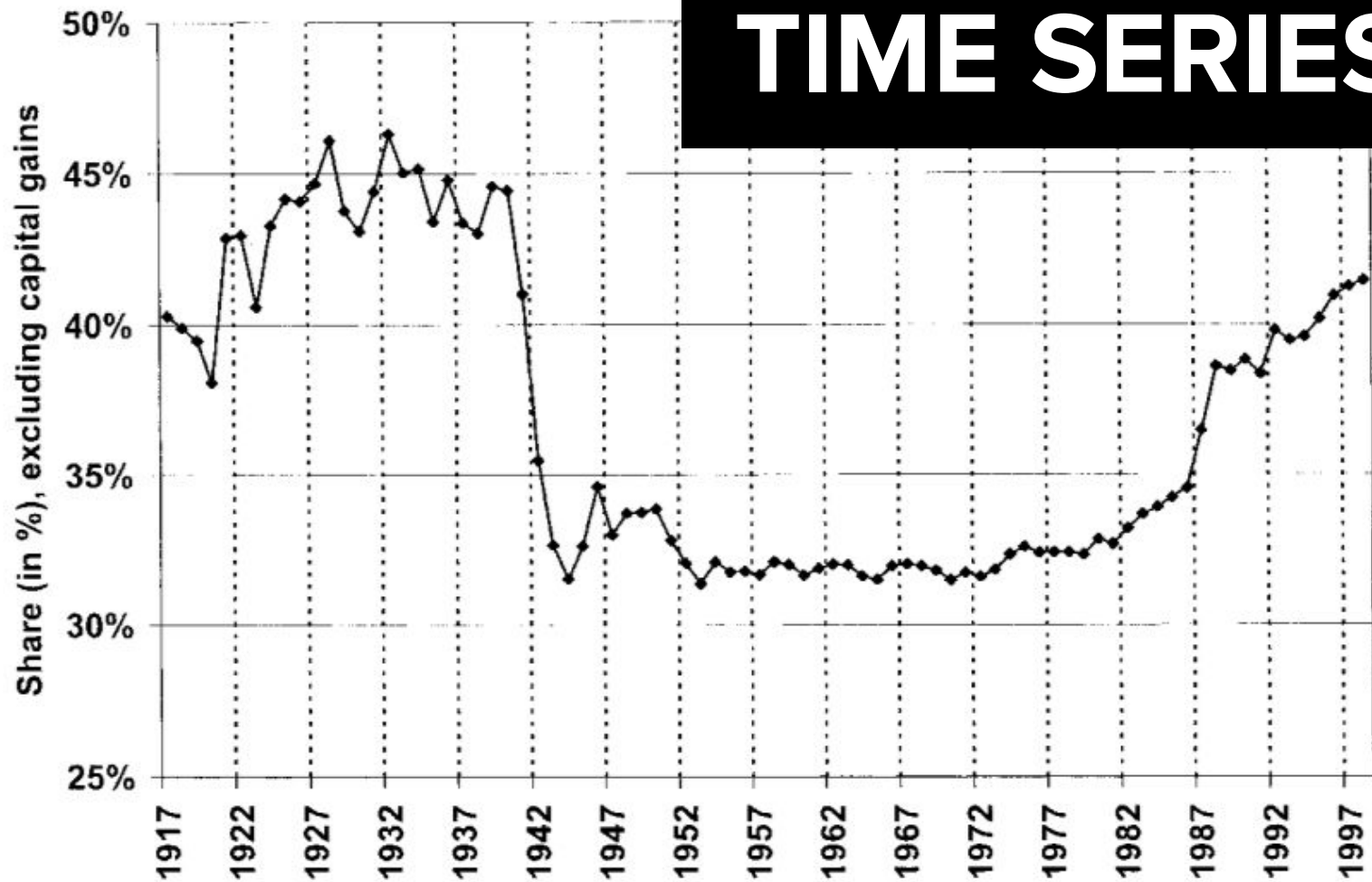


FIGURE I

The Top Decile Income Share, 1917–1998

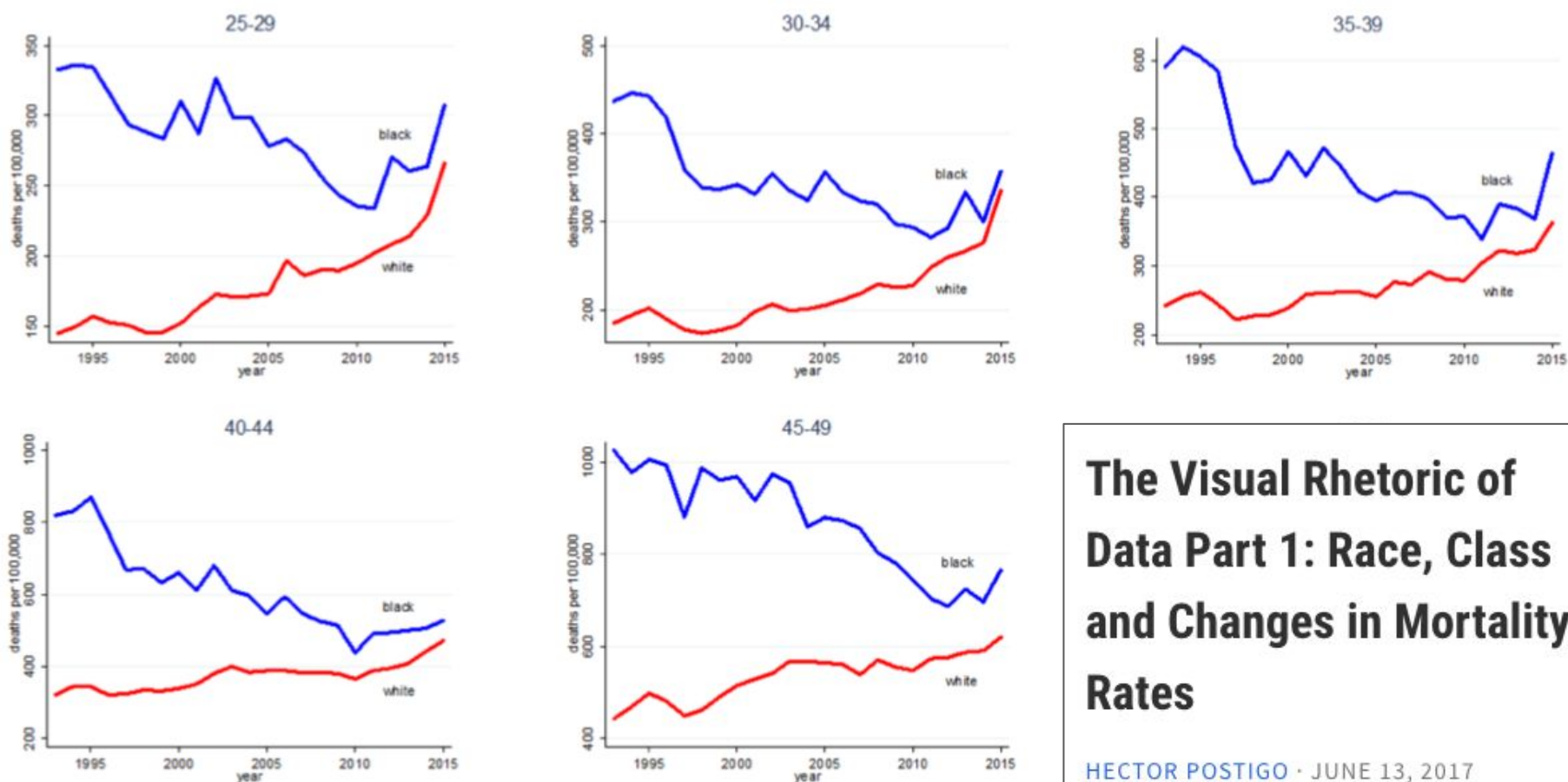
Source: Table II, column P90–100.

Mortality and morbidity in the 21st century

Anne Case, Princeton University

Angus Deaton, Princeton University

Figure 1.2 All-cause mortality, black and white non-Hispanics with a high school degree or less education



**The Visual Rhetoric of
Data Part 1: Race, Class
and Changes in Mortality
Rates**

HECTOR POSTIGO · JUNE 13, 2017

Figure 1: Violence trends through 2015: Ministry of Health and Police Data

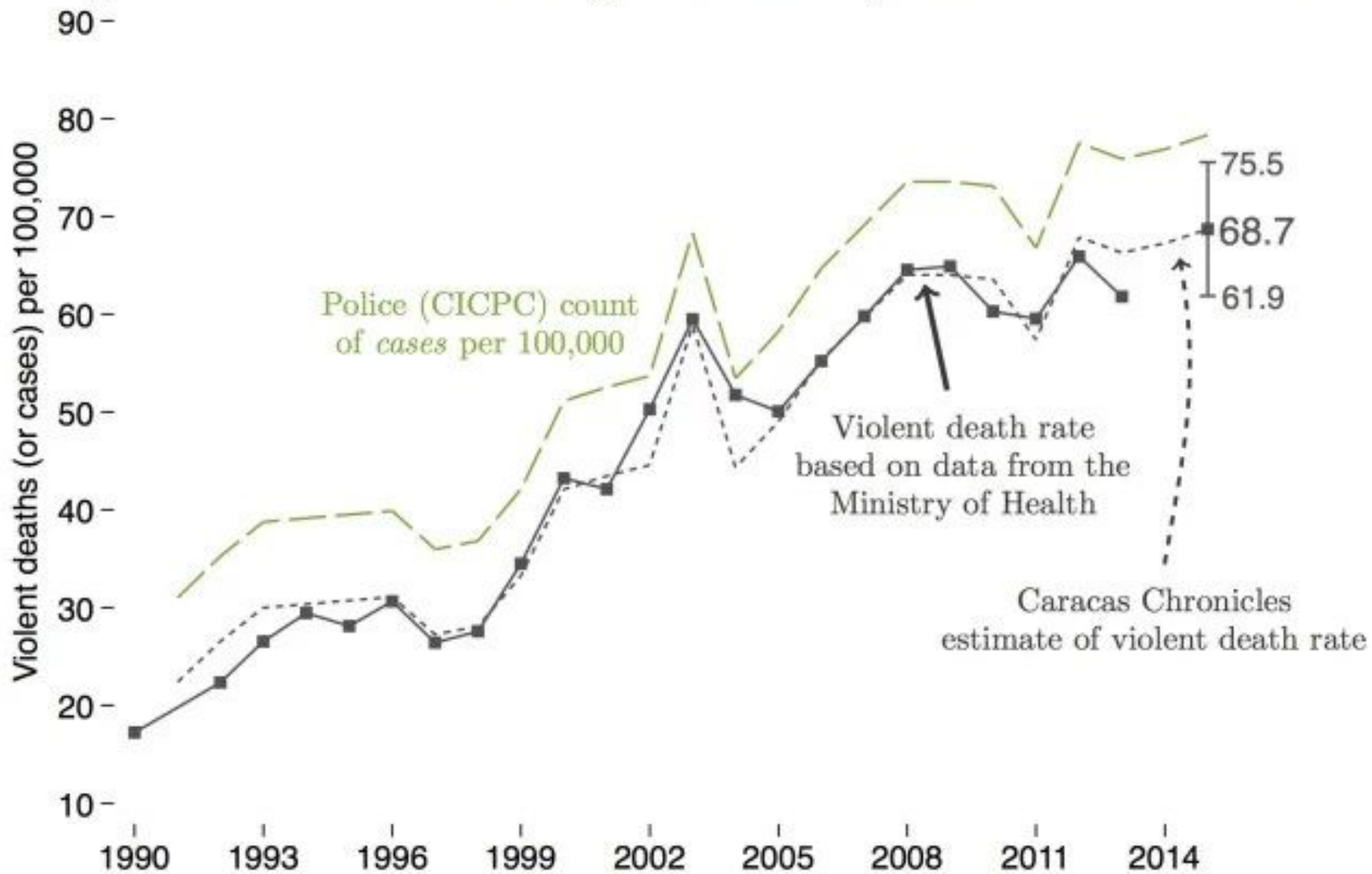
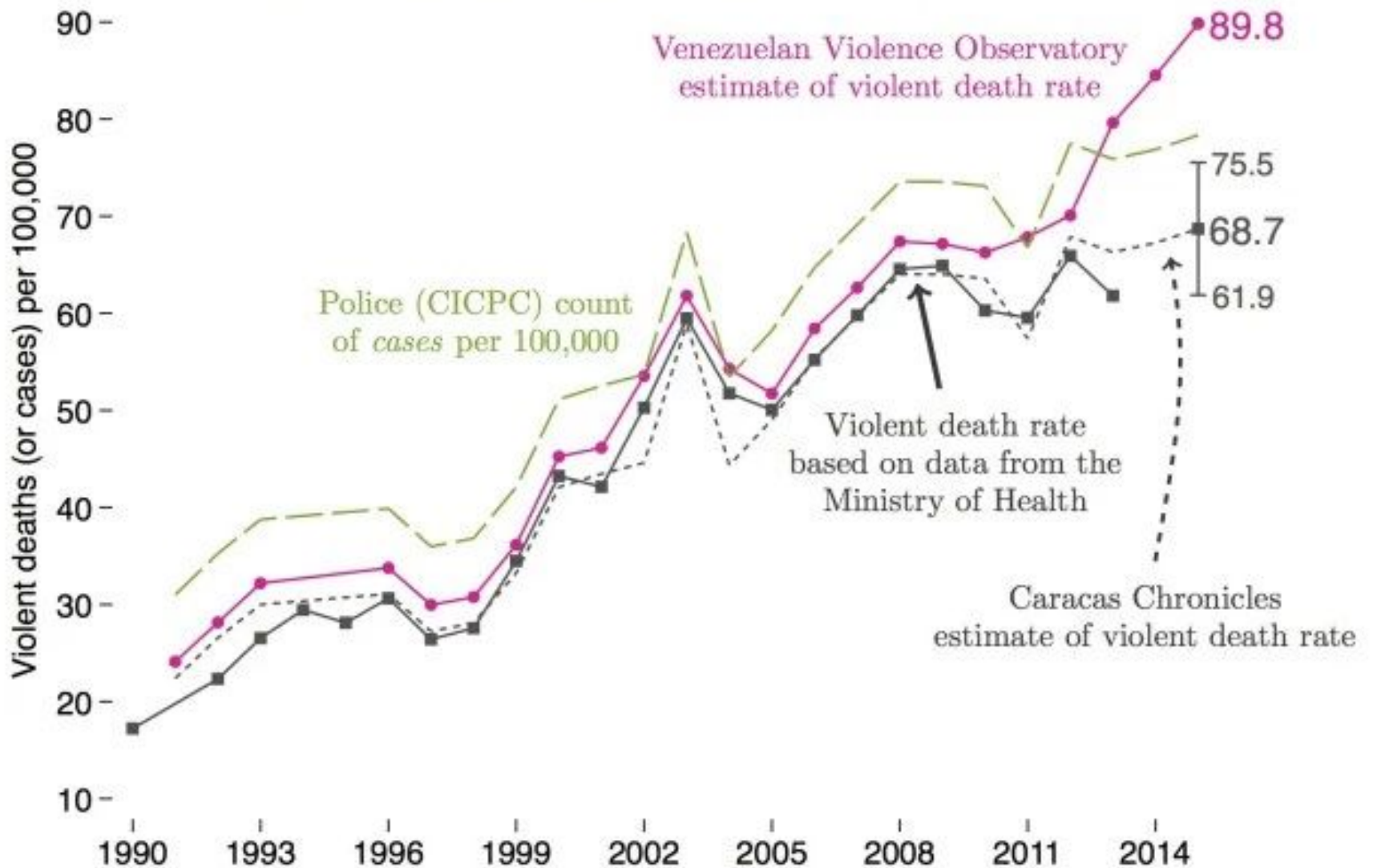
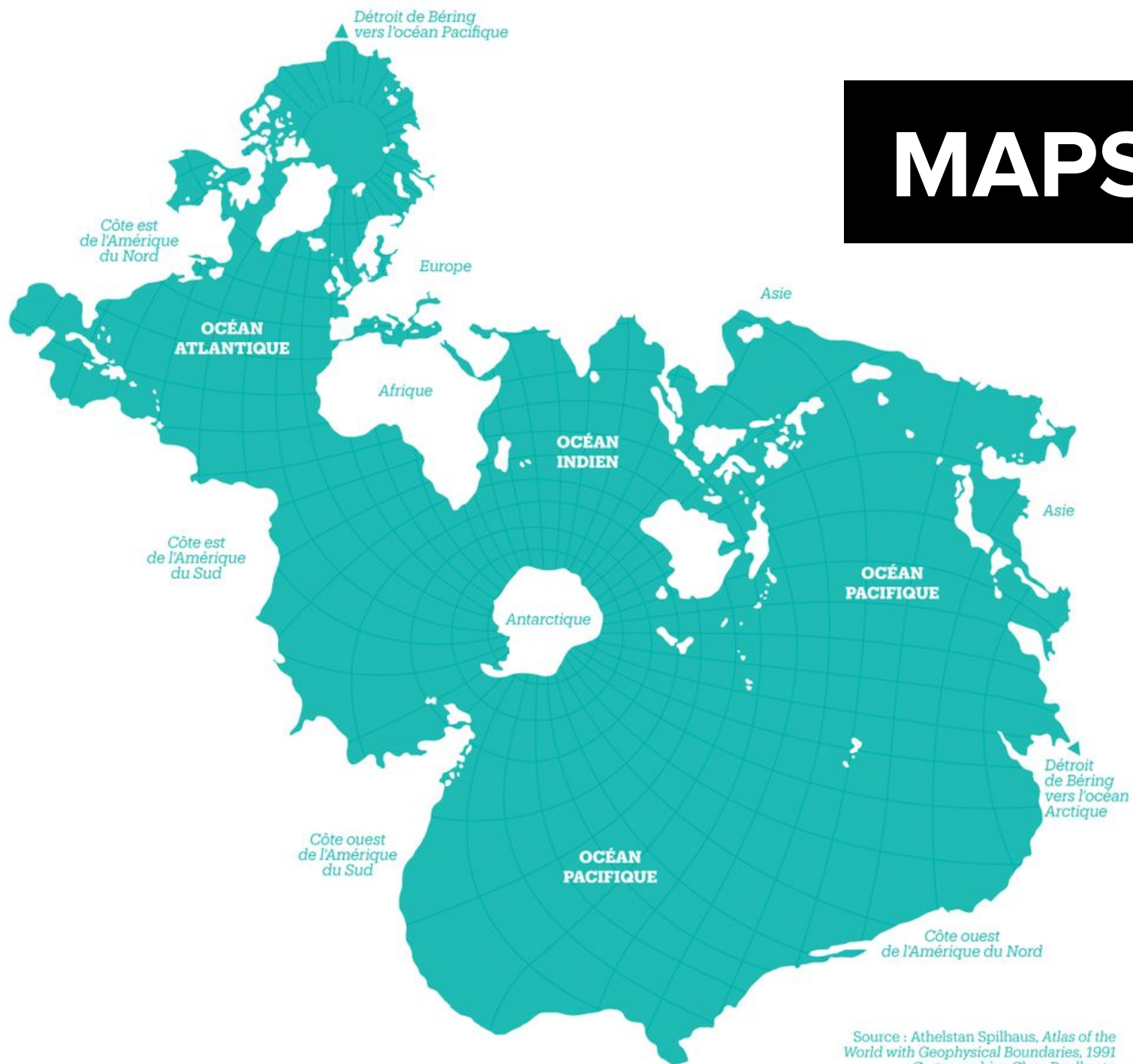


