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To cite this article: MARK FOSSETT (2006) Ethnic Preferences, Social Distance Dynamics, and Residential Segregation: Theoretical Explorations Using Simulation Analysis*, *Journal of Mathematical Sociology*, 30:3-4, 185-273, DOI: [10.1080/00222500500544052](https://doi.org/10.1080/00222500500544052)

To link to this article: <https://doi.org/10.1080/00222500500544052>



Published online: 21 Sep 2006.



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Ethnic Preferences, Social Distance Dynamics, and Residential Segregation: Theoretical Explorations Using Simulation Analysis*

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In this paper I consider theories of residential segregation that emphasize social distance and ethnic preference dynamics. I argue that these theories are more compelling than many critics have supposed, and I conclude that they deserve to be considered more carefully. I then use simulation methodology to assess the potential impact of social distance and ethnic preference dynamics on ethnic segregation under certain theoretically interesting conditions. Based on the results from the simulation analyses, I offer three conclusions: (1) status preferences and status dynamics have the capacity to produce high levels of status segregation but do not produce high levels of ethnic segregation under the specified simulation conditions; (2) ethnic preferences can, under certain theoretically interesting conditions specified in these simulations, produce high levels of ethnic segregation in the absence of housing discrimination; and (3) ethnic preferences and social distance dynamics can, when combined with status preferences, status dynamics, and demographic and urban-structural settings common in American cities, produce highly stable patterns of multi-group segregation and hyper-segregation (i.e., high levels of ethnic segregation on multiple dimensions) of minority populations. Based on these model-based theoretical explorations I speculate that the persistence of segregation in recent decades may have been overdetermined, that is, it may have been sustained by multiple sufficient causes including not only discrimination, but also social distance and preference dynamics. This raises the possibility that reductions in housing discrimination may not necessarily lead to large declines in ethnic segregation in the short run because social distance and

*An earlier version of this paper was presented at the Annual Meetings of the American Sociological Association Chicago, Illinois, August 1999. I thank two anonymous reviewers for helpful suggestions for improvement of an earlier version of this paper. The research reported here was facilitated in part by funding support from NIH Grants R43HD38199 (Simulating Residential Segregation Dynamics: Phase I) and R44HD038199 (Simulating Residential Segregation Dynamics: Phase II). In addition, the research reported here was made possible in part by faculty development leave support provided by Texas A&M University.

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| preference dynamics may be able to sustain ethnic segregation at surprisingly high levels in the absence of housing discrimination.

Keywords: agent-based model, simulation, ethnic segregation, urban ecology, prejudice, ethnic preferences, social distance

In this paper I examine two traditions of segregation theory—the urban ecological “social distance” tradition in sociology and the “individual preferences” tradition in economics. Both perspectives hold that, under certain conditions, the “voluntary” location choices that households make in decentralized, unregulated housing markets will help build and maintain residential segregation along ethnic and status lines. I review the basic logic of these theories along with some of the key criticisms that have been raised against them. I then use computer simulation methodology to explore some of the implications of these perspectives and assess their potential relevance for understanding residential segregation in contemporary American urban areas.

“Classical” human ecologists writing in the early decades of the 20th century devoted considerable attention to the study of the segregation of population groups and activities in urban space (e.g., Burgess, 1928; Cressey, 1938; McKenzie, 1926; Park, 1936). Their theories of residential segregation emphasized processes of spatial competition and interaction between different social groups in urban settings. A central thrust of the perspective was that differences in culture and interest gives rise to “social distance” between status and ethnic groups that is likely to be reflected in their separation in residential space. Another tenet of the perspective was that differential means play an important role in competition for housing in spatially structured housing markets and tends to relegate the lower economic classes and ethnic minority groups to older, centrally located, neighborhoods with lower quality housing and less desirable living conditions marked by disproportionate exposure to crime and other social problems.¹

Classical human ecology fell from prominence following critiques in the 1930s and 1940s (e.g., Alihan, 1938; Gettis, 1939; Firey, 1947), but “neoclassical” formulations advanced in the 1950s (e.g., Hawley, 1944a, 1950; Duncan, 1959, 1961), breathing new life into the

¹The predictions that low income groups will be centralized are grounded in the assumption that city neighborhoods are organized in a zonal pattern with new, high-quality construction being concentrated in the periphery of the city in low density, high-status residential areas.

ecological perspective. These and subsequent statements (e.g., Berry and Kasarda, 1977; Hawley, 1986) reestablished human ecology as a viable theoretical framework (Turner, 1991) best known today for informing the study of population dynamics, urban spatial distributions, and urban systems (Namboodiri, 1988; Frisbie and Kasarda, 1988). The transition from classical to neoclassical ecology was less traumatic in the area of residential segregation than in any area of ecological theory and research. The core theoretical concepts in this area—*social distance, congregation, centralization, competition, invasion, succession, segregation*, and the like—all survived substantially intact. Today they remain central to sociological efforts to describe and explain urban structure and especially residential segregation and neighborhood change. Evidence of this is seen in the steady stream of important theoretical and empirical works that have drawn extensively on ecological concepts to understand processes of residential segregation, spatial assimilation, and neighborhood change (e.g., Aldrich, 1975; Duncan and Duncan, 1955, 1957; Lee and Wood, 1991; Lieberson, 1963, 1980; Massey, 1985; Massey and Denton, 1988, 1989, 1993; Massey and Mullen, 1984; Taeuber and Taeuber, 1965; White, 1984, 1986).

Urban ecological theory recognizes that segregation may arise through one or more of several avenues, including economic competition, social distance dynamics, and discrimination. *These distinct mechanisms are not mutually exclusive. All may operate simultaneously, all are predicted by ecological theory under certain conditions, and each one individually is potentially a sufficient cause of segregation.* A complete understanding of residential segregation must consider them all. Here I focus particular attention on the strains of ecological theory that emphasize the role of social distance dynamics in residential segregation. This body of theory holds that households that are similar in terms of ethnicity or status position will have low “social distance” from each other based on one or more of the following: shared interests, similar sensibilities or tastes, a common culture, sense of mutual acceptance, and in-group solidarity. All else equal, similar households are expected to congregate with each other (i.e., voluntarily self-segregate) in residential areas. Conversely, households with dissimilar interests, sensibilities (i.e., tastes), or cultures based on different ethnic and status backgrounds will have high social distance from each other and will tend to live separately from each other. In particular, higher-status households and households from majority ethnic groups are predicted to have an aversion to coexisting with lower-status households and minority ethnic groups and will seek to separate themselves from them. They do so to minimize

interaction and association with perceived social inferiors and thereby demonstrate and consolidate their position in the status hierarchy. In this way, social distance dynamics are hypothesized to contribute to building and maintaining residential segregation among ethnic and status groups.²

Ecological theory holds that these effects are reinforced and amplified by status inequality and economic competition. Thus, higher status households seek to live together *and are able to do so* because they have advantages in economic competition for high-quality housing and desirable neighborhoods. Similarly, lower status households and ethnic minorities populations are disadvantaged in this competition and are disproportionately relegated to lower-quality housing in less desirable neighborhoods. Ecological theory holds that when status dynamics and social distance dynamics operate in decentralized housing markets they have the capacity to produce “natural areas,” that is, areas that are internally homogeneous with respect to the ethnic and social status of their residents and that tend to hold their character over time even as individual households in the neighborhood come and go.

The neoclassical literature often uses the term “social area” rather than natural area to avoid the suggestion that segregation is socially “desirable.” Whatever the label, homogeneous social areas are the building blocks of residential segregation and are interesting theoretically because they arise out of uncoordinated, micro-level interactions without any *necessary* assistance from law or formal institutional practices.³ Social areas are likely to coalesce around features of the natural or built environment (e.g., scenic bluffs, flood plains, or other amenities), but this is not a crucial point. Ecological theory holds that social distance dynamics are capable of creating and maintaining stable natural or social areas in space that is featureless save for the characteristics of the population residing in different areas. The addition of city structure in the form of simple assumptions that cities grow around a central point with newer, higher quality housing stock tending to emerge at the perimeter of the city leads to well-known expectations about segregation patterns in an idealized model of urban form; status segregation emerges along a center-periphery continuum of concentric status “rings” with ethnic clusters emerging within

²Peter Blau (1977) has emphasized the relationship between social distance segregation in a structural theory that while distinct from the ecological tradition, is compatible with it.

³Since Hawley (1944a, 1944b) ecological theory recognizes that coordination and institutional practice can play an important supporting role in creating and maintaining segregation.

status rings and aligning across adjacent status rings to form ethnic “sectors” or wedges (Hawley, 1950; Kasarda and Berry, 1977). Real cities are considerably more complicated, of course, but the introduction of refined assumptions about city structure does not alter the basic ecological prediction of systematic patterns of status and ethnic segregation arising out of uncoordinated, micro-level interactions. Furthermore, the general theoretical framework predicts segregation will emerge based on other social characteristics as well (e.g., age, family structure, life style, etc.) although these are generally presumed to be less powerful than status and ethnicity in their effects.

Ecological theory also recognizes that formal and informal discrimination on the part of high status groups and ethnic majority populations may exert independent effects on residential segregation and that these effects may reinforce and amplify the impacts of social distance dynamics and status dynamics (Hawley, 1944b, 1950; Berry and Kasarda, 1977). However, as my primary interest in this paper is with the impact that social distance dynamics and status dynamics may have *in the absence of discrimination*, I do not discuss the effects of discrimination on segregation at length.⁴

The “individual preferences” tradition in economics is distinct and separate from the human ecological tradition in sociology. However, there is more than a passing similarity between “social distance” effects in human ecological theory and the effects of individual preferences in economic theory. The individual preferences tradition draws on micro-level choice theory to predict what kinds of macro-level outcomes (e.g., segregation patterns) will result when individuals independently pursue their preferences for ethnic coresidence and avoidance under varying demographic conditions.⁵ The work of Thomas Schelling (1969a, 1969b, 1971a, 1971b, 1972, 1978) represents the best-known example of how this perspective has been applied to help understand the underlying dynamics that produce residential segregation. This tradition emphasizes the use of formal theoretical models to derive implications about neighborhood stability, tipping, and the tendency for unstable integrated neighborhoods to give way

⁴See Massey and Denton (1993), Yinger (1995, 1998), Galster (1991, 1992), and Farley, Danziger, and Holzer (2000) for discussions focusing on the impact of discrimination on residential segregation.

⁵The individual preferences tradition in economics does not try to explain the existence of “ethnic preferences.” It merely assesses the implications of such preferences when they exist. In this regard, the “social distance” tradition in human ecology is more ambitious. It seeks to explain preferences as emerging from the competition between groups with disparate interests based on socioeconomic position and ethnic culture.

to stable neighborhoods with homogeneous ethnic populations.⁶ Clark (1986, 1988, 1989, 1991, 1992, 1996, 2002) has done much to keep Schelling's theory "in the mix" in recent debates concerning the relevant explanations of contemporary ethnic segregation.

Both the ecological social distance tradition in sociology and the individual preferences tradition in economics generate the prediction that, in certain contexts (e.g., decentralized, unregulated housing markets), voluntary choices and economic competition have the potential to build and/or maintain macro-level patterns of residential segregation along ethnic and status lines. This hypothesis is viewed with skepticism by many (Galster, 1988, 1989; Massey and Denton, 1993; Massey, 2000; Yinger, 1995). In the past decade two important works in the literature on residential segregation—*American Apartheid* by Massey and Denton (1993) and *Closed Doors, Opportunities Lost* by Yinger (1995)—provide strong, articulate statements of the view that the role of social distance and preference dynamics in residential segregation is probably modest if not negligible altogether. In both works the authors argue that the high levels of segregation observed in American urban areas cannot plausibly be explained in terms of voluntary choice dynamics and that, based on the elimination of this and other possible causes (e.g., status segregation dynamics), it is reasonable to conclude that discrimination in housing is the primary factor in present-day ethnic segregation.⁷

While some scholars point to the *potential* role of voluntary choice, preferences, and status distance dynamics in building and/or maintaining segregation (Clark, 1986, 1988, 1989, 1991, 1992, 1996, 2002; Thernstrom and Thernstrom, 1997; Glazer, 1999), the majority of scholars writing in the area embrace views similar to those set forth by Massey and Denton and by Yinger and discount this possibility (e.g., see Galster, 1988, 1989; Peach, 1981; Farley and Allen, 1986). Indeed, many scholars who have examined ethnic preferences as measured in surveys have suggested that they are not a limiting factor in racial integration (e.g., Bobo and Zubrinsky, 1996; Farley, Steeh,

⁶The individual preferences tradition in economics does not dismiss housing discrimination as a possible cause of residential segregation, but does not itself address the dynamics of housing discrimination. In contrast, ecological theory is more general. It identifies mechanisms – categoric group formations (e.g., ethnic groups), intergroup competition, and dominance relations – that can produce segregation via discrimination and exclusion. Thus, while the focus in this paper is on strains of ecological theory that emphasize the role of voluntary choice and social distance dynamics, the ecological tradition is not restricted to explaining segregation solely in these terms.

