MEASURING RACIAL RESIDENTIAL SEGREGATION

WHERE WE LIVE:

THE COLOR LINE

The color line is carved deeply and measurably across the cityscape of America in the form of racial residential segregation. Race relations are formed and maintained around the resulting structural framework of residential segregation. As Charles S. Johnson wrote in the 1940s:

> The racial segregation in residential areas provides the basic structure for other forms of institutional segregation. It is a result of social and economic selection, of the direct operation of racial sanctions, and of the internal pull and cohesion of a community, and bears a significant relationship to those impersonal forces operating in the growth of a city.

Those words are no less true today. In *American Apartheid*, Douglas Massey and Nancy Denton identify residential segregation as the institutional apparatus that supports and binds together other forms of racial discrimination and subordination.

"Where We Live: The Color Line" is a series of reports addressing different facets of racial residential segregation, both nationwide and in Nashville, Tennessee. This collection, a research product of the Race Relations Institute of Fisk University, continues the legacy of Charles S. Johnson, the eminent sociologist and founder of the Race Relations Institute. It was Johnson's vision that sociological research, academic discourse, and broad dissemination of factual information and social theory were the keys to demonstrating the entrenched system of race discrimination and thereby driving social change.
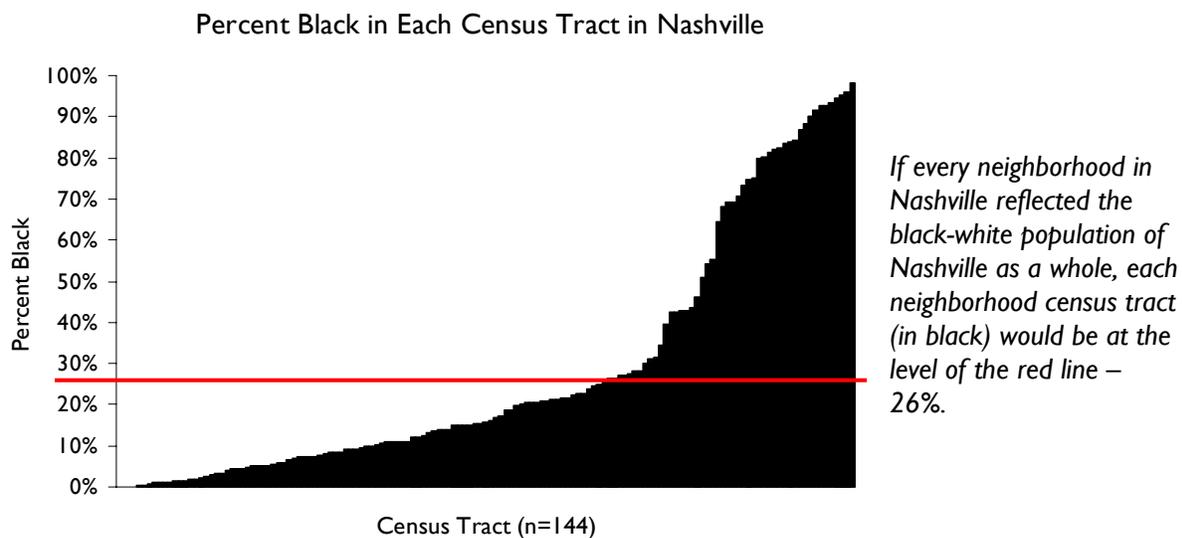
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We are a nation segregated by race. Whites and blacks in particular tend to live on different streets, in different neighborhoods, in different areas of American cities. Residential segregation is our landscape, our backdrop, our infrastructure. And yet, what is residential segregation, really? How do we measure it, and how do we understand it? How do we experience it?

In common sense terms, racial residential segregation is the degree to which racial and ethnic groups live separately from one another, in different areas of their city. Beyond that general definition, however, there are five specific ways in which residential segregation manifests itself and can be conceptualized and measured: 1) evenness, 2) exposure, 3) clustering, 4) concentration, and 5) centralization.[1] This report provides a brief overview of these five dimensions of racial residential segregation.

