Segregation and Residential Location Patterns

Urban Economics

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Residential Location Patterns: US

Table 1
Poverty in cities and suburbs

Row		Center city resident	Suburban resident
1	All	0.1990	0.0753
2	Northeast	0.2089	0.0599
3	Midwest	0.1984	0.0565
4	South	0.1865	0.0744
5	West	0.1895	0.1031

Residential Location Patterns: Atlanta, Phoenix, Los Angeles

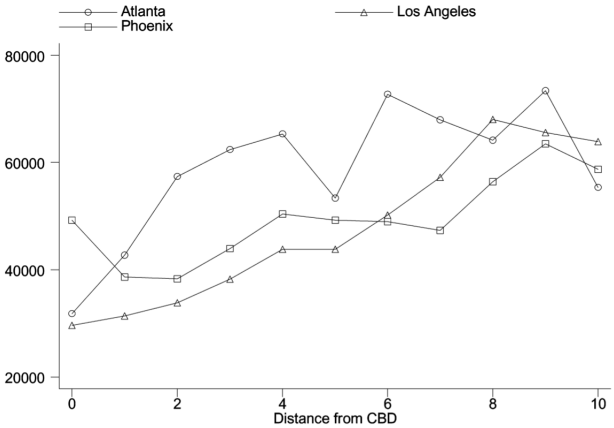


Fig. 2. Income and distance from the CBD in three new cities.

Residential Location Patterns: Europe

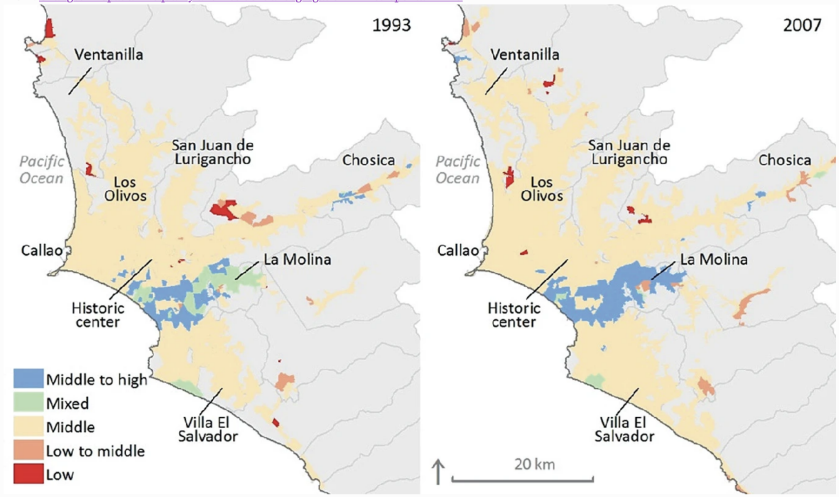
Table 1
Central-city vs. suburban incomes in France and the US

	Household income[a]	
Case	Central-city	Suburbs
Ile de France (Paris metro area)	124 000 Fr.[b]	106 000 Fr.
Province (other metro areas)	76 000 Fr.	84 000 Fr.
France (all metro areas)	84 000 Fr.	82 000 Fr.
Detroit (metro area)	$20 207	$40 084
U.S. (all metro areas)	$26 727	$26 314

[a] Household incomes are the 1990 average value in France and the 1989 median value in the U.S. The French data are from Nicot (1996), and the U.S. data are from the 1990 Census.
[b] The current franc-dollar exchange rate is approximately 6 francs per dollar.