⁷Recent articles by Massey (2001) and Yinger (1998) affirm their commitment to this position.

Jackson, Krysan, and Reeves, 1994; Farley, Schuman, Bianchi, Colasanto, and Hatchett, 1978; Zubrinsky and Bobo, 1996). In many cases, this view is grounded in the assumption that existing residential preferences held by minorities would play a key role in promoting integration if discrimination in housing did not constrain minority choices (e.g., Farley, Fielding, and Krysan, 1997; Massey and Denton, 1993; Massey, 2000; Yinger, 1995; Zubrinsky and Bobo, 1996; Charles, 2001).

Conventional empirical studies have not settled this theoretical debate. The reason for this is that definitive quantitative assessments of the relative contributions of discrimination, social distance and preference dynamics, and other factors to residential segregation are difficult to obtain. The data needed to perform the relevant analyses are unavailable and would be difficult to obtain. As a result, the empirical literature speaks only indirectly to the issues at hand. Many studies document the existence of segregation and how it varies over time and across areas in conjunction with various city characteristics (e.g., Massey and Denton, 1987, 1989; Farley and Frey, 1994). These studies make valuable contributions but their reliance on highly aggregated census data limits their capacity to speak to the underlying causal dynamics that generate and sustain the patterns of segregation and neighborhood change they document.

Audit experiments, field studies, and historical analyses provide compelling evidence of housing discrimination against ethnic minorities (e.g., Fix and Struyk, 1993; Galster, 1991, 1992; Yinger, 1995). Reviews pointing to the historical importance of discrimination in racial residential segregation (e.g., Massey and Denton, 1993; Farley, Danziger, and Holzer, 2000) are accepted with little dispute as are reviews pointing to the continuing importance of discrimination in the present (e.g., Yinger, 1998; Galster, 1991; Farley, Danziger, and Holzer, 2000). At the same time, however, there also is wide agreement that the nature and magnitude of housing discrimination changed in the second half of the 20th century and that obstacles to and risks associated with minority entry into predominantly white neighborhoods have moderated significantly. Missing from the literature is any authoritative assessment of the impact of discrimination on residential segregation or any assessment of whether this impact has changed over time. Patterson (1997) and Butters (1993) point out that audit studies conducted in recent decades document patterns of discrimination that are statistically discernible, but far from monolithic. They suggest that, *at least in recent decades*, minority households who seek to move into integrated or predominantly white areas usually are able to do so. Even proponents of discrimination theory have noted

that in some audit studies minority auditors who asked to see housing in predominantly white areas were nearly always shown such housing (Galster, 1992).

Studies of minority “pioneering” of majority residential areas, invasion-succession sequences, and neighborhood transitions call attention to instances where minority entry into previously all-white residential areas occurs from time-to-time despite discrimination. The incidence may have been less common in the past, but even at low rates the steady cumulation of areas undergoing “invasion and early succession” would promote long-term reductions in segregation. Of course, this has not been the case historically, but the literature suggests that more than discrimination is involved. The early stages of succession do initiate integration in the local area, but this does not necessarily lead to reduction in overall segregation in the long run because succession can and often does continue to a terminal stage in which one ethnic group largely or completely replaces another. Thus, local integration is often short lived and gives way to resegregation (Massey and Mullen, 1981; Lee and Wood, 1991). Discrimination plays a role by limiting minority choices and funneling minority households into areas that are “turning,” but it is not the only factor. The progression from integrated to homogeneously minority is driven in part because whites are reluctant to move to integrated neighborhoods and are likely to leave areas where minority representation is increasing (Quillian, 2002; Crowder, 2000). This social distance dynamic may be grounded in the same racial stereotypes and race prejudice underlying discrimination, but it is distinct from exclusionary discrimination; it sustains segregation through white “avoidance” of minorities not by directly constraining minority housing options.⁸

This is significant for two reasons. First, recent research on residential attitudes indicates that, despite some movement in the direction of

⁸The documentary film *This is Our Home, It is Not for Sale* (Schwarz, 1987) provides detailed ethnographic evidence of this dynamic. The film documents ethnic transition in an upper middle-class neighborhood in central Houston during the 1960s. It shows how discrimination (including symbolic and actual violence) impeded the initial integration of this neighborhood. However, after the “pioneering” phase of integration, minorities gained access to housing in the neighborhood through conventional means (e.g., realtors). A few sections of the neighborhood underwent rapid white-to-black succession based on “white” flight in response to block-busting activities. In the main, however, the area’s transition from predominantly white to predominantly black came about gradually over two decades as white households exited the neighborhood for “normal” (i.e., life cycle-related) reasons and were disproportionately replaced by black rather than white households.

greater tolerance of integration, whites still are generally reluctant to locate in neighborhoods with substantial minority presence. Also, many indicate they are inclined to move out of neighborhoods with large or increasing minority presence (Farley, Danziger, and Holzer, 2000). Whites' tendencies to avoid and flee from minorities are strong enough to lend credibility to the hypothesis that this dynamic could be an important contributing factor in segregation. Second, there is no reason to expect that the legal and administrative remedies that have been implemented to counter discrimination would have had much impact on this social distance dynamic. So it is plausible to hypothesize that the *relative* importance of this dynamic may be increasing over time. This raises the question, "Under prevailing residential preferences, how much would segregation decline if discrimination were reduced or eliminated, making it easier for minorities to gain access to white residential areas?". Studies documenting the existence of discrimination cannot answer this question because they cannot separate out the degree to which levels of observed segregation can be attributed *solely* to direct discrimination in the housing market. This leaves open the possibility that factors other than discrimination play significant *contributing* roles in creating and maintaining segregation, roles that may increase in relative importance over time if discrimination were to decline.

Studies of the preferences households hold for co-ethnic contact and integration (e.g., Bobo and Zubrinsky, 1996; Clark, 1991, 1992; Charles, 2001; Farley, Steeh, Jackson, Krysan, and Reeves, 1994; Farley, Schuman, Bianchi, Colasanto, and Hatchett, 1978; Farley, Danziger, and Holzer, 2000; Zubrinsky and Bobo, 1996) provide information relevant to the question of whether preferences may play a role in residential segregation. These studies document preference distributions, but they do not establish quantitative estimates of how much segregation, if any, can be attributed to these preference structures. Analytic models suggest that the preferences expressed in surveys are *not* compatible with large-scale integration (Clark, 1991, 1992) and can be described as segregation-promoting rather than integration-promoting (Fossett, 2004; 2006). However, no empirical study has directly assessed the impact of preferences on choices and segregation patterns. Instead, those who emphasize the *possibility* that preferences, voluntary choice, and social distance dynamics may be a significant factor in segregation rely on theoretical and analytic arguments, not empirical assessments, to make their case. In like manner, those who argue against the potential impact of preferences also rely on theoretical arguments rather than empirical studies to support their views.

This frustrating situation has prevailed in the literature from the inception of research on residential segregation. Always unsatisfying, it has grown more so in recent decades because questions about the role of social distance dynamics, voluntary choice, and preferences have become less and less “academic.” In the past half century, laws and formal institutional practices directly supporting housing discrimination have been substantially dismantled. Fair housing legislation and anti-discrimination statutes and policies have been adopted and strengthened. Acts of violence and intimidation directed toward pioneering minority households have become infrequent and, in contrast to the past, now tend to be met vigorous investigation and prosecution by law enforcement. Many conclude that these and related developments have blunted the practice and impact of discrimination, not merely driven it “underground” and out-of-view (Wilson, 1977, 1986; Thernstrom and Thernstrom, 1997). Others argue that the most open and blatant forms of discrimination have given way but only to be replaced by a hidden and more subtle “discrimination with a smile” (Massey and Denton, 1993; Yinger, 1995, 1998).

Is it possible that racial housing discrimination is as virulent today as it was 50 years ago? The continuing persistence of segregation might be seen as consistent with the hypothesis that discrimination continues undiminished. But this interpretation requires the strong assumption that segregation would fall to low levels soon after discrimination moderates. This assumption is debatable, however, because the literature provides no clear theoretical or empirical basis for predicting how much segregation would decline, and on what timetable, if racial housing discrimination were significantly reduced or even eliminated.

Those who stress the role of social distance dynamics, preferences, and choice can interpret the current trend of steady or only slowly declining segregation and argue that it is consistent with the hypothesis that preferences and social distance dynamics are important factors capable of sustaining segregation at high levels even as discrimination moderates. Since researchers who emphasize the role of social distance and preference dynamics do not quarrel with the view that discrimination was a central factor in segregation historically, they implicitly embrace the idea that segregation in the past was *overdetermined*. That is, they see segregation as being created and/or sustained by the impact of two separate and distinct mechanisms—discrimination dynamics *and* social distance and preference dynamics. Since both mechanisms are seen as sufficient causes of segregation, both must be eliminated for segregation to be substantially

reduced; the elimination of one but not the other will leave one sufficient cause of segregation operating. This leads to the prediction that reductions in discrimination may not necessarily lead to rapid and substantial reductions in segregation *in the short run* so long as social distance and preference dynamics continue to operate. Again, however, there is no empirical basis for saying precisely how much segregation there would be if social distance and preference dynamics were to continue operating in the absence of discrimination.

I do not resolve these difficult issues in this paper. The data needed to generate empirically grounded estimates of the separate effects of discrimination and social distance and preference dynamics *in real urban systems* simply do not exist. I instead pursue a goal that, while less ambitious, may serve as a step toward this broader goal. Namely, I use simulation methodology to explore the preliminary theoretical question “Is it reasonable to entertain the hypothesis that social distance and preference dynamics could generate and sustain significant levels of segregation in the absence of discrimination?”. From the above literature review it is clear that some researchers already view the hypothesis as plausible (Schelling, 1971, 1972; Clark, 1986, 1988, 1991, 1992, 2002; Glazer, 1999; Thernstrom and Thernstrom, 1997; Patterson, 1997).⁹ However, this is hardly a consensus view. To the contrary, statements by Massey and Denton (1993), Massey (2000), and Yinger (1995) have advanced the view that voluntary choice, ethnic preferences, and social distance dynamics should *not* be seen as playing an important role in explaining segregation in American urban areas. Other important statements (e.g., Farley, 1996; Farley and Allen, 1986; Farley, Danziger, and Holzer, 2000; Galster, 1988, 1991, 1992; Krysan and Farley, 2002) take positions that in some cases are more flexible, but all stop short of assigning an important role to social distance and preference dynamics.¹⁰

The question at hand deserves investigation. A small but vocal camp argues that the roles of social distance and preference dynamics

⁹One recent line of research focusing on white “flight” and “avoidance” behavior in residential decisions (e.g., Quillian, 2002; Crowder, 2000; Emerson, Yancey, and Chai, 2001) has begun to accumulate evidence that the researchers in this area interpret as consistent with key elements of Schelling’s models.