EVENNESS AND THE INDEX OF DISSIMILARITY

Evenness is the most commonly measured dimension of racial residential segregation, and it considers the extent to which different racial and ethnic groups are dispersed evenly, commensurate with their proportionate populations, throughout the neighborhoods of a city.[2] In an evenly integrated city, each neighborhood's population would reflect the respective racial and ethnic proportions of the entire city's population. Thus, in Nashville, where 26% of the city's population is African–American,[3] if it were evenly integrated each neighborhood would be 26% black.

Percent Black in Each Census Tract in Nashville

If every neighborhood in Nashville reflected the black-white population of Nashville as a whole, each neighborhood census tract (in black) would be at the level of the red line – 26%.

Census Tract (n=144)

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[1] Douglas Massey and Nancy Denton, through an extensive literature search and cluster analysis, identified 20 indices of segregation and categorized them into five distinct dimensions of measurement. Massey, D. S. and Denton, N. A. (1988). The Dimensions of Residential Segregation, *Social Forces*, 67, 281-315.
[2] Massey and Denton (1988).
[3] U.S. Census 2000.

Evenness is measured most commonly by the mathematical formula called the index of dissimilarity. For example, with regard to African Americans and whites, the index of dissimilarity quantifies the percentage of blacks in a city that would have to move (to other neighborhoods within the city) in order for the city to be evenly integrated. The higher the dissimilarity number, the more uneven the distribution of blacks and whites throughout the city, and the more segregated the city; at the opposite end of the spectrum, a dissimilarity index of zero would indicate an evenly integrated city.[4]

The index of dissimilarity can be calculated for cities with relative ease and affords comparison from decade to decade and between cities. It is generally agreed that the index of dissimilarity steadily increased for African Americans in most American cities for the first seven decades of the 1900s.[5] Since 1970, the index of dissimilarity has been declining gradually for African Americans, but is still far above the levels of a century ago.[6]

> *For Hispanics living in Nashville in the year 2000, the index of dissimilarity is 44%; the index of dissimilarity for African Americans in Nashville is 53%.*

Index of Dissimilarity for Various Cities, 1890-2000[7]

	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Atlanta, GA	18%	24%	34%	41%	44%	81%	83%	77%	82%	77%	67%	62%
Baltimore, MD	29%	37%	40%	44%	54%	79%	80%	82%	81%	74%	71%	67%
Boston, MA	57%	56%	63%	65%	68%	81%	80%	81%	81%	76%	68%	63%
Chicago, IL	64%	58%	69%	77%	85%	94%	91%	91%	91%	86%	84%	78%
Dayton, OH	42%	38%	40%	52%	62%	83%	87%	91%	88%	79%	75%	71%
Detroit, MI	57%	61%	64%	57%	60%	83%	81%	87%	89%	87%	87%	84%
Kansas City, MO	18%	19%	38%	48%	60%	73%	79%	83%	88%	79%	72%	68%
Louisville, KY	30%	29%	34%	41%	38%	69%	73%	78%	83%	74%	69%	64%
Memphis, TN	19%	20%	28%	34%	46%	59%	65%	73%	79%	70%	69%	66%
New York, NY	43%	46%	48%	58%	64%	77%	83%	74%	74%	53%	69%	67%
Philadelphia, PA	43%	38%	46%	47%	51%	68%	74%	80%	78%	77%	75%	69%
Richmond, VA	34%	42%	30%	20%	19%	67%	70%	76%	77%	64%	59%	55%

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[4] The mathematical equation for the Index of Dissimilarity, and hence for evenness, is the sum of:

$$\frac{\text{Population of census tract} \times \textit{absolute value of} (\text{percent black population of that census tract} - \text{percent black population of city})}{2 \times \text{population of city} \times \text{percent black population of city} \times (1 - \text{percent black population of city})}$$

This report provides the most commonly used formulas for segregation measurement; for a complete technical description of all segregation indices, see http://www.census.gov/hhes/www/housing/housing_patterns/app_b.html.

[5] Massey, D. S. and Denton, N. A. (1993). *American Apartheid*. Cambridge, MA: Harvard University Press.

[6] Frey, W. H. and Myers, D. (2005). Racial Segregation in U.S. Metropolitan Areas and Cities, 1990-2000: Patterns, Trends, and Explanations. Population Studies Center Research Report 05-573. See also Glaeser, E. L. and Vigdor, J. L. (2001). Racial Segregation in the 2000 Census: Promising News. Washington, D.C.: Brookings Institute.

