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Mapping the Evolution of Racially Mixed and Segregated Neighborhoods in Chicago

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Abstract

The Chicago metropolitan region consists of a spatially complex mosaic of neighborhoods, in which measures of racial and ethnic composition vary dramatically. Understanding these patterns and their evolution has been hindered by ambiguities in the use of terms like "diverse" or "segregated," which are often posited as opposite ends of a one-dimensional scale. Using a new taxonomy of neighborhood composition, we have mapped the evolving patterns of Chicago's neighborhoods in 1990, 2000, and 2010, and tabulated census tracts that have undergone transitions or remained stable. Looking beyond the Chicago metropolitan area, we have developed an interactive atlas of similar maps for states and metropolitan areas across the US.

Introduction

If the United States is a nation of migrants and immigrants, then Chicago is a quintessentially American city – its neighborhoods have been shaped and reshaped by successive waves of new arrivals. Chicago's urban landscape contains both diverse and segregated neighborhoods, sometimes side-by-side (Howenstine 1996), a seeming paradox that leads us to consider the shortcomings of the traditional framework in which these terms have come to represent opposite ends of a one-dimensional scale. Not all low-diversity neighborhoods are alike, and collapsing the variety of real neighborhoods onto this axis obscures important differences. Recognizing these shortcomings, scholars have begun to describe the racial-ethnic mosaic of cities in more nuanced terms, highlighting, for instance, the evolution of

multi-ethnic (e.g., Farrell and Lee 2011) or "global" neighborhoods (Logan and Zhang 2010).

We have developed a new taxonomy of neighborhood racial composition (Holloway et al. 2012; Wright et al. 2011) that incorporates both the degree of diversity within a neighborhood, and, for low- or moderate-diversity neighborhoods, the identity of the numerically dominant racial group. Thus, we could speak of communities as "black dominant and moderately diverse" or "Asian dominant and not diverse". The advantage of this approach is that it considers neighborhood segregation and diversity simultaneously.

The set of maps accompanying this paper illustrates our taxonomy of neighborhood composition, using demographic data for the Chicago metropolitan region to examine changes in patterns of segregation and diversity that have occurred over the past two decades. To encourage the adoption of this approach, we have also created an interactive atlas of segregation and diversity for the 53 largest US metropolitan areas, as well as all 50 US states (http://mixedmetro.com).

Methods

Our neighborhood classification method uses entropy to measure racial diversity (Holloway et al. 2012). Neighborhoods are categorized as low, moderate, or high diversity, with the first two levels further identified by the numerically dominant racial group. This two-dimensional classification scheme lends itself naturally to a cartographic symbolization method whereby low-diversity neighborhoods with different racial groups are represented with highly-

saturated colors, and moderately diverse neighborhoods are mapped in less saturated colors. This system is generally well aligned with current practices and preferences for color selection in the cartographic and data visualization communities (e.g., Brewer 2006; Tyner 2010). Previous research into "tipping points" in neighborhood composition informed the entropy thresholds used to differentiate among levels of diversity.

Demographic data from the 1990, 2000, and 2010 decadal censuses were used as the basis for this classification system. In each census year the tract boundaries change, and the racial categories in the 1990 census differed from subsequent censuses in several ways (e.g., the Asian and Pacific Islander categories were combined, and individuals were not offered the option of selecting multiple races). To facilitate comparisons across years, we resolved the 1990 and 2010 census tracts to match 2000 tract boundaries, adjusting populations based on the proportional area of overlap for partially overlapping tracts. We also recombined data from 2000 and 2010 to match the race categories used in the 1990 census.

The individual map panels representing each year can be used to explore the changing spatial patterns of neighborhood composition, while transition matrices tabulate the numbers of tracts that changed from one category to another, or remained unchanged, between any two census years. Table 1 illustrates this with the transition matrix for the Chicago region from 1990 to 2010. For example, the first row of this table shows that of 1065 tracts that were classified as low-diversity white dominant in 1990, fewer than half (485 tracts) remained in that category in 2010. In contrast, 317 out of 360 low-diversity black-dominant tracts from 1990 remained in 2010. Similar transition matrices for the 1990-2000 and 2000-2010 intervals are available on the project's website.

Table 1. Transition matrix for the Chicago metropolitan area: 1990 - 2010.

1990	2010	Low diversity				Moderate diversity				High diversity	Total
		White	Black	Asian	Latino	White	Black	Asian	Latino		
Low diversity	White	**485**	2		14	474	21		69		1065
	Black		**317**			4	38		1		360
	Asian										
	Latino				**31**	5	2		10		48
Moderate diversity	White	33	12		28	**151**	37	5	88	8	362
	Black		19		1	12	**41**		3	2	78
	Asian			1			2	**4**	1		8
	Latino	1			28	32	8		**46**	1	116
High diversity									2	**1**	3
Total		519	350	1	102	678	149	9	220	12	2040

The interactive web-based atlas uses a color scheme similar to the one employed for the set of Chicago maps accompanying this paper. For the online maps, the user can select from several alternate base map layers to provide spatial context, and then adjust the opacity of the neighborhood racial composition map layers as desired. For this paper and its maps, spatial data layers representing the transportation network, and rivers, lakes, and other water bodies, were obtained from the US Geological Survey and included in the maps to provide context.

Conclusions

The dominant trend in the Chicago region has been its transformation from a heterogeneous urban core surrounded by low-diversity white neighborhoods, into a network of more diverse sub-regions, some still white-dominated but others being reshaped by newcomers and their descendants. Few types of neighborhoods did not undergo substantial change over this time period; the exception being low-diversity, black-dominated tracts, whose numbers and locations barely changed during the past 20 years. The proliferation of Latino-dominated tracts outside the urban core is obvious and striking, but moderately diverse tracts with predominantly white or black populations also roughly doubled in number. Urban geographers recognize the importance of these increasingly diverse tracts, often neighborhoods where the racial and ethnic composition is in flux, as places where residents' circumstances and views are shaped by social diversity. Chicago presents a particularly interesting laboratory for exploration of this process (e.g., Berrey 2005; Maly 2000; Talen 2010; Sandoval 2011), due to its complex neighborhood mosaic. We hope that the maps,

transition matrices, and discussions resulting from our analysis of neighborhood composition and change will promote interest in, and understanding of, the spatial manifestation of diversity in Chicago's metropolitan area, and in other metropolitan regions across the United States.

Software

The classification of census tracts into categories of segregation and diversity was accomplished using Stata, while the transition matrices were produced using Microsoft Excel. Spatial analysis, preparation of spatial data layers, and map design were performed using ESRI ArcGIS v.10. To create the web-based maps, GMapCreator (from the University College of London's Centre for Advanced Spatial Analysis [UCL-CASA]) was employed to rasterize and tile the vector data layers. Finally, custom software was developed at Dartmouth College to provide a visual user interface for the online maps using the Google Maps Javascript application programming interface (API).

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