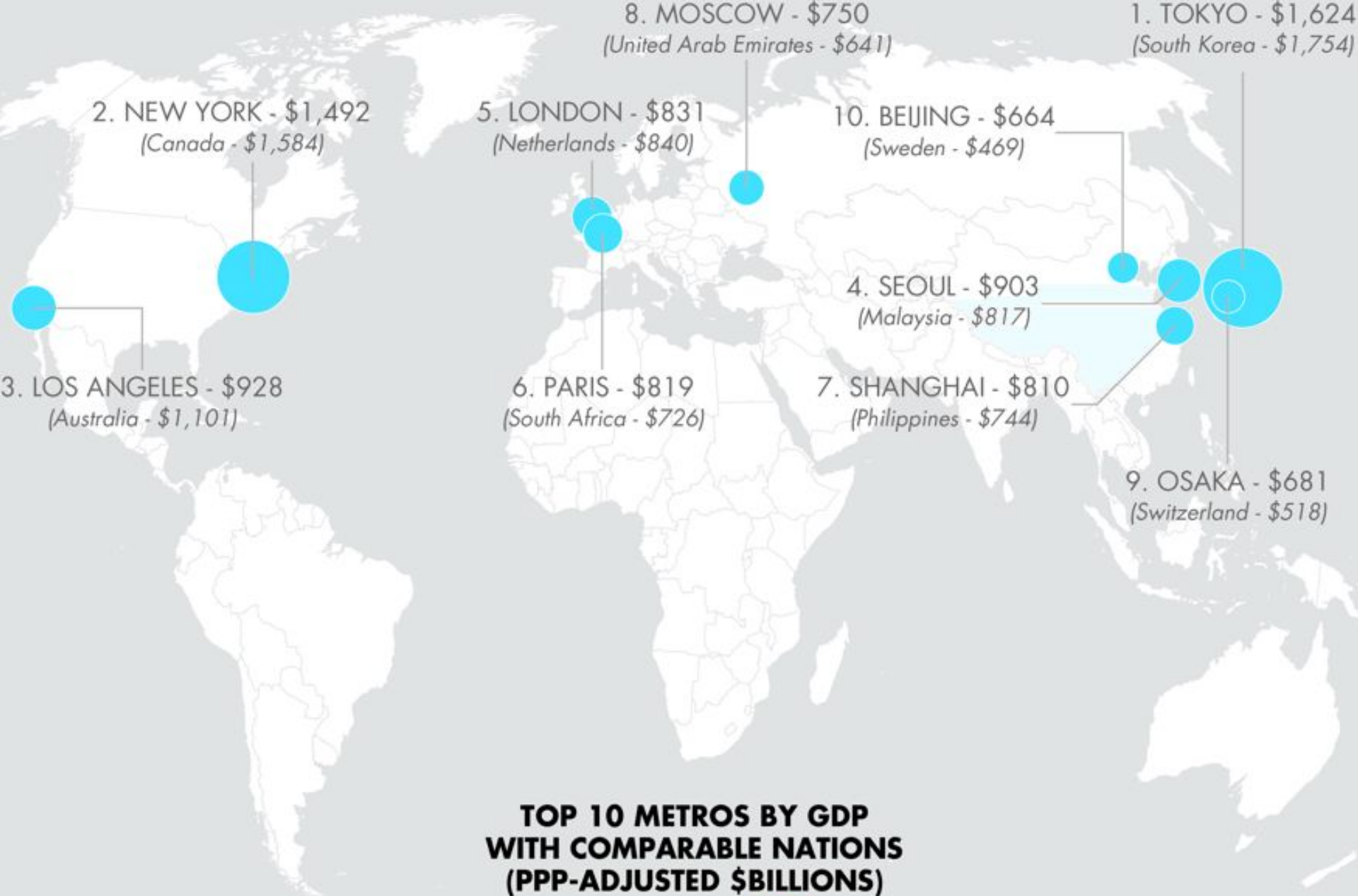
Figure 2: Violence trends through 2015: Three sources



MAPS

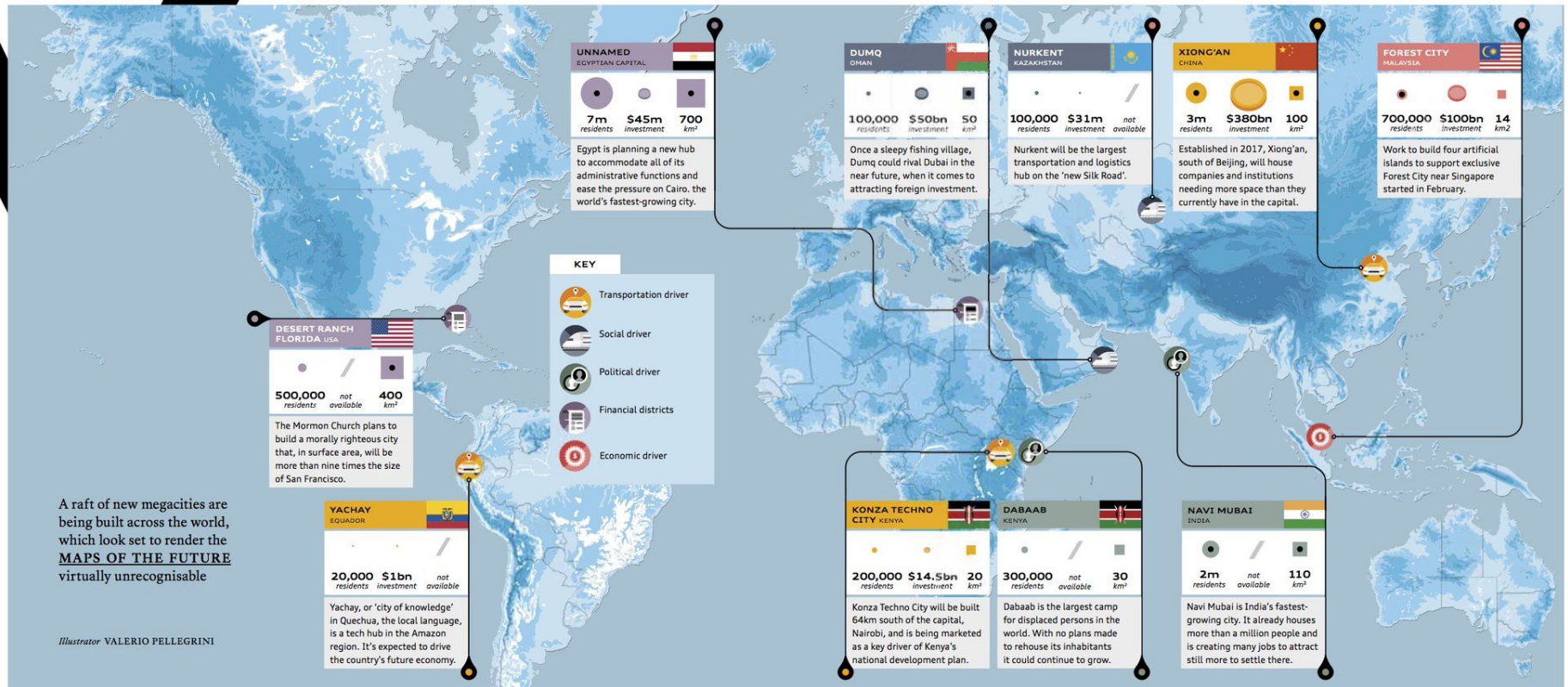


Source : Athelstan Spilhaus, *Atlas of the World with Geophysical Boundaries*, 1991
Cartographie : Clara Dealberto



**TOP 10 METROS BY GDP
WITH COMPARABLE NATIONS
(PPP-ADJUSTED \$BILLIONS)**





A raft of new megacities are being built across the world, which look set to render the **MAPS OF THE FUTURE** virtually unrecognisable

Illustrator VALERIO PELLEGRINI

Can you identify any of the cities marked on the map? No? Well, don't worry, because some of these places are projects that haven't even broken ground yet. But, by 2050, they could become some of the most important cities on the planet.

We are living in an age of unprecedented city-building. As you read this, more than 200 new cities are at various stages of development around the globe. These economic hubs are expected to cater for large populations – in some cases, numbering millions. Some will even become new capitals.

'Building cities is nothing new, but the current intensity and global spread we are witnessing is unparalleled,' says

Wade Shepard, co-author of the upcoming *Atlas of New Cities*. 'What's fascinating is that, in terms of development, countries all over the world are doing the same thing at the same time, often with the same companies involved. It's starting to look like an all-out movement – a new industry.'

Some of the most prolific and concentrated development is happening in China. Since it opened itself up to capitalism in the early 1980s, there has been a massive rural exodus, prompting heavy urban development. In the past decade, this has intensified and, today, a quarter of the 100 largest cities in the world can be found in China. And it's Chinese investment that's funding many of the projects in other

regions too, including Africa, and the new Belt and Road Initiative – the trade route that stretches from Asia to Europe.