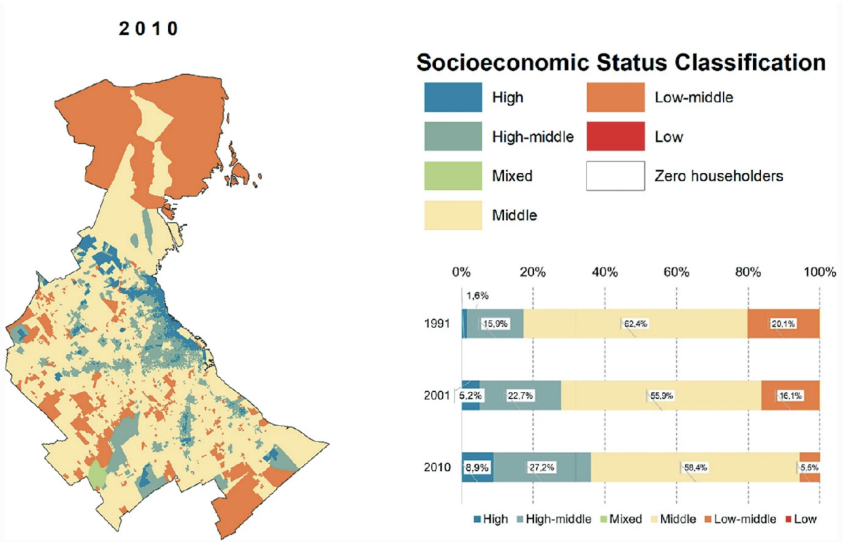
Residential Location Patterns: Lima

From: Changes in Spatial Inequality and Residential Segregation in Metropolitan Lima



Classification of neighbourhoods by socio-economic composition in Lima.

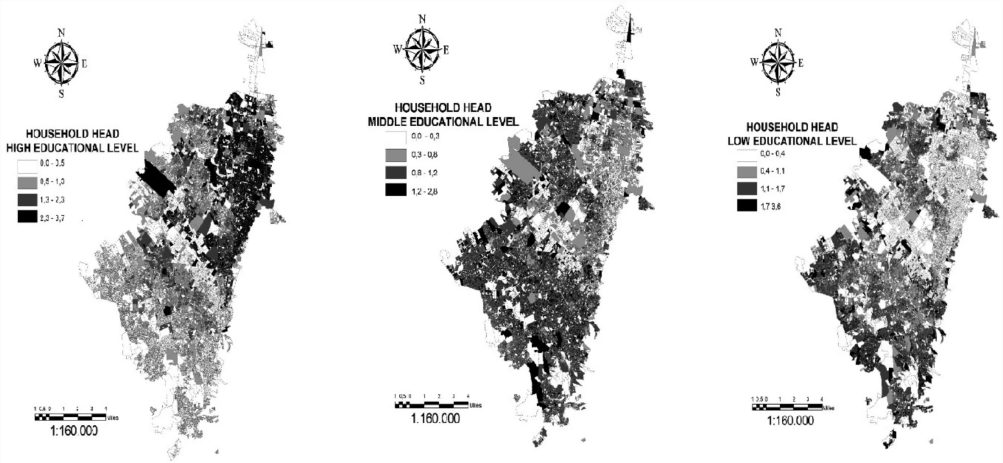
Residential Location Patterns: Buenos Aires



Source Population and housing censuses 1991, 2001, and 2010, INDEC, author's maps

Residential Location Patterns: Bogotá

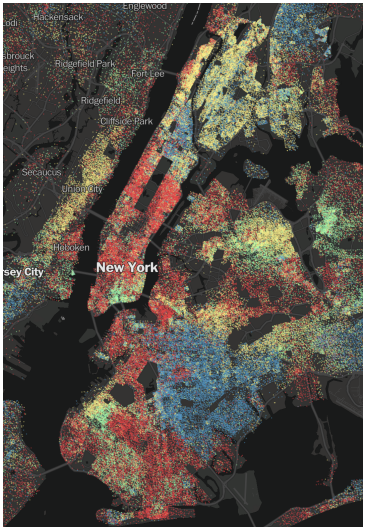
From: Socioeconomic Residential Segregation and Income Inequality in Bogotá: An Analysis Based on Census Data of 2005



Source Elaboration by the authors based on Population Census DANE (2005)

