The Spatial Scale and Spatial Configuration of Residential Settlement: Measuring Segregation in the Postbellum South[1]

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Studies of residential segregation typically focus on its degree without questioning its scale and configuration. The authors study southern cities in 1880 to emphasize the salience of these spatial dimensions. Distance-based and sequence indices can reflect spatial patterns but with some limitations, while geocoded 100% population data make possible more informative measures. One improvement is flexibility in spatial scale, ranging from adjacent buildings to whole districts of the city. Another is the ability to map patterns in fine detail. In southern cities the authors find qualitatively distinct configurations that include not only black "neighborhoods" as usually imagined but also backyard housing, alley housing, and side streets that were predominantly black. These configurations represent the sort of symbolic boundaries recognized by urban ethnographers. By mapping residential configurations and interpreting them in light of historical accounts, the authors intend to capture meanings that are too often missed by quantitative studies of segregation.

This study has three purposes. The most general purpose is conceptual: to demonstrate the importance of both spatial scale and spatial configuration for the study of residential segregation. Researchers have increasingly rec-

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ognized that segregation occurs at multiple geographic scales, and new mapping technology facilitates measuring proximity between members of different groups (Reardon and O'Sullivan 2004). Less attention has been given to what Myrdal (1944) called "ceremonial distance," where strong social boundaries may be expressed through the specific pattern of placement of group members within small areas. We refer to this pattern as the spatial configuration. The second purpose is methodological: to compare and evaluate several spatially informed measures of segregation, including distance-based measures such as applied by Lee et al. (2008) and a sequence measure reintroduced by Grigoryeva and Ruef (2015). These measures are relatively new, and their features have been little explored with real data. We take advantage of geocoded data that map the addresses of all residents of 10 southern cities in 1880 to clarify what can be learned about segregation from each of these measures and from more intuitive alternatives. The third purpose is substantive: to provide new insight into the nature of residential segregation in the postbellum South. A well-developed literature mainly by urban historians and historical geographers describes highly segregated southern cities even before the imposition of Jim Crow in the 1880s. However, those findings have been contradicted by quantitative studies, which show that cities such as Charleston stood out as unusually integrated as late as 1940 (Taeuber and Taeuber 1965, p. 45; Cutler, Glaeser, and Vigdor 1999, pp. 462–63). We will draw on geocoded data and spatially specific measures to assess segregation in these cities in the early postbellum period.

In the following sections we pursue each of these purposes in order, and the findings in one section lead directly to the next. We begin with a description of the sample and data used in all three sections. We then turn to an exploratory mapping of the location of blacks and whites in fine detail to explain the notion of spatial configuration. We identify four prototypical configurations found to some extent in all 10 cities. In three of these configurations we find black households living in close proximity to whites but in a pattern that could not be described as racially integrated. The results of this step lead us to the question of how various measures of segregation provide insight into these patterns. We have conducted an intensive analysis of all 10 southern cities in 1880 to measure segregation in different ways and at different spatial scales, revealing the advantages of using well-known measures calculated at multiple qualitatively meaningful scales. We present the cases of Nashville, Charleston, Washington, D.C., and Baltimore to illus-

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trate our findings in detail. We then summarize the main results for the full set of cities to make comparisons among them and to draw conclusions about segregation in this pre–Jim Crow era.

RESEARCH QUESTIONS AND STUDY DESIGN

Studies of the antebellum South describe cities where whites and blacks lived near one another, facilitating a master-slave relationship. Geographic separation was not crucial as a marker of racial boundaries, it is said, because the social distance between races was so great in the era of slavery. Scholars have offered differing opinions about segregation in the years after the Civil War when southern cities absorbed a large wave of rural black migrants. Blassingame (1973, p. 481) describes a "relatively open housing pattern" in Savannah, but Rabinowitz (1978, p. 106) states that "by the late 1880s segregation was firmly established" in Richmond, Atlanta, Montgomery, and Raleigh. Several point to variations among cities, based on how strongly the antebellum pattern had been established and maintained (Demerath and Gilmore 1954; Frazier 1957; Taeuber and Taeuber 1965, p. 190; Schnore and Evenson 1966). Quantitative studies based on tract or ward data conclude firmly that segregation was moderate at most as late as the 1940s (Taeuber and Taeuber 1965; Cutler et al. 1999). Yet Grigoryeva and Ruef (2015), using a method that evaluates same-race neighbor sequences, report that by their measure southern cities were more segregated than northern cities in 1880.

This study draws on new high-resolution data about where whites and blacks lived in several major southern cities in 1880, at the end of Reconstruction and just before the imposition of Jim Crow laws. It is based on new and historically accurate geographic information system (GIS) street maps in which people's addresses have been geocoded. In other words, the data tell us who lived where, next to whom, and who lived down the block or around the corner. Not constrained to aggregated data for arbitrary administrative units such as enumeration districts or wards, it offers a detailed view of the nature of residential segregation at this time. Confirming the view of Grigoryeva and Ruef, we find that the seemingly low segregation that others have reported in many southern cities is mainly a function of its distinctive scale and spatial configuration, masking a substantial degree of segregation even within small residential areas.

The main data source is the 100% transcription of records from the 1880 federal census, harmonized by the Minnesota Population Center and available for public use through the North Atlantic Population Project (http://www.nappdata.org/napp; Ruggles et al. 2010). These records were mapped and geocoded to the address level for 39 cities by the Urban Transition Historical GIS Project (http://www.s4.brown.edu/utp, described in Logan et al.

[2011]). Consequently, nearly complete population information at the finest possible geographic level is available without constraints on how it can be aggregated. An advantage of working from the original microdata is that we can remove black live-in domestic workers in white-headed households (on the basis of their occupation, as we found the "relationship to head of household" coding to be unreliable). In our view they are not "neighbors" of other household members in the usual social meaning of the term. When they are included in the analysis, of course, segregation appears lower. This is a consequential decision, because such a large share of black adults were live-in domestic workers: about 9.5% overall in these southern cities, ranging from as low as 5%–8% in Mobile, Charleston, New Orleans, and Memphis to as high as 13%–19% in Baltimore, Washington, and Louisville. In 1880 the census enumerators separately counted Negroes and mulattos; we combine them here as blacks.

The mapped microdata are analyzed here for Atlanta, Baltimore, Charleston, Louisville, Memphis, Mobile, Nashville, New Orleans, Richmond, and Washington, D.C.[2] Appendix table A1 describes the racial composition of these cities as they evolved over time from before the Civil War through 1940. What is most striking is the large share of blacks in these southern cities. Among the 10 cities studied here, the city with the smallest share of blacks as early as 1860 was Louisville (10.0%), while the others ranged up to 42.3% in Charleston. In comparison, the northern city in 1880 with the largest black population (not counting St. Louis, considered by many to be a border city) was Philadelphia. Philadelphia had 31,000 black residents, accounting for only 3.7% of its population.

There were dramatic increases in the share of black residents in Washington in the 1860–70 decade, mostly after 1865 (jumping from 18% to 32.5% black), and also in Atlanta (rising from 20.3% to 45.6%) and Memphis (rising from 17.2% to 38.5%). Most southern cities also witnessed a continuing growth in the number of blacks, though at a lesser rate, as they participated in the nationwide wave of urbanization that was in progress in the latter 19th century. Another major structural change resulted from the abolition of slavery. The share of blacks who were enumerated as slaves in 1860 had varied greatly. In Baltimore only 8% and in Washington 16% were slaves. These were outliers. In the other cities studied here the range was from 56% in New Orleans to 95% in Memphis. One additional factor in several cities, especially Charleston, was the destruction of the built environment suffered during the war. In Charleston's case, there was also a major fire in 1861 that destroyed a large section of the denser part of the city. Hence the antebellum

[2] The full geocoded data for all 39 cities in the 1880 maps of the Urban Transition HGIS Project can be viewed and downloaded from https://s4.ad.brown.edu/Projects/UTP2/query.htm.

built environment had to be partly rebuilt after the war, creating opportunities for a restructuring of spatial patterns.

The Charleston city directory (Scholes 1882) is used as a supplementary source to study the backyard pattern in Charleston (described below). Unlike the population census, which provides only the street and house number of residents, the directory includes a notation distinguishing persons living in separate buildings in the rear of the lot.

SPATIAL SCALES AND SPATIAL CONFIGURATIONS

Historians and historical geographers have identified four residential configurations that coexisted in the South to varying degrees in different cities: the neighborhood, the backyard, the alley, and the side street. These spatial patterns separated whites and blacks residentially, and when they are fully taken into account it becomes clear that segregation in southern cities was considerably higher than previously measured.

The four configurations raise an issue of spatial scale, suggesting an important distinction between microsegregation and macrosegregation (a distinction emphasized in Radford's [1976] study of 19th-century Charleston). Lowi (1979) describes a southern city where blacks historically lived in every section of town. As late as 1950, "they did not live in a ghetto." But white residents "could in no way be accused of living in an integrated community. . . . There were no black-white-black-white house patterns (although there were a number of instances where several black families lived directly across the street from or 'alley to alley' with a larger number of white families). In good urban fashion, blacks and whites learned to ignore each other" (p. 240).

Scholars have raised this same issue in northern cities, noting that most pre-1940 studies relied on data from city wards. Philpott (1978, pp. 120–21) pointed out that Chicago's 1900 ward map showed blacks scattered around the city at a time when their concentration on the South Side was common knowledge. Recently, Logan, Zhang, and Chunyu (2015) took advantage of newly available data for much smaller units (enumeration districts) to show that Chicago was in fact highly segregated in 1900, with a value of the index of dissimilarity of nearly .75.[3]

[3] The index of dissimilarity (D_{bw}) measures how evenly whites and blacks are distributed across areas (wards in this case). It reaches a minimum if every area has the same share of the city's total white and black residents and a maximum of one if there is no overlap at all in where whites and blacks live. Values above .60, by convention, are described as "very high." Values in the range of .20–.30 are often found in the contemporary metropolis for segregation between whites of different European ancestry. Another standard measure that is used below is the exposure index, specifically the version that is referred to as the isolation index (P^*_{bb})—the %black in the area where the average black person lives.

Methodologists who developed contemporary measures of segregation were aware of this issue of scale (see the methodological appendix in Taeuber and Taeuber [1965]). They also pointed out a related question: What is the spatial configuration of segregation? Duncan and Duncan (1955, pp. 216–17) point out that "it is easy to gerrymander tract boundaries to increase or decrease the apparent degree of segregation. However, the problem cannot be solved merely by reducing the size of areal units, e.g., to blocks. . . . For example, if all nonwhites resided on alleyways and all whites in street-front structures, then even a block index would fail to reveal the high degree of segregation" (see also Cowgill and Cowgill 1951).

Massey and Denton (1988) tapped into the spatial pattern by identifying centralization, concentration, and clustering as independent dimensions of segregation (still relying on census tracts as the unit of analysis). This study takes a related approach that takes advantage of finer geographic resolution, identifying several specific configurations that result from different origins and development processes. These configurations offer clues about the social relations that each variant of segregation represents.

The four configurations are illustrated here in different cities. A map of the entire city of Nashville is used to depict black neighborhoods. The other illustrations are at two spatial scales. The finest scale is an area of one to three city blocks, where the location of black, white, and mixed households is plotted, building by building, on historical fire insurance maps. At a larger scale, the area surrounding these blocks is mapped with geocoded data on the residents at each address (excluding black live-in servants), showing the location of predominantly white or predominantly black buildings. The areas selected for these visualizations represent common situations in each city.

The Neighborhood

The most commonly expected spatial form is the *neighborhood*: a "contiguous territory defined by a bundle of social attributes" (Spielman and Logan 2013, p. 67). The usual assumption is that a neighborhood can be mapped as a polygon that covers a specific zone of a city, and segregation can be measured by evaluating the extent to which blacks and whites are separated into different zones. When scholars have described older southern cities as "less segregated," they likely had in mind that in these cities there are less pronounced districts of minority concentration—or black neighborhoods.