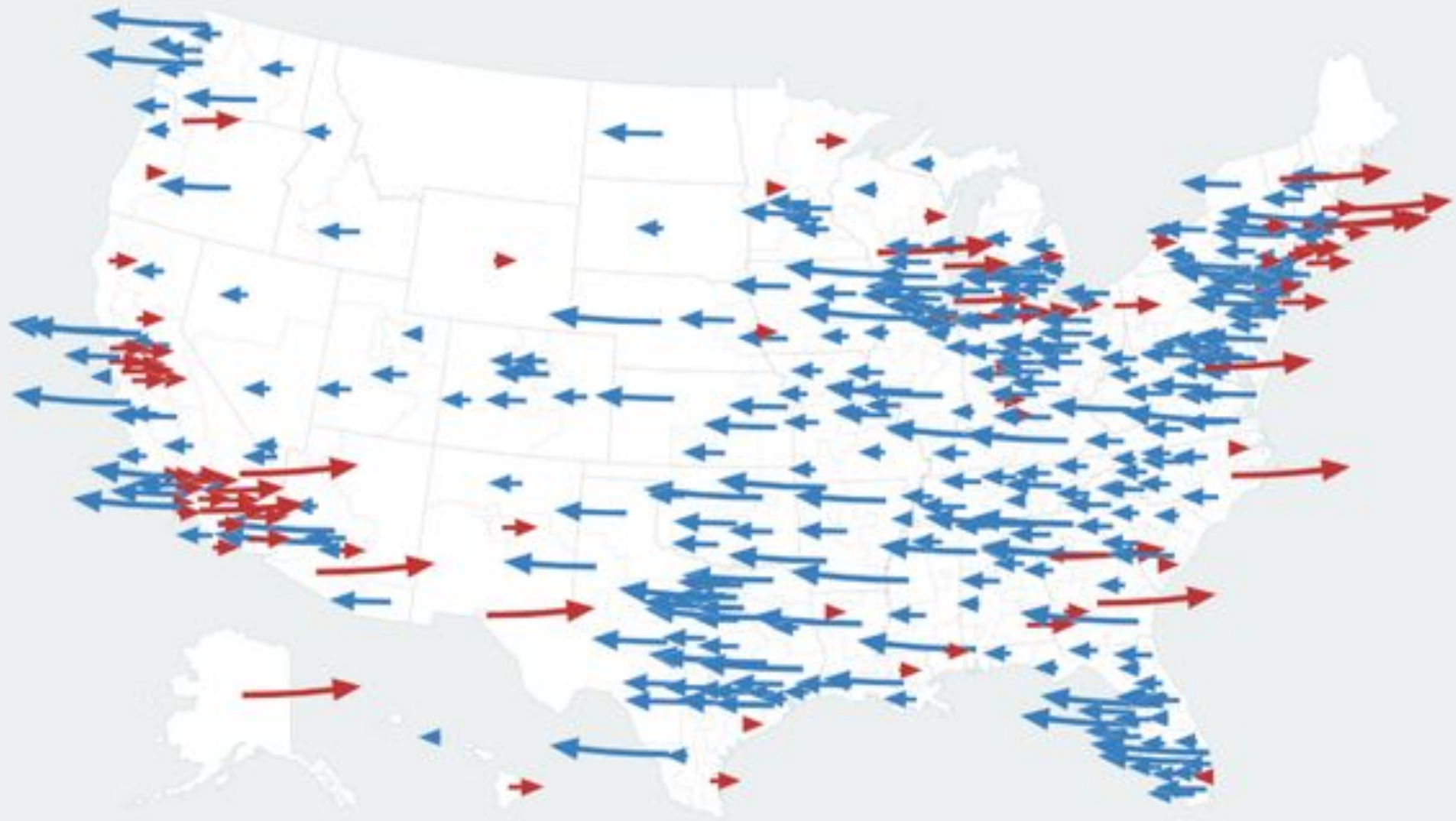
According to Shepard, there are five reasons for the development of these megacities. Some are being created by economic drivers and others are transportation projects. There are those created around financial districts and others that are politically or religiously motivated. Finally, there are socially driven cities – places on the periphery of other developments that create interconnected urban clusters.

In many cases, the development of a new metropolis will incorporate a number of these identities. New cities in the Middle East, for example, are often created to fulfil multiple

purposes as it becomes apparent that the region's current reliance on an oil-based economy cannot last.

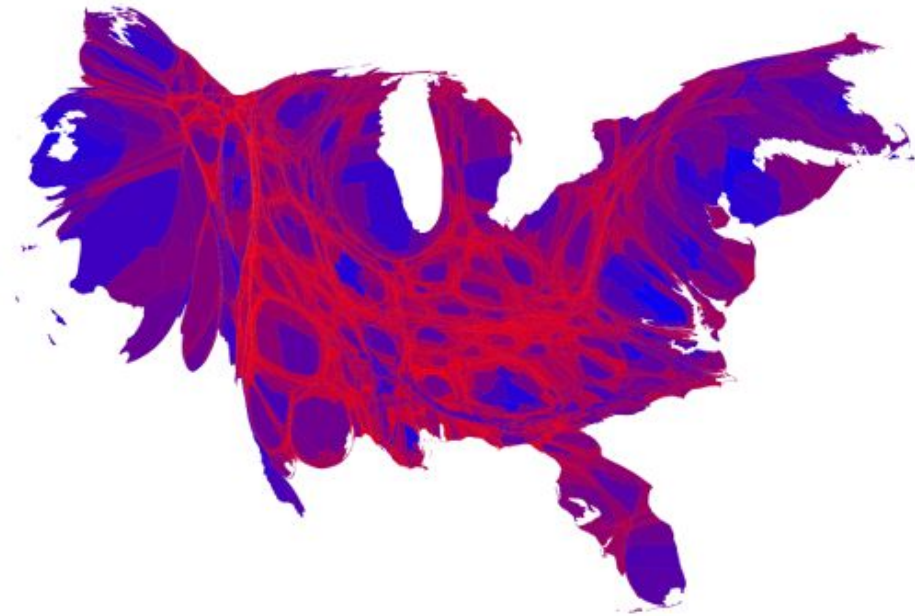
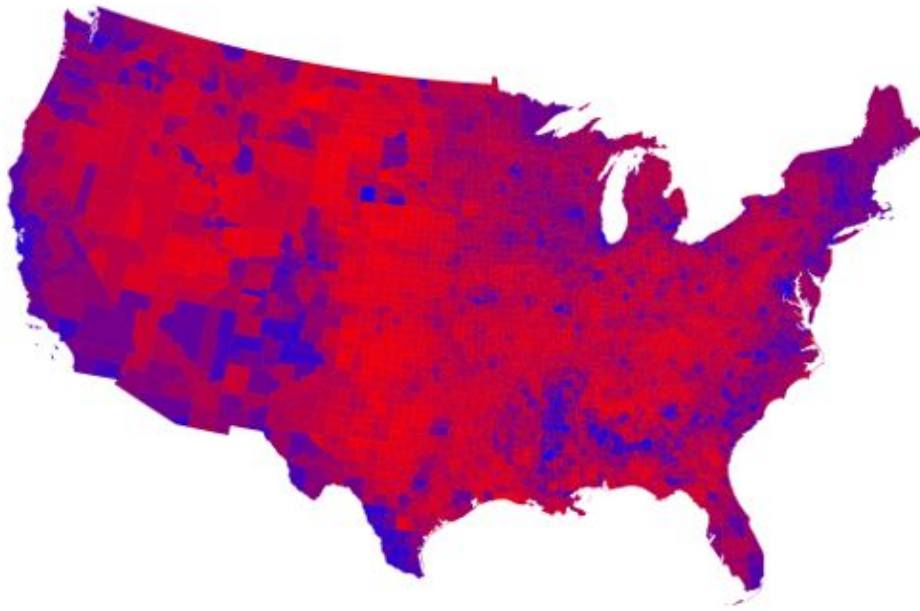
'With such a high level of development, there's an important question to be asked about sustainability,' says Shepard. 'Will these megacities be successful and buoy up local economies? Or will they drag down global development? In some places, we're witnessing large developments failing to attract inhabitants and lying dormant, while those elsewhere have prospered and continue to grow.'

It will be decades before we know the answer to that question. In the meantime, it's a case of 'wait and see' – and of being ready to draw up a new atlas. ©©©© JOHN SILCOX



CARTOGRAMS

of the U.S. 2016 presidential election
by Mark Newman



see also

WORLD
MAPPER



The Two Americas of 2016

By TIM WALLACE NOV. 16, 2016

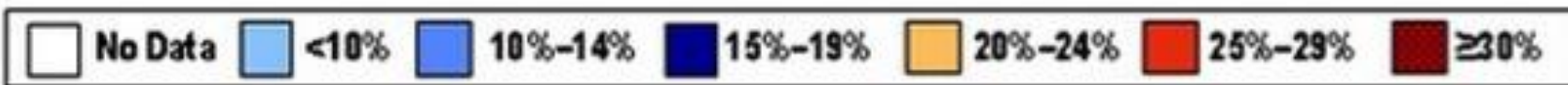
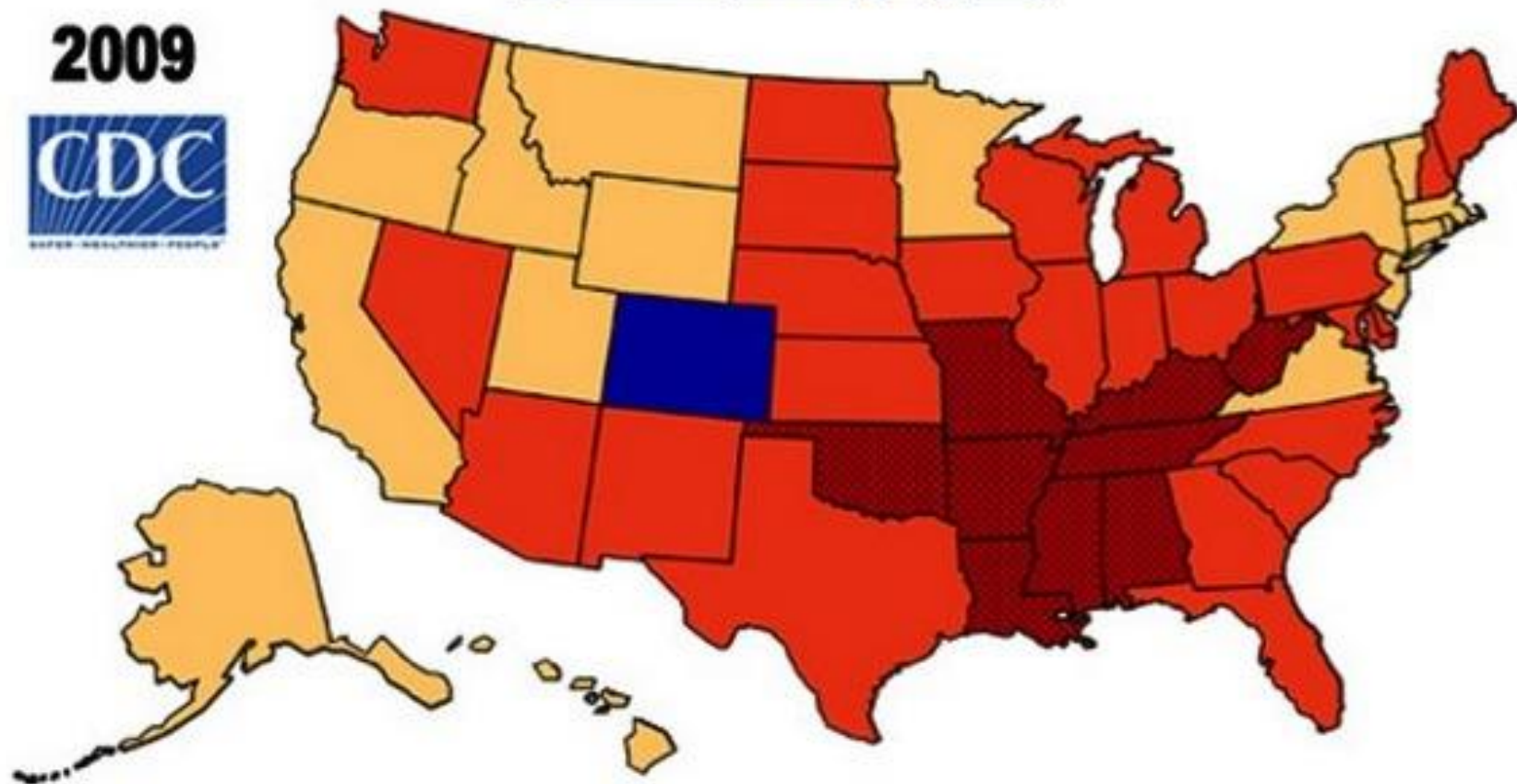
The Visual Rhetoric of Data Part 2: Political Maps and Infographics

HECTOR POSTIGO · JUNE 27, 2017

Percent of Obese (BMI ≥ 30) in U.S. Adults

[<previous](#) [next>](#) [play](#) [stop](#)

2009



**White
non-Hispanic**



**Black
non-Hispanic**



Hispanic



Misclassification of cardiometabolic health when using body mass index categories in NHANES 2005–2012

A J Tomiyama¹, J M Hunger², J Nguyen-Cuu¹ and C Wells³

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²Department of Psychological and Brain Sciences, University of California, Santa Barbara, CA, USA

³Office of Information Technology, University of California, Los Angeles, CA, USA

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Received 16 September 2015; Revised 4 December 2015; Accepted 9 December 2015

Accepted article preview online 4 February 2016; Advance online publication 15 March 2016

Abstract

▲ [Top](#)

The United States Equal Employment Opportunity Commission has proposed rules allowing employers to penalize employees up to 30% of health insurance costs if they fail to meet 'health' criteria, such as reaching a specified body mass index (BMI). Our objective was to examine cardiometabolic health misclassifications given standard BMI categories.

Matthew
Ericson

When Maps Shouldn't Be Maps

Fri Oct 14 2011 11:12 AM EDT |  26 Comments



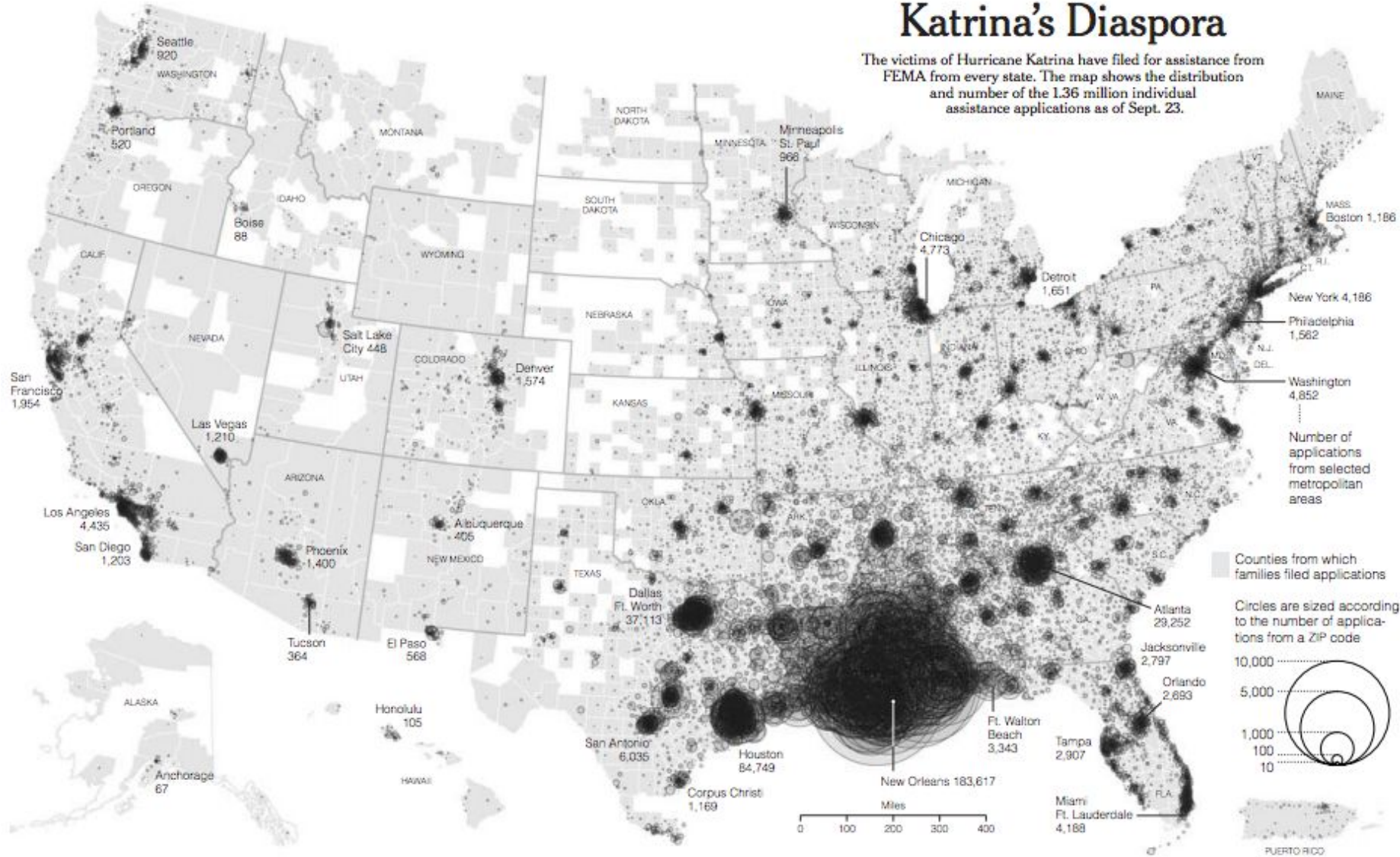
Type d'implantation	Nature des données							
	Qualitative				Quantitative			
	Nominale		Ordinale		Relative		Absolue	
Ponctuelle	Forme	Couleur	Taille	Valeur	Valeur	Couleur	Texture	Taille
			Couleur	Texture				
Linéaire	Forme	Couleur	Taille	Valeur	Couleur	Valeur	Couleur	Taille
Zonale	Couleur	Texture	Valeur	Couleur	Valeur	Couleur	Taille	Points comptables
			Texture	Grain	Texture	Grain		

Source : Zanin C., Trémélo M.-L., *Savoir faire une carte. Aide à la conception et à la réalisation d'une carte thématique univariée*. Ed. Belin, Paris, 2003.