¹⁰Statements by Farley and his associates have changed over time. Earlier statements, (at least up to Farley, Fielding, and Krysan, 1997) optimistically argued that white and black preferences could permit significant movement toward integration if discrimination were reduced. Later statements by Farley and associations are more cautious about the possibilities for integration under prevailing preferences. A very recent statement (Krysan and Farley, 2002) recognizes that preferences may be important factors in segregation but dismisses certain interpretations offered by preference theorists. I give the Krysan and Farley article extended attention below.

in segregation are underestimated and potentially important. If simulation analysis investigating their views fails to generate evidence that social distance and preference dynamics can have significant consequences for segregation, it would raise serious questions about whether the “social distance” strain of urban ecological theory in sociology and the “individual preferences” tradition in economics warrant serious attention from researchers. On the other hand, if simulation analysis suggests that social distance and preference dynamics can, at least in principle, contribute significantly to the creation and/or maintenance of segregation, then more serious attention would need to be directed to assessing the relative effects of social distance dynamics and discrimination.

CRITIQUES OF SOCIAL DISTANCE AND PREFERENCE MODELS OF SEGREGATION

Social distance and preference dynamics are not generally seen as playing an important role in ethnic segregation in American cities. One reason for this is that the role of these factors has been vigorously discounted, in some cases even dismissed, by influential segregation theorists. In view of this, I review some of the more common critiques of social distance and preference models of segregation and offer my reasoning for why the case for setting aside theories of segregation that emphasize social distance and preference dynamics is not compelling. My review touches on many different issues, but there is one theme that consistently comes to the foreground—social distance and preference theories are grounded in formal theoretical analysis to a much greater degree than the critiques which are often contradicted by careful theoretical analysis.

Prejudice is Not Enough: Preference Effects Cannot Produce or Sustain Segregation in the Absence of Discrimination

Segregation theorists distinguish between the effects of prejudice and housing discrimination. Prejudice involves negative affect and predispositions toward others but is distinct from housing discrimination which involves actions that constrain minority housing options. Acts of discrimination may range from overt acts of violence and intimidation to covert acts of differential treatment by real estate professionals. Discriminators may or may not be motivated by personal prejudice; prejudiced individuals may or may not engage in acts of discrimination. Discrimination theorists such as Massey and Denton (1993), Yinger (1995), and others have criticized preference theories

for hypothesizing that white prejudice can promote segregation *apart* from discrimination. Thus, they raise the question “Absent discrimination, can white aversion to coresiding with minorities create and/or maintain segregation by leading whites to avoid locating in areas with significant minority presence and fleeing from neighborhoods when minority presence increases?”

Massey and Denton (1993) argue the answer to this question is “no” and offer a critique of preference theories that hinges on two arguments. The first is that the interaction of white prejudice (i.e., whites’ low tolerance of residential contact with minorities) and minority preferences cannot create and/or maintain segregation. The second is that segregation can only be created and maintained if housing discrimination prevents minorities from establishing and settling in integrated residential areas. In their words:

“By itself...the Schelling model is incomplete. Although it accurately captures the dynamic effects of prejudice, it accepts as a given the existence of racial discrimination. Black entry leads to neighborhood racial turnover not simply because of the interaction of white and black preferences but because the model implicitly assumes a racially segmented housing market maintained by discrimination. Whites can only avoid co-residence with blacks if mechanisms exist to keep blacks out of most white neighborhoods. They can only flee a neighborhood where blacks have entered if there are other all-white areas to go to, and this escape will only be successful if blacks are unlikely to follow. Some method must exist, therefore, to limit black entry to a few neighborhoods and to preserve racial homogeneity in the rest. Although white prejudice is a necessary precondition for the perpetuation of segregation, *it is insufficient to maintain the residential color line; active discrimination against blacks must occur also.*” (1993:97; emphasis added).

This statement is clear and unambiguous. Massey recently reiterated the position (2000: 65) using nearly identical wording thus affirming his views on this issue and offering them as a serious challenge to theories of segregation that emphasize social distance and preference dynamics.

These conclusions may be questioned on several counts. The first is that Massey and Denton specifically discount Schelling’s theories, but they do not expose flaws in Schelling’s theoretical and simulation analyses showing neighborhood integration to be unstable when groups hold incompatible ethnic preferences. They assert that the “interaction of white and black preferences” is, in and of itself, insufficient to produce “neighborhood racial turnover” and segregation. But they do not identify errors in Schelling’s formal theoretical

analyses of preference effects, nor do they provide alternative formal theoretical analyses producing different results. Similarly, they do not identify problems with his simulation analyses or present alternative simulation results showing integration to be stable under the kinds of conditions examined by Schelling. This raises the question, “What is the specific basis for dismissing Schelling’s theoretical analyses and simulation results?” In my view, a compelling critique of Schelling must ultimately answer this question. Some 30 years later, no telling critique of Schelling’s theoretical analysis has gained acceptance. To the contrary, a recent theoretical review by Young (1998) concluded that Schelling’s basic insights are robust. A recent paper by Laurie and Jaggi (2003) purported to identify important possibilities for integration within Schelling-like simulation models, but Fossett and Warren (2005) exposed crucial flaws in Laurie and Jaggi’s analysis and strongly supported Schelling’s position.

A second problem with Massey and Denton’s critique of Schelling is found in their assertion that whites “can only flee a neighborhood where blacks have entered if there are other *all-white* areas to go to” and that “some method must exist, therefore, to limit black entry to a few neighborhoods and to preserve racial homogeneity in the rest” (1993: 97; emphasis added). These statements suggest that the maintenance of *all-white* neighborhoods is central to Schelling’s theories of neighborhood change and segregation. This is not the case. *Schelling does not assume that whites will only move to all-white neighborhoods.*¹¹ His models draw on the much weaker assumption that, when the option is available, whites will choose neighborhoods that have higher white representation over neighborhoods with lower white representation. This is readily evident in his discussion of how variation among whites in their tolerance for different ethnic mixes may affect “tipping” and neighborhood transition.

A third weakness in Massey and Denton’s critique is found in the assertion that Schelling’s model “implicitly assumes a racially segmented housing market maintained by discrimination.” This also is not the case. Schelling’s models and simulation experiments generate stable segregation from any starting condition where ethnic composition varies across neighborhoods. Simulations I present below replicate this finding, and it is replicated in Fossett and Waren

¹¹Schelling’s work gives careful consideration to a broad range of issues including heterogeneous preferences on the part of whites for different neighborhood ethnic mixes. His theoretical models do not hinge on assumptions that whites seek all-white neighborhoods.

(2005). In Schelling's models, whites seek out neighborhoods with greater white representation and avoid neighborhoods with lesser white representation. *All that is needed for this process to ensue is that ethnic composition vary across neighborhoods.* This can result from a variety of mechanisms including simple random forces. Discrimination could be one of these mechanisms, but it is not *necessary* to assume that discrimination is involved. Other systematic and random forces may serve to create the variation in ethnic composition needed to "fuel" preference dynamics in Schelling's models.

Regarding systematic forces, status dynamics combine with ethnic inequality to produce variation in ethnic composition across status-stratified neighborhoods.¹² Settlement patterns of in-migrating ethnic populations also produce variation in ethnic composition across neighborhoods.¹³ Other systematic social mechanisms can be noted, but *systematic forces need not be assumed.* Winship (1977) has shown that ethnic composition will vary nontrivially across neighborhoods and other small areas *under conditions of purely random assignment.* This stochastic component of variation in neighborhood ethnic composition is more pronounced when there are multiple ethnic groups, when some groups are small in size, and when smaller geographic areas (e.g., blocks or block groups) are considered. It will be especially pronounced when housing decisions consider immediate neighbors, a situation Schelling explicitly considers in his simulation analyses. Thus, Schelling's models do not rest on any necessary assumptions about discrimination or other systematic forces producing variation in ethnic composition relevant to whites' location decisions.

The fourth problem with the conclusion that social distance and preference dynamics cannot generate segregation in the absence of discrimination is the implicit reliance on the assumption that minority preferences are integration-promoting. This assumption is evident in Massey and Denton's statement that "whites can only avoid co-residence with blacks if mechanisms exist to keep blacks out of most white neighborhoods." The assumption is embraced by many others, but it is incorrect. The issue is of sufficient importance that I give it separate treatment.

¹²The research literature consistently reports that, while status dynamics are not a central cause of ethnic segregation, status inequality and status dynamics does produce non-negligible levels of ethnic segregation.

¹³By definition, literal first arrivers cannot be evenly distributed across all neighborhoods. Later arrivers tend to locate nearby because: they have similar status characteristics; they depend on earlier migrants for information about residential options; and they often desire to locate near earlier migrants.

Minority Preferences are Integration-Promoting

The view that minority preferences are integration-promoting is hardly unique to Massey and Denton. They are direct and clear in rejecting the idea that minority preferences for “largely black” neighborhoods could promote high levels of segregation, stating that “this line of reasoning does not square with the survey evidence” (1993: 88). Other scholars offer similar arguments and conclusions. For example, Charles (2001) reviews data on minority preferences and draws the conclusion that the data “argue strongly against the idea that the high level of residential segregation experienced by blacks . . . is the result of black preferences for majority same-race neighborhoods” (2001: 193). Yinger’s analysis of white and black attitudes towards residential mixing leads him to state that “black attitudes do not constitute a major barrier to integration” (1995: 188), whereas the attitudes of whites are such that “integration cannot be sustained in the long run at any racial composition” (1995: 189). Krysan and Farley’s analysis of blacks’ preferences leads them to conclude that the data reveal a clear desire for integration and a ready willingness to mix with whites (2002: 950, 960).

There is a fundamental problem with these strongly-stated conclusions—they imply that minority preferences documented in surveys are integration-promoting, or at a minimum are compatible with extensive integration, when they are not.¹⁴ To the contrary, minority preferences regarding neighborhood ethnic mix are unambiguously segregation-promoting in most cities; they cannot be satisfied in fully integrated cities, cities in which all ethnic groups are distributed evenly across neighborhoods. Consequently, *the realization of minority preferences would foster high levels of segregation in at least three ways under models that emphasize social distance and preference dynamics*: minority preferences would directly sustain uneven distribution of minority households across neighborhoods; residential distributions resulting from minority preferences would give whites ample opportunities to avoid residential contact with minorities; and, all else equal, the two preference dynamics just described would interact (as Schelling explicitly theorizes) to drive cities toward racially polarized neighborhoods.

What are the key characteristics of minority preferences? The minority preference data Massey and Denton (1993) introduce to support their arguments are taken from the Detroit Area Survey

¹⁴As later discussion shows, minorities need only seek disproportionate co-ethnic presence for their preferences to be segregation-promoting.

(Farley et al., 1978). Similar data have been reported for other cities and more recent time periods (Clark, 1991, 1992, 2002; Farley et al., 1994; Zubrinsky and Bobo, 1996; Charles, 2001; Farley, Danziger, and Holzer, 2000). These studies are consistent in showing that an overwhelming majority of black respondents express a preference for a neighborhood mix that is *at least* 50% black.¹⁵ Only a small fraction of black respondents express a preference for neighborhoods where blacks are a minority in the population as either their first or second choice. There are few if any metropolitan areas in the country where these preferences could be satisfied with a proportionate (even) distribution of ethnic groups across all neighborhoods.¹⁶ Even distribution of groups across neighborhoods would create neighborhoods where black representation falls far short of meeting blacks' preference for 50% in-group contact (or higher). Since proportionate (even) distribution is the standard reference point for full integration (zero segregation) as measured by *all* measures of uneven distribution (e.g., the widely used index of dissimilarity), minority preferences unambiguously promote segregation relative to this standard.

This conclusion revolves around what I term *the paradox of weak minority preferences*; that is, while blacks' preferences for in-group contact are much weaker than those observed for whites, *they nevertheless are segregation-promoting, not integration-promoting*. The crux of the matter is that the consequences of ethnic preferences for segregation depend critically on ethnic demography; preferences are segregation-promoting if they exceed population representation. Consequently, for any numerical minority, preferences for moderate and even low levels of in-group contact can be frustrated under conditions of proportionate (even) distribution of groups across neighborhoods. If minority households act on their "weak" preferences for in-group contact, their location decisions will initiate a segregation-producing, ecological process known as "congregation." If this process is not constrained or countered by other forces, it can generate very high levels of segregation.¹⁷

¹⁵The most common first choice is for a 50/50 mix. The next most common first choice is for a mix that is substantially greater than 50% black (e.g., 70%).