[7] Cutler, Glaeser and Vigdor (1999). The Rise and Decline of the American Ghetto, *Journal of Political Economy,* 107, 455-506. The scale of measurement over this time period changed from wards to census tracts to metropolitan areas. In addition, 2000 data is drawn from Glaeser, E. L. and Vigdor, J. L. (2001). Racial Segregation in the 2000 Census: Promising News, Washington, D.C.: Brookings Institution.

EXPOSURE: ISOLATION OR INTERACTION

The dissimilarity index, despite its virtues of simplicity and ease of comparison, does not capture other critical aspects of segregation which illuminate more specifically the nature of the experience and manifestation of racial residential segregation. Exposure, a second dimension of residential segregation, refers to the amount of possible contact and interaction between members of different racial and ethnic groups, and contemplates the extent to which they are isolated from one another by virtue of residing in different areas.[8] Thus, the measurement of exposure, much more so than the index for evenness, purports to quantify how segregation is felt and lived by blacks, whites, and others in their daily lives, in terms of how much or how little they interact with one another.

According to the standard of exposure, with regard to African Americans, a city may be considered less segregated when blacks are more exposed to whites, and more segregated if they are less exposed. Exposure may be conceptualized, measured, and expressed in a variety of ways. For example, some studies have considered any racial or ethnic group that constitutes 90% or more of its area (census tract) to be "isolated" from other groups. Citywide, then, the percentage of that racial group that resides in such isolated areas may be said to constitute the level of isolation for that particular group in that city.

Areas of extreme racial isolation in Nashville, Tennessee

Census tracts of Nashville with 80% or more African American residents

Census tracts of Nashville with 95% or more white residents

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[8] Massey and Denton (1988).

Another way to measure such lack of exposure is the mathematical formula known as the isolation index.[9] This index is a commonly used formula and, like the index of dissimilarity, affords comparison over time and between cities.

Black-White Isolation for Nashville
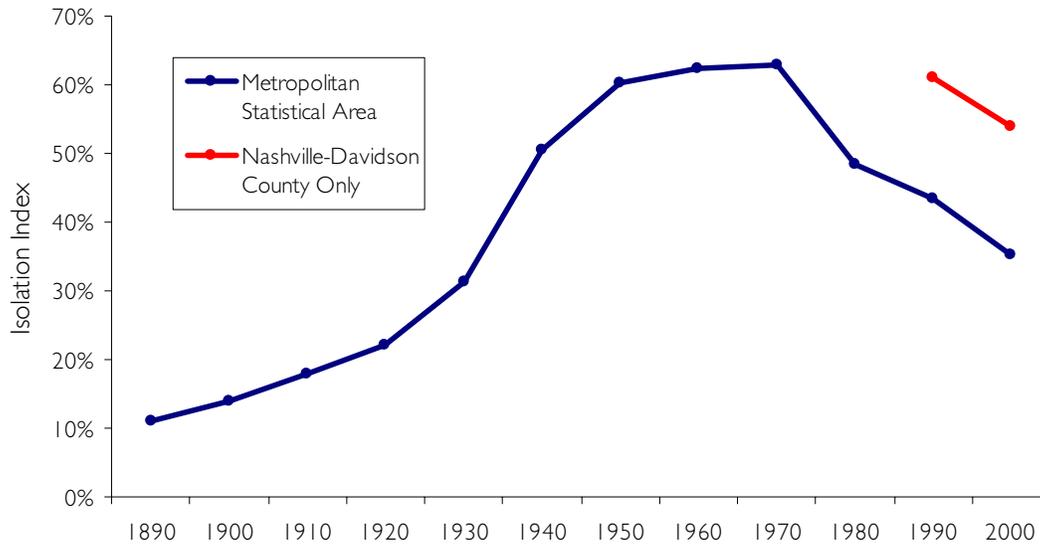
CENSUS DATA AND GEOGRAPHIC AREAS

All of the segregation measurements rely on data collected for the U.S. Census, and in particular on the population numbers and categorizations reported for subdivided areas of cities. Under the Census, however, the definition and measurement of city subunits, and indeed of cities themselves, have changed over the course of time.