Researchers have identified segregation at the neighborhood level in postbellum southern cities, although often in juxtaposition with other patterns. Spain (1979, p. 86) reports that even before the Civil War, free blacks had begun to create "small black sections . . . concentrated at the edge of town." According to one of the earliest studies (Woofter 1928, p. 38), in

"most of the large Southern cities . . . Negroes are highly concentrated in several rather large parts of the city and lightly scattered in others." Frazier (1957, p. 243) notes that in border cities such as Louisville, St. Louis, Baltimore, and Washington there were "large concentrations of Negroes in a few areas." Ingham (2003, p. 642) reports that after the Civil War "Washington, Richmond, Savannah, and Memphis all drew black migrants, who developed vital neighborhoods. In addition, 'rebuilt' cities like Atlanta and Nashville, which did not have significant black populations before the war, developed large, segregated neighborhoods afterwards." Rabinowitz (1978, pp. 106–12) maps the streets block by block in four cities, finding that the great majority of them were either all white or all black. "Nashville had its Rocktown, Black Center, and Black Bottom," he says, "Montgomery, its Baguehomma and Peacocks Tract; Richmond, its Jackson Ward and Byrd Island; and Raleigh, its Hungry Neck and Hell's Half Acre." In Washington, Groves and Muller (1975, p. 181) found by 1880 "at least one and possibly two black residential concentrations" including a 20-block area southwest of the Capitol.

Several accounts explain the existence and location of these neighborhoods in terms of undesirability to whites. Johnson (1942, pp. 8–9) states that "in southern towns that existed before the Civil War but never experienced significant growth, all the Negro neighborhoods . . . are located on the edge of town." Blassingame (1973, p. 469) points out that blacks were nearly half of Savannah's population in 1870, many living in "ill-ventilated huts on the outskirts of the city." Kellogg (1977, p. 313) also describes black shantytowns in peripheral areas of Atlanta, Lexington, and Richmond, especially in "damp, poorly drained lowlands" and in "low-amenity residential areas near railroad tracks, . . . on land near city dumps, land adjacent to cemeteries, land with very steep slope, or in any area near the city's edge that had low appeal as a residential site." Similarly in New Orleans after the Civil War, "destitute and the target of racial prejudice, the freedmen settled mostly in the least desirable, highest-risk areas in the back-of-town" (Campanella 2007, p. 708). Rabinowitz concludes that there was such a strong association of black residence with bottomlands that "the easiest way to locate Negro settlements in a Southern city at the end of the nineteenth century was to find the lowest spots" (1978, p. 115).

We use the example of Nashville to illustrate the neighborhood configuration. Figure 1 maps the location of predominantly white and predominantly black buildings in Nashville. In the area to the east of the Cumberland River is a district called Edgefield, originally a settlement camp for freed blacks after the Civil War. There were some clusters of black residents in this area in 1880. The denser black settlements were on the other side of the river, and their names identified them as black neighborhoods. Black Center lies mainly west of the Capitol Building (which is visible on the

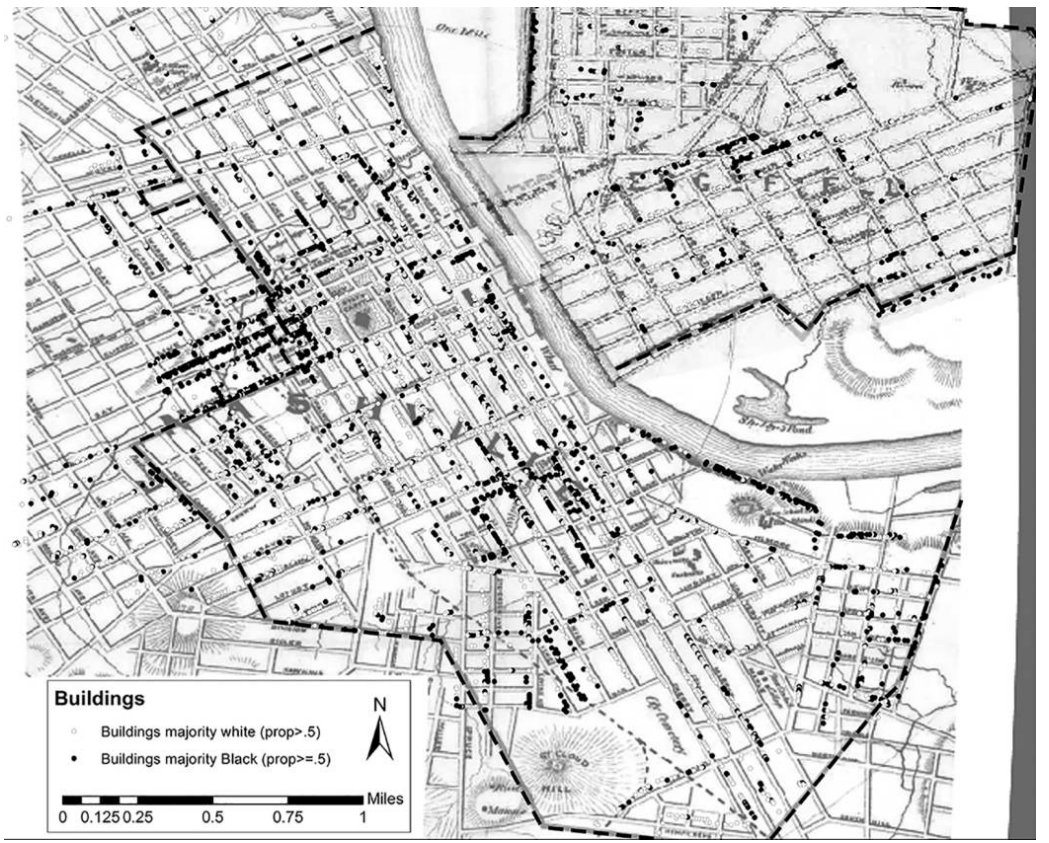

FIG. 1.—Nashville in 1880, showing the location of predominantly black neighborhoods

map) and north of Cedar Street (now Charlotte Avenue). Another concentration is found in South Nashville close to the river. This neighborhood was called Black Bottom, and it was known for periodic flooding. A smaller cluster (Trimble Bottom) is farther south along the river. In between them are other areas where black and white buildings are more intermixed and also some entirely white street segments.

If neighborhoods are large and racially homogeneous enough, their presence can be captured with data from standard census administrative units, such as blocks and tracts. Other spatial patterns are visible only with higher geographic resolution. These include the backyard, the alley, and the street. All of these may be found in other parts of the country, but they are most often associated with southern cities.

The Backyard

The *backyard* configuration is explicitly related to antebellum practices when a majority of black residents were slaves. Many scholars attribute lower segregation in southern cities to the carryover of the backyard, especially in older and slower-growing southern cities (Demerath and Gilmore 1954, p. 157; Frazier 1957, p. 237; Taeuber and Taeuber 1965, p. 190; Schnore and Evenson 1966). Wade (1964, p. 55) explains that this spatial pattern was a solution to the problem of maintaining social control, locating blacks "in such a way that social distance between the races was maintained even under conditions of close physical proximity." As he describes it, "The most common design placed the main residence on the street or nearly so; behind stood the yard and the slave quarters. [In] the Negro buildings . . . only the second floor had sleeping rooms; the first generally contained the kitchen and store rooms, and in some instances a stable" (p. 57). The layout effectively cut off slaves from the wider society because "the plot itself was enclosed by high brick walls. The rooms had no windows to the outside and were accessible only by a narrow balcony that overlooked the yard and the master's residence. The sole route to the street lay through the house or a door at the side" (p. 59). Hence the backyard pattern is aptly described by Radford (1976, p. 331) as "the architectural expression of the captive status of its inhabitants." Wade (1964, p. 61) points out that in southern cities with large shares of slaves in the black population, backyard housing was much preferred by slave owners and authorities in comparison to alleys and side streets where blacks could not be so directly supervised.

This built environment persisted in the postbellum years when slaves became free laborers and the growth of the black population created high demand for cheap housing. Charleston is frequently cited for the survival of this configuration (see Woofter 1928, pp. 37–38). Doyle (1990, p. 302) cites "what an observer referred to in 1880 as 'the proximity and confusion, so

to speak, of white and negro houses.' Often this proximity resulted when live-in servants or renters occupied former slave quarters in the backyards of townhouses owned by whites." Some scholars interpreted the backyard pattern in the postbellum era as nonsegregated. It is a major source of what scholars describe as a "widely scattered Negro population" (Frazier 1957, p. 237) or "marble caking" (Demerath and Gilmore 1954, p. 157). Blassingame (1973, p. 481) posited that in the case of Savannah the backyard pattern was progressive, generalizing to an acceptance of mixed-race accommodation in lodging houses and working-class streets throughout the city.

Yet as we will see in the case of Charleston, backyard housing was black housing in 1880. It was a mélange of shanties and more durable brick structures that were used in various ways over time as kitchens, storehouses, stables, rented rooms, and high-density tenements, unrelated in race or class composition or quality to the larger homes fronting on the street. Although Taeuber and Taeuber (1965, p. 190) could refer to the lower levels of segregation in older cities characterized by this spatial structure as a "pattern of residential intimacy," the backyard nevertheless represented a strong social boundary. Rabinowitz (1978, p. 113) puts it this way: "Obviously these blacks and whites did not live next to one another as *neighbors*" (emphasis added).

The lower portion of Charleston (the older part of the city south of Calhoun Street), depicted in figures 2 and 3, illustrates the backyard pattern. This area was quickly rebuilt and repopulated after the war. Data on residents are from *Scholes' Directory of the City of Charleston* (1882), which lists only adults and mainly includes men. It is quite comprehensive, including 9,812 whites and 4,936 Negroes or mulattos (all treated here as black). The city directory has the advantage over the population census in that it distinguishes between people living in street front housing and in rear buildings at each address.

Figure 2 displays a single block of King Street running south from Tradd Street. The layout of buildings and identification of street addresses are based on 1884 and 1888 maps from the Sanborn Fire Insurance Map Company.[4] Each circle identifies the residence of a person who is identified as black or white. Backyard housing is denoted by shading on that portion of the lot. Overall the racial composition of this area was very mixed, but street front residents on Tradd Street were mostly white, while six of 10 backyard residents were black. On Smith's Lane (at the bottom of the map) the residents were almost evenly mixed. Along King Street, however, most street

[4] Maps from the Sanborn Fire Insurance Company can be found at http://mdhistory.net/msaref07/bc_ba_atlases_1876_1915/1880_BC_Sanborn02/Thumbnails.html (for Baltimore), http://www.sc.edu/library/digital/collections/sanborn.html (for Charleston), and http://www.historicmapworks.com/Map/US/1597150/Plate+021/Washington+D.C.+1888+Sanborn/District+of+Columbia/ (for Washington).

FIG. 2.—Portion of King Street, Charleston, showing the backyard pattern of segregation. The information on residents at each address is from the Scholes (1882) city directory and the underlying map showing the building layout is from Sanborn.

FIG. 3.—Map of a larger area of Charleston (based on Scholes [1882])

front residents were white (77) with a minority of blacks (27). And in King Street's backyard housing there were only five whites and 36 blacks.

Figure 3 is a map based on geocoded data from the same city directory for a larger area centered on the intersection of Tradd Street and King Street. The area covered in figure 2 is shaded. This map represents two main characteristics of the Charleston case. First, while many of the black residents are in backyard housing (identified with a black star), few whites are (identified with a star with no fill). Of all persons listed in the city directory, 1,148 lived in backyard housing and 84% of them were black. Of 12,093 in street front housing, only 28% were black. Expressed differently, 22% of blacks but only 2% of whites were reported living in the "rear." Second, however, there are an appreciable number of blacks in street front housing, but highly clustered in any neighborhood. There are, to be sure, some streets (e.g., the alley just north of the intersection of King Street and Cumberland Street) with more blacks than whites on the street front. And some streets (e.g., all the blocks of Logan Street and most of Broad Street and Queen Street) are all white on the street front. On many street segments, however, the street front housing includes a mix of blacks and whites. In this respect Charleston's reputation for "marble caking" was warranted.