¹⁶Proportionate or even distribution means that, for two groups being compared, the proportion of each group's population in each area is the same. Thus, for example, if an area contains a certain fraction (e.g., 0.02) of the city's white population, it also will contain that fraction of the city's black population.

¹⁷While not specifically drawing on urban ecological theory, Thernstrom and Thernstrom make a similar point (1997: 225–230).

This can be illustrated by considering a hypothetical city that is 15% black and 85% white (not an uncommon situation).¹⁸ If minority preferences for 50/50 neighborhoods are realized by means of strategic assignment that minimizes segregation while never violating minority preferences, 30% of the city's population would reside in 50/50 integrated neighborhoods, and 70% of the city's population would reside in all-white neighborhoods. The integrated neighborhoods would contain all blacks in the city plus 17.65% of whites in the city ($17.65 = 100 \cdot 15 / 85$); the all-white neighborhoods would contain the remaining 82.35% of whites in the city. The index of dissimilarity (D) for the city would be 82.35.¹⁹ Several things are significant about this result. First, this value is higher than the reported values of D for white-black segregation in most metropolitan areas. Second, this value is the *theoretical minimum* level of segregation under *strategic assignment* of white and black households that avoids contradicting blacks' preferences. Third, even the modest level of integration that results requires that whites be *constrained* by some unspecified force to reside in "integrated" neighborhoods in violation of their residential preferences.²⁰ Obviously, if whites prefer neighborhoods with disproportionate white representation, *even the limited integration that does result under fully realized minority preferences is highly unstable*. Absent restrictions on white movement, whites would leave integrated areas and move to the readily available predominantly-white areas and segregation would increase to yet higher levels (this is the polarizing interaction of group preferences hypothesized by Schelling).

¹⁸For convenience, I use the terms "city" and metropolitan area synonymously, focusing on the notion of the greater urban area that includes both central city and suburban ring.

¹⁹This value can be obtained from the standard formula $D = 1/2 \sum |w_i - b_i|$, where w indexes neighborhoods and w and b measure each neighborhood's percentage share of the city-wide total of whites and blacks, respectively. The city's all-white neighborhoods can be treated as a single area for which $|w_i - b_i|$ is 82.35 (since w_i is 82.35 and b_i is 0.0). Similarly, the remaining integrated neighborhoods can be treated as a single area for which $|w_i - b_i|$ also is 82.35 (since b_i is 100.0 and w_i is 17.65). Thus, $1/2 \sum |w_i - b_i|$ is 82.35.

²⁰Few whites (one third or less) indicate that they would be willing to move into a 50/50 white/black neighborhood and the number is undoubtedly much lower for majority black neighborhoods. Very few whites identify this neighborhood mix as a first choice or second choice. The vast majority of whites have a first choice for a majority white neighborhood.

Why are minority preferences commonly, but mistakenly, viewed as integration-promoting? I believe the answer is found in careless theorizing about the consequences of preference-based location decisions. Specifically, researchers who conclude that minority preferences are integration promoting often draw on multiple, inconsistent meanings of the term “integration” when reasoning about the effects of preferences. For example, because minorities are more tolerant of out-group contact than whites, it is conventional to describe minorities as being more tolerant of “integration” and more inclined to seek “integrated” neighborhoods. In this same mode, areas compatible with minority preferences (50/50 white-black mixes) are routinely characterized as “integrated” and neighborhoods compatible with whites’ preferences (90/10) for high in-group contact are described as “segregated” (or at least less integrated). The problem is that these characterizations are not consistent with the notion of integration that guides the measurement of city-level segregation—the notion of even distribution.

When defined in terms of even distribution, integration is strictly contingent on a city’s ethnic demographic structure. Thus, all neighborhoods in a perfectly “integrated” city will have an ethnic mix that reflects the city’s ethnic mix, not some particular ethnic mix (e.g., 50/50). In a city that is 85% white and 15% black, full integration is reached *if and only if all* neighborhoods are 85% white and 15% black. Under this definition of integration, neighborhoods that depart from an 85/15 white/black mix promote segregation, not integration. Seen from this vantage point, minority preferences for 50/50 neighborhoods depart further from the ideal of integration than white preferences for 90/10 neighborhoods.

It is safe to say that minorities are more tolerant of diversity and out-group contact than whites. But this does not mean that minority preferences are more compatible with integration. The distinction is at the heart of the paradox of weak minority preferences, blacks *are* more accepting of out-group contact, but whites’ preferences may nevertheless be more compatible with the kinds of neighborhoods needed to produce integration under the standard of even distribution. The significance of the paradox is revealed by the fact that, for the hypothetical 85/15 city under consideration, whites’ relative intolerance for out-group contact would produce a surprisingly low level of segregation. Under strategic assignment that minimizes segregation without violating whites’ preferences, all whites would live in neighborhoods that are 90% white. These predominantly white neighborhoods would accommodate about 63% of the black population in the city, and the index of dissimilarity (D) would be

37.04.²¹ This value is much lower than the value of 82.35 generated under strategic assignment minimizing segregation under minority preferences (noted above).

The paradox of weak minority preferences is at the heart of two facts about minority preferences that are not widely appreciated. The first, already noted, is that minority preferences cannot be described as integration-promoting; if realized, they can promote substantial segregation. The second is that, under ethnic demographic structures found in many American metropolitan areas, minority preferences can, at least in one technical sense, be seen as no more and perhaps even less compatible with integration than white preferences as just illustrated in the above example. In view of this, those who wish to portray minority preferences as integration-promoting confront a major problem; they must show how residential choices guided by minority-preferences will directly or indirectly produce an even distribution of groups across areas. As yet, this has not been shown.

There are only a handful of ways to avoid the conclusions just offered. One is to abandon the notion of integration as even distribution. Many would object to this because it would fundamentally reshape widely accepted understandings of patterns of segregation in American cities. For example, under any notion that counts 50/50 neighborhoods as integrated, measured levels of segregation in American metropolitan areas would drop dramatically.

Another alternative open to those who are skeptical of the implications of social distance and preference theory is to consider discounting data on preferences or casting them aside as irrelevant altogether. One obvious problem with this approach is that many of the critics of preference theory have already characterized these data as highly relevant to the theoretical debate. If this inconsistency is ignored, there are some additional possibilities. One is to argue that blacks' preferences for in-group representation in neighborhoods are in fact much weaker than studies would suggest and in fact are integration-promoting. To do this, it would be necessary to establish

²¹The city's population is 85% white. They will accept a proportion of 0.10 black. The expression $0.10 = X/(85 + X)$ represents X as the maximum proportion of the city's population that could be black and co-reside with whites without violating whites' preferences. Solving for X yields a figure of 9.44. The city's population is 15% black. Thus, 62.96% of blacks ($62.96 = 100 \cdot 9.44/15$) would live in integrated neighborhoods and 37.04% of blacks would live in all-black neighborhoods. The city's all-black neighborhoods can be treated as a single area for which $|w_i - b_i|$ is 37.04 (since w_i is 0.0 and b_i is 37.04). The integrated neighborhoods can be treated as a single area for which $|w_i - b_i|$ also is 82.35 (since b_i is 62.96 and w_i is 100.0). Thus, $D = 1/2 \sum |w_i - b_i| = 37.04$.

that blacks specifically prefer neighborhoods where black representation matches the proportion black in the population of the city as a whole over other types of integrated neighborhoods. No researcher reporting preference data has suggested that this is the case. Also, if the data presented in the literature are taken at face value, they clearly indicate that this is not the case (Clark, 1991, 1992, 2002; Bobo and Zubrinsky, 1996; Farley, Danziger, and Holzer, 2000).

Another option is to argue that minority preferences for in-group contact do not reflect “real” preferences, but instead reflect concerns about discrimination, hostility, and ill treatment in predominantly white neighborhoods. Strictly speaking, this does not establish that minority preferences are integration-promoting but *provides an explanation for why they are not*. If these concerns are based on realistic assessments of present-day risks of encountering discrimination, hostility, and ill-treatment, then conventional discrimination theory applies. If the assessments are not realistic, if they are exaggerated stereotypes of present-day risks grounded in the legacy of a long history of racial antagonism, then cultural lag theory applies; historical discrimination becomes a distal cause, present-day preferences are the proximate cause. The distinction is crucial because implications for policy differ dramatically depending on which pattern (if either) applies. I give these important issues further consideration in later sections.

Heterogeneity in Preferences and Competing Preferences Undermine Segregation Dynamics Outlined in Preference Models

Yinger (1995) argues that preference models of segregation can be discounted because the representation of preferences in these models is too simplistic. One criticism he offers is that white prejudice is not homogeneous, and thus integration may be more feasible than an examination of average or median preferences would suggest (1995: 119). This idea has intuitive appeal. But it again reflects the tendency of critics of preference theory to dismiss Schelling’s theoretical analysis without exposing specific errors of reasoning or offering alternative models leading to different outcomes. Yinger offers no evidence or theoretical analysis to show that heterogeneity in preferences would lead to different outcomes in preference models. This does not mean that the hypothesis should not be considered. However, there is no theoretical or empirical evidence to support Yinger’s position; it appears to be an informed hunch. Theoretical analyses (Schelling, 1971a; Fossett, 2004; 2006) suggest that heterogeneity of preferences

does not undermine the segregation-producing force attaching to the central tendency (e.g., the median) of preference distributions. Simulation experiments presented below also support this conclusion. Two key factors are involved. The first is that, by definition, variation around the central tendency includes not only people with *greater* tolerance for out-group contact, but also people with *lesser* tolerance. The second is that Schelling's theoretical work outlines how incremental neighborhood change resulting from the behavior of the less tolerant undermines the stability of integrated neighborhoods that might be possible under strategic assignment of households with compatible preferences.²²

Yinger offers a second critique of preference theories by hypothesizing that racial preference effects are likely to be undermined by competing preferences. He argues that ethnic composition is not necessarily an end in itself for many households but rather something associated with crime, housing values, school quality, responsive government, good services, and other neighborhood amenities which are ends in themselves. Thus, he suggests “[r]acial and ethnic attitudes are not so strong for most people that they cannot be overcome by other neighborhood factors” (1995: 121). The hypothesis merits consideration. Accordingly, the simulations I report below directly consider this view by giving households competing preferences for housing quality and neighborhood status and giving the combination twice the weight as ethnic preferences.

It is important to note, however, that the hypothesis can be questioned on several counts. First, many would be skeptical of the premise that ethnic mix has little intrinsic relevance to most households. When ethnic preferences are grounded in prejudice, ethnocentrism, cultural nationalism, ethnic solidarity, or even amorphous notions of a sense of “comfort” or “community,” ethnic mix is often an end in itself not simply a proxy for neighborhood amenities. Similarly, if households view neighborhood ethnic mix as *predictive* of unwelcome neighborhood change, they may make decisions based on ethnic mix even when other factors are otherwise acceptable.²³

Second, the possibility that ethnic preferences *can* in principle be “overcome by other neighborhood factors” does not mean that this is

²²Schelling points out that the least tolerant whites leave an integrated area first. As they leave the ethnic mix changes making some of the remaining, less prejudiced whites uncomfortable and they leave and so on.