From 1890 to 1940, census figures were reported by city wards, which are political units that varied widely in population as well as geographic size. Since 1940, census data has instead been reported according to census tracts, which were designed to be roughly comparable units of similar population; tract data therefore provides more consistency for comparison purposes than the earlier ward-based numbers.

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[9] The mathematical equation for the Isolation Index, which quantifies the extent to which members of a group are exposed only to one another, is the sum of:

$$\frac{\text{minority population of census tract}}{\text{minority population of city}} \times \frac{\text{minority population of census tract}}{\text{total population of census tract}}$$

The Interaction Index takes the converse approach and measures how much group members are exposed to members of other groups. The mathematical equation is the sum of:

$$\frac{\text{minority population of census tract}}{\text{minority population of city}} \times \frac{\text{majority population of census tract}}{\text{total population of census tract}}$$

Census data is also reported by block group, which are smaller units within census tracts. Typically, there are about four census block groups for each tract, though this number varies. Analysis at the census block group level, though less frequent than analyses at the tract level, provides a closer look at neighborhood phenomena and can be an important and powerful scale on which to understand segregation.

Measures of segregation—whether dissimilarity, isolation, or other common measures—can vary dramatically depending upon the scale at which a community is contemplated. The common differentiations as to scale include two dimensions: one is the unit of analysis, which is typically census tracts or census block groups, and the other is the regional dimension, typically measured at either the city-boundary or MSA level.

The City of Nashville, Tennessee, constitutes one county (Davidson), but the Nashville MSA, as defined by the U.S. Census and relied upon for calculations of segregation and other phenomena, includes 12 additional surrounding counties. Not surprisingly, the 13-county region of the Nashville MSA presents a different picture of racial residential segregation than that presented by Nashville-Davidson County only.

Calculations of the isolation index for Nashville, as plotted on the graph of Black-White Isolation above, reveal the disparity. For 1990 and 2000, Nashville MSA's black-white isolation index is lower than that of the City of Nashville. Moreover, while we find a decrease over these two decades at both scales of measurement, the isolation index dropped 19% for the MSA but only dropped 11% for Nashville-Davidson County.

Beginning in 1950, and reflecting the trend of suburbanization of American cities, the U.S. Census began reporting Metropolitan Statistical Areas (MSAs)—groups of counties surrounding and including a central city, well beyond just the city itself—as the major unit for urban areas. This emphasis on the broader metropolitan area began, in turn, to be adopted in segregation studies, which now predominantly analyze MSAs rather than cities within their urban boundaries.

This redefinition of a city's parameters, which in many cases encompasses huge swaths of suburban and rural areas, arguably distorts segregation statistics. That is, the indices of dissimilarity and isolation for a given city, considered according to its urban boundaries, may differ significantly from its indices as an MSA, and thereby present utterly different pictures of segregation levels. For example, in a recent study measuring black isolation in Washington, D.C., the metropolitan area scored 37%, but when calculated within the actual boundaries of the city the isolation rate was 69%.[10]

The potentially great variation in the segregation measurement of one community at two different scales of analysis also highlights a major concern about studying segregation trends over time. Longitudinal comparisons are arguably hindered by the conversion to MSAs. On the one hand, it is true that the urban form of American communities has dramatically changed, but modifying the scale of segregation measures complicates our understanding of real differences in segregation patterns.

SPATIAL MEASURES: CONCENTRATION, CENTRALIZATION, AND CLUSTERING

Three other dimensions of segregation—concentration, centralization, and clustering—address key spatial aspects of racial residential segregation. Concentration, the third dimension for

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[10] Yinger, J. (1995). *Closed Doors, Opportunities Lost: The Continuing Costs of Housing Discrimination.* New York: Russell Sage Foundation.

measuring residential segregation, contemplates the relative amount of physical space in the city that is occupied by a racial or ethnic group.[11] Blacks, for example, are residentially concentrated to the extent that they live in a small share of the total area of the city, and the more they are concentrated, the more the city may be said to be segregated.

Centralization, the fourth dimension, also contemplates the spatial situation of minority groups. Centralization is the degree to which a racial or ethnic group lives in or near the center of a city, usually defined as the central business district.[12] The trend in the United States has been the confining of minorities to declining central city areas, in the oldest and most substandard housing (gentrification notwithstanding).