The Alley

The *alley* is a pattern in which housing on a narrow lane running through a block is physically separated from the street front building behind it. Washington, D.C., is the case that has been most fully examined (most recently, by Grigoryeva and Ruef [2015] and Logan [2017]). In this city a single alley was often intersected by other lanes in the interior of the block and sometimes also had narrow pedestrian passageways leading out. The alley is similar to the backyard in that it separates people living in more substantial houses on street fronts from those located in the interior of the block. But alley housing is typically separated by a wall from the street front buildings. It is like a very small neighborhood, forming a cluster of residences in the interior of a single block. Like backyard housing, alley housing sometimes comprised self-constructed shanties or kitchens, sheds, or stables repurposed as rental housing. Increasingly over time it took the form of low-quality row housing.

Alleys were often created after the Civil War to take advantage of the large influx of black migrants during the 1860s (Johnson 1932; Groves and Muller 1975). Most black heads of households living in Washington's alleys were migrants from Virginia or Maryland (Groves 1974, p. 275). The original plan for the District of Columbia was based on houses with large lots, sometimes with a service alley for trash and utilities. Jones (1929, pp. 30–33) describes how developers bought up whole blocks, replaced front yards with row houses along the main street front, and converted rear lots into alley housing. Hayward (1981, p. 50) describes similar developments in Baltimore.

In our geocoded data, alley residents can be distinguished from nonalley residents by the name of their street. In the cities studied here, we confirmed that almost invariably streets named as Alley, Lane, Row, Court, or Place were short streets running within or through a larger block. By that criterion, of the 10 cities studied here, the highest share of alley housing was in Baltimore (7.1%), Charleston (6.2%), and Washington (4.7%). Some cities (Memphis, Mobile, Nashville, and New Orleans) were under 1%. What they all had in common was that alleys were disproportionately black. The extreme cases were Washington and Nashville, where the odds of a black person living in alley housing were 15 or more times the odds for a white person. New Orleans had the lowest odds ratio (2.7); the total alley population there was about equally mixed between whites and blacks.

The importance of alleys is well documented in the historical literature. Myrdal's *An American Dilemma* (1944, p. 621) notices that "in some Southern cities, especially in the older ones, Negroes usually live in side streets or along alleys back of the residences of whites" (see also Radford 1976, p. 343). Frazier (1957, p. 246) reports that in the 1870s about half of Washington's black population lived in alleys. The racial and class homogeneity of alley

populations was also well known to contemporaries, and this was a source of efforts to demolish them. A report titled "Elimination of Insanitary and Alley Houses" in Washington proclaimed that "everyone familiar with these and other such labyrinths realizes the security from police supervision which they afford, to say nothing of other disadvantages" (Baldwin 1909, p. 8). Alleys were understood to be unhealthy environments, "lined on both sides with miserable dilapidated shanties, patched and filthy" (Borchert [1971–72, p. 276], citing Board of Health reports in Washington in the 1970s), most built directly on the ground without a foundation or flooring, with open privies behind them, and water supplied from a community hydrant in a corner of the alley (Jones 1929).

We have selected an area of Northwest Washington to display the alley pattern that is distinctive in this city. Figure 4 displays the block known as Blagden Alley (see descriptions of this block in Jones [1929] and Groves [1974]). The layout is based on an 1888 map from the Sanborn Fire Insurance Map Company, and data are from the 1880 census. This block includes one alley running north-south between M and N Streets, a wider lane perpendicular to it in the center of the block, and additional narrow lanes running north-south at either end of that lane. This forms the H-pattern mentioned in historical accounts of Washington alleys. In addition there are two narrower pedestrian passageways leading out to Ninth and Tenth Streets.

In this figure each circle represents a household that may be all white, all black, or mixed (only one household, found in the southeast corner, is mixed). All residents of Blagden Alley were black, while the majority of residents of the surrounding streets were white. The figure also distinguishes the size of buildings (both the footprint and the number of stories). It is clear that street front buildings were larger, and many of them (all white-occupied) had three stories. Alley houses were smaller and mostly two-story.

Figure 5 presents a map of a larger area that shows how common and how racially homogeneous alleys were at this time. It is based on an 1880 street map with less detail than the fire insurance map, but it includes 14 shaded zones where blocks formed by major streets contain an alley within it. It uses 1880 census data and shows the racial composition of buildings. The Blagden Alley pattern is repeated throughout this area. Rarely is there a white building in an alley, and many street segments on the perimeter of blocks are all white, although there are also examples of mixed-race street segments. Nearly two-thirds of blacks in this section of the city lived in alleys. Analysis of the city as a whole shows 7,676 persons living in alleys (including also streets identified as a court, lane, row, or place), 86% of whom were black. In contrast, only 30% of the 154,000 persons living outside of alleys were black.

Like the backyard, the alley pattern typically placed blacks and white in close proximity to one another. Nevertheless, it is also a highly structured

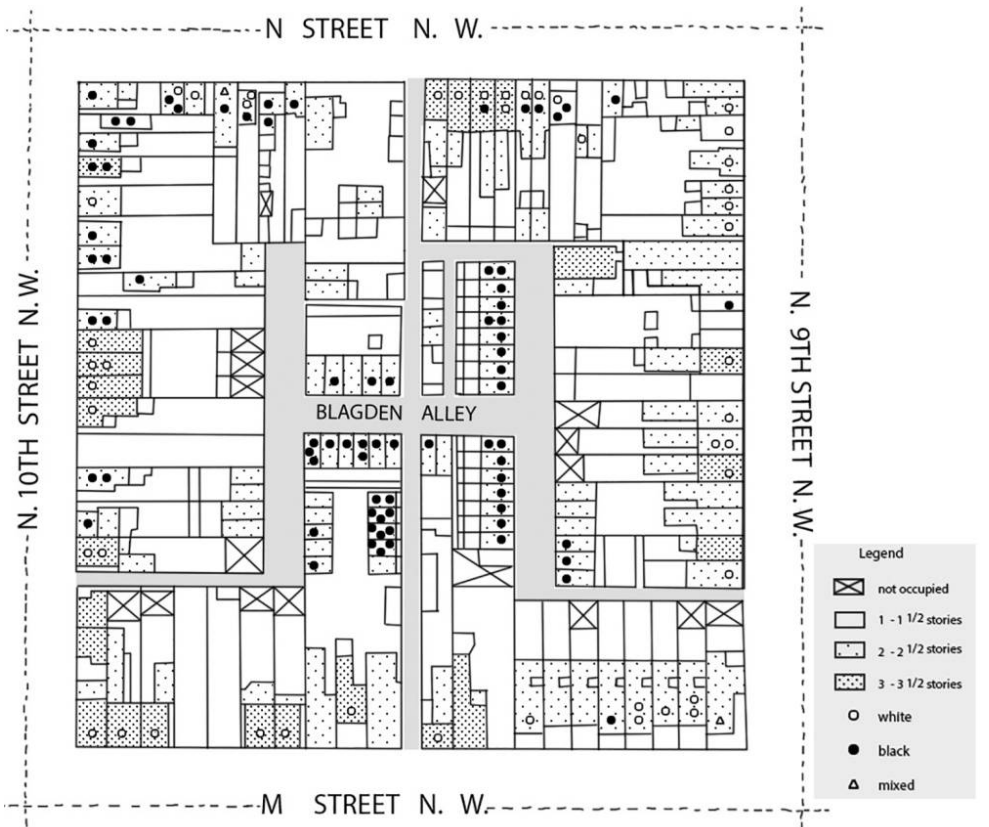

FIG. 4.—Blagden Alley in Northwest Washington, D.C. (overlaid on a Sanborn Fire Insurance Company map from 1888).

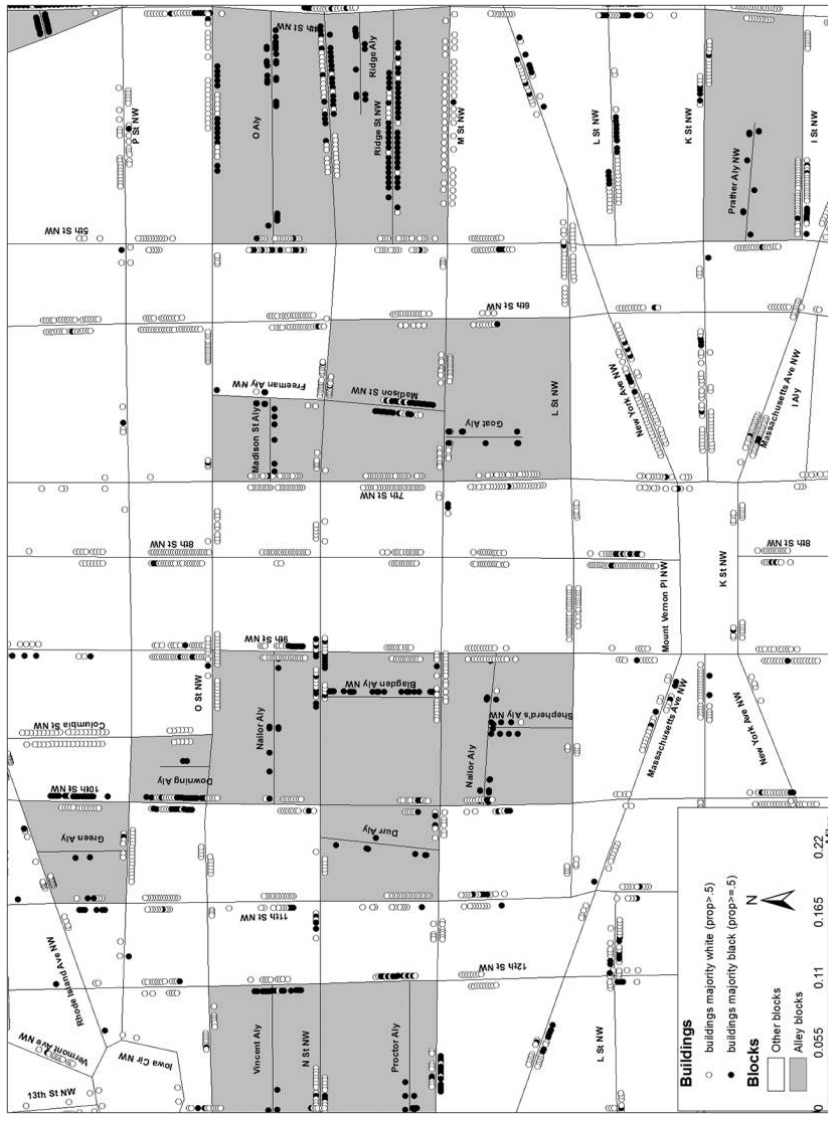

FIG. 5.—Map of a larger area of Northwest Washington, 1880

pattern in which each race had its assigned place, and in this sense one could describe it as highly segregated.

The Side Street

Another spatial configuration is the *side street*. Accounts of residential patterns in southern cities often mention blacks living on side streets, sometimes linking this spatial configuration with backyards and alleys as a form of racial intermixing (as in Massey and Denton's reference to "black servants and laborers who lived on alleys and side streets" [1993, p. 26]). Like backyards or alleys, a predominantly black side street isolates blacks at the microscale of nearest neighbors but places many blacks and whites within a block (or less) of one another. This pattern has been most fully discussed in the case of Baltimore. Here the layout of the side street has two main features: (1) it often runs parallel for many blocks to another street that is predominantly white, and (2) the side street was originally designed as a secondary street and is much narrower than the main street. Vill (1986, p. 171) describes these as "north-south running narrow streets that alternate with wide streets." Groves and Muller (1975, p. 182) refer to a section of Baltimore at the end of the 19th century where a majority of blacks "resided in numerous segregated alleys, courts and narrow secondary streets. . . . [These] differed from the main streets by being narrower and often only a few blocks long."