²³Even people who understand that neighborhood change might be driven by self-fulfilling prophecies may nevertheless act in ways that reinforce the dynamic because they rationally fear being a victim of the process (i.e., they fear being the last to sell their home in a neighborhood that is “turning”).

likely to be an empirically important dynamic. The pursuit of non-ethnic concerns for housing quality, neighborhood status, crime, school quality, and the like has the *potential* to promote ethnic integration. However, *for this to be the case, ethnic concerns must be substantially incompatible with non-ethnic concerns and ethnic concerns must be subordinate to non-ethnic concerns that influence location decisions.* Must whites compromise on school, neighborhood, housing quality, and other amenities to locate in predominantly-white neighborhoods? Must blacks who prefer significant black representation in their neighborhoods compromise on schools and other amenities to satisfy this preference? When households hold multiple preferences and are forced to compromise on something, will they compromise first on ethnic concerns and must these compromises be dramatic? These conditions may not necessarily hold. The emergence of segregated suburbs in recent decades has created a situation that affords whites the opportunity to satisfy both ethnic and nonethnic preferences through voluntary movement rather than exclusion and at the same time permits blacks who seek above expected (i.e., disproportionate) co-ethnic presence access to higher-status neighborhoods with high quality housing, better schools, lower crime, and more attractive amenities and services.²⁴

Some might speculate that the emergence of segregated suburbs is a clear sign of evolving discrimination dynamics. Housing discrimination undoubtedly contributes to suburban segregation, but single-factor explanations are likely simplistic and the possible role of social distance and preference dynamics in this phenomena cannot be ruled out on either theoretical or empirical grounds. The basic theoretical arguments reviewed earlier apply here, and the hypothesis that minority housing choices are less constrained by discrimination now than in the past is *especially* plausible for higher-status minority households. In addition to these considerations, the paradox of weak minority preferences may have particular relevance for segregation dynamics in suburban settings. Again the crux of the matter is that the implications of ethnic preferences for segregation are contingent on socio-demographic distributions. Inter-group inequality and status segregation dynamics serve to intensify the segregation-promoting impact of weak minority preferences. Because ethnic inequality in socioeconomic status is high, blacks are especially underrepresented

²⁴The fact that predominantly black suburbs tend to be older and lower status than predominantly white suburbs does not undercut this point. Black suburbs typically have lower crime and better services and amenities than predominantly black inner-city neighborhoods.

at higher-status levels. Consequently, if white and black higher-status households are distributed evenly across higher-status neighborhoods, higher-status black households will reside in neighborhoods where black representation is *lower* than blacks' overall representation in the population. Under these circumstances, higher-status black households would have an especially difficult time satisfying a preference for 50/50 "integrated" neighborhoods. Thus, the paradox of weak minority preferences creates especially strong *structural* pressures for higher-status blacks to congregate. The question arises, is it likely that higher-status black households will strongly prefer neighborhoods where blacks are represented in *status-specific, population proportions* over neighborhoods that are otherwise equivalent in terms of status, amenities, and services but have greater black presence? Further research in this area is needed, but as yet there is little evidence to suggest that this is typical.²⁵ Moreover, this possibility contradicts the premise of Yinger's argument that stresses the role of practical concerns over ethnic ones in residential choices.

Significantly, this same structural situation makes it easier for higher-status whites to satisfy their low levels of contact with minorities. Conceivably, higher-status whites' preference for 90% white neighborhoods might be satisfied on the basis of *even* distribution of whites and blacks *within* status levels. Thus, the notion that higher-status whites must *necessarily* turn to exclusionary discrimination to avoid high levels of contact with minorities in suburban areas is questionable on demographic grounds. Three alternatives to discrimination might serve them as well. In cities where minority representation at high-status levels is low, they might not be required to do *anything*. Alternatively, whites could seek neighborhoods that are more *uniformly* high-status since that would help insulate them from contact with minorities.²⁶ Finally, whites could simply avoid suburban areas with a significant minority presence. If Yinger's argument that households focus primarily on non-ethnic concerns applies to minorities,

²⁵I prepared simple tabulations from the Multi-City Study of Urban Inequality to explore this issue and could not find evidence that preferences for black representation in neighborhoods were lower for upper- and middle-status black households; they also prefer 50/50 "integrated" neighborhoods as a first choice. Krysan and Farley (2002: 960) also report data that is consistent with this conclusion. All else equal, then, greater congregation is required to satisfy this preference.

²⁶Status homogeneity reduces the possibility that minorities can enter high-status areas at the "low end". In light of this, it is interesting to note that area stratification within metropolitan areas appears to have increased in recent decades (Jargowsky, 1997). Gated communities and other class-homogeneous "up scale" development strategies effectively insure that high-status whites will have limited residential contact with blacks of any status and almost no contact with working-class blacks.

their indifference to neighborhood ethnic mix in suburban areas will not undermine segregation produced by white flight and avoidance behavior. In view of these possibilities, it is not unreasonable to consider the possibility that the emergence of segregated suburbs in recent decades has been shaped by more than just discrimination dynamics.

Ethnic Preferences Do Not Reflect “Neutral” Ethnocentrism

Some critics object to theories that emphasize preferences and choice because they are wary that this may suggest that segregation rests on benign inter-group dynamics. Thus, Krysan and Farley stress that preference dynamics involve more than “neutral ethnocentrism” (2002: 969), and Bobo and Charles (1996) stress that whites’ preferences are not simply positive affirmations of in-group culture but also are shaped by negative stereotypes of and prejudice toward minorities. The potential role of negative stereotypes and prejudice in shaping preferences and choice should be acknowledged. *However, doing so does not diminish the relevance of theories of segregation that emphasize social distance and preference dynamics because these theories do not require an assumptions that ethnocentrism is neutral or that preferences are grounded only in positive sentiments toward in-groups.*

Many influential critics of preference theories recognize that these models readily incorporate both prejudice toward out-groups and positive sentiments toward in-groups. For example, Massey and Denton state that Schelling’s model “accurately captures the dynamic effects of prejudice” (1993: 97). The critique that they and Yinger (1995) offer against preference theories is not that the models have problems incorporating stereotypes and prejudice, but rather it is that white prejudice *alone* is not sufficient to sustain segregation (i.e., in their view discrimination also is required). Urban ecological theories of segregation likewise incorporate both forces of attraction *and* aversion. Attraction occurs when social distance is low based on similarity of interest or common culture. Aversion results when social distance is high based on dissimilar interest or cultural difference and such situations may well include negative stereotyping, lack of acceptance, and antipathy between groups. Thus, generally accepted accounts of spatial assimilation for European immigrant groups stress the role of acculturation and socioeconomic assimilation in reducing negative stereotypes, prejudice, and avoidance behavior on the part of established groups.²⁷

²⁷Socioeconomic assimilation provided greater means for successful competition in housing markets. But, the attenuation of socioeconomic differences also reduced the social distance between groups.

In sum, the notion of neutral ethnocentrism is not crucial to theories of segregation that emphasize social distance and preference dynamics. Any choice to seek greater than proportionate contact with co-ethnics necessarily diminishes the possibility for contact with out-groups and increases spatial separation between groups; the particular motivation behind the choice (i.e., attraction vs. aversion) may be a matter of perspective and in any case is largely beside the point.²⁸ The key for general formulations of social distance and preference theories is not whether the orientation toward different groups are specifically positive, negative, or indifferent. The key is whether groups are ranked in terms of their relative desirability for residential contact. If so, choice behavior may well promote segregation and it matters little whether residential choices are described as “most attractive” or “least objectionable,” the implications for spatial patterns are identical.

Minority Preferences Do Not Reflect “Authentic” Ethnic Solidarity

Another criticism of preference theory is that minority preferences do not derive from authentic sentiments of solidarity with ethnic culture and co-ethnics. For example, Krysan and Farley (2002) deem it important that only a small fraction of black households avoid predominantly white areas for reasons relating to “cultural differences.” This conclusion can be questioned on the basis that the survey evidence they review on this point is not geared to ascertaining the prevalence and importance of minority ethnic solidarity.²⁹ But that is a side issue. The crucial theoretical point is that theories of segregation that emphasize social distance and preference dynamics do not require that minority preferences reflect ethnic solidarity grounded in powerful sentiments of cultural nationalism and ideological commitment to group solidarity.

Urban ecological theory predicts that segregation may emerge from social distance and preferences associated with many different social characteristics including not only ethnicity and socioeconomic status

²⁸The one exception is when aversion is based on the expectation of extreme discrimination and hostile treatment. This issue is discussed later.

²⁹As is discussed in more detail below, their coding procedures limit “cultural” reasons. In addition, they identify reasons for desiring disproportionate co-ethnic presence such as “want diversity” or “would not feel comfortable” without considering whether “comfort” is linked to the presence of minority culture and institutions or whether “diversity” would be prized if it involved proportionate minority representation.

but also family life-cycle variables, life-style values, and other factors. For example, young professionals without children systematically live apart from middle-class couples with children. College professors often live apart from corporate managers and sales worker who have roughly similar socioeconomic status.³⁰ Accepted ecological explanations for this do not presume that either of the groups has a strong ideological commitment to a particular social identity and “true” sentiments of solidarity relative to that identity. Instead the explanations invoke the much weaker assumption that the two kinds of households have different sensibilities, interests, and priorities and tend to be attracted to different kinds of housing, locations, residential amenities, and neighbors. These sentiments can be relatively amorphous as might be expressed in general statements that a neighborhood “feels right,” “feels comfortable,” “has a sense of community,” or “would be easy to fit in.”³¹ These notions stressed in urban ecological theory and social area analysis are hardly controversial; they are routinely invoked to help explain the “urban mosaic.” In view of this, it is difficult to dismiss the argument that group differences in ethnic culture meet the relatively low threshold needed to entertain the hypothesis that social distance and preference dynamics may contribute to residential segregation.

Social Distance and Preference Dynamics Warrant Little Attention Because Discrimination Is the Only Important Cause of Segregation

Is it possible to conclude that the role of social distance and preference dynamics in segregation cannot be significant because discrimination is without question the only important cause of segregation? There is a sense in which this argument had considerable force in the past. The unprecedented levels of white-black segregation that emerged in the period 1920–1960 resulted from factors such as state sanction, institutionalized discrimination in the housing industry, and widespread acts of intimidation and violence aimed at excluding blacks from white neighborhoods (e.g., Massey and Denton, 1993). These manifestations of spatial competition were qualitatively and quantitatively exceptional and placed ethnic segregation squarely in the realm of overt inter-group conflict. In such situations, the

³⁰See for example, Park’s (1926) discussion of spatial variation in groups that differ on life-style groupings differentiated on age, sex, and stage in the life-cycle.

³¹Alternatively, these sentiments could be negatively expressed as “doesn’t feel right,” “doesn’t feel comfortable,” “wouldn’t fit in,” or “lacks a sense of community.”

notion of individual households making choices in a decentralized market has limited relevance.

Nowadays, however, segregation theorists do not emphasize the direct role of these exceptional factors in explaining segregation. This is true of theorists who emphasize the role of discrimination as well as those who do not. For example, Massey and Denton stress the role of extreme and blatant forms of discrimination in explaining *past* segregation, but acknowledge that these have largely ended and that the present era is different from the past. They argue that discrimination is still a central factor in segregation, but they stress that a new pattern—"discrimination with a smile"—has taken root (1993: 96–98). In their account, this new form of discrimination is insidious rather than blatant; it consists of welter of small, subtle acts of discrimination that are "usually unobservable, even to the person experiencing it" (1993: 98). To highlight examples of present-day discrimination, Massey and Denton cite the work of Yinger (1995) and other researchers who use sophisticated study designs and statistical analysis to document that minorities experience discrimination in their housing search (e.g., receiving less information and assistance from real estate agents) and mortgage lending. They argue that, in the present era, the manifestations of discrimination are different, but the final outcome is not because a dense web of subtle acts of discrimination has "a powerful, cumulative effect lowering the probability of black entry into white neighborhoods" (1993: 98).

Not surprisingly, researchers who stress the role of social distance and preference dynamics in present day segregation also assign little importance to the role of extreme forms of discrimination. For example, Thernstrom and Thernstrom (1997) conclude that the incidence of racial exclusion grounded in violence and the threat of violence have become rare. They note that black entry into previously all-white suburbs and neighborhoods occurred at unprecedented levels in recent decades, even in bastions of segregation such as suburban Chicago. In an earlier era this would have precipitated dramatic increases in acts of intimidation and violence. In the present era it did not, thus highlighting how the present era differs from the past (1997: 219–220). Patterson (1997: 46) draws on evidence from audit studies, accounts of the Gautreaux program in Chicago, and his own experiences, and concludes that discrimination does not necessarily prevent minority families that desire to live in an integrated neighborhood from doing so. He acknowledges the continuing existence of lesser forms of housing discrimination and the need to eliminate it. But he argues that its impact is not insurmountable in the way that

discrimination in earlier eras was. To the contrary, his view is that minority families who wish to do so usually are able to move to a predominantly European-American neighborhood, albeit not necessarily any such neighborhood.³²

In sum, no segregation theorists make the argument that present day segregation is maintained by the kinds of blatant and extreme forms of discrimination that made the notion of individual households acting independently in a decentralized market irrelevant in the past. Even theorists who stress the role of discrimination describe it as less severe and portray it in statistical, not monolithic, terms. This leaves open the logical possibility that choice can affect segregation patterns.