A final dimension of residential segregation is clustering, which is the extent to which minority areas are adjacent to one another.[13] A higher degree of clustering occurs where minority neighborhoods cohere to form one large, contiguous expanse. A city is said to be less clustered, and thus less segregated, when minority neighborhoods are scattered, non-adjacent, throughout the urban area, in a checkerboard fashion.

Black-White Racial Residential Segregation in Nashville, 2000 Census

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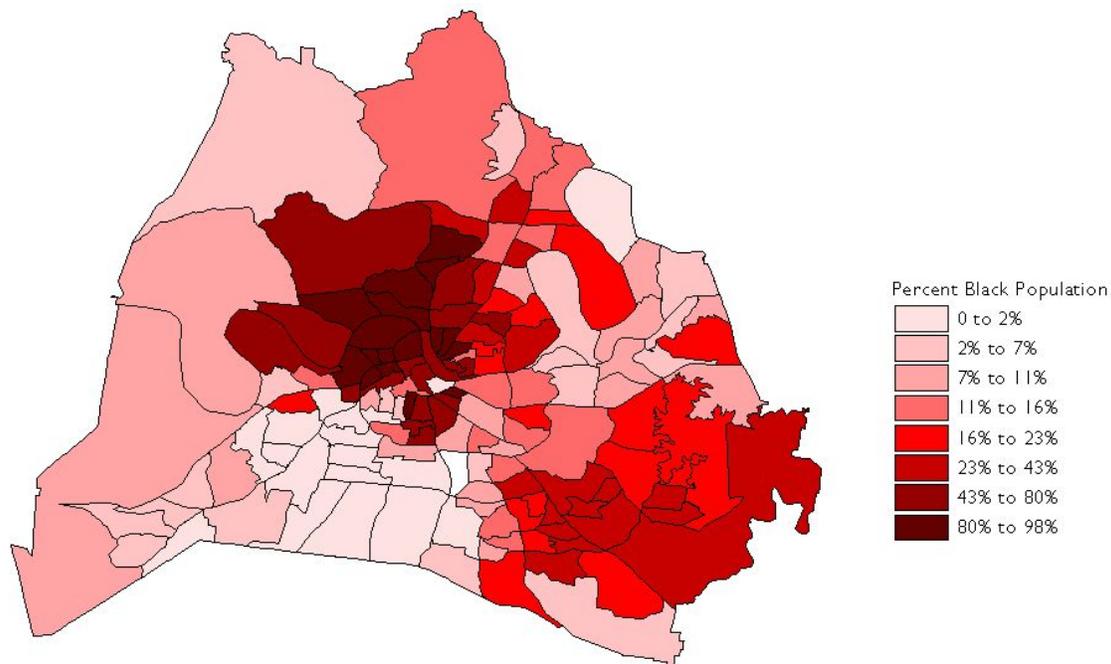
[11] Massey and Denton (1988).
[12] Massey and Denton (1988).
[13] Massey and Denton (1988).

While the spatial concepts of concentration, centralization, and clustering are important conceptual dimensions of segregation, in fact the literature reveals they are rarely used and offer little by way of comparison and analysis. Their mathematical calculation has proven to be difficult as well as controversial.[14]

CONCLUSION

Segregation scholars continue to grapple with issues of measurement, particularly with regard to the spatial dimensions. The non–spatial measures of dissimilarity and isolation harbor inherent inaccuracies: the statistics vary depending upon whether they are computed based on political wards, census tracts, or block groups, and whether they contemplate cities within their urban boundaries or suburbanized metropolitan environs as well. In the meantime, however, these indices—measurements of the dimensions of evenness and exposure—provide accessible if incomplete standards for comparison and study of racial residential segregation.

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[14] For example, scholars have found that the measurements for clustering and concentration did not work well. Massey, D. S., White, M. J. and Phua, V. (1996). The Dimensions of Segregation Revisited, *Sociological Methods and Research*, 25, 72-206. Another author recommends an entirely different formula—the Gini Index—for measuring the spatial dimensions of segregation. Dawkins, C. J. (2004). Measuring the Spatial Pattern of Residential Segregation, *Urban Studies*, 41, 833-851.