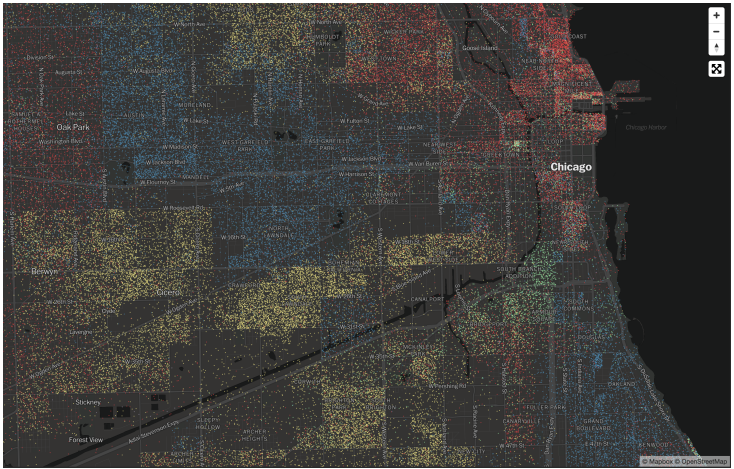
Location quotient for household leader by high, medium, and low education level in Bogotá, 2005.

Residential Location Patterns by Race: NYC



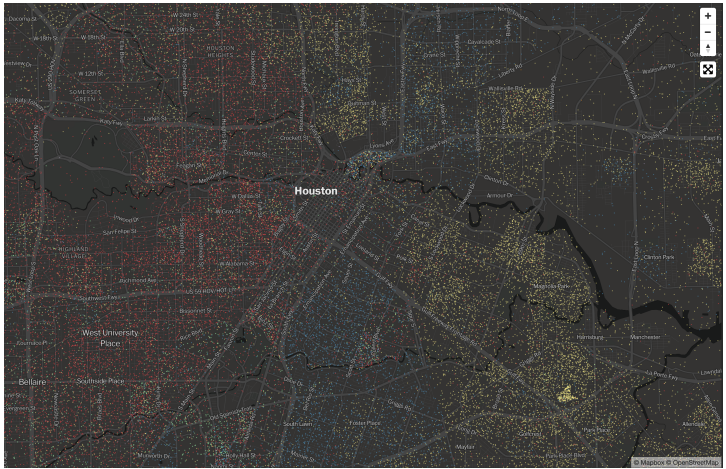
Source: https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/

Residential Location Patterns by Race: Chicago



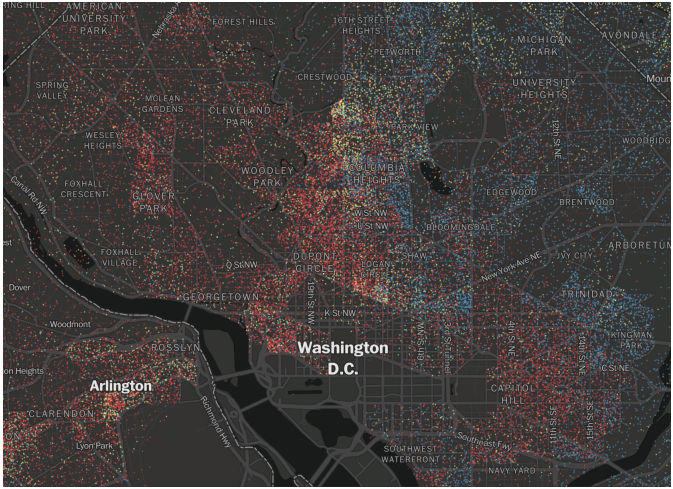
Source: https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/

Residential Location Patterns by Race: Houston



Source: https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/

Residential Location Patterns by Race: Washington, DC



Source: https://www.washingtonpost.com/graphics/2018/national/segregation-us-cities/

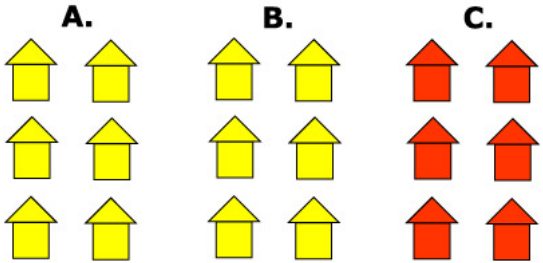
Dissimilarity and Isolation Indices

- Social scientists have struggle with the measurement of segregation for more than 50 years.
- The two of the most common measures are:
  - Dissimilarity index
  - Isolation index