Side streets in Baltimore were often originally called alleys to distinguish them from the wider parallel streets. Hayward and Belfour (2001, p. 21) describe how "many small rowhouses were built on the narrow streets, or alleys, that ran down the center of city blocks. These had such colorful names as Happy Alley, Apple Alley, Strawberry Alley, Bottle Alley, Cyder Alley, and Whiskey Alley." The type of housing built on these streets was consistent with their class composition. Hayward (1981) describes in detail the middle-class housing on major streets, typically three to three-and-a-half stories high, three bays wide, with rooms about 16 feet by 13 feet. In contrast, rental housing built for immigrants and blacks moving into the city generally had only two stories. In the "half house" only the front of the house was completed, yielding a single 10-foot by 10-foot room on each floor.

Olson (1997, p. 127) refers to such streets in various parts of the city as "emerging black neighborhoods," centered in East Baltimore on "narrow north-south streets such as Dallas, Wolfe, Spring, and Chestnut; in Western Baltimore on Tessier and Orchard streets; and in South Baltimore on Sharp and Montgomery streets." They were likely perceived by residents as neighborhoods in the sense of providing community and supporting local institutions, because they did not separate and isolate black residents from one another as fully as backyard or alley housing. For example, they were the

location of many black churches. But their spatial configuration was unique. One might refer to them as "linear neighborhoods" because their black population mostly did not extend to the neighboring parallel street or, in most cases, to the streets that they intersected.

Spain (1979, p. 86) describes another version of this pattern at a larger scale in New Orleans that she calls a "superblock": "The richest whites were located along the major boulevards, which were in turn separated by ten or fifteen smaller streets. Blacks who lived behind the big house lived several blocks behind the main boulevard on one of the interior streets [creating] 'superblocks' about one-half mile square, with white perimeters and black cores."

A similar configuration has been identified in Philadelphia's historically black Center City area in 1880 (Logan and Bellman 2016). Here there are some predominantly black alleys as in Washington, but more prominent are short streets, running for as many as five blocks. In this part of the city a majority of blacks lived on short streets, whose residents averaged 39% black compared to 14% black on longer streets.

Figures 6 and 7 illustrate the Baltimore case. Figure 6 shows two blocks of South Bethel Street (its name in 1880, originally called Apple Alley). North of Gough Street most households were black (19 of 24). South of Gough on the west side of the street is a group of buildings with 14 black households and then some mixing, followed by another group of 11 black households. On the east side of Bethel is a similar alternation: 18 black households, then a white and a black household, six white households, and then a mix of three black and one white. On Herrings Court the lower section is all black. In contrast, there is no black household on South Broadway or South Bond Street in these blocks, nor any black households on the cross streets (Gough and East Pratt).

Figure 7 displays a larger area of East Baltimore showing the predominantly black sections of two other north-south side streets, Dallas Street (originally Strawberry Alley) and Durham Street (originally Happy Alley). Bethel was mixed in the two blocks south of Eastern Avenue and then majority black for seven or more blocks and beyond Fayette Street (these street segments were 56% black). Dallas was majority black in most of the 11 blocks north of Eastern (58% black in these street segments). Durham's black zone began a block south of Eastern, ran for four blocks, became mixed or predominantly white for several blocks, and then became majority black above Fayette Street. Along the majority black street segments of Durham the population was 52% black.

The map also shows many mixed or predominantly black street segments that did not extend for such a long distance. In the northwest of the map, centered on East Street, is a large cluster of black buildings that could best be described as a black neighborhood. There are six or more interconnected

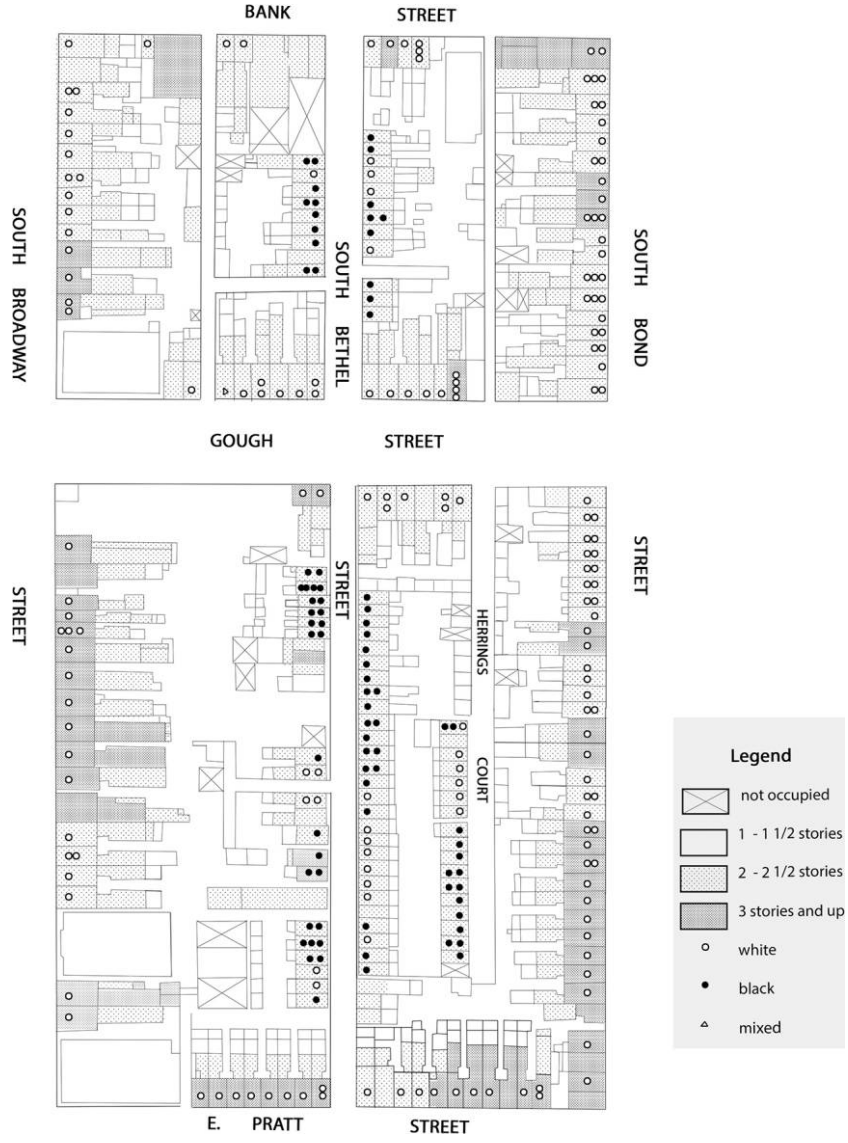

FIG. 6.—South Bethel Street (Apple Alley) in Baltimore, 1880 (overlaid on a Sanborn Fire Insurance Company map from 1884).

FIG. 7.—Map of a larger area of Baltimore north of the harbor, 1880

black street segments in a compact zone. Census data show that this neighborhood included 2,131 residents, of whom 79.6% were black.

There are very few street segments where blacks and whites lived in roughly equal proportions. Most Baltimore street segments were entirely or almost entirely white. These include long stretches of the major streets that run parallel to the side streets, such as Broadway and Bond, as well as several east-west streets. Aside from the side streets and black neighborhood described above, the area shown in figure 7 (with nearly 55,000 residents) was 93% white.

MEASURES OF SEGREGATION

This extended exposition of racial residential patterns provides a basis for evaluating segregation indices that are intended to measure them. A major point of this study is that familiarity with the phenomenon that one is trying to measure is vital to effective research. Residential patterns of the sort described above mostly cannot be discovered through approaches that presume that segregation presents itself on the scale of census tracts or higher and that disregard its spatial configuration. Most studies of cities in the 19th and early 20th centuries were based on the published data from the Census Bureau, which were aggregated to large city wards. Inevitably those studies were misleading about the level of segregation, a lacuna that was evident to researchers who looked beyond census sources. They showed that southern cities had levels of segregation that, while increasing steadily, were quite low at the end of the 19th century and remained well below large midwestern and northeastern cities in the period 1890–1940, despite their much larger black populations (Cutler et al. 1999). Table 1 demonstrates this

TABLE 1
Segregation (Index of Dissimilarity) by Wards, 1890–1940

	1890	1900	1910	1920	1930	1940
Atlanta	.18	.24	.34	.41	.44	.34
Baltimore	.29	.37	.40	.44	.54	.55
Charleston	.15	.18	.17	.17	.20	.27
Louisville	.30	.29	.34	.41	.38	.38
Memphis	.19	.20	.28	.34	.46	.49
Mobile	.29	NA	.45	.51	.59	.63
Nashville	.29	.34	.38	.42	.54	.58
New Orleans	.17	.18	.15	.18	.22	.25
Richmond	.34	.42	.30	.20	.19	.30
Washington, D.C.	NA	NA	.21	.27	.41	.42
9 northern cities	.45	.45	.52	.59	.67	.69

Note.—The segregation indices for each city are from Cutler et al. (1999), and the average for the nine northern cities is from Logan et al. (2015).

point. It reports the index of dissimilarity (*D*) using the published ward data for the 10 cities studied here and for a weighted average of nine of the largest northeastern and midwestern cities that were studied by Logan et al. (2015). In 1890 several of the southern cities had values of *D* below .20, while the average northern city was about .45. By 1920 the average northern city had nearly reached what scholars consider the "very high" level of .60, while the highest value in a southern city was .453 in Mobile. Charleston remained below .20 as late as 1930.

How can spatially sensitive measures of segregation that are now being discussed in the urban literature more faithfully reflect residential patterns? We have applied several measures to all 10 cities, and we illustrate their common features here for the case of Washington, D.C., for which full-count census microdata from 1880 have previously been analyzed by Grigoryeva and Ruef (2015). The measures discussed here have not been widely applied. Looking closely at them in cities that we have already examined in detail will provide more guidance about how they function in practice.

We begin by signaling a limitation of any research that relies on census reports. The backyard pattern that we found in Charleston and that likely existed to some extent in other cities cannot be examined with census data, because enumerators did not systematically distinguish between residents of street front and rear buildings. In some census years, in some enumeration districts, and in some cities the house numbers (e.g., 610½ or 610B Main Street) reflect this distinction, but not reliably. Hence while some current scholars (such as Grigoryeva and Ruef [2015]) are aware of the "backyard pattern" and "street front housing," they are able to examine these configurations with census data only in a generic sense. Neither they nor we can identify housing in the back of a land parcel that has a building on the street front from the census. Alternative sources such as the Charleston city directories (as illustrated above) make possible a more explicit treatment. For example, in an analysis at the scale of street segments, if the analyst wished to highlight street front versus rear segregation, residents of a "segment-rear" or a "segment-front" building could be considered to live in different segments.[5] By doing so, of course, the analyst would be allowing the short physical distance between residents to be trumped by the qualitative distinction (in Myrdal's term, the ceremonial distance) between front and rear. In our

[5] Although a minority of residents of Charleston lived in backyard housing, measures of segregation differ substantially if they are treated separately. In the following analyses (tables 2 and 3) census data show Charleston with the lowest value of *D* at every scale from the building to the enumeration district (ED). Based on the city directory data (a very different sample from the census data used in tables 2 and 3) and not distinguishing between backyard and street front housing, the index of dissimilarity at the scale of street segments was only .404. If persons in rear buildings are treated as living in a different street segment, this value rises to .524, which would place Charleston in the middle of the distri-

terms, the spatial configuration would be given precedence over the spatial scale. This is a theoretical and substantive decision about what should be measured.