See also · [Full guide \(PDF\)](#), in French

Katrina's Diaspora

The victims of Hurricane Katrina have filed for assistance from FEMA from every state. The map shows the distribution and number of the 1.36 million individual assistance applications as of Sept. 23.



They are scattered through all 50 states, the District of Columbia and Puerto Rico — 623 in Utah, 1,114 in Kansas, 101 way out in Alaska. They are clustered by the thousands in large Southern cities like Dallas, Atlanta and Memphis, and huddled in handfuls in unlikely hamlets like Shell Knob, Mo. (pop. 1,393) and Fountain Run, Ky. (pop. 236).

Evacuees fled Hurricane Katrina and the floods that followed in caravans of cars and fleets of buses, on helicopters and chartered planes, by boat and, a few, on foot. A month after the storm, a map

emerges of where they landed, based on ZIP codes from which applications for aid were submitted to the Federal Emergency Management Agency as of Sept. 23.

Of 1,356,704 applications, 86 percent came from Louisiana, Mississippi, Texas and Alabama. But 35,539 families were more than 1,000 miles from the Gulf — among the farthest: one in Nome, Alaska, 3,931 miles from the French Quarter and another in Lihue, Hawaii, 4,279 miles away.

Residents of New Orleans, a city that was two-thirds black, seem to have flocked to the nation's African-American population

centers. On average, the applicants came from counties where blacks were 28 percent of the population, more than twice the national average.

Baton Rouge, La., appears to be temporary home to 10 percent of evacuees, Houston 6.25 percent. But after the top 18 hubs, applicants are spread like the wind that whipped through their old neighborhoods: none of the other 900-plus metropolitan areas has even 1 percent of the total.

Some 4,000 ZIP codes — among them Pochontas, Miss.; Promise City, Iowa; and Hope, Mich. — had just one applicant.

Applications by state

Louisiana	523,149	38.6%
Mississippi	383,840	28.3%
Texas	156,895	11.6%
Alabama	109,469	8.1%
Georgia	35,342	2.6%
Florida	31,005	2.3%
Tennessee	15,529	1.1%
Arkansas	11,027	0.8%
California	10,953	0.8%
Illinois	6,430	0.5%
Others	73,065	5.4%

Applications by distance from New Orleans

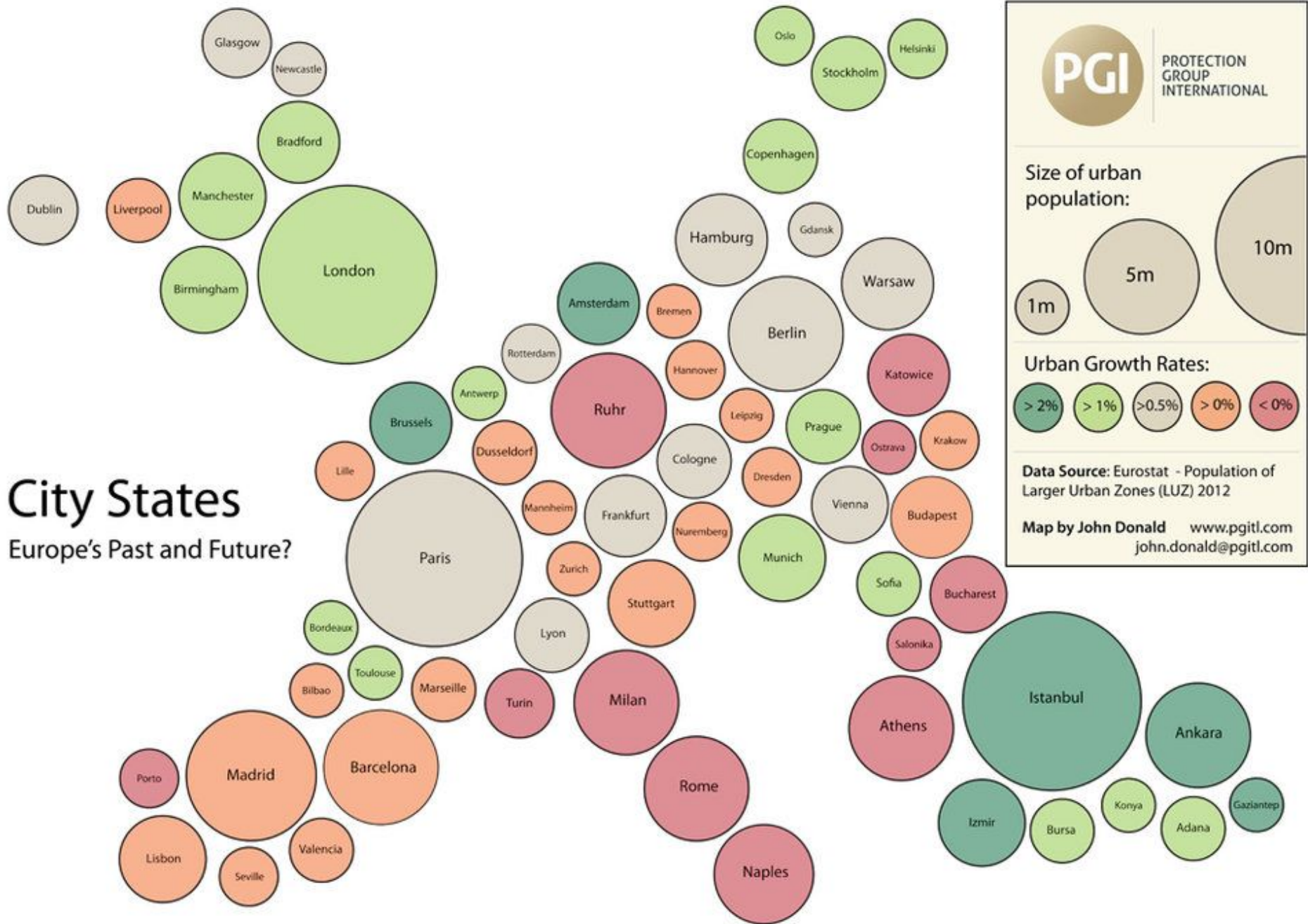
MILES	APPLICANTS	PCT.
0-100	626,232	46.2%
100-200	338,080	24.9%
200-400	184,169	13.6%
400-800	143,497	10.6%
800-1,600	45,371	3.3%
1,600-3,200	13,403	1.0%
3,200+	232	0.0%

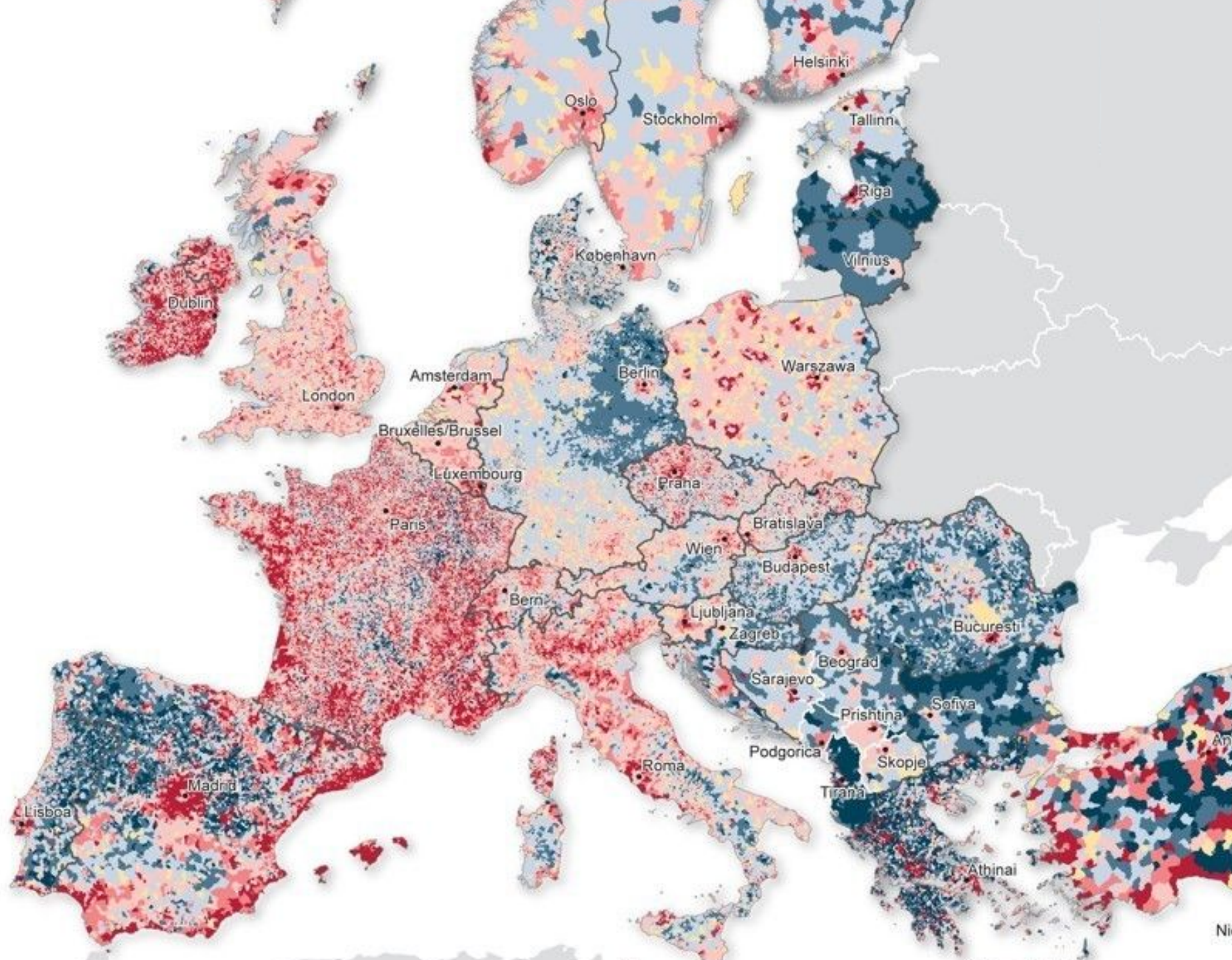
Distances could not be calculated for 0.4 percent of applicants.

Sources: FEMA, Census Bureau, Queens College Sociology Department
Matthew Ericson, Archie Tie and Jodi Wilgoren/The New York Times

City States

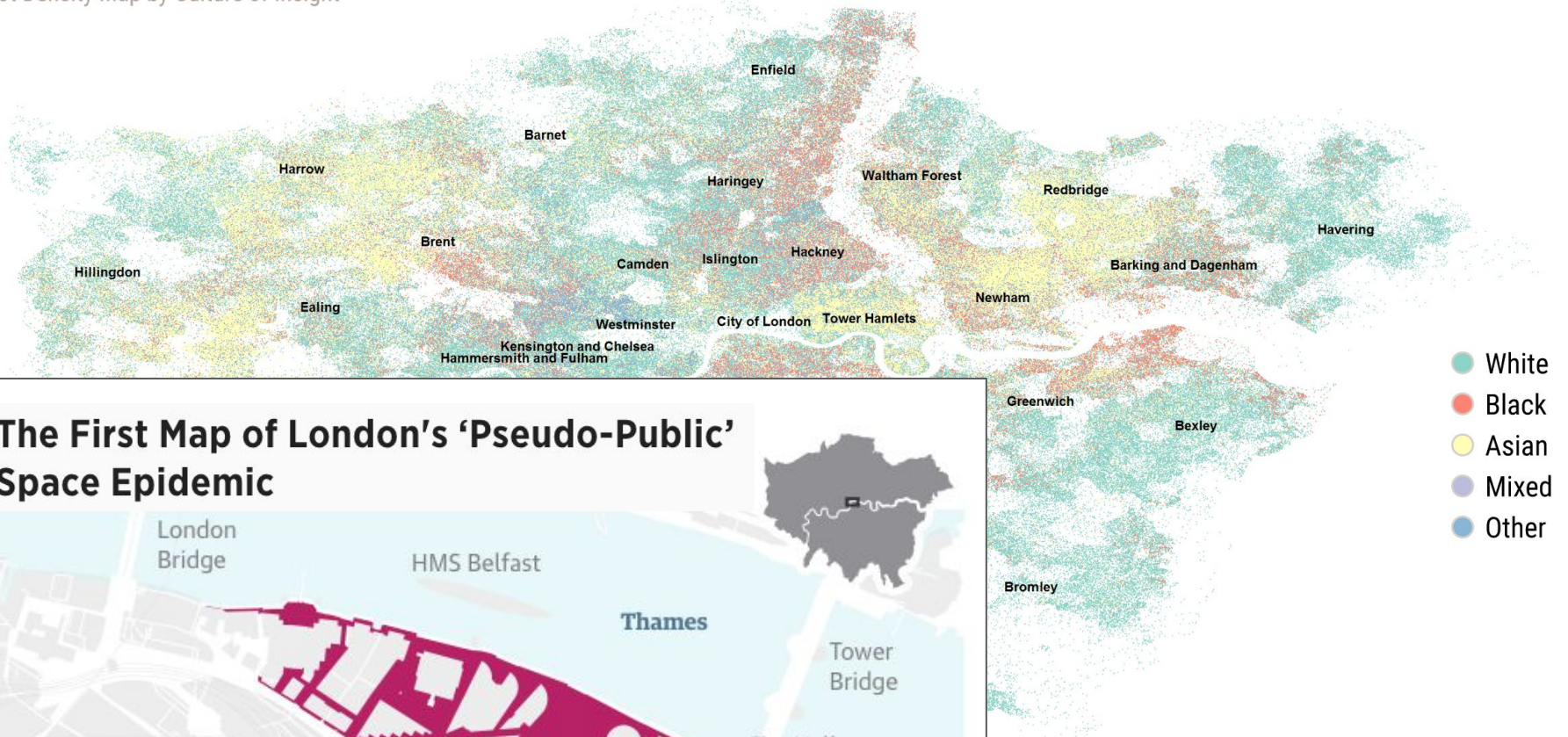
Europe's Past and Future?