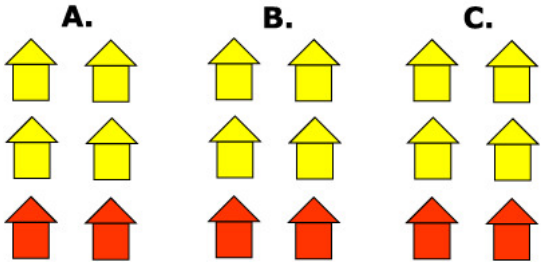
Dissimilarity Index

$$\text{Dissimilarity} = \frac{1}{2}\sum_{i=1}^{N}\left|\frac{B_i}{B_{total}} - \frac{B_i^c}{B_{total}^c}\right| \tag{1}$$

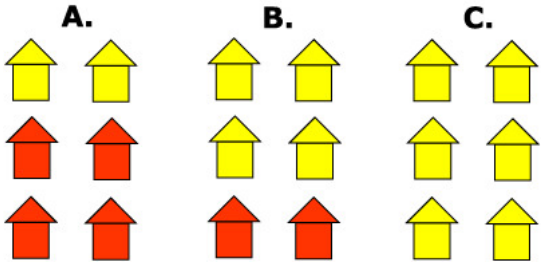
Dissimilarity Index



Dissimilarity Index



Dissimilarity Index



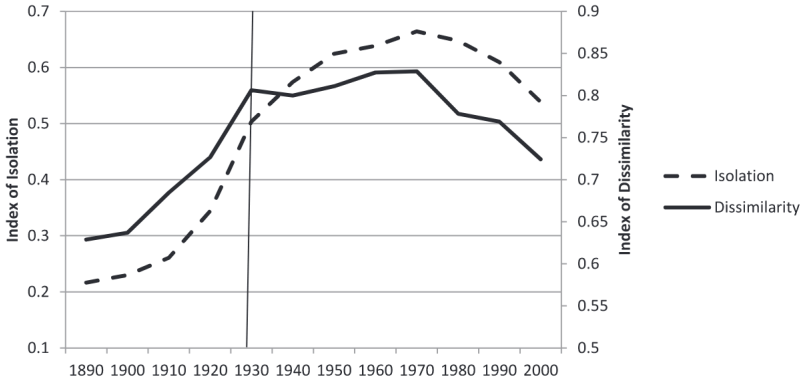
Dissimilarity Index

Isolation Index

$$\text{Isolation} = \sum_{i=1}^{N} \left(\frac{AA_i}{AA_{total}} . \frac{AA_i}{persons_i} \right) \tag{2}$$

Dynamics of Segregation

FIGURE 1.—SEGREGATION TRENDS IN THE LARGEST TEN AMERICAN CITIES, 1890–2000



Source: Shertzer and Walsh (2019) Racial Sorting And The Emergence Of Segregation In American Cities

Dynamics of Segregation

- Recent research has shown that the neighborhood where people live has important implications for short-run, long-run and even intergenerational outcomes.
- Residential choice can be driven by multiple factors:
  - Neighborhood/Housing/Amenities preferences
  - Disparities in income
  - Racial discrimination
  - Others: Information, Taxes/subsidies, Labor market opportunities, etc...

Residential Location Patterns: Schelling Model

- In 1969, Thomas C. Schelling developed a simple but striking model of racial segregation
- His model studies the dynamics of residential location, that can be applied to any two groups.
- Like much of Schelling's work, the model shows how local interactions can lead to surprising aggregate structure.
- In particular, it shows that relatively mild preference for neighbors of similar race can lead in aggregate to the collapse of mixed neighborhoods, and high levels of segregation.
- In recognition of this and other research, Schelling was awarded the 2005 Nobel Prize in Economic Sciences (joint with Robert Aumann).

Residential Location Patterns: Schelling Model

- Schelling Model is a basic agent-based model (ABM)
- The minimum ingredients for an ABM are:
  - Agents that interact with the world around them and/or with other agents
  - A world in which the agents 'live' or move around
  - A set of rules that determines what every agent is allowed or has to do
  - A loop, which allows to repeatedly act or interact

Residential Location Patterns: Schelling Model

- Set-Up
  - Suppose we have two types of people: orange people and green people.
  - These agents all live on a single unit square.
  - The location of an agent is just a point (x, y), where $0 < x, y < 1$.