Ethnic Preferences Are Not “Causal” Because They Are Rooted in Past Discrimination

Yinger focuses on whites' residential preferences and argues that "white prejudice is itself a product of past and current discrimination in housing and other markets" (1995: 120). In his view, white prejudice is "supported by a vicious circle;" group disparities in social outcomes and lack of contact give rise to prejudice that leads to discrimination which preserves disparities and segregation. Thus, he argues that "stating that white prejudice is a cause of segregation is equivalent to" saying "that past discrimination continues to promote segregation through its legacy of white prejudice" (1995: 120). The problem with this argument is that, while it is plausible that prejudice and discrimination reinforce each other through feedback loops (i.e., a "vicious circle"), this does not constitute a basis for dismissing "prejudice" models of segregation. *The proximate causal force of whites' preferences in voluntary choice models of segregation cannot be denied based on the fact that they are part of a complex causal web.* If whites systematically avoid residential contact with minorities, the proximate impact on segregation is clear regardless of whether the preferences that motivate whites' behavior are a legacy of past discrimination and segregation or not.

Another variation of the idea stresses the role that past discrimination has played in shaping blacks' preferences for co-ethnic

³²My conversations with an admittedly non-random sample of middle-class blacks (mostly academic professionals and college students) on this topic provide no basis for contradicting Patterson's conclusion. For example, I have never encountered the view that it would be difficult for a middle-class black household to move to a home in a predominantly white neighborhood in the city I live in; yet the segregation level in this city is near the average for all metropolitan areas nationwide.

presence. In this view, blacks' historical experience is unique and should not be equated with that of voluntary immigrant populations highlighted in early formulations of the ecological model of spatial assimilation (Massey, 1985). Where immigrants may carry a preexisting culture and seek to reproduce ethnic institutions (Breton, 1964), black culture, group solidarity, and preferences for co-ethnic contact must be seen as *defensive* adaptations to exceptional and enduring institutionalized discrimination and segregation. This view is plausible, but it does not negate the possibility that minority preferences may have *proximate* causal force in present-day segregation dynamics. *Simply put, the impact of preferences in the present day cannot be denied based on their unique historical origins.* Those who see black culture and social institutions as temporary adaptations that will "dissipate" in the future may properly characterize the impact of minority preferences in terms of "inertia" or "cultural lag." But they cannot simply dismiss their proximate consequences for residential patterns.

The same line of reasoning applies to the argument that minority preferences are rooted in a past history of encountering blatant discrimination and extreme hostility in predominantly white residential areas. Discrimination theorists do not challenge the Thernstroms' point that nowadays the "objective risk" of encountering extreme hostility is low and falling. Still, it would be surprising if minority concerns created by the harsh reality of past discrimination did not linger, possibly for decades or generations. Those who emphasize the role of preferences should acknowledge this "cultural lag" dimension of preferences. But it is equally important for the critics of preference theories to recognize that this *explanation* of the origins of preferences is not a basis for concluding that preference dynamics are inconsequential. The distinction is crucial for framing and assessing policy. If past discrimination is a *distal* cause of present-day segregation operating via the proximate mechanism of minority preferences, two points warrant consideration. One is that the full impact on segregation of reducing discrimination is not likely to be realized in a short period of time; it may be decades before the lingering effect of past discrimination on minority preferences dissipates. This possibility must be taken into account when assessing the impact of past efforts to reduce discrimination. Another point to bear in mind is that efforts aimed at changing minority perceptions could help hasten movement toward greater integration. Those who are interested in better understanding present-day segregation and who wish to promote greater integration should not ignore these possibilities.

Minority Willingness to Mix Preferences May Foster Possibilities for Integration

Krysan and Farley (2002) acknowledge that blacks' top preferences for neighborhood ethnic composition suggest that "prospects for neighborhood integration are bleak" (2002: 959). However, since neighborhoods of the type blacks most prefer (i.e., 50/50 areas) are uncommon, they suggest that possibilities for integration may hinge on blacks' willingness to move to areas with other ethnic mixtures. They then review data showing that blacks' willingness to mix with whites is much greater than whites' willingness to mix with blacks (2002: 959–960) and conclude that blacks' preferences more are conducive of integration than are whites' preferences.

Closer consideration of the situation reveals that the story is more complicated than Krysan and Farley's discussion suggests. Krysan and Farley stress that blacks are more willing to mix than whites. They support this conclusion with data showing that 89% of blacks are willing to move to a neighborhood with an 80/20 white/black mix after the move, whereas only 73% of whites are willing to move to this neighborhood.³³ Clearly, blacks are more open to out-group contact than whites; the percentage of blacks saying they would be willing to enter an 80% white area is higher than the percentage of whites saying they would be willing to enter a 20% black area. But does this establish that white's preferences are a major obstacle to integration? It so happens that an 80/20 neighborhood would approximate an ethnic mix reflecting even distribution in many American metropolitan areas. Considered from this vantage point, most whites are "willing integrators" *relative to the standard of even distribution* and thus whites' preferences can be seen as compatible with fairly high levels of integration.

This can be demonstrated by conducting a simple exercise to explore the implications of willingness to mix preferences for integration. First, assume three types of neighborhoods, all-white areas, all-black areas, and 80/20 integrated areas. Then assume that blacks and whites who are willing to integrate can be strategically placed in integrated (i.e., 80/20) neighborhoods to maximize city-wide integration. In an 80/20 city, 73% of blacks and 73% of whites could be placed in 80/20 integrated areas. The resulting index of dissimilarity for the city would be 27.0. This low score indicates that whites' preferences are

³³That is, they report that 89% of blacks are willing to move to a neighborhood that is 86% white before the move and 80% white after the move and that 73% of whites are willing to move to a neighborhood that is 78.6% white before the move and 80% white after the move.

compatible with substantial integration. This exercise highlights that Krysan and Farley's discussion of willingness to mix preferences is not guided by a model of how preferences are linked to integration. They focus on group differences in particular levels of willingness to mix but overlook the fact that the implications of these preferences for integration are contingent on city-wide ethnic mix in a way that produces dramatic asymmetry in the implications of white and black willingness to mix preferences. This is another face of the paradox of weak minority preferences; the standard of even distribution requires that numerical minority populations be willing to mix at very high levels but demands less of numerical majority populations.

It is feasible to extend the logic of strategic placement and develop more exact assessments of the possibilities for integration under varying conditions of city-wide ethnic mix and distributions of white and black willingness to enter areas with different ethnic mixes.³⁴ I do not pursue this here because I do not see willingness to mix preferences as central to residential patterns. Few whites or blacks who express a willingness to live in neighborhoods with an ethnic composition compatible with integration hold this neighborhood outcome as top preference. Krysan and Farley do not identify a process by which willingness to mix preferences can promote integration when preferences regarding *top ranked* choices are segregation-promoting. Unless such a process can be identified, I presume residential choices are primarily driven by higher-ranking alternatives, not ones that are acceptable in principle but otherwise undesired.

The closest Krysan and Farley come to identifying such a process is when they suggest that the “integrated” (lay usage) neighborhoods most blacks prefer cannot easily be chosen. This leads them to suggest that lower-ranked preferences may come into play and thus that willingness to mix preferences might promote neighborhood mixes that are not top preferences. There is a basic problem with this argument; blacks' second- and third-ranking preferences are for higher black representation than their top-ranking preference.³⁵ If blacks turn to lower-ranking alternatives because their top-ranked choice (e.g., 50–53% black areas) is hard to find, they would seek predominantly black areas (i.e., 70% black and higher), and such neighborhoods are readily found in most metropolitan areas. So moving from top-ranking preferences to the next alternatives would promote greater segregation, not more integration. In view of this,

³⁴In the interest of space, I excised a discussion on this subject. I review this in more detail in a forthcoming book (Fossett, forthcoming).

³⁵If households consider options in rank order of preference, blacks' second- and third-ranked choices are for areas that are 71–73% and 100% black, respectively.

it is fair to say that willingness to mix preferences can promote integration *only if* most black households choose neighborhoods that correspond to their lowest ranking residential preferences (i.e., 14% black and 0% black) over neighborhoods that correspond to their highest-ranking preferences (i.e., 50%, 71%, and 100%).

This kind of choice behavior can be specified in an “optimal mixing” model where white and black households strategically move to neighborhoods that would best promote integration (i.e., even distribution) subject only to the condition that they must be willing to enter the destination neighborhood. Significantly, a process of optimal mixing would produce high levels of integration regardless of the initial distribution of neighborhood ethnic mix and this integration would be highly stable. This conclusion rests on four conditions: a substantial fraction of blacks are willing to pioneer; black willingness to enter areas increases monotonically as percent black increases from 0 to 80%; most whites are willing to reside in areas where black representation does not exceed 20%; and white willingness to enter a neighborhood increases monotonically as the percentage of blacks decreases.

Krysan and Farley report that 35% of black respondents are willing to be “pioneers,” that is, willing to enter all-white areas. Thus, the fact that intermediate neighborhoods are uncommon is not a problem in an optimal mixing model. If they did not exist at all, the moves of willing black pioneers would *create* them.³⁶ This would then set off a sequence of residential movement leading to extensive integration. To illustrate, consider a completely segregated city with an 80/20 mix. The moves of the 35% of black households who are willing black pioneers would combine with the moves of the 73% of white households who are willing to enter 20% black areas to create neighborhoods with a 90/10 ethnic mix.³⁷ With this increase in black representation, the neighborhoods become acceptable to additional blacks who enter and the chain reaction continues until either no more blacks are willing to enter or the percentage of blacks reaches 20. Krysan and Farley report that 89% of blacks would be willing to integrate (i.e., enter a 14.3–20.0% black area [before-after entry]). Ignoring whites’ preferences for the moment, movement toward integration in an 80/20 city

³⁶ My examination of census tract data for the MCSUI cities shows that intermediate mix neighborhoods, while not common, are hardly rare. But, for theoretical analysis it is important to note that *even if they did not exist*, “willingness to mix” preferences would readily permit their creation.

³⁷ If all “willing” pioneers disperse evenly in feasible, partially integrated neighborhoods, black representation in these neighborhoods would be $100 \cdot A / (A + B)$ where A is the number of willing black pioneers ($0.35 \cdot 20 = 7.0$) and B is the number of willing whites ($0.73 \cdot 80 = 58.4$). Thus, $100 \cdot 7.0 / (58.4 + 7.0) = 10.7$.

would terminate with 89% of blacks residing in neighborhoods that are 18.2% black and 11% of blacks living in all-black areas.³⁸ White-black dissimilarity for this city would be 11. Bringing whites' preferences back into the analysis does not substantially change the outcome. Since 73% of whites say they are willing to enter an area that is 21.4–20.0% black (before-after entry), it is possible for 73% of blacks and 73% of whites to move to neighborhoods that are 20% black. This would produce a white-black dissimilarity score of 27, and this score could be lowered even further if willingness to mix preferences were considered in more detail.³⁹

The results obtained using this simple “optimal mixing” model highlights a problem with Krysan and Farley’s argument that blacks’ willingness to mix preferences would promote integration were it not for blacks reluctance to pioneer due to concerns about white hostility. The problem is fundamental—if willingness to mix preferences could promote micro-level behavior leading to significant macro-level integration, the preconditions needed for that dynamic to unfold are already in place. The model does not require all blacks be willing pioneers, only a significant fraction, other blacks will enter behind them in a chain reaction leading to extensive integration. The problem, of course, is that the model of “optimal mixing” is not viable. It requires that whites and blacks choose neighborhoods *strategically* (i.e., for the purposes of maximizing integration) based on willingness to mix preferences rather than choosing neighborhoods that correspond to their top-ranking residential preferences. There is no basis for expecting this, so the process outlined in the above example is unlikely to unfold.