The Ethnic Makeup of London

Dot Density Map by Culture of Insight



The First Map of London's 'Pseudo-Public' Space Epidemic



Source: UK Census 2011
Contains National Statistics data © Crown copyright and database right 2012
Contains Ordnance Survey data © Crown copyright and database right 2012

Figure 1: Historical expansion of the city and territorial control

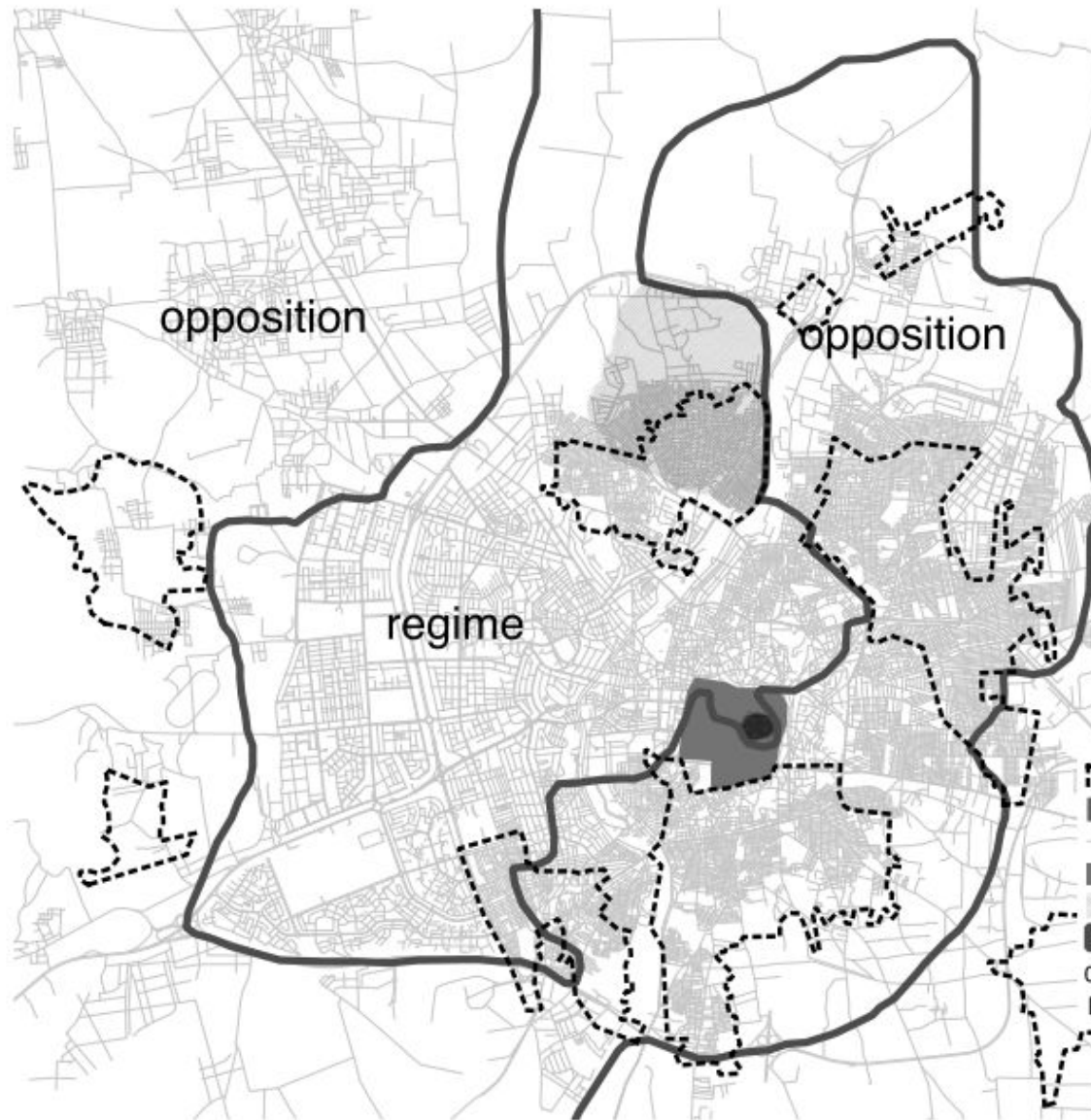
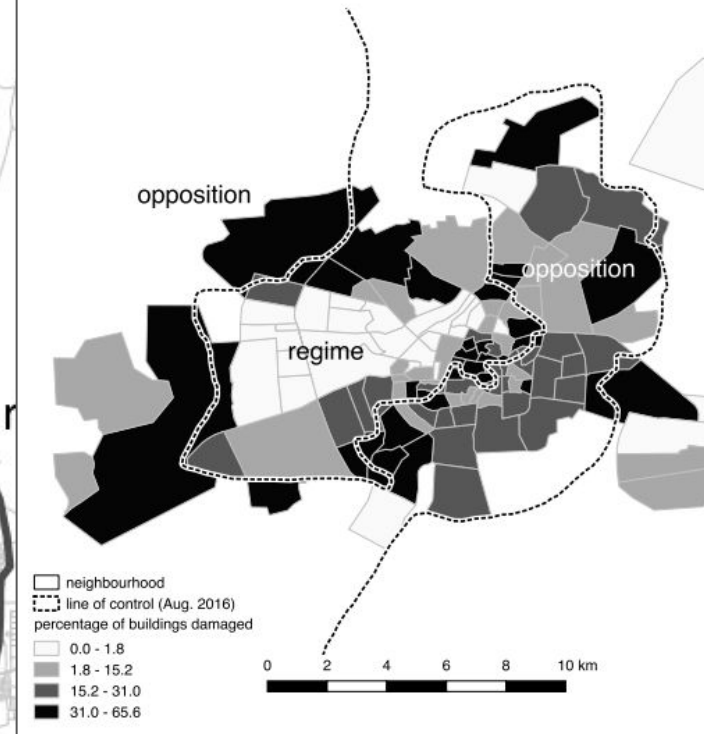
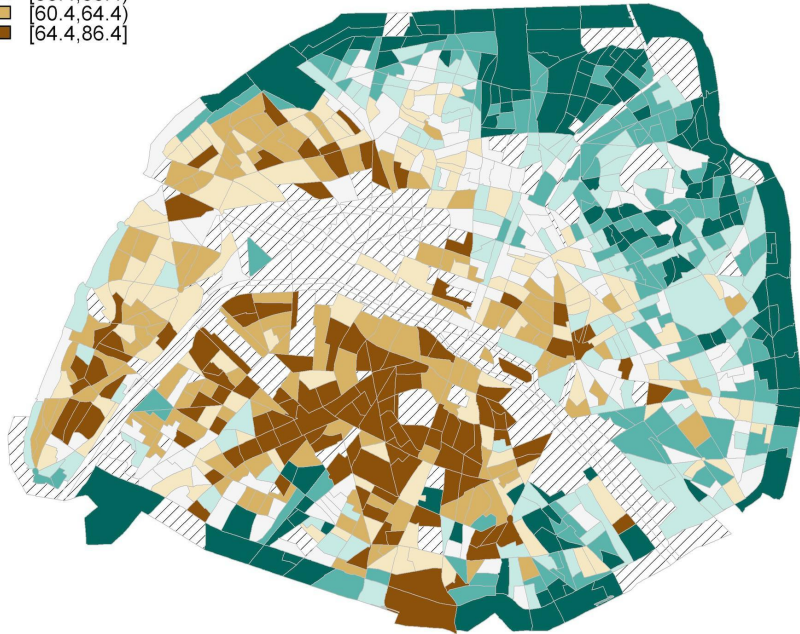
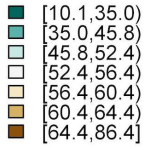


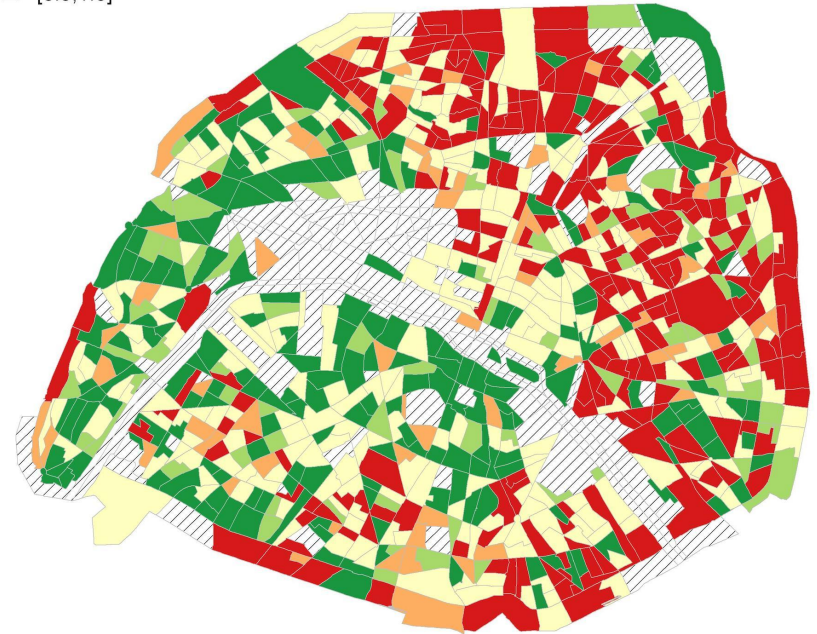
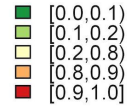
Figure 3: Territorial control and neighbourhood destruction, 2016



Notes: Informal settlement based upon government designation of areas of collective violation (*mukhalafat jama'iyya*), from al-Dayeri (2007): Neighbourhoods of Spontaneous Housing in Syria and Their Linkages with Specificities of Families and Residents. Damascus: Public Housing Institution for Planning Affairs and Housing Studies. Control lines from Lund (<https://tcf.org/content/commentary/slow-violent-fall-eastern-aleppo>).

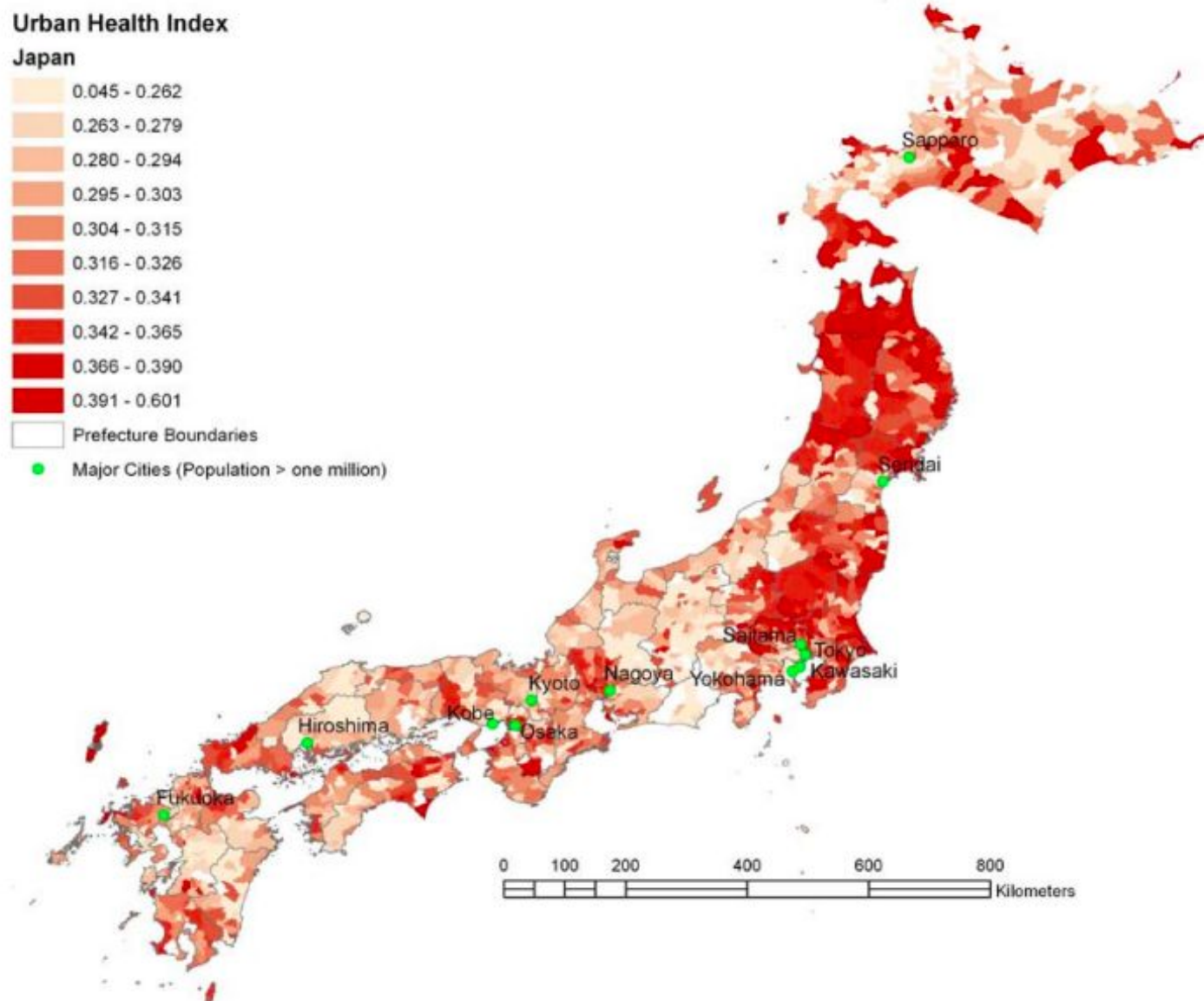


Adult university qualifications



$\Pr(\text{sSMR} > 100 \mid \text{Men})$

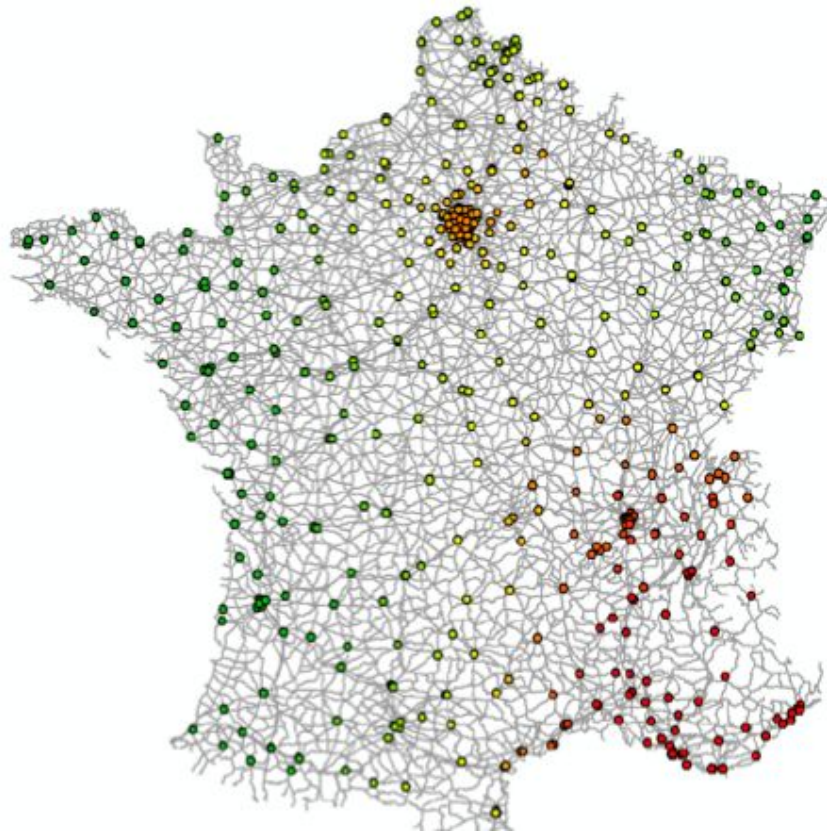
Figure 7. Distribution of UHIs by smallest municipality in Japan, 2008