Otherwise the principal limitation of census data is the geographic scale at which they are available. We will examine the performance of three kinds of measures that take proximity into account, reflecting the racial composition of neighbors at varying spatial scales. We begin with applications of distance-based measures, which evaluate population composition within a given radius of a location. We then discuss two other approaches, one based on sequences of neighbors and the other on the racial clustering of neighbors at varying qualitatively meaningful spatial scales.[6]

Distance-Based Measures

Reardon and O'Sullivan (2004) describe a set of distance-based variants of standard nonspatial measures of segregation, building on White's (1983) proposal for an index of spatial proximity. We focus here on the spatial versions of D_{bw} (the index of dissimilarity) and P^*_{bb} (the measure of black isolation). In this approach data for nearby small areas are taken into account in assessing the racial composition of a focal area. The meaning of "nearby" is established by the length of the distance band selected by the researcher. This presents a difficulty in using these measures: researchers are unfamiliar with thinking of segregation at varying distances, and the difference between segregation at one distance band (say, 200 meters) and another (say, 2,000 meters) is not intuitively obvious. Reardon et al. (2008) suggest construction of a "segregation profile" rather than a single measure, graphing the value of the spatial measure at various distances. Segregation that is not evident at one distance may be better reflected at another. The segregation profile in lieu of a single all-purpose measure is a useful suggestion.

bution. Similarly based on the city directory (which omits children and most women), the isolation index at the segment scale was .482; but if backyard residents are treated as living on a separate street segment, the value rises to .580.

[6] The distance-based measures of P^*_{bb} and D_{bw} were calculated in two ways. One method used block data that we constructed from geocoded addresses. Measures were calculated with the SpatialSeg program referenced in Reardon et al. (2008). Unfortunately, this program is no longer being publicly disseminated, and it has not been updated for current versions of ArcGIS. Angelina Grigoryeva performed these calculations with block data that we supplied, using SpatialSeg with an obsolete version of ArcGIS. The other method used the geocoded point data directly, so that segregation at finer scales could be detected. This method used R code described in Hong, O'Sullivan, and Sadahiro (2014). SpatialSeg includes a kernel density function, but it is not documented, so we cannot reproduce it in R. Therefore, our results for distance-based segregation using point data do not include a kernel density function. The sequence index of segregation (SIS) was calculated using code provided by Grigoryeva and Ruef (http://www.soc.duke.edu/~mr231/projects).

Unless one knows in advance the spatial scale of segregation, it can be misleading to apply a single distance band on disparate urban areas. However, in their own research, they emphasize segregation at distances of 500 meters (which they describe as similar to a pedestrian neighborhood) up to four kilometers ("the maximum distance that people might still consider in any sense a neighborhood or community" [Reardon et al. 2008, pp. 502–3]).

A possible concern even with a segregation profile is that the effect of distance may be monotonic (persons further away are really less socially relevant neighbors) but not linear (the person 10 meters away may be more than 10 times as socially relevant as the person 100 meters away). Methods derived from Reardon and O'Sullivan (2004) deal with this problem by applying a fixed "kernel density function" in which relevance decays quickly with distance. Therefore, within a given distance band, closer areas are weighted more heavily than more distant ones. Unfortunately, the effect of including a kernel density function has not been demonstrated empirically, and little attention has been given to the selection of the particular function to be used. We find below in the case of Washington that it has little effect.

A larger concern is the level of aggregation of the input data. Up to now applications of distance-based measures have relied on administrative data of the sort used in nonspatial studies (most often census tracts, less commonly block groups or even blocks). Although today the block is perceived to be a very fine geographic scale, it may not be suitable for patterns that we described above. In the same way in which census data cannot distinguish between street front and backyard residents, block data do not distinguish alleys and side streets from main streets. Often a census block is defined by the main streets, ignoring alleys, especially when these do not cut through all the way between two streets. In these cases all residents of the alley and the main streets that define the block are treated as living together. Consider the example of Blagden Alley (fig. 4). If the block were defined by M and N between Ninth and Tenth, block data would show a racially integrated block. Alternatively consider the Baltimore example of South Bethel Street (fig. 6). If a block were defined by Bethel (the side street), Gough, Broadway, and Pratt, the mostly black residents of the west side of Bethel would be included with the all-white residents of the north side of Pratt, east side of Broadway, and south side of Gough, similarly showing a racially mixed block. No further manipulation could reveal the highly structured racial pattern within it.

To illustrate this concern, we present two versions of the distance-based D and P^* for Washington. In the first, we begin with block-level data, replicating the procedures in Reardon et al. (2008). Their procedure requires selection of a cell size (the size of grid cells used to approximate the location of points within blocks). They used a 100-meter cell size. We experimented with cell sizes of 5, 10, and 100 meters and found that the choice makes little

difference. Here we report results for the 100-meter cell size. In the second version, we exploit our geocoded point data, but we weight all persons within the given distance band equally (i.e., with no kernel density gradient). This procedure creates what geographers call "egocentric neighborhoods," overlapping areas of a given radius around a person within which all residents are treated as "neighbors" (see, e.g., Chaix et al. 2005). Results are reported in figure 8.

The values for D and P^* happen to be similar in this case (though in other cases they might be quite different because P^* depends on the minority proportion in the city). They also vary closely with one another by distance. A striking result is that the measures based on block data are nearly constant within the range of 5–100 meters. The point-based measures, however, are very high at 5 or 10 meters (showing, e.g., that the average black person lived in an environment that was close to 85% black at a distance of 10 meters). Then they decline rapidly (e.g., the black share of neighbors is 72% at 25 meters and 65% at 50 meters, then falling gradually to 40% at 500 meters). We also note that beyond 100 meters the point-based measures are a little lower. The reason may be that the kernel density function used with the block data continues to give more weight to the greater racial homogeneity at shorter distances within the distance band.

Qualitative Identification of "Neighbors"

These results confirm what we knew must be true, that block data cannot reflect segregation at small scales (in this case, under 100 meters). However,

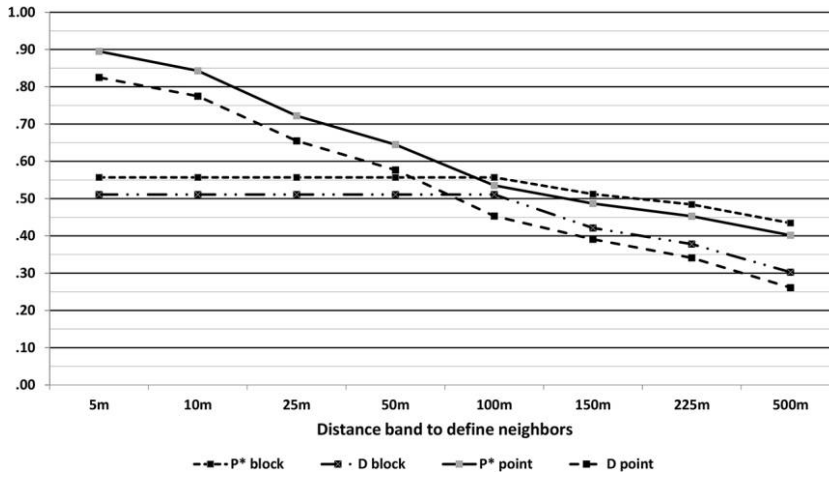

FIG. 8.—Distance-based segregation using block or point data, Washington, 1880. Color version available as an online enhancement.

they provide estimates at longer distances that roughly match calculations from point data. The results also illustrate the value of the segregation profile, emphasizing that the observed level of segregation is closely tied to the scale at which it is assessed. We now turn to a different approach altogether, dealing not with linear distances but rather with a qualitative definition of proximity. It is based on a simple idea: someone who is very close and on the same street segment—therefore likely in one's line of sight—may be perceived as "closer" than someone at the same distance but around the corner or across an intersection. We do not know a priori how spatial cognition affects perceptions of close or distant neighbors, so we will experiment with different scales.

One approach is to focus on a specific spatial relationship that is assumed to be especially important: the closest neighbor. Whether the nearest neighbor is 10 meters or 30 meters away, being the closest neighbor may have special meaning. This is the concept behind the sequence index of segregation (SIS), applied by Grigoryeva and Ruef (2015) in their study of segregation in 1880. The SIS is designed to draw on full-count census microdata. It infers people's relative location from their order of enumeration, in this way capturing adjacency along a street network without requiring any information about actual locations or distances. It calculates the length of sequences, which are "runs" of racially alike households along streets.[7] Its advantages are that it is sensitive to segregation at a fine geographic scale, it is based on a position along the street network rather than straight-line distances, and it is readily calculable from census microdata. The SIS also has limitations that derive from its being based solely on the order of enumeration. Persons living almost as close as "next door" but on the other side of the street (or alley) will almost never be treated as neighbors (i.e., in the same sequence of racially alike persons). Multiple households within a single building (or, when the analysis is based on all adult residents, even different adults within the same household) may not be found in the same sequence, because only the "next enumerated household" (or household member) is considered a neighbor. (This problem is minimal in cities such as Washington in 1880 because, as shown below, households and buildings were very racially homogeneous in this case.) Unlike spatial measures of segregation, it produces a single value rather than a profile at varying distances. It does not reveal to what extent sequences of racially alike neighbors are mainly found within the same build-

[7] For example, a sequence of white (W) and black (B) neighbors of BBB WWW, which includes two runs of like households, would contribute to a higher value of the SIS than a sequence of BWBWBW, which includes six distinct runs. The SIS is calculated as a ratio of the actual number of such runs to the expected number under a random distribution (which depends on the relative numbers of whites and blacks). Hence like D, it controls for group size; unlike P^*, it will not depend heavily on the black share of the population.

ing or in adjacent buildings, or whether sequences tend to be broken at intersections.

Grigoryeva and Ruef compared the SIS from 1880 census data to the most-often-used nonspatial measure of segregation, the index of dissimilarity (*D*), calculated at the scale of the enumeration district (a scale chosen because the ED is transcribed in the microdata, and *D* can readily be calculated for EDs). They reported that southern cities were less segregated than northern cities in 1880 on the basis of *D* but more segregated on the basis of the SIS. For example, the SIS for Washington is .687, taking into consideration only the race of the household heads. This is a very high value in comparison with the other 170 cities that they studied. Only Baltimore, Camden (N.J.), New York, and Wilmington (Del.) were higher. At the ED scale, *D* is only .358 for Washington, which is much lower in the distribution across cities. Their inference is that *D* at the ED scale did not fully measure residential segregation in southern cities, where cities "developed a different, more fine-grained pattern of segregation, which took place at a smaller spatial scale than in the Northeast" (Grigoryeva and Ruef 2015, p. 832). We agree that the SIS is likely to reflect patterns at a finer geographic scale than the ED, because it tends to be high when people's nearest neighbors are disproportionately of their same race, regardless of the racial composition of their block or ED. However, because it is calculated from sequence lengths, it is not possible to provide a simple interpretation of what .687 actually means. It cannot be expressed, for instance, as the share of nearest neighbors who are the same race.

Traditional Measures Calculated at Varying Scales

Grigoryeva and Ruef's online supplement provides additional information based on mapping the geocoded data for Washington building by building. Their maps of several EDs reveal more explicitly than the SIS the importance of racially homogeneous alleys. We carry this mode of analysis further by analyzing our own geocoded data, calculating *D* and *P** at various spatial scales that have intuitive meaning. Following Logan et al. (2015), our smallest scales are the household and building where people live. These are components of segregation at all larger scales, though they are not usually discussed in the segregation literature. The next larger areal unit is the building group, which includes a building plus the buildings on either side of it on the same block—people who might be considered to be living next door. The face block expands the scale to all of the buildings on the same side of the street between two intersections, and the street segment extends it farther to include all residents on both sides of the street. In addition, we construct two combinations of street segments, the segment group and extended segment group. The segment group includes a street segment and

all street segments with which it intersects (typically three segments at each end of the block). The extended segment group reaches out one layer more, including all street segments to which the segment group is connected.[8] We also calculate measures for EDs, which are similar in scale to extended segment groups but somewhat smaller than contemporary census tracts.

What scholars usually think of as segregation across "neighborhoods" (areas including a web of several interconnected street segments) should be reflected in the measures at larger scales (segment group, extended segment group, and ED). Measures at the scale of street segments will additionally pick up segregation in alleys and side streets. Measures at smaller scales will reveal whether there is additional microsegregation within segments.

Figure 9 reports values of D_{bw} and P^*_{bb} for Washington at these various spatial scales (the building group is not included for D_{bw} because we are unable to construct a good nonoverlapping proxy at this scale). At the household and building scales, segregation is extremely high with values of both measures at or above .95. Moving to a slightly larger scale, isolation in one's building group drops to below .85 and then to .732 for face blocks and .687 for street segments. At this point there appears to be another sharp break; at the scale of segment group, D is below .45 and P^* is .51. The continuing decline to larger scales (extended segment group and ED) is more gradual.

