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11-9-2012

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#### Dartmouth Digital Commons Citation

Chipman, Jonathan; Wright, Richard; Ellis, Mark; and Holloway, Steven R. R., "Mapping the Evolution of Racially Mixed and Segregated Neighborhoods in Chicago" (2012). *Dartmouth Scholarship*. 2448.  
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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

1 multi-ethnic (e.g., Farrell and Lee 2011) or “global” neighborhoods (Logan and Zhang  
2 2010).

3  
4 We have developed a new taxonomy of neighborhood racial composition (Holloway et al.  
5 2012; Wright et al. 2011) that incorporates both the degree of diversity within a  
6 neighborhood, and, for low- or moderate-diversity neighborhoods, the identity of the  
7 numerically dominant racial group. Thus, we could speak of communities as “black  
8 dominant and moderately diverse” or “Asian dominant and not diverse”. The advantage of  
9 this approach is that it considers neighborhood segregation and diversity simultaneously.

10  
11 The set of maps accompanying this paper illustrates our taxonomy of neighborhood  
12 composition, using demographic data for the Chicago metropolitan region to examine  
13 changes in patterns of segregation and diversity that have occurred over the past two  
14 decades. To encourage the adoption of this approach, we have also created an interactive  
15 atlas of segregation and diversity for the 53 largest US metropolitan areas, as well as all 50  
16 US states (<http://mixedmetro.com>).

## 17 18 **Methods**

19  
20 Our neighborhood classification method uses entropy to measure racial diversity (Holloway  
21 et al. 2012). Neighborhoods are categorized as low, moderate, or high diversity, with the first  
22 two levels further identified by the numerically dominant racial group. This two-dimensional  
23 classification scheme lends itself naturally to a cartographic symbolization method whereby  
24 low-diversity neighborhoods with different racial groups are represented with highly-

1 saturated colors, and moderately diverse neighborhoods are mapped in less saturated colors.  
2 This system is generally well aligned with current practices and preferences for color  
3 selection in the cartographic and data visualization communities (e.g., Brewer 2006; Tyner  
4 2010). Previous research into “tipping points” in neighborhood composition informed the  
5 entropy thresholds used to differentiate among levels of diversity.

6  
7 Demographic data from the 1990, 2000, and 2010 decadal censuses were used as the basis  
8 for this classification system. In each census year the tract boundaries change, and the racial  
9 categories in the 1990 census differed from subsequent censuses in several ways (e.g., the  
10 Asian and Pacific Islander categories were combined, and individuals were not offered the  
11 option of selecting multiple races). To facilitate comparisons across years, we resolved the  
12 1990 and 2010 census tracts to match 2000 tract boundaries, adjusting populations based on  
13 the proportional area of overlap for partially overlapping tracts. We also recombined data  
14 from 2000 and 2010 to match the race categories used in the 1990 census.

15  
16 The individual map panels representing each year can be used to explore the changing spatial  
17 patterns of neighborhood composition, while transition matrices tabulate the numbers of  
18 tracts that changed from one category to another, or remained unchanged, between any two  
19 census years. Table 1 illustrates this with the transition matrix for the Chicago region from  
20 1990 to 2010. For example, the first row of this table shows that of 1065 tracts that were  
21 classified as low-diversity white dominant in 1990, fewer than half (485 tracts) remained in  
22 that category in 2010. In contrast, 317 out of 360 low-diversity black-dominant tracts from  
23 1990 remained in 2010. Similar transition matrices for the 1990-2000 and 2000-2010  
24 intervals are available on the project’s website.

1

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

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

3

4

5

1

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

9

## 10 **Conclusions**

11

12 The dominant trend in the Chicago region has been its transformation from a heterogeneous  
13 urban core surrounded by low-diversity white neighborhoods, into a network of more  
14 diverse sub-regions, some still white-dominated but others being reshaped by newcomers  
15 and their descendants. Few types of neighborhoods did not undergo substantial change over  
16 this time period; the exception being low-diversity, black-dominated tracts, whose numbers  
17 and locations barely changed during the past 20 years. The proliferation of Latino-dominated  
18 tracts outside the urban core is obvious and striking, but moderately diverse tracts with  
19 predominantly white or black populations also roughly doubled in number. Urban  
20 geographers recognize the importance of these increasingly diverse tracts, often  
21 neighborhoods where the racial and ethnic composition is in flux, as places where residents'  
22 circumstances and views are shaped by social diversity. Chicago presents a particularly  
23 interesting laboratory for exploration of this process (e.g., Berrey 2005; Maly 2000; Talen  
24 2010; Sandoval 2011), due to its complex neighborhood mosaic. We hope that the maps,

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

## 6 **Software**

7  
8 The classification of census tracts into categories of segregation and diversity was  
9 accomplished using Stata, while the transition matrices were produced using Microsoft  
10 Excel. Spatial analysis, preparation of spatial data layers, and map design were performed  
11 using ESRI ArcGIS v.10. To create the web-based maps, GMapCreator (from the University  
12 College of London's Centre for Advanced Spatial Analysis [UCL-CASA]) was employed to  
13 rasterize and tile the vector data layers. Finally, custom software was developed at  
14 Dartmouth College to provide a visual user interface for the online maps using the Google  
15 Maps Javascript application programming interface (API).

## 17 **Acknowledgments**

18  
19 Sandy Wong, Minal Caron, and Kevin Mwenda at Dartmouth College contributed to the  
20 development of the maps and transition matrices, along with Michael Wellman at the  
21 University of Georgia. Grant support from the National Science Foundation, the Russell  
22 Sage Foundation, and the Neukom Institute at Dartmouth College made these analyses, and  
23 the development of the online interactive atlas, possible.



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