The limits of willingness to mix preferences can be seen by considering how blacks who report being willing to move to all-white areas are likely to behave. These households play a crucial role in promoting integration under the optimal mixing model outlined above; their pioneering behavior creates partially integrated neighborhoods that can “draw in” the many black households who are open to mixing but reluctant to pioneer. However, the data indicates that these key households (i.e., the willing black pioneers) overwhelmingly prefer

³⁸All 89% of blacks who indicate they are willing to move to a 14.3–20% black neighborhood (before-after entry) could reside with whites in neighborhoods that are 18.2% black ($20 - 0.89 = 17.8$; $17.8/[80 + 17.8] = 18.2$).

³⁹Even more integration is clearly possible since Krysan and Farley report that an additional 16% of whites would be willing to move to neighborhoods that are 6.7–7.1% black and could be paired with available blacks who would be willing to accept this neighborhood mix. However, more detailed preference data are needed to make exact calculations of the minimum D that could be achieved without violating any individual's willingness to mix preferences.

other neighborhood mixes over pioneering. Approximately 9 out of 10 prefer 14–20%, 50–53% black areas, and 71–73% areas over pioneering. Approximately 7 out of 10 prefer all-black neighborhoods over pioneering.⁴⁰

In sum, major aspects of Krysan and Farley's discussion of the potential for willingness to mix preferences to promote integration are open to question. They suggest that blacks' willingness to mix is more compatible with integration than whites' willingness to mix, but they overlook the fact that consequences of group preferences for integration are conditioned by relative group size leading to the paradox of weak minority preferences. They suggest that black reluctance to pioneer due to concerns about white hostility is a crucial factor limiting movement toward integration, but they report data showing that willing pioneers are already available in sufficient numbers to "jump start" a dynamic that would produce extensive integration under an optimal mixing model. Finally, and most importantly, they provide no basis for expecting willingness to mix preferences to promote integration when top-ranking residential preferences are segregation-promoting. The simulation analyses I present later in the paper drive home the fundamental nature of this basic problem. In the simulations where ethnic preferences are active, *all* households are willing to enter *any* neighborhood. But, as will be seen, this does not promote extensive integration. The reason for this is simple, households rank order available residential choices in relation to their goals for neighborhood ethnic mix and move to less attractive choices *only* when they cannot find better alternatives. Households usually encounter a range of choices on neighborhood ethnic mix and are rarely forced to move to neighborhoods that correspond to their lowest ranking choices. Thus, willingness to mix is unlikely to promote integration, even when it is universal, so long as top-ranking choices are segregation promoting.

Minority Preferences for Co-Ethnic Contact Primarily Reflect Concerns about White Hostility

Krysan and Farley (2002) break with many critics of preference theories by acknowledging that the top-ranking residential preferences held by whites and blacks are not compatible with integration. Accordingly, they note in their discussion that changes in preferences may be

⁴⁰Similarly, while the vast majority of black households report being "willing" to reside in neighborhoods that are 14–20% black (a fact which permits high levels of integration under the model of "optimal mixing"), about 9 out of 10 of these households prefer areas that are 50–73% black over areas that are 14–20% black.

needed if segregation is to decline significantly in the future. However, they take exception to preference theories arguing that minority preferences do not reflect true sentiments of preference for co-ethnic contact but instead primarily reflect concerns about discrimination and white hostility. In their words,

African American preferences are inextricably linked to discrimination and white hostility. From this we conclude that the role of preferences in the future of integration is based not on free and open choices derived from neutral ethnocentrism, nor even expectations about neighborhood quality, but they are instead based upon past and present patterns of discrimination and hostility. (2002: 969–970)

Krysan and Farley raise important issues and provide a valuable discussion focusing on minority residential preferences and minority concerns about discrimination and white hostility. However, they offer strong conclusions that cannot be squared with their data. Specifically, they *overstate* the role that blacks' concerns about discrimination and white hostility play in shaping blacks' segregation-promoting residential preferences, and they *understate* the segregation-promoting implications of blacks' ethnic preferences that are not rooted in concerns about hostility and discrimination. In addition, and perhaps even more importantly, Krysan and Farley's expansive view of what constitutes racial hostility breaks with the previous literature in a way that increases the relevance of conventional social distance and preference theories for understanding present-day segregation.

Krysan and Farley's assessment that blacks' preferences reflect a desire for integration is questionable since residential choice based on these preferences would likely create high levels of segregation. But perhaps they are correct in arguing that these segregation-promoting preferences are primarily shaped by concerns about discrimination and white hostility. The data Krysan and Farley present regarding the reasons black respondents give for ranking majority-black (i.e., 50–100% black) areas as most attractive do not lend support to this view. In all, more than 9 out of 10 of black respondents identified a majority-black neighborhoods as their first choice. The reasons these respondents offered for their choices are summarized below (adapted from Krysan and Farley's Table 2). Only 6% offer reasons involving concerns about discrimination and white hostility.⁴¹

⁴¹There is some variation by neighborhood type; 15% of those who ranked all-black neighborhoods as their top choice mentioned concerns about discrimination and white hostility, but these concerns were mentioned by only 4% of the much larger group of black respondents who ranked 50–73% black areas as their top choice.

Significantly, the overwhelming majority of respondents (77%) are in Category C; they offer reasons for preferring majority-black areas that mention some aspect of the area's ethnic mix. The specific reasons are varied (e.g., "comfortable with own kind", "prefer mixed," "benefits of integration," "more blacks than whites," etc.), but the pattern is indisputable—most black respondents mention area ethnic composition as a reason for choosing a majority-black area over the other choices.

- 6.3% A. White hostility.
- 1.7% B. Cultural concerns.
- 77.1% C. Reasons mentioning some aspect of area ethnic mix.
- 6.5% D. Better neighborhood characteristics.
- 8.3% E. Other reasons.

One way to interpret these data is to conclude that many blacks place a positive value on ethnic diversity in its own right. A large body of survey evidence is consistent with this view. The complication this poses for extensive macro-level integration is that the kinds of diverse neighborhoods blacks desire cannot typically be realized under conditions of even distribution.

Krysan and Farley find greater evidence of concerns about discrimination and white hostility when they examine black respondents' reasons for being unwilling to pioneer (i.e., enter all-white areas). On this topic they report that 65% of black respondents are unwilling to move to all-white neighborhoods and that of these 53% (34.5% overall) gave reasons mentioning concerns about discrimination or white hostility. This yields the following breakdown.

- 35.0% A. Black respondents who report they are *willing* to pioneer.
- 30.5% B. Black respondents who report they are unwilling to pioneer for reasons *unrelated* to concerns regarding discrimination or white hostility.
- 34.5% C. Black respondents who report they are unwilling to pioneer and mention concerns about discrimination and/or white hostility.

What implications follow from these findings? Krysan and Farley offer the interpretation that blacks' reluctance to pioneer due to concerns about discrimination and hostility is a major factor underpinning white-black segregation patterns. This conclusion can be questioned on multiple counts. The most serious problem is that their argument rests on a dubious assumption—willingness to pioneer is potentially important for integration. As the previous section

established, if willingness to pioneer and willingness to integrate can promote integration, the 35% of black respondents who are willing pioneers and the 89% of black respondents who are willing integrators (i.e., willing to live in 14–20% black areas) *already* provide the demographic foundation for the presumed integration-promoting dynamic to unfold. In view of this, Krysan and Farley's conclusions must be discounted until they accomplish two tasks. First, they must identify the relevant behavioral model in which choices by willing pioneers and willing integrators will promote integration when their top-ranked preferences are for majority-black areas. Then they must explain why this model does not already operate given the sizable pool of willing pioneers and willing integrators. These would appear to be very difficult tasks and the challenge again highlights that critics of preference theories rest their arguments on intuitions about the effects of preferences rather than explicit models outlining how preferences and choice will promote integration.

Should Krysan and Farley meet the theoretical challenge, their position would then face another major problem. It is that, if some social policy were to successfully alleviate blacks' concerns about discrimination and white hostility this would not necessarily make all blacks willing pioneers. Such a policy might instead succeed only in moving blacks from Category C above (i.e., unwilling to pioneer due to concerns about white hostility) to Category B above (i.e., unwilling to pioneer for other reasons). Curiously, Krysan and Farley do not discuss respondents in Group B. They represent approximately 3 in 10 black respondents and, given Krysan and Farley's argument that reluctance to pioneer has important implications for segregation, their existence would appear to warrant extended discussion. Two basic questions arise: "On what basis can these respondents be viewed as irrelevant to the analysis of preferences and segregation?" and "Given their numbers (they represent 47% of black respondents who are unwilling to pioneer), is it reasonable to conclude that concern about discrimination and hostile reception is the only important factor in reluctance to pioneer?"

Two additional observations highlight problems with Krysan and Farley's analysis. First, if all respondents in Group C are moved into Group B, concerns about discrimination and hostility would be eliminated, but there would be no basis for expecting segregation patterns to change. Second, if all respondents in Groups B and C are moved into Group A, there would still be no basis for expecting segregation patterns to change. In view of this, it is difficult to avoid the conclusion that Krysan and Farley's analysis oversimplifies and overstates the importance of blacks' concerns about discrimination and white

hostility. They stress the possible role of pioneering in promoting integration yet ignore the substantial pool of willing pioneers and willing integrators. They stress the segregation-promoting implications of reluctance to pioneer when it is based on concerns about discrimination and hostility and ignore the fact that many black respondents are unwilling to pioneer for reasons unrelated to concerns about discrimination and white hostility.

The closer one looks at the evidence they offer for the central role of blacks' concerns about discrimination and white hostility, the more questions arise. For example, Krysan and Farley categorize reasons for preferring particular neighborhoods or for expressing unwillingness to move to an all-white neighborhoods using "hierarchical" coding procedures that *maximize* the measurement of concern about discrimination and white hostility. Under these procedures, respondents are coded as having only *one* reason, and reasons involving white hostility are given priority over all other reasons. This approach yields the maximum possible count for the reason of white hostility and masks evidence that factors other than discrimination may also be salient.

Another controversial aspect of Krysan and Farley's coding procedures is their use of an expansive definition of white hostility. As anyone would expect, they coded the reason as white hostility when respondents expressed concerns about extreme and illegal acts such as being discriminated against, being subjected to symbolic violence, or being harmed (e.g., "they'll burn you or kill you;" "I don't want to wake up with crosses burning on my lawn"). They also coded the reason as white hostility when respondents expressed concerns about "not being welcomed" and "the sense that whites do not like blacks." This in itself is significant because these kinds of lower-intensity manifestations of "hostility" are not outside the bounds of social distance and preference dynamics involving prejudice and negative stereotypes. Krysan and Farley's definition of hostility is expansive. This is indicated by the representative examples they list in the body of their article that includes the statement, "You either get treated as a token or you get ignored or there's this superficial niceness that is annoying" (2002: 961).

Grouping concerns like this under an expansive conception of white hostility may be reasonable for certain purposes. But, as I discuss in more detail below, the practice undercuts the view that black residential preferences are shaped by antagonism and conflict that is unique to the dynamics of white-black segregation. Many ethnic and nonethnic social groups are likely to have concerns about hostility conceived so expansively. Certainly, European-origin immigrant groups

encountered hostility of this nature and beyond. The key point here is not that lower-intensity hostility is not potentially important to segregation—it often is—the point is that this is not unique to white-black segregation dynamics and has been evident for groups that experienced lower levels of segregation.

Krysan and Farley analysis of the role of discrimination and white hostility focuses on blacks' perceptions, not the actual incidence of discrimination and hostility. Perceptions are important because they are proximate causes in residential decisions. But the implications for policy vary dramatically depending on whether perceptions reflect "realistic" assessments of risk. If the incidence of extreme hostile receptions is low and declining (as Thernstrom and Thernstrom and others argue), one policy implication is to spread this news to counteract the cultural lag of dated stereotypes about the risks associated with pioneering and integration. On the other hand, if perceptions of the risk of extreme hostile reception are founded, this calls for the much different response of redoubling efforts to counter discrimination. Krysan and Farley's brief discussion of the issue seems to suggest that they see the cultural lag of stereotypes as nontrivial.

If the small number of African Americans who are now pioneering find that whites are tolerant, quite likely that favorable information will spread among African Americans and there will be a large flow of blacks to such neighborhoods. This migration did not greatly lessen segregation in the 1990s but may do so in this decade. (2002: 970)

Their conjecture could be seen as consistent with the argument that blacks' preferences for majority-black areas are rooted in the extreme ethnic antagonism of earlier historical eras (not in present-day experience) and will slowly but eventually dissipate.