This graph mirrors results from the distance-based measures in figure 8 that were also calculated from point data. The correspondence is not perfect, but the overall pattern is consistent. Let us focus on values of P^*. At 5 meters in figure 8, black isolation is nearly as high as for the household and building in figure 9 (in fact, everyone in the same building would be assigned the same point location). At 10 meters isolation is in between the building and building group levels. At 25 meters it is similar to the face block and at 50 meters to the whole street segment. At 100 meters isolation is about the same as we found in segment groups. At 500 meters it reaches as low as at the extended segment group or ED level. Hence a distance of 500 meters was not a usual "pedestrian neighborhood" (the term that Reardon et al. [2008] apply), if we understand the term to imply that it is at this scale that segregation is maximized. In Washington, perhaps 50 meters was the scale at which one might speak of relatively homogeneous pedestrian neighborhoods. Because segregation is so low at 500 meters, this distance

[8] We initially defined segment groups and extended segment groups as egocentric neighborhood scales; unlike administrative areas such as blocks or EDs, they overlap with one another. However, calculating the index of dissimilarity at these scales required that we create comparably sized nonoverlapping areas to represent these scales. We did this by overlaying hexagon grids of two sizes (150-meter and 225-meter sides) on the city map. We assigned street segments to the hexagon whose central point was located closest to the segment.

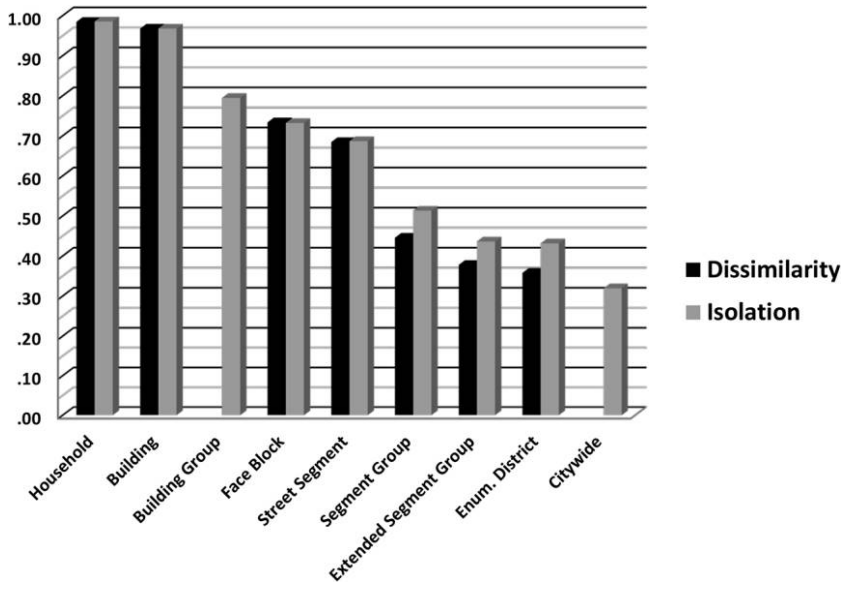

FIG. 9.—Segregation at varying spatial scales, Washington, 1880. Color version available as an online enhancement.

might be thought of as the maximum distance rather than the starting point for analysis. Of course these findings are specific to Washington at this time. Still they help us to understand what different linear distances mean in terms of the scales we commonly think about in daily life.

COMPARISONS ACROSS CITIES

The previous section used data for Washington to illustrate the behavior of alternative spatial measures of segregation. Distance-based measures in a "segregation profile" (if calculated from point data) and parallel non-distance-based measures at varying spatial scales reveal the same patterns of segregation. Both offer more explicit information about scale than the SIS, but this advantage comes at the cost of requiring much more detailed locational data. We now return to a comparison across all 10 southern cities. Tables 2 and 3 report D and P^* at the same qualitative spatial scales that we presented above for Washington and also show the value of SIS in each city.

As expected and as found in Washington, segregation declines monotonically as the geographic scale increases. Not surprisingly, household segregation is extremely high in all cities, and in every city the average black resident lived in a household that was nearly all black. One source of household racial heterogeneity is intermarriage, which was unusual in this period.

TABLE 2

INDEX OF DISSIMILARITY BETWEEN WHITES AND BLACKS AT VARIOUS SPATIAL SCALES, 1880

	Household	Building	Face Block	Street Segment	Segment Group	Extended Segment Group	Enumeration District	SIS	City % Black
Atlanta	.94	.87	.65	.61	.43	.38	.29	.56	41.6
Baltimore	.99	.97	.88	.85	.48	.42	.46	.79	14.5
Charleston	.97	.76	.49	.43	.27	.20	.19	.46	53.1
Louisville	.98	.94	.73	.67	.48	.46	.42	.65	15.5
Memphis	.96	.86	.58	.53	.36	.31	.24	.52	43.4
Mobile	.97	.86	.56	.51	.39	.34	.28	.46	42.0
Nashville	.95	.85	.57	.53	.40	.34	.23	.57	35.2
New Orleans	.98	.79	.58	.53	.38	.35	.32	.44	25.1
Richmond	.94	.80	.57	.54	.38	.34	.28	.48	40.3
Washington	.98	.97	.73	.68	.45	.38	.36	.69	31.9
Pearson r:									
Segment		.88	1.00	1.00	.86	.77	.91	.94	−.79
%black		−.66	−.80	−.79	−.83	−.85	−.91	−.69	1.00
SIS		.91	.94	.94	.78	.66	.78	1.00	−.69
Spearman ρ:									
Segment		.82	.95	1.00	.77	.78	.82	.81	−.70
%black		−.54	−.77	−.70	−.79	−.78	−.83	−.58	1.00
SIS		.87	.73	.81	.83	.59	.56	1.00	−.58

NOTE.—Black live-in domestic servants in white households and black children in these households are omitted.

TABLE 3
INDEX OF ISOLATION FOR BLACKS AT VARIOUS SPATIAL SCALES, 1880

	Household	Building	Building Group	Face Block	Street Segment	Segment Group	Extended Segment Group	Enumeration District	Citywide	SIS
Atlanta	.95	.90	.79	.73	.69	.58	.53	.47	.42	.56
Baltimore	.98	.95	.85	.76	.73	.47	.30	.29	.14	.79
Charleston	.98	.85	.76	.69	.66	.59	.57	.56	.53	.46
Louisville	.97	.89	.72	.58	.52	.37	.29	.26	.15	.65
Memphis	.97	.89	.76	.68	.64	.55	.50	.48	.43	.52
Mobile	.97	.90	.73	.67	.62	.55	.52	.49	.42	.46
Nashville	.95	.86	.71	.62	.58	.49	.45	.41	.35	.57
New Orleans	.97	.75	.61	.53	.49	.40	.37	.33	.25	.44
Richmond	.95	.85	.74	.67	.64	.56	.51	.48	.40	.48
Washington	.99	.97	.84	.73	.69	.51	.44	.43	.32	.69
Pearson r:										
Segment		.73	.91	1.00	1.00	.70	.34	.40	.28	.41
%black		−.14	−.01	.22	.28	.87	.99	.98	1.00	−.69
SIS		.75	.69	.47	.41	−.34	−.66	−.61	−.69	1.00
Spearman ρ:										
Segment		.70	.96	.98	1.00	.47	.29	.20	.13	.46
%black		−.15	.04	.12	.13	.84	.90	.92	1.00	−.58
SIS		.72	.54	.48	.46	−.39	−.54	−.59	−.58	1.00

NOTE.—Black live-in domestic servants in white households and black children in these households are omitted.

Other mixed households were boardinghouses run by whites but mainly serving black lodgers. At the other extreme, segregation was modest at the scale of EDs. It would be misleading to rely on ED-level census data, much less ward data as in table 1, in an assessment of segregation in these cities in 1880.

Tables 2 and 3 also report several correlations across cities. Because there are only 10 cities, we report both the Pearson r and Spearman ρ (rank-order correlation), and we do not attempt multivariate analysis. The correlations offer insight into the variation in residential patterns.

First we consider correlations between segregation at the street segment level and segregation at other levels (omitting the household, where values are uniformly extremely high). These are all positive. Although we saw that D declines rapidly with increasing scale, the covariation of D at the segment scale with D at higher scales is very high (even the ED scale, with $r = .91$ and $\rho = .82$). This finding is important to researchers: although D at the ED scale greatly understates segregation in this era (and probably in several subsequent decades), it can be used effectively as a dependent variable or as a predictor. This is not the case for P^*. Black isolation at the street segment scale is highly correlated with segregation at the finer scales of face block and building group, somewhat less correlated with the building or segment group scale, and only moderately correlated with isolation at the extended segment group, ED, or citywide scale. Consequently, studies that seek to explain segregation using P^* indices or to gauge its effects are likely to reach different results depending on the scale at which it is measured.

A routine finding in the contemporary segregation literature is that segregation is higher in cities with larger black populations. Such a correlation is built into exposure measures such as the P^*, but we notice that it is found here only at larger spatial scales (table 3). At scales of the street segment and below, the correlations of P^* with city black share are negligible. Abruptly at the level of the segment group the correlation jumps to .87 (Pearson) and .84 (Spearman). This means that even southern cities with more modest black populations—cities such as Baltimore and Louisville with less than 20% black residents—could nevertheless be as isolated in buildings and street segments as in southern cities with much larger black shares. This outcome is implicit in microlevel segregation: when the black population is too small to create homogeneous clusters in areas as large as EDs, they may nevertheless be concentrated in certain buildings and streets.

There is a more challenging anomaly in correlations of D with black share (table 2). All of these correlations are negative, and they are substantial at all scales. Southern cities with smaller black populations had higher D (i.e., were more unevenly distributed compared to whites) across buildings, street segments, and larger areas than other southern cities. We cannot interpret this finding. The usual result is often interpreted in terms of

Blalock's (1967) hypothesis that discrimination is motivated by whites' sense that they are threatened, economically or politically, by larger black populations. Certainly there may have been a sense of political threat, as blacks formed part of a new Republican political coalition in many cities during Reconstruction. But if there was, it apparently did not have much impact on residential patterns. We considered the possibility that it is the result of outliers (such as Baltimore or Louisville, with small black shares but high *D*, and Charleston, with the largest black share and lowest *D*). However, even without these cases, the correlations persist (though they are much reduced).

Finally, we use these data as indirect clues to the interpretation of SIS, whose values and associations with *D* and *P** are also reported in tables 2 and 3. Grigoryeva and Ruef (2015) reported very low correlations of SIS with *D* at the ED level. However, among these southern cities, SIS covaries closely with the values of *D*, higher at the scales of the building, face block, and street segment but also .78 at the ED scale. This suggests that if a southern city was highly segregated as measured by SIS, it was also likely to be highly segregated at every scale from the building to the ED. Possibly in these cities with very high shares of black residents, the distinction between microlevel and macrolevel segregation was less important than it was in the comparison of southern cities with northern cities with much smaller black population shares.

The SIS has a very different pattern of association with values of *P**. The correlation with isolation at the building scale is high (Pearson $r = .75$). It diminishes considerably at the building group, face block, and street segment scales. Then, surprisingly, it becomes negative at larger scales. In cities where the average black person has a higher share of black neighbors at the segment group scale and above, the SIS is lower. To understand why would require intensive review of the racially alike sequences in the census enumeration. We suspect that the source is the high dependence of *P** on the city's share of black residents. Possibly, for example, in cities with the largest black populations, it is more common for a few black households to be located in predominantly white areas. Although they could not create long sequences of black neighbors, they could disrupt long white sequences and hence reduce their contribution to SIS. Whatever the reason, these results suggest that in southern cities, SIS functions better as a measure of unevenness (*D*) than isolation or exposure (*P**). In addition, although intuitively SIS seems to target segregation mainly at a fine scale like the street segment, our small sample of cities does not confirm this assumption. SIS has the great advantage that it is readily available for all cities in 1880, and it will soon be available for all cities in the period 1900–1940 from the 100% microdata that the Minnesota Population Center is now disseminating. Hence its characteristics merit more attention.