Residential Location Patterns: Schelling Model

- Preferences
  - We will say that an agent is *happy* if half or more of her 10 nearest neighbors are of the same type.
  - Here 'nearest' is in terms of Euclidean distance
  - An agent who is not happy is called *unhappy*.
  - An important point here is that agents are not averse to living in mixed areas.
  - They are perfectly happy if half their neighbors are of the other color.

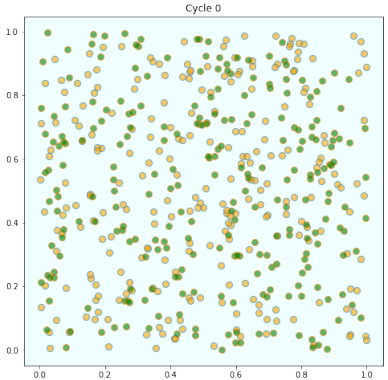
Residential Location Patterns: Schelling Model

- Behavior
  - Initially, agents are mixed together (integrated).
  - In particular, the initial location of each agent is an independent draw from a bivariate uniform distribution on $S = (0, 1)^2$.
  - Now, cycling through the set of all agents, each agent is now given the chance to stay or move.
  - We assume that each agent will stay put if they are happy and move if unhappy.
  - The algorithm for moving is as follows

    1. Draw a random location in S
    2. If happy at new location, move there
    3. Else, go to step 1

  - In this way, we cycle continuously through the agents, moving as required.
  - We continue to cycle until no one wishes to move.

Schelling Model Results: p=.50



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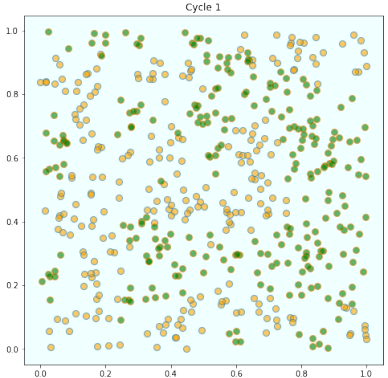
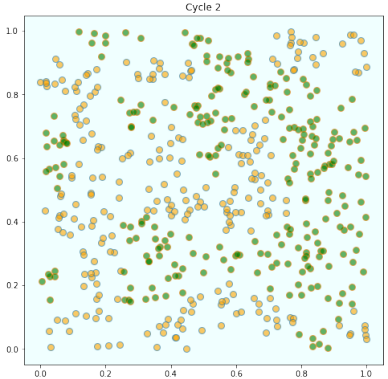
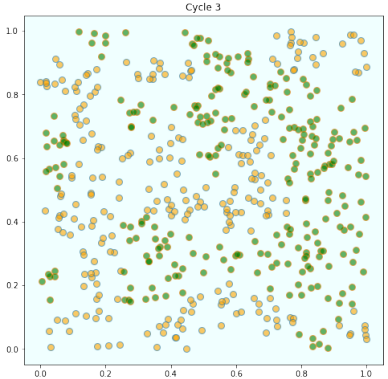


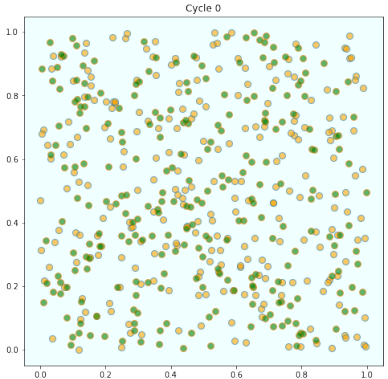
Schelling Model Results: p=.50



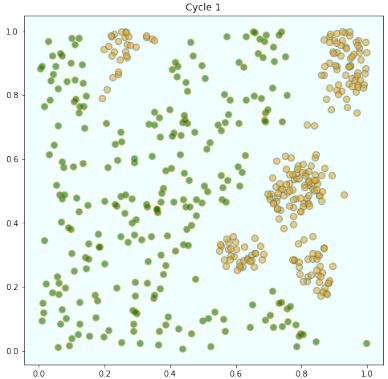
Schelling Model Results: p=.50



Schelling Model Results: p=.80



Schelling Model Results: p=.80



Schelling Model Results: p=.80