Charpentier *et al.* – La ville en économie

Check the reproducible examples

Géolocalisation de “producteurs-consommateurs”, cf Charpentier, Galichon & Vernet (2017) *A Toolbox for the Modeling of Competition in Geographic Networks*



- Maternités en France
- Stations essence en Bretagne



Charpentier *et al.* – La ville en économie

Consider the following illustration. The buyers of a commodity will be supposed uniformly distributed along a line of

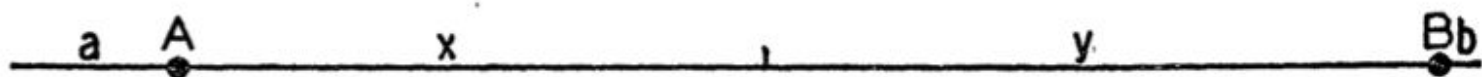


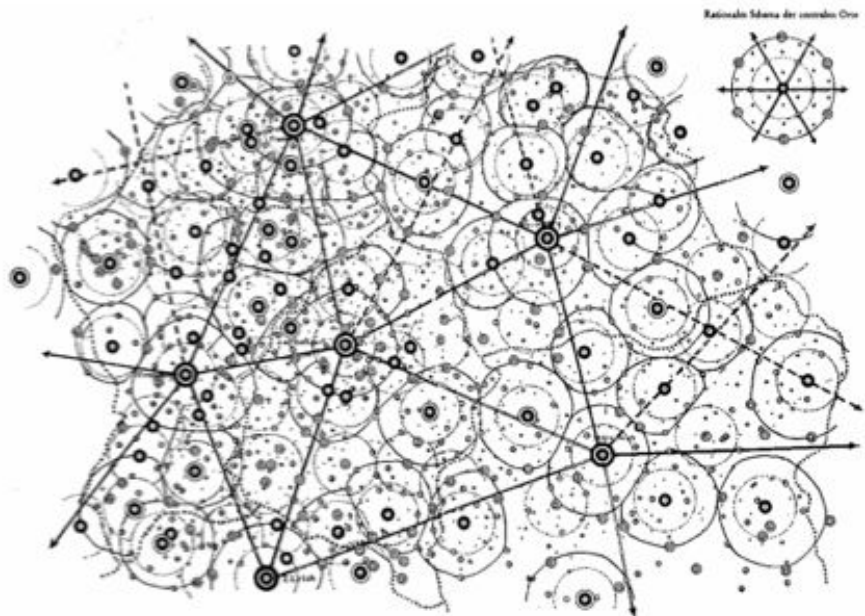
FIG. 1.

Market of length $l = 35$. In this example $a = 4$, $b = 1$, $x = 14$, $y = 16$.

length l , which may be Main Street in a town or a transcontinental railroad. At distances a and b respectively from the two ends of this line are the places of business of A and B (Fig. 1).



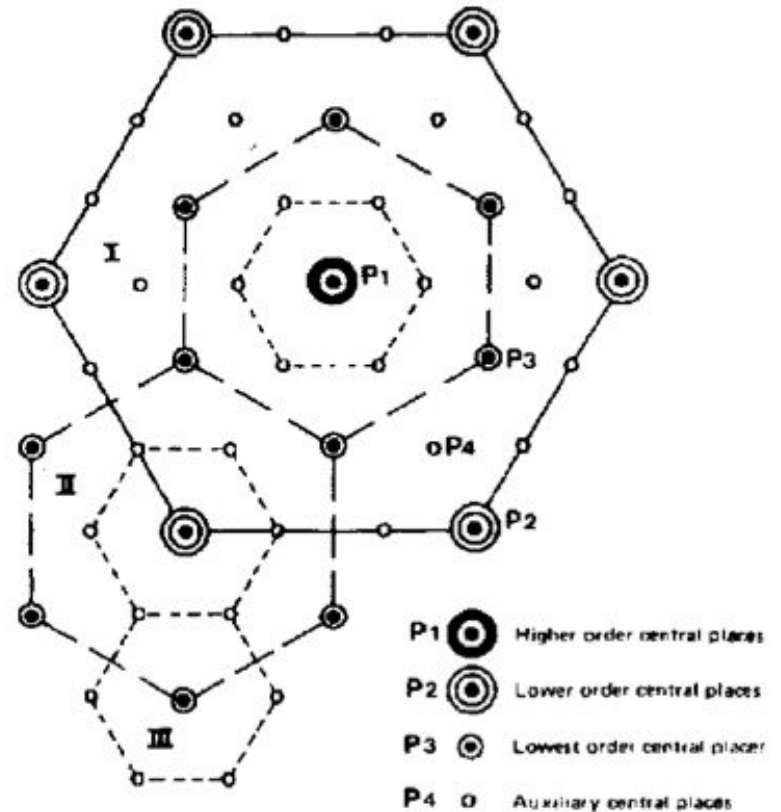
Charpentier *et al.* – La ville en économie



- L-Ora
- 7-Ora
- C-Ora
- B-Ora
- E-Ora
- A-Ora
- M-Ora

- II km. E. Ring (obscuro)
- Ring de R-Ora (normal 14 km)
- ||||||| Ombra de L. Sistema
- ||||||| L. Sitios de L. Gado
- ||||||| L. Sitios de L. Gado

Karte 4
Das System der zentralen Orte in Südwestland

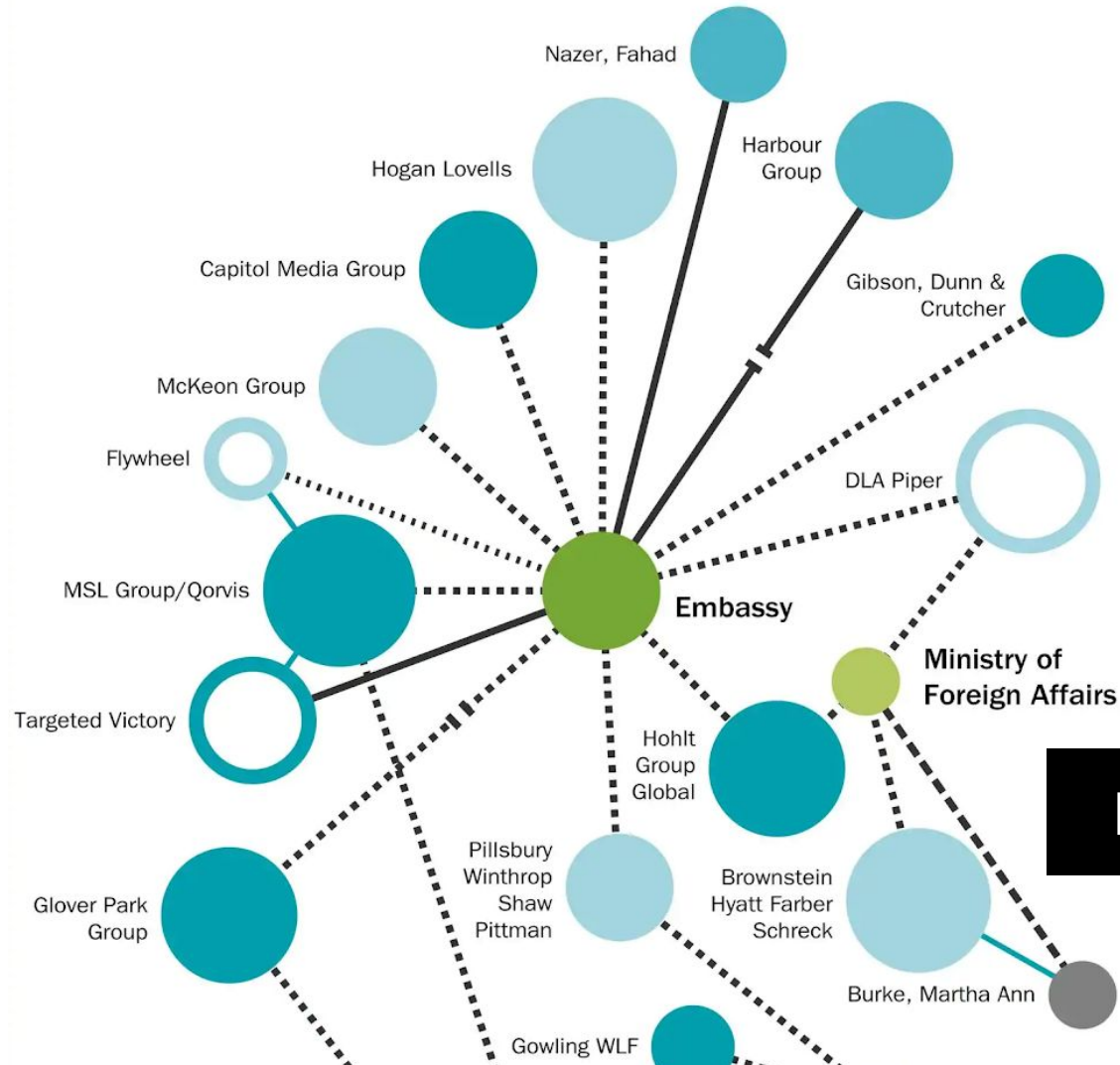


Saudi Arabia's network of advocacy

Washington Post analysis of FARA filings. Blue circles are scaled to amount spent/contract amount from 2016–2018; gray circles indicate registered relationships of unknown amount.

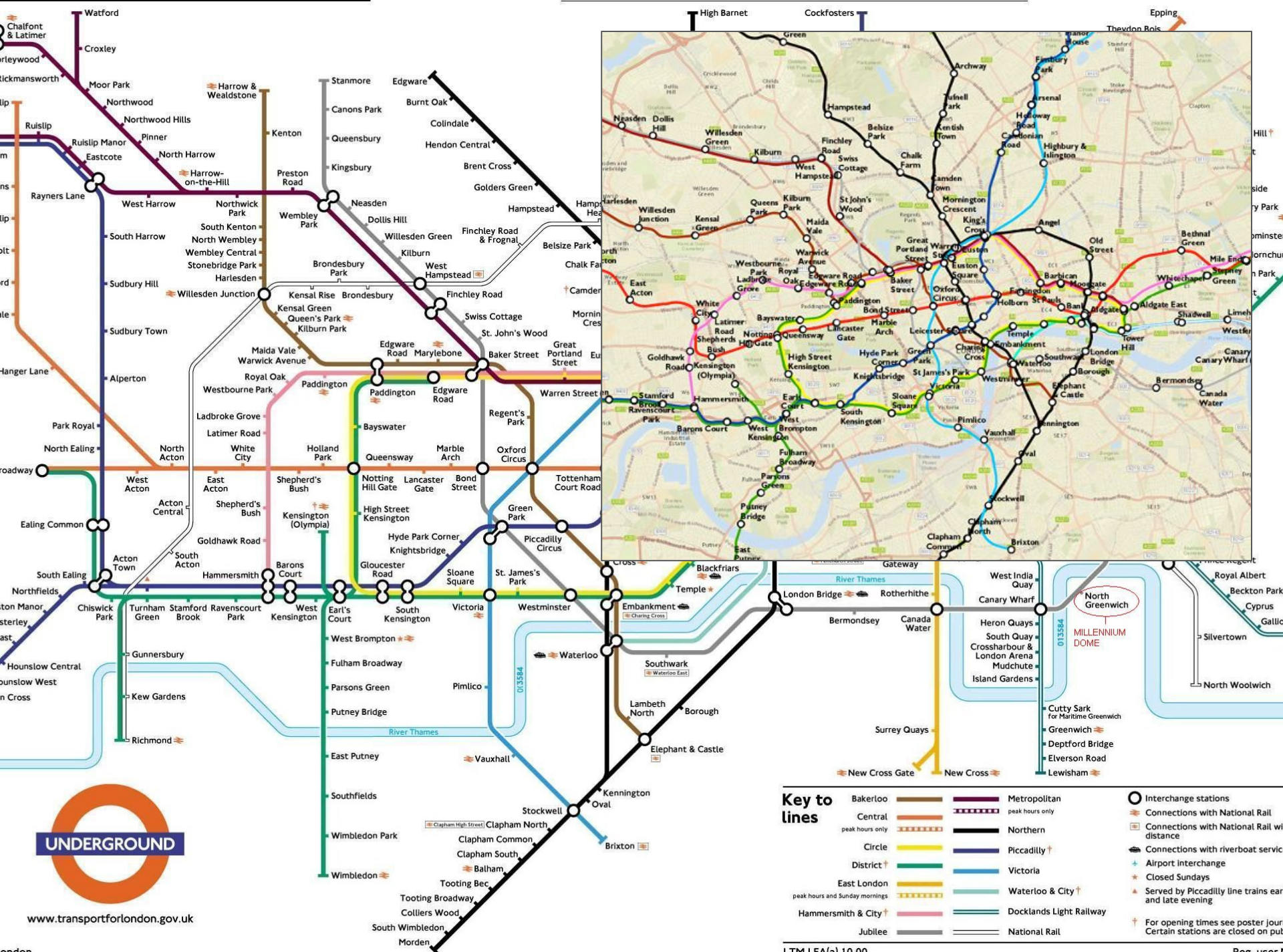
- REGISTERED FIRM/INDIVIDUAL ○ INACTIVE — CONTRACTOR ● SAUDI ARABIA
- PR/COMMS/MEDIA ... LOBBYING/OUTREACH - - - CONSULTING ...
- ⊠ RELATIONSHIP TERMINATED