Meanwhile, this analysis illustrates some advantages of geocoded data, which require a much greater investment to produce. One is that they support measures of multiple dimensions of segregation, including both exposure/isolation (P^*) and unequal distribution (D). More important is that they make possible construction of a segregation profile (whether in terms of linear distances or in terms of qualitative neighborhood scales) that reveals how segregation varies at different scales.

This variation can be substantively important. In table 2 we see very clear breaking points between the household and building where D is extremely high, the face block and street segment where it is still very high by contemporary standards (.60 is often used as a criterion for extreme segregation), and the segment group and larger scales where segregation is in the moderate range. These breaks were substantial in every city, and especially in Baltimore and Charleston. The latter break (from street segment to segment group) is substantively important because the segment can capture segregation on alleys and side streets. Segment groups, in contrast, include buildings around the corner that may be on main streets and have a very different racial composition (as in Washington). We also notice a large difference in Charleston between segregation at the household level (.966) and at the building level (.760). Since "building" refers here to an address, lower segregation at this scale may partly reflect the backyard pattern that we identified more directly with city directory data. This particular break is also more pronounced in New Orleans and Richmond than in other cities, which could indicate a similar pattern.

The profiles in table 3 offer additional information. Here we see a fairly large break in isolation between the building and building group scales. This is most pronounced in Louisville (where P^* drops from .893 to .724). This sharp drop in isolation represents an interspersion of predominantly white buildings next to black buildings. If such interspersion were very common, it would greatly reduce isolation at the face block and street segment scales. This occurs only to a moderate degree. In several cities there is another sharper break between the segment and segment group (such as Washington from .687 to .513 and Baltimore from .727 to .474). As in table 2, we suspect that this pattern reflects the importance of alley and side street segregation. This interpretation could be tested directly in an analysis that distinguishes alleys from other streets as we did in Washington.

CONCLUSION

Let us review the findings and their implications in terms of the three purposes set out in the introduction but in inverse order: gauging segregation in the postbellum South, examining alternative spatial measures of segregation, and understanding the spatial scale and configuration of segregation.

Segregation in Southern Cities

First, what have we learned about segregation in southern cities? As the literature review reveals, many historians and social scientists throughout the 20th century were aware of the detailed spatial patterns of segregation in southern cities at multiple scales, and recent research has placed renewed emphasis on microlevel segregation. Yet the mainstream view for researchers who relied on standard measures and published census data was that segregation was modest. There was always some uneasiness about this conclusion. Researchers have been anxious about relying on the ward data that for many years were the only national source of pre-1940 information on small-area populations. Some explicitly noted that their ward-level findings for southern cities might not correspond well with actual patterns (Cutler et al. 1999, pp. 460–61). Demographers who pioneered the segregation measures in use today were keenly aware of potential problems even after tract and block counts became widely available.

The findings reported here confirm that residential segregation was high in these cities even in the early years after the Civil War. While strong norms of racial etiquette enforced the social boundaries between whites and blacks at this time, evidently these boundaries were also reflected in and reinforced by residential patterns. Segregation took multiple forms. Using geocoded data at the household level allows us to compare measures systematically at different spatial scales. We found large, predominantly black neighborhoods in many cities (described by historians as areas with rundown housing or undesirable locations). Yet these were not the main form taken by segregation, which was moderate at the ED level. At smaller scales—in street segments, alleys, face blocks, and buildings that were often very near to white neighbors—black residents were much more highly segregated from whites. These findings are not unique to the South. They mirror results for major northern cities in the same period that had much smaller black populations and a very different slavery history (on New York and Chicago, see Logan et al. [2015] and on Philadelphia, Logan and Bellman [2016]).

Spatial Measures of Segregation

Another purpose of this study was to examine alternative approaches to measuring segregation in a way that is sensitive to distance. We showed the advantage of recently suggested measures based on distance bands that make it possible to construct a segregation profile for cities—displaying how high segregation reaches at very short distances and the shape of its decline at greater distances. In the cities studied here, these measures are informative only when applied to geocoded data. When calculated from data even as fine as census block counts, they cannot capture common forms of segregation such as the alley or side street configuration. Another obstacle to their

use is that scholars are unfamiliar with scales expressed in distances—what is the meaning of 25 meters versus 100 meters versus 500 meters—and the relevant distances may differ across locales and groups. For example, it may well be the case that in many metropolitan areas today a "pedestrian neighborhood" is reflected in a 500-meter distance band, and predominantly black neighborhoods can be reliably identified at this scale. Yet the relevant scale may be smaller in cities than in suburbs or in older, denser places than in more sprawling places that grew up in the automobile age. It may also be different for small minority groups than for large ones.

The sequence approach (as implemented in the SIS) has the advantage of relying simply on the order of enumeration, with no other geographic information, to assess segregation. The necessary data are already being made available, and in a short time 1950 data will also become public. As noted above, SIS treats only the previous and next enumerated person (or householder) as a neighbor, which is counterintuitive in multifamily buildings, and persons across the street are rarely neighbors in this sense. We found that SIS is highly correlated with standard measures of segregation at small geographic scales. Yet it is also nearly as highly correlated with segregation (D) at the scale of EDs. In fact, if there were a high level of segregation between EDs, fairly long sequences of same-race neighbors within each ED would be likely, because there would be few other-race persons to disrupt the sequence. In an all-white ED, not uncommon in northern cities, there would be a single long sequence of white neighbors. This means that SIS alone does not identify the scale at which segregation occurs.

For these reasons we express a strong preference for the use of well-known measures of dissimilarity and exposure based on geocoded address to generate a segregation profile. We recommend that all analyses begin with a map visualization, showing the residential pattern in a given city directly and without the filter of a summary measure. In the research presented here, for example, we began with no expert knowledge about postbellum southern cities. We found alleys in several cities and long side streets in cities such as Baltimore on the maps, and this led us to a careful search of historical accounts. And while spatial scales could reasonably be defined in terms of linear or street network distances, we prefer the categories used here (household, building, building group, face block, street segment, etc.) because they have a simple qualitative connotation that is meaningful from the perspective of both the resident and the analyst.

Spatial Scale and Spatial Configuration

We have used the southern cities data and measures to elaborate the more general concepts of the spatial scale and configuration of segregation. Most past research has conceived of segregation on a continuum of lower to higher

separation between groups. Recent spatial methods have given rise to more systematic consideration of the spatial scale at which groups are separated. The spatial configuration is a feature of the landscape of the city that is partly defined by its scale, but it has other more qualitative aspects. These pull us in the direction of urban ethnographers, who regularly notice and try to make sense of the specific layout of neighborhoods (e.g., the Gold Coast's adjacency to the slum [Zorbaugh 1929]).

In much urban ethnography the spatial configuration is treated as supportive of the major axes of social organization (typically race/ethnicity and social class). Distinct spaces even within a single neighborhood have meaning. For example, Suttles (1970) described the "ordered segmentation" of Chicago's Addams neighborhood mainly in terms of the dominance of Italian Americans. While pointing out the somewhat separate local territories of blacks, Puerto Ricans, and Mexicans, he emphasized that Mexicans accommodated to their shared space with Italians by acknowledging its Italian identity. Italians' control of Peanut Park was expressed in the marginal location that was temporarily occupied by a group of Puerto Rican teenagers—the most visible and least sheltered corner of the park, far from where Italians congregated. The spatial configuration provided clues to social boundaries, but it could not be interpreted without additional knowledge of how locals understood and navigated the landscape.

Small's (2004) study of the Villa Victoria apartment complex in Boston's South End also shows that the use of space even in relatively close quarters depends on how it is socially defined. He framed his work around the question of how a small community could be effectively isolated from a surrounding larger neighborhood. What is the source of boundaries when distances are so short, there are no physical obstacles, and people rely on many of the same shops and public infrastructure? In fact, he found, South Enders were so sensitive to the "otherness" of Villa Victoria that some even avoided walking on the side of the main shopping street that was closer to it. And, as he recounts with surprise, they appeared to be unaware of an annual outdoor music and food festival that brought thousands of visitors to the area.

In trying to interpret the spatial configurations that we found in southern cities, we relied on historical accounts of how they were created and how they may have been understood by residents. We suspect that attention to both spatial scale and spatial configurations will raise new questions about the meaning of residential segregation. The construction of the alley and side street was boundary work (Lamont and Molnár 2002) that reflected and then reinforced social relationships through space. These processes take place at multiple scales, each of which may matter in different ways. The building is the scale at which neighbors have the most intimate contact (sharing a backyard privy or hallway toilet, dealing with the same landlord). The face block or street segment is treated by urban scholars as the core basis of casual,

face-to-face social relations of "neighboring" (Suttles 1972; Grannis 2009). Suttles (1972, p. 56) referred to a larger area as the "defended neighborhood," because it "possesses a corporate identity known to both its members and outsiders" and has implications for access to collective resources. (If schools had not been racially segregated in 1880, blacks and whites living in close proximity would have sent their children to the same schools.) Kusenbach (2008) draws out similar comparisons of how residents perceive and use their local environment at different scales, ranging from microsettings within blocks, street blocks, and walking distance neighborhoods to larger city districts.

Is it useful to think of settings in which whites and blacks live in proximity to one another as being segregated if they lived in different buildings on the same lot or on different but adjacent street segments? We argue that it is essential on the following grounds. First, the spatial patterns described here are distinct and strongly organized by race. Blacks lived in backyards, alleys, and narrow streets; whites rarely did. Second, we know from historical and architectural studies that the nature of the housing in these different locations was decidedly unequal. Third, when measured at an appropriate scale (the street segment), the absolute value of segregation was high in these cities by the usual standards. The average black person in all of these cities lived on a street segment that was majority black (except New Orleans at 48.6%), and in all but Charleston (where results are skewed by the backyard pattern) the dissimilarity index was already above .50 in 1880 at this scale.

This research brings into focus a question about the definition of segregation in a way that has not seemed as relevant to urbanists studying contemporary cities with large black settlement areas. Is segregation essentially about distance or about spatial boundaries? Distance matters, and we can now calibrate segregation and intergroup exposures based on the distances between the places where members of different groups live (Reardon and O'Sullivan 2004). In some cities, it is pointed out, small clusters of minorities are relatively dispersed around the city while in others they are grouped together into large minority districts. Cities vary in the spatial scale at which minorities are segregated (Lee et al. 2008), and the spatial scale may change over time (Reardon et al. 2009). The scale at which a large and long-established group is clustered may be different from the scale of segregation of a small and newly arriving group. A corollary of these findings is that we need to identify the relevant spatial scale in order to construct a valid measure of segregation.

Segregation can also be understood in terms of boundaries between people (when adjacent areas are separated by law, custom, or other means) even when they live in close proximity to one another. Consider the extreme case of residents in the same household, some as domestic workers (quite common in 1880). A typical arrangement has been for employees to have

bedrooms on different floors, to use a back entrance to the house and a back staircase to reach other floors, and to spend much time in the kitchen and working areas. These are strong spatial boundaries within the residence, though few would call it residential segregation. More relevant to the usual understanding of segregation are the spatial configurations beyond the building that were examined here. The alley configuration is an evocative example. All available evidence suggests that there were strong social boundaries between alleys and perimeter streets: alleys were not surveilled by authorities, nonresidents were afraid to enter them, and they were considered to be appropriate for blacks but not for decent white people. It is this social boundary that turns the short distance between the alley and its connected street into a deep divide. A parallel argument can be made for backyards and side streets—and, indeed, for black neighborhoods. In these respects the spatiality of segregation is fundamentally a matter of how space is organized to create and reflect social boundaries.

APPENDIX

TABLE A1
BLACK POPULATION (Residents and Percentage of City Total) IN SELECTED SOUTHERN CITIES, 1860–1940

Black Population	Atlanta	Baltimore	Charleston	Louisville	Memphis	Mobile	Nashville	New Orleans	Richmond	Washington
1860:										
Residents	1,939	27,898	17,146	6,820	3,882	8,404	3,945	24,074	14,275	10,983
% of city	20.3	13.1	42.3	10.0	17.2	28.7	23.2	14.3	37.7	18.0
1870:										
Residents	9,929	39,558	26,173	14,956	15,471	13,919	9,709	50,456	23,110	35,455
% of city	45.6	14.8	53.5	14.8	38.5	43.5	37.5	26.4	45.3	32.5
1880:										
Residents	16,330	53,716	27,276	20,905	14,896	12,240	16,337	57,617	27,832	48,377
% of city	43.7	16.2	54.6	16.9	44.3	42.0	37.7	26.7	43.8	32.8
1890:										
Residents	28,098	67,104	30,970	28,651	28,706	13,630	29,382	64,491	32,330	75,572
% of city	42.9	15.4	56.4	17.8	44.5	43.9	38.6	26.6	39.7	32.8
1900:										
Residents	35,727	79,258	31,522	39,139	49,910	17,045	30,044	77,714	32,230	86,702
% of city	39.8	15.6	56.5	19.1	48.8	44.3	37.2	27.1	37.9	31.1
1910:										
Residents	51,902	84,749	31,056	40,522	52,441	22,763	36,523	89,262	46,733	94,446
% of city	33.5	15.2	52.8	18.1	40.0	44.2	33.1	26.3	36.6	28.5
1920:										
Residents	62,796	108,322	32,326	40,087	61,181	23,906	35,633	100,930	54,041	109,966
% of city	31.3	14.8	47.6	17.1	37.7	39.3	30.1	26.1	31.5	25.1
1930:										
Residents	90,075	142,106	28,062	47,354	96,550	24,514	42,836	129,632	52,988	132,068
% of city	33.3	17.7	45.1	15.4	38.1	35.9	27.8	28.3	29.0	27.1
1940:										
Residents	104,533	165,843	31,765	47,158	121,498	29,046	47,318	149,034	61,251	187,266
% of city	34.6	19.3	44.6	14.8	41.5	36.9	28.3	30.1	31.7	28.2

NOTE.—Data are from Gibson and Jung (2005).

REFERENCES

Baldwin, William H. 1909. "Report of the Committee on Improvement of Existing Homes and Elimination of Insanitary and Alley Houses." Pp. 3–16 in *Reports of the President's Homes Commission*, edited by George M. Sternberg. Washington, D.C.: Government Printing Office.

Blalock, Hubert M., Jr. 1967. *Toward a Theory of Minority-Group Relations*. New York: Wiley.

Blassingame, John W. 1973. "Before the Ghetto: The Making of the Black Community in Savannah, Georgia, 1865–1880." *Journal of Social History* 6 (4): 463–88.

Borchert, James. 1971–72. "The Rise and Fall of Washington's Inhabited Alleys, 1852–1972." *Columbia Historical Society Records* 48:267–88.

Campanella, Richard. 2007. "An Ethnic Geography of New Orleans." *Journal of American History* 94:704–15.

Chaix, Basile, Juan Merlo, S. V. Subramanian, John Lynch, and Pierre Chauvin. 2005. "Comparison of a Spatial Perspective with the Multilevel Analytical Approach in Neighborhood Studies: The Case of Mental, Behavioral Disorders Due to Psychoactive Substance Use in Malmo, Sweden, 2001." *American Journal of Epidemiology* 162:171–82.

Cowgill, Donald O., and Mary S. Cowgill. 1951. "An Index of Segregation Based on Block Statistics." *American Sociological Review* 16:825–31.

Cutler, David M., Edward L. Glaeser, and Jacob L. Vigdor. 1999. "The Rise and Decline of the American Ghetto." *Journal of Political Economy* 107:455–506.

Demerath, Nicholas J., and Harlan W. Gilmore. 1954. "The Ecology of Southern Cities." Pp. 135–54 in *The Urban South*, edited by Rupert B. Vance and Nicholas J. Demerath. Chapel Hill: University of North Carolina Press.

Doyle, Don. 1990. *New Men, New Cities, New South: Atlanta, Nashville, Charleston, Mobile, 1860–1910*. Chapel Hill: University of North Carolina Press.

Duncan, Otis Dudley, and Beverly Duncan. 1955. "A Methodological Analysis of Segregation Indexes." *American Sociological Review* 20:210–17.

Frazier, E. Franklin. 1957. *The Negro in the United States*, rev. ed. New York: Macmillan.

Gibson, Campbell, and Kay Jung. 2005. "Historical Census Statistics on Population Totals by Race, 1790 to 1990, and by Hispanic Origin, 1970 to 1990, for Large Cities and Other Urban Places in the United States." Population Division working paper no. 76. U.S. Census Bureau, Washington, D.C. https://www.census.gov/population/www/documentation/twps0076/twps0076.html.

Grannis, Richard. 2009. *From the Ground Up: How the Layered Stages of Neighbor Networks Translate Geography into Neighborhood Effects*. Princeton, N.J.: Princeton University Press.

Grigoryeva, Angelina, and Martin Ruef. 2015. "The Historical Demography of Racial Segregation." *American Sociological Review* 80:814–42.

Groves, Paul A. 1974. "The 'Hidden' Population: Washington Alley Dwellers in the Late Nineteenth Century." *Professional Geographer* 26:270–76.

Groves, Paul A., and Edward K. Muller. 1975. "The Evolution of Black Residential Areas in Late Nineteenth Century Cities." *Journal of Historical Geography* 1:169–91.

Hayward, Mary Ellen. 1981. "Urban Vernacular Architecture in Nineteenth-Century Baltimore." *Winterthur Portfolio* 16:33–63.

Hayward, Mary Ellen, and Charles Belfour. 2001. *The Baltimore Rowhouse*. Princeton, N.J.: Princeton Architectural Press.

Hong, Seon-Yun, David O'Sullivan, and Yukio Sadahiro. 2014. "Implement Spatial Segregation Measures in R." *PLoS One* 9:e113767.

Ingham, John N. 2003. "Building Businesses, Creating Communities: Residential Segregation and the Growth of African American Business in Southern Cities, 1880–1915." *Business History Review* 77:639–65.

Johnson, Charles S. 1932. *Negro Housing: Report of the Committee on Negro Housing*. Washington, D.C.: Government Printing Office. https://archive.org/stream/negrohousingrepo00presrich/negrohousingrepo00presrich_djvu.txt.

———. 1942. *Patterns of Negro Segregation*. South Bend, Ind.: University of Notre Dame Press.

Jones, William Henry. 1929. *The Housing of Negroes in Washington, D.C.* Washington, D.C.: Howard University Press. http://babel.hathitrust.org/cgi/pt?id=uc1.$b538873;view=1up;seq=71.

Kellogg, John U. 1977. "Negro Urban Clusters in the Postbellum South." *Geographical Review* 67:310–21.

Kusenbach, Margarethe. 2008. "A Hierarchy of Urban Communities: Observations on the Nested Character of Place." *City and Community* 7:225–49.

Lamont, Michèle, and Virág Molnár. 2002. "The Study of Boundaries in the Social Sciences." *Annual Review of Sociology* 28:167–95.

Lee, B. A., S. F. Reardon, G. Firebaugh, C. R. Farrell, S. A. Matthews, and D. O'Sullivan. 2008. "Beyond the Census Tract: Patterns and Determinants of Racial Residential Segregation at Multiple Geographic Scales." *American Sociological Review* 73:766–91.

Logan, John R. 2017. "Racial Segregation in Postbellum Southern Cities: The Case of Washington, DC." *Demographic Research* 36 (art. 57): 1759–84.

Logan, John R., and Benjamin Bellman. 2016. "Before *The Philadelphia Negro*: Residential Segregation in a Nineteenth Century Northern City." *Social Science History* 40:683–706.

Logan, John R., Jason Jindrich, Hyoungjin Shin, and Weiwei Zhang. 2011. "Mapping America in 1880: The Urban Transition Historical GIS Project." *Historical Methods* 44:49–60.

Logan, John R., Weiwei Zhang, and Miao Chunyu. 2015. "Emergent Ghettos: Black Neighborhoods in New York and Chicago, 1880–1940." *American Journal of Sociology* 120:1055–94.

Lowi, Theodore. 1979. *The End of Liberalism: The Second Republic of the United States*. New York: Norton.

Massey, Douglas, and Nancy Denton. 1988. "The Dimensions of Residential Segregation." *Social Forces* 67:281–315.

———. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, Mass.: Harvard University Press.

Myrdal, Gunnar. 1944. *An American Dilemma*. New York: Harper & Bros.

Olson, Sherry. 1997. *Baltimore: The Building of an American City*, 2d ed. Baltimore: Johns Hopkins University Press.

Philpott, Thomas Lee. 1978. *The Slum and the Ghetto: Neighborhood Deterioration and Middle-Class Reform, Chicago, 1880–1930*. New York: Oxford University Press.

Rabinowitz, Howard N. 1978. *Race Relations in the Urban South, 1865–1890*. Athens: University of Georgia Press.

Radford, John P. 1976. "Race, Residence and Ideology: Charleston, South Carolina in the Mid-Nineteenth Century." *Journal of Historical Geography* 2 (4): 329–46.

Reardon, Sean F., Chad R. Farrell, Stephen A. Matthews, David O'Sullivan, Kendra Bischoff, and Glenn Firebaugh. 2009. "Race and Space in the 1990s: Changes in the Geographic Scale of Racial Residential Segregation, 1990–2000." *Social Science Research* 38:55–70.

Reardon, Sean F., Stephen A. Matthews, David O'Sullivan, Barrett A. Lee, Glenn Firebaugh, Chad R. Farrell, and Kendra Bischoff. 2008. "The Geographic Scale of Metropolitan Racial Segregation." *Demography* 45:489–514.

Reardon, Sean F., and D. O'Sullivan. 2004. "Measures of Spatial Segregation." *Sociological Methodology* 34:121–62.

Ruggles, Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. 2010. *Integrated Public Use Microdata Series: Version 5.0* [machine-readable database]. Minneapolis: University of Minnesota.

Schnore, Leo F., and Philip C. Evenson. 1966. "Segregation in Southern Cities." *American Journal of Sociology* 72:58–67.
Scholes. 1882. *Scholes' Directory of the City of Charleston, 1882*. New York: Scholes & Co.
Small, Mario Luis. 2004. *Villa Victoria*. Chicago: University of Chicago Press.
Spain, Daphne. 1979. "Race Relations and Residential Segregation in New Orleans: Two Centuries of Paradox." *Annals of the American Academy of Political and Social Science* 441:82–96.
Spielman, Seth, and John R. Logan. 2013. "Using High-Resolution Population Data to Identify Neighborhoods and Establish Their Boundaries." *Annals of the Association of American Geographers* 103:67–84.
Suttles, Gerald D. 1970. *The Social Order of the Slum: Ethnicity and Territory in the Inner City*. Chicago: University of Chicago Press.
———. 1972. *The Social Construction of Communities*. Chicago: University of Chicago Press.
Taeuber, Karl E., and Alma F. Taeuber. 1965. *Negroes in Cities: Residential Segregation and Neighborhood Change*. Chicago: Aldine.
Vill, Martha J. 1986. "Building Enterprise in Late Nineteenth-Century Baltimore." *Journal of Historical Geography* 12:162–81.
Wade, Richard C. 1964. *Slavery in the Cities: The South, 1820–1860*. New York: Oxford University Press.
White, Michael. 1983. "The Measurement of Spatial Segregation." *American Journal of Sociology* 88:1008–18.
Woofter, Thomas J. 1928. *Negro Problems in Cities*. New York: Doubleday & Co. http://books.google.com/books?id=OOwCAAAAYAAJ&printsec=frontcover&ie=ISO-8859-1&output=html.
Zorbaugh, Harvey W. (1929) 1976. *The Gold Coast and the Slum*. Chicago: University of Chicago Press.