NETWORKS



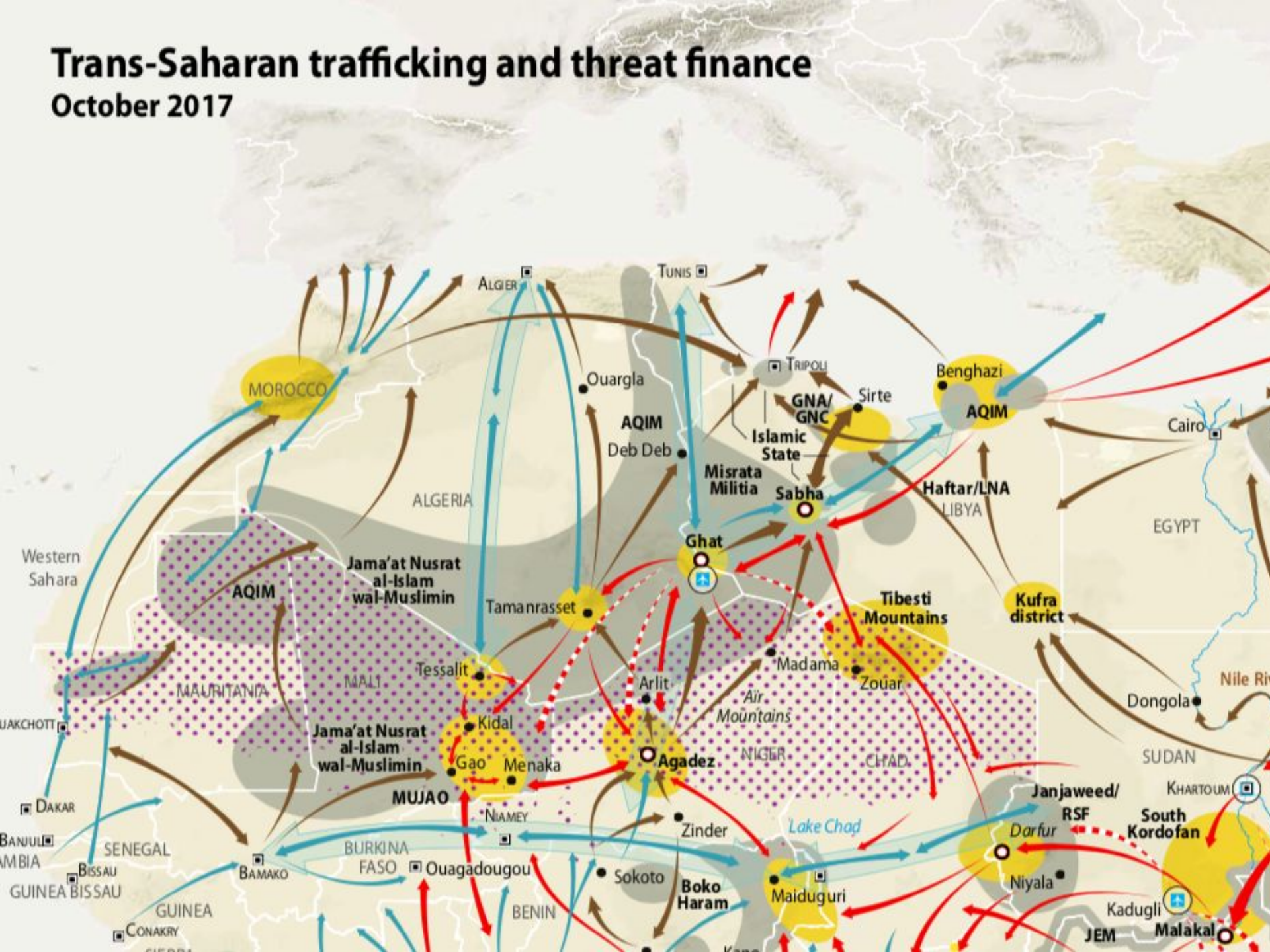
NODES

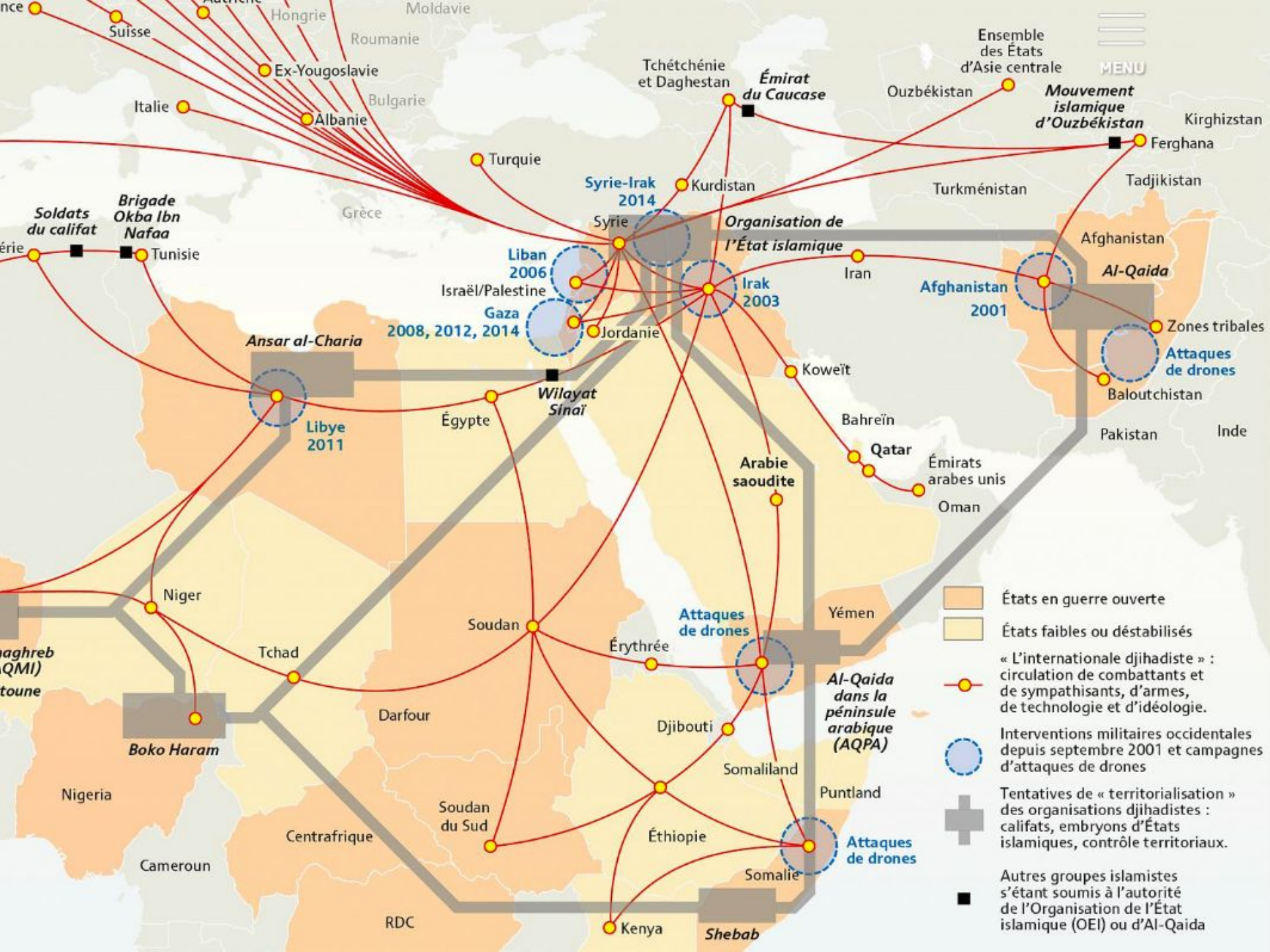
EDGES



Trans-Saharan trafficking and threat finance

October 2017





MENU

- États en guerre ouverte
- États faibles ou déstabilisés
- « L'internationale djihadiste » : circulation de combattants et de sympathisants, d'armes, de technologie et d'idéologie.
- Interventions militaires occidentales depuis septembre 2001 et campagnes d'attaques de drones
- Tentatives de « territorialisation » des organisations djihadistes : califats, embryons d'États islamiques, contrôle territoriaux.
- Autres groupes islamistes s'étant soumis à l'autorité de l'Organisation de l'État islamique (OEI) ou d'Al-Qaïda

États en guerre ouverte (orange) : Syrie-Irak 2014, Liban 2006, Israël/Palestine, Gaza 2008, 2012, 2014, Égypte (Wilayat Sinâï), Afghanistan 2001, Pakistan (Baloutchistan), Yémen, Somalie (Somaliland, Puntland), Nigeria (Boko Haram), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman, Émirat du Caucase, Tchétchénie et Daghestan, Ouzbékistan, Kirghizstan, Tadjikistan, Afghanistan (Zones tribales), Baloutchistan, Inde, Pakistan, Émirats arabes unis, Oman, Yémen, Somalie (Somaliland, Puntland), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman.

États faibles ou déstabilisés (jaune) : Libye 2011, Niger, Soudan, Nigeria (Boko Haram), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman, Yémen, Somalie (Somaliland, Puntland), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman.

« L'internationale djihadiste » (rouge) : Réseau global de circulation de combattants, d'armes, de technologie et d'idéologie, reliant des zones comme le Caucase, l'Afghanistan, le Pakistan, le Sahel, et l'Afrique de l'Est.

Interventions militaires occidentales et campagnes d'attaques de drones (bleu pointillé) : Liban 2006, Israël/Palestine, Gaza 2008, 2012, 2014, Égypte (Wilayat Sinâï), Afghanistan 2001, Pakistan (Baloutchistan), Yémen, Somalie (Somaliland, Puntland), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman.

Tentatives de « territorialisation » des organisations djihadistes (gris) : Libye 2011, Nigeria (Boko Haram), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman, Yémen, Somalie (Somaliland, Puntland), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman.

Autres groupes islamistes s'étant soumis à l'autorité de l'Organisation de l'État islamique (OEI) ou d'Al-Qaïda (noir) : Soldats du califat, Brigade Okba Ibn Nafaa, Tunisie, Égypte (Wilayat Sinâï), Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman, Yémen, Somalie (Somaliland, Puntland), République centrafricaine, République démocratique du Congo (RDC), République de Tchad, République du Soudan, Éthiopie, Érythrée, Arabie saoudite, Bahreïn, Qatar, Émirats arabes unis, Oman.

For fun · [Medieval Fantasy City Generator](#)

See also · [Dynamics of Medieval Cities](#)





Questions?

Class break for

10 minutes

Visualization **tools**

Theory and vocabulary

GIS software: **ArcGIS**, **QGIS**

Web solution: **Magrit**

Free software packages



Arc Diagram



Area Graph



Bar Chart



Box & Whisker Plot



Brainstorm



Bubble Chart



Bubble Map



Bullet Graph



Calendar



Candlestick Chart



Chord Diagram



Choropleth Map



Circle Packing



Connection Map



Density Plot



Donut Chart



Dot Map



Dot Matrix Chart

Visual Vocabulary

Designing with data

There are so many ways to visualise data – how do we know which one to pick? Click on the coloured categories below to decide which data relationship is most important in your story, then look at the different types of chart within the category to form some initial ideas about what might work best. This list is not meant to be exhaustive, nor a wizard, but is a useful starting point for making informative and meaningful data visualisations

Inspired by the Graphic Continuum by Jon Schwabish and Severino Ribecca



Correlation

Show the relationship between two or more variables. Be mindful that, unless you tell them otherwise, many readers will assume the relationships you show them to be causal (i.e. one causes the other)

Examples of use

Inflation & unemployment, income & life expectancy

Chart types

scatterplot

line-column

scatterplot-
connected

Bubble

XY-heatmap



Data Visualization for Social Science

A practical introduction with R and ggplot2

Kieran Healy

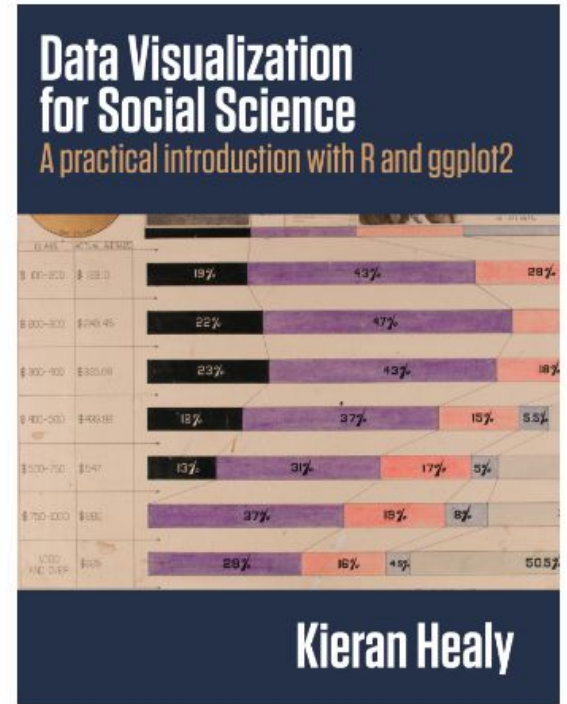
Duke University

kjhealy@soc.duke.edu

Preface

You should look at your data. Graphs and charts let you explore and learn about the structure of the information you collect. Good data visualizations also make it easier to communicate your ideas and findings to other people. Beyond that, producing effective plots from your own data is the best way to develop a good eye for reading and understanding graphs—good and bad—made by others, whether presented in research articles, business slide decks, public policy advocacy, or media reports. This book teaches you how.

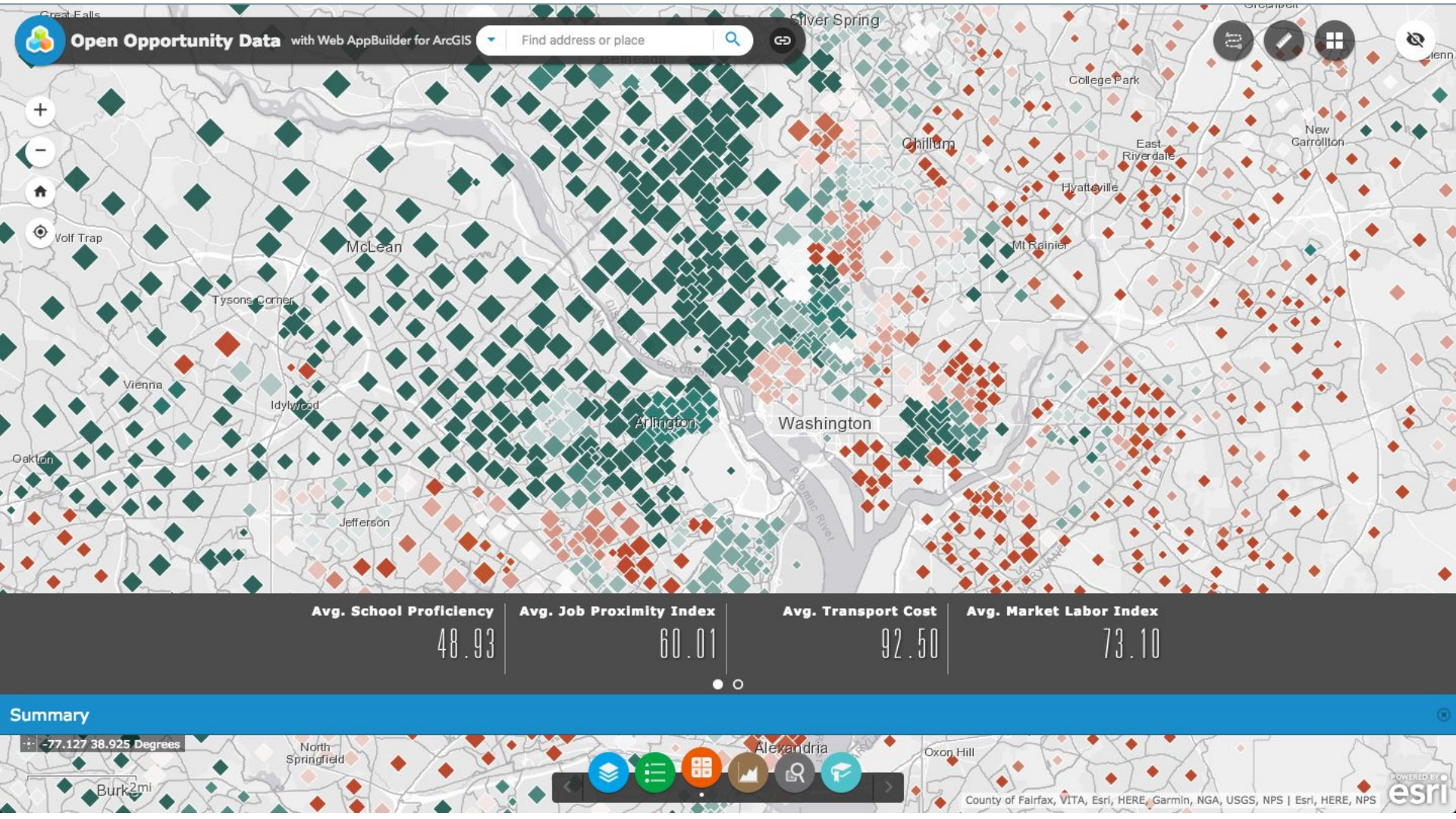
My main goal is to introduce you to both the *ideas* and the *methods* of data visualization in a sensible, comprehensible, reproducible way. Some classic works on visualizing data, such as Tufte (1983), present numerous examples together with some general taste-based rules of thumb for constructing and assessing plots. In what has now become a large and thriving field of research, more recent books provide excellent discussions of the cognitive underpinnings of successful and unsuccessful graphics, often providing many compelling and illuminating examples (Ware 2008). Other works provide good advice about how to graph data under



About the Cover Image: Large detail from 'Income and expenditure of 150 Negro families in Atlanta, Ga., U.S.A.', by W.E.B. Du Bois. Chart prepared by Du Bois for the Negro Exhibit of the American Section at the Paris Exposition Universelle in 1900 to show the economic and social progress of African Americans since emancipation. Bar graph shows amount spent on rent, food, clothes, taxes, and other expenses by families in various income brackets. LOT 11931, no. 31, <http://hdl.loc.gov/loc.pnp/ppmsca.33893>.

About the Author: Kieran Healy is Associate Professor of Sociology at Duke University. His website is <http://kieranhealy.org>.

Expensive, closed GIS · ArcGIS



Free, open-source GIS · QGIS

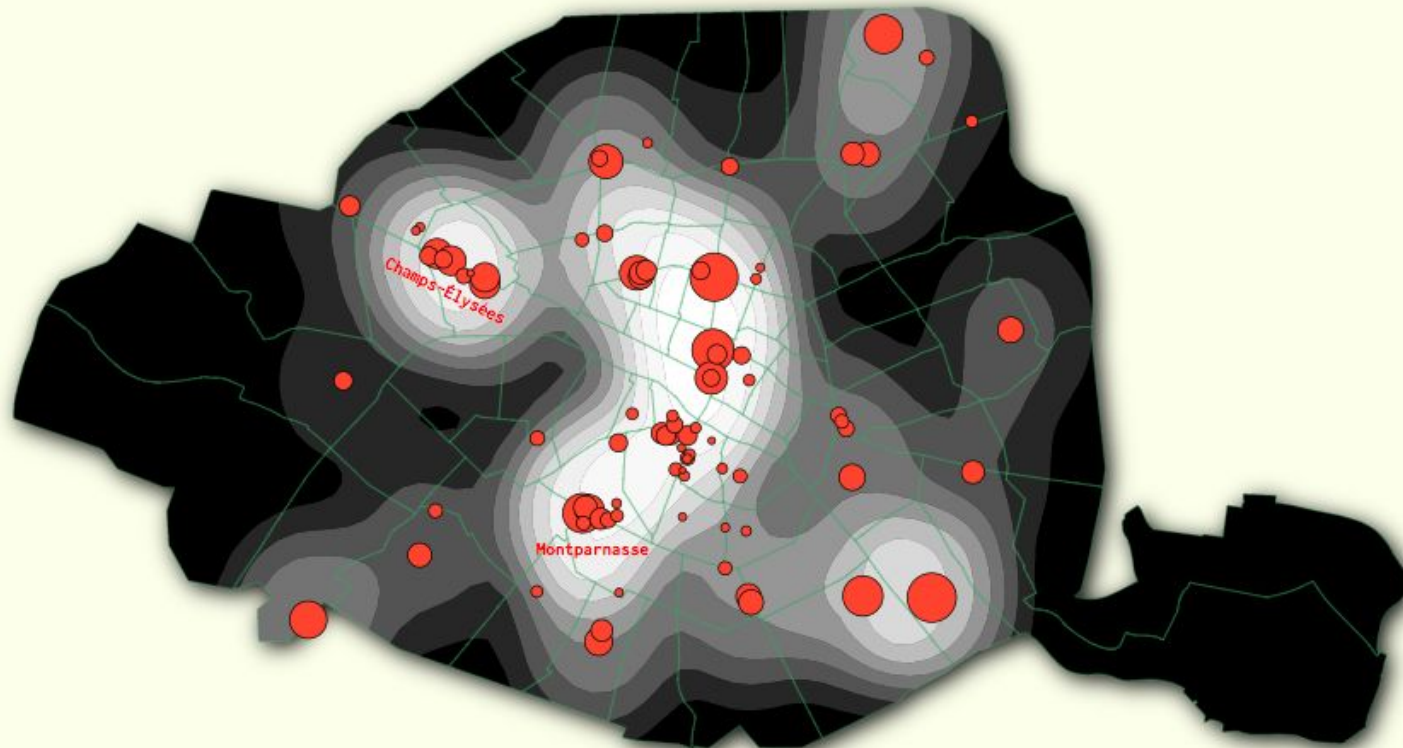
The image displays the QGIS desktop application window. The title bar reads '*chimie - QGIS'. The menu bar includes 'Projet', 'Éditer', 'Vue', 'Couche', 'Préférences', 'Extension', 'Vecteur', 'Raster', 'Base de données', 'Internet', 'Traitement', and 'Aide'. The toolbar contains various icons for file operations, navigation, and data management. On the left, the 'Explorateur' (Explorer) panel shows a tree view with 'Project Home' selected, and a list of local drives (C:\, D:\, E:\, F:\, H:\) and database connections (GeoPackage, Spatialite, PostGIS, MSSQL, Oracle). Below it, the 'Couches' (Layers) panel shows two layers: 'Nodes' and 'Edges', both of which are checked and visible. The main map area displays a network graph with green circular nodes of varying sizes connected by thin green lines, overlaid on a yellow-toned map of France with its regional boundaries.

Free online solution .

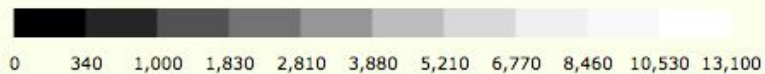


Établissements cinématographiques à Paris

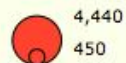
Accessibilité potentielle à un fauteuil de cinéma dans un voisinage d'un kilomètre



Fauteuils accessibles dans un voisinage d'un kilomètre



Fauteuils par salle



Données : Mairie de Paris (via data.gouv.fr)
M.V. - 2017 - Réalisée avec Magrit (magrit.cnrs.fr)

Free software for maps

GIS application **QGIS** · see also **other free GIS software**

Online tool **Magrit** · easiest recommended option

JavaScript **Leaflet** library · also **via Python** and **via R**

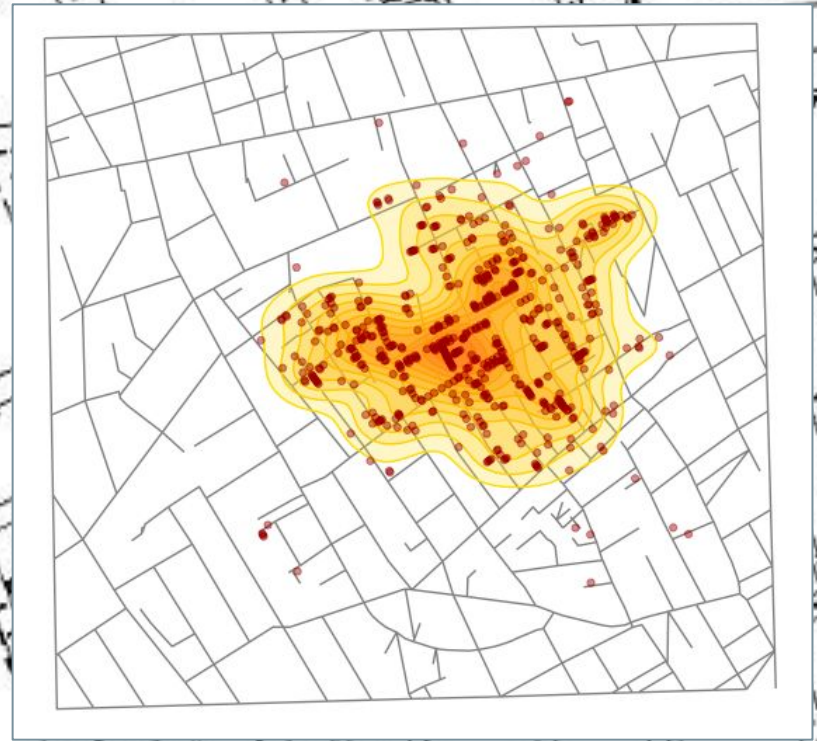
OpenStreetMap **OSM** website, **OSRM** routing engine

Python **Matplotlib Basemap**, **GeoPandas**, **GeoPy**

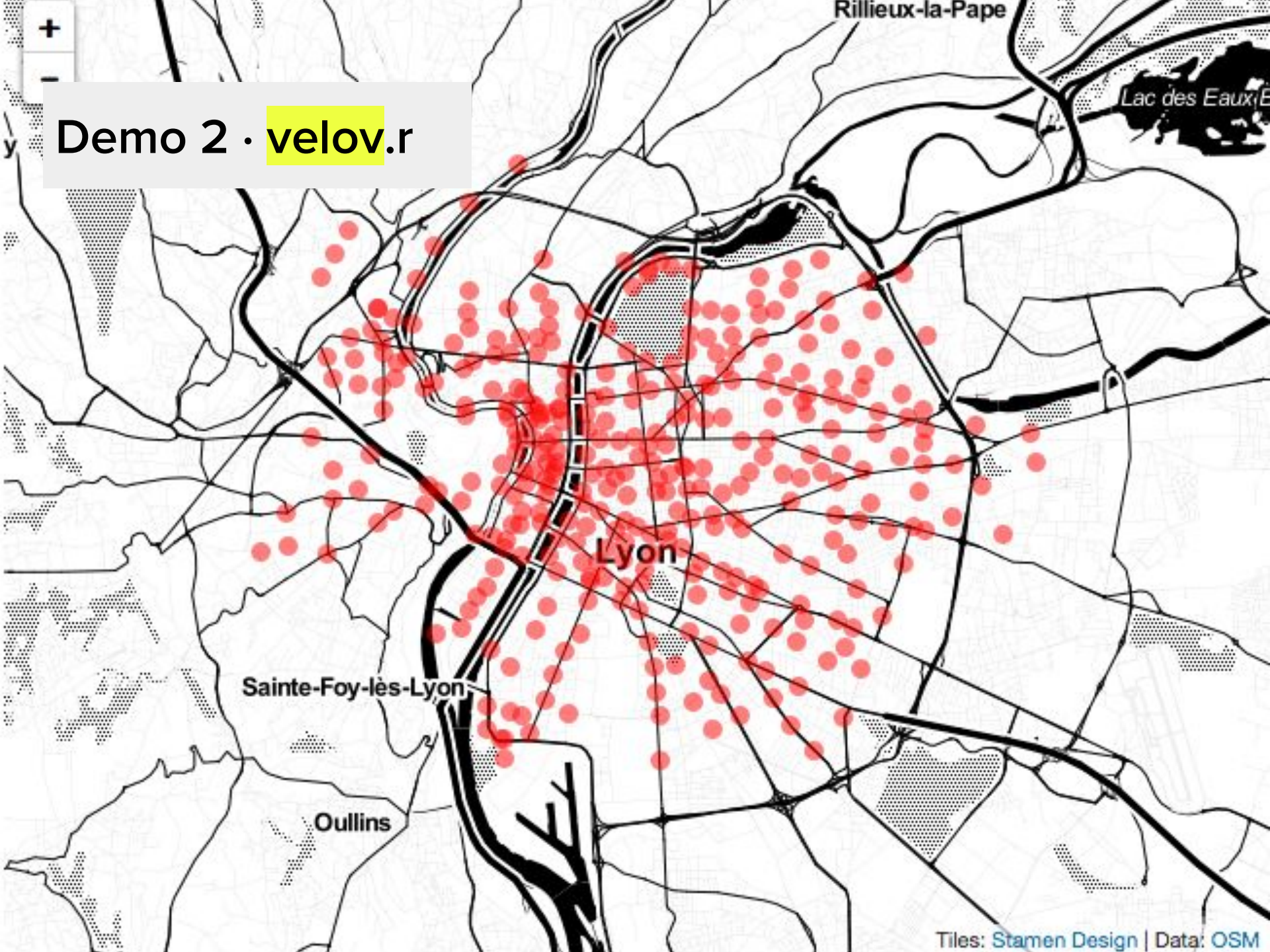
R + RStudio **cartography**, **sf** · will import **rgdal**, **rgeos**

Stata **spmap**, **maptile**, **tmap** · less capable

Demo 1 · cholera.r



Demo 2 · **velov.r**





Questions?

Thanks for your

attention

Additional references in English

Spatial resources for R users

[CRAN Task View: Analysis of Spatial Data](#)

[r-spatial](#) · blog, R packages, events

From my own bookmarks (mostly in English)

[R](#) · packages, tutorials, etc.

[Visualization: Maps](#) · mostly nice examples

[Statistics: Spatial](#) · mostly R packages

Additional references in French

French National Statistics Institute · 2018

Guide de sémiologie graphique

Guide de sémiologie cartographique

Manuel d'analyse spatiale · using R

More free, high-quality stuff

Carnet (néo)cartographique

R et espace · free book, last updated 2014

VisionsCarto · also in English and Spanish

Links to the **course material**

This course

[Web page](#) · Sciences Po Urban School website

[Basecamp group](#) · ask Joël or Sam for access

[GitHub repository](#) · includes stuff for this session

This session

Slides frama.link/odur-2018-s4

Author francois.briatte@sciencespo.fr