Krysan and Farley's analysis of the role of white hostility in white-black segregation breaks with the traditional literature by highlighting phenomena that fall within the scope of social distance and spatial competition models of ethnic and nonethnic segregation. Massey (1985) summarized the view standard urban ecological models of ethnic segregation and spatial assimilation are inadequate for explaining white-black segregation. The reason was *not* because other ethnic and social groups welcomed or at least were indifferent to each other's presence; urban ecological accounts of neighborhood succession have always stressed that entering groups often encounter indifference, negative stereotypes, prejudice, and hostility. The key factor distinguishing the dynamics of white-black segregation was the severity

and comprehensiveness of institutional discrimination, state sanction, intimidation, and violence directed at blacks. Krysan and Farley's willingness to emphasize lesser manifestations of ethnic antagonism shifts the frame for theorizing about white-black segregation. It suggests that, to a greater degree than before, white-black segregation can be understood in terms of the kinds of spatial competition and social distance dynamics (including prejudice and unwelcoming attitudes) that shape segregation between other ethnic and nonethnic groups.

Krysan and Farley offer another basis for stressing discrimination and downplaying the views of preference theorists. They highlight the finding that only 4% of black respondents who indicated that they would be unwilling to move to all-white neighborhoods gave a reason that stressed black identity, culture, or heritage (2002: 960–961). This result is not the telling point they suppose it to be. The reason is simple—preference theory does not require that preferences for co-ethnic contact be grounded in self-conscious cultural nationalism. They can also derive from lesser manifestations of social distance and preference including amorphous sentiments of “fitting in,” “feeling comfortable,” or “a sense of community” based on common interest, sensibility, and taste. Conceived in this way, Krysan and Farley's data indicate that an additional 38% of the respondents who indicated they would be unwilling to move to an all-white neighborhood gave reasons involving expressions of preference regarding area ethnic mix *without any expression of fear of discrimination or white hostility*. The breakdown of these respondents is as follows (adapted from Krysan and Farley [2002] Table 4 and Appendix A).

- 15% *Would not be comfortable*. “Any reference to negative feelings that a respondent associates with a neighborhood that is all white. This can include feelings of discomfort, isolation, and loneliness.”
- 16% *Don't want to be pioneer*. “Respondent prefers not to be in an all-white neighborhood, citing a preference not to be the only member of their race in a neighborhood. This also includes mentions of wanting to be around others of their own race.”
- 7% *Want diversity*. “A preference to live in a mixed neighborhood.”

Krysan and Farley do not describe these sentiments as expressions of ethnic preference, but I suspect Clark, Glazer, Patterson, Schelling, and Thernstrom and Thernstrom would see them as fitting nicely with their theorizing about segregation. However they are labeled, these expressions pose problems for arguments that sentiments involving ethnic mix are irrelevant to understanding segregation. Combining

these respondents with those Krysan and Farley placed in the category of cultural similarity indicates that 42% of black respondents who said they would be unwilling to move to an all-white neighborhood gave a reason involving an expression of preference regarding area ethnic mix or culture without mentioning concerns about discrimination or white hostility.

In sum, Krysan and Farley oversimplify when they conclude that Patterson and the Thernstroms are “right about the importance of black preferences for segregation” but “wrong about the reasons for these preferences and their implications” (2002: 969). Krysan and Farley’s assessment that blacks’ ethnic preferences are relevant for segregation primarily due to concerns about discrimination and hostile reception is too strong a conclusion given the data they present. Krysan and Farley highlight the fact that 1 in 3 blacks who are reluctant to pioneer mention concerns about discrimination and hostility. This can readily be acknowledged as an important finding with clear relevance for segregation. But Krysan and Farley overlook their findings that are consistent with preference perspectives. They do not mention that 3 in 10 blacks who are reluctant to pioneer do not cite concerns about discrimination and hostility. They do not mention that vast majority of the 35% of blacks who are willing to pioneer place this option among their lowest-ranking choices. They downplay the fact that fewer than 1 in 10 blacks who identify majority-black areas as their top residential preference mention concerns about discrimination and white hostility, while more than 7 in 10 offer reasons mentioning area ethnic mix.

In the final analysis, Krysan and Farley’s arguments cannot provide a basis for dismissing theories of segregation that emphasize social distance and preference dynamics. Indeed, in many respects the preference data they report and the manner in which they frame the discussion of concerns about hostility lend support to the view that, *to a greater degree than in the past*, contemporary white-black segregation involves relatively “conventional” social distance dynamics. By the term “conventional” I do not mean inconsequential or socially desirable; I mean only that the dynamics do not involve the exceptional manifestations of discrimination, intimidation, and violence that were unique white-black segregation in earlier eras.

THE POTENTIAL VALUE OF SIMULATION METHODOLOGY

The previous sections establish that the hypothesis that social distance and preference dynamics may contribute in significant ways

to ethnic residential segregation cannot be casually dismissed. Unfortunately, it is difficult to assess the effect of preferences and social distance dynamics on segregation with the methods and data used in most previous studies of segregation. Studies of the levels and trends in segregation and neighborhood change draw on census data files that do not contain measures of preferences at the household level. Studies of ethnic preferences draw on surveys that do not directly assess the impact of preferences (or reasons underlying preferences) on actual residential choices. Studies of residential movement (Crowder, 2000; Quillian, 2002) draw on micro data that do not include direct measures of preferences and which cannot be used to directly assess the impact of residential choices on city-wide segregation.

This situation helps explain why the debate between those who stress discrimination (e.g., Massey and Denton, 1993; Yinger, 1995; Galster, 1988, 1991) and those who stress preferences (Clark, 1991, 1992, 2002; Schelling, 1972; Thernstrom and Thernstrom, 1997; Glazer, 1999) is unsettled and sometimes acrimonious. Neither position can marshal the kind of data needed to establish sound, empirically grounded assessments of the impact of preferences and choice dynamics on segregation. Data sets used to document micro-level preferences and residential decisions cannot be used to assess their impact on macro-level segregation patterns. Data sets used to measure macro-level segregation patterns cannot be used to assess the contribution that ethnic preferences make to establishing or maintaining the level of segregation observed.

This situation is not likely to improve in the immediate future. In view of this, I turn to simulation methodology as one option that can help move the theoretical debate forward. Simulation methodology provides a means for exploring segregation dynamics in ways that are not feasible using other available methodologies; it allows me to explore questions about the impact of specific behavioral processes on segregation outcomes under conditions that I can directly specify and manipulate. The general approach I use is as follows: I implement a model that represents selected features of urban residential systems; then I conduct simulation experiments in which I vary the parameters of the model; and then I compare the patterns of segregation that result under these different simulation scenarios. A key benefit of the approach is that my model includes both representations of micro-level dynamics and macro-level outcomes and thus provides a basis for *exploring* how hypothesized micro-level dynamics may be linked to macro-level residential patterns.

Simulation methodology is widely used in many sciences but is only recently gaining cautious acceptance in sociological research. I believe the methodology has much to commend it in the present application to exploring theories of residential segregation.⁴² At the same time, however, I recognize that the use of this methodology is a departure from conventional practice and that it is important to be clear about the limits of the methodology and to avoid extravagant or premature claims about what can be learned using it. Thus, I stress that I use simulation methodology not to draw conclusions about segregation patterns in “real” cities, but only to investigate the following *theoretical* question, “Can ethnic preferences and social distance dynamics create and sustain significant levels of ethnic segregation in a theoretical system where discrimination is absent?” The question is narrow but important. Respected, influential scholars and researchers have argued against this possibility. If the evidence from simulation experiments is consistent with these negative conclusions, it would present a significant problem for theories emphasizing social distance and preference dynamics. On the other hand, if evidence from simulation analyses contradicts these negative conclusions, it will lend support to the view that theories emphasizing social distance and preference dynamics may deserve greater consideration.

Before proceeding to the next section, I offer some brief remarks aimed at clarifying the nature of the experiments I have conducted and the nature of the resulting empirical evidence. The experiments involve manipulations of a simulation model that is crafted to represent selected aspects of segregation theory. The results of the simulation experiments provide *empirical evidence about the behavior of this model*. In many fields this is an accepted practice for testing and refining theories that are too complex to be analyzed using mathematical techniques and cannot be directly studied using experiments. The important thing to bear in mind is that these “virtual” experiments *cannot speak directly* to question of what impact preferences may have on segregation in real urban areas. The experiments speak only indirectly to this question by providing evidence about the implications of various theoretical positions that guide our interpretation of segregation in the real world.

⁴²In a National Academy of Sciences report on segregation, Pettigrew highlighted the simulation work of Freeman and Sunshine (1970) focusing on discrimination and white prejudice as an “important new beginning...demonstrating the complex interface of prejudice attitudes and social and market factors” (1973: 77). He also noted that some of the implications of their work are “interesting and not necessarily obvious.” For whatever reason, this work did not stimulate future studies building on their initial efforts.

THE SIMSEG PROGRAM

I used the SimSeg simulation program to carry out the experiments I report below. SimSeg is an agent-based simulation. The active agents are virtual households that seek to satisfy housing goals within a virtual housing market. My goal in developing the program is to implement a simulation model that can represent key aspects of theories about how selected behavioral processes and features of urban and demographic structure influence residential segregation. The SimSeg model is considerably more complex and sophisticated than other models found in the literature.⁴³ Developed over a period of more than 10 years, it consists of many tens of thousands of lines of computer code.⁴⁴ I developed the program incrementally, subjecting each extension and refinement to testing along the way. Over time it has become a capable tool for applications in teaching and theoretical research. Recently, the entire code base for the core simulation model was reviewed by a team of professional programmers who verified the program's internal validity; that is, they confirmed that it does what it is I claim it does as described in the program's technical documentation (Fossett, 1998). To be absolutely clear, the version of SimSeg I report here is geared to theoretical analysis—it gives expression to formal representations of segregation theory and provides a means for exploring the implications of these theories. This is a valuable contribution and, as seen below, can lead to the generation of new hypotheses that deserve investigation. However, it also is important to note the limitations of the program. At present, I make no claims about the program's external validity, and thus it is inappropriate to generalize to real residential systems based on results obtained using SimSeg.

Given the complexity of the SimSeg program, I cannot provide a full and complete description of the program here. For the moment, I provide only a brief overview of what happens in *every* simulation trial. At the beginning of every simulation experiment, the SimSeg program creates a virtual city "landscape" composed of bounded areas (neighborhoods) arranged in an "area grid." Each bounded neighborhood

⁴³There are a variety of simulations that implement variations and extensions of the models Schelling, explored (e.g., Schelling, 1969a; Epstein and Axtell, 1996; Gaylord and D'Andria, 1998; Laurie and Jaggi, 2003). By comparison with SimSeg, these models are much simpler in terms of their representations of ethnic demography, socioeconomic inequality, urban structure, ethnic preferences, and behavioral rules. The Freeman and Sunshine (1970) effort stands as one of the more ambitious efforts of its time. But, it too implements a model that is much simpler than the SimSeg model.

⁴⁴The program is implemented in Delphi, an object-oriented variant of the Pascal programming language. The first versions of the program were developed to run under the DOS operating system. The current version runs under the Windows operating systems.

contains a square “housing grid” with a fixed number of residential “lots.” Next the program creates housing units of varying “quality” and places them at residential locations around the city until every lot in every area contains a housing unit. SimSeg then populates the city with a virtual population consisting of individual households, each of which is assigned an ethnic status and a socioeconomic status. In addition, each household is “motivated” by assigning them preference “targets” that reflect their particular goals for three residential outcomes: housing quality, neighborhood status, and neighborhood ethnic composition. The program then places households into housing units; the initial assignments are random with the exception that (in the case of the simulations reported here) assignments are means-tested. At this point the virtual city has been “initialized,” the city “landscape” has been created and populated. The program computes a battery of segregation measures and records their values (along with those of a host of other variables of interest) in output files for later analysis.

SimSeg then sets the residential system “in motion” using algorithms that randomly select households and give them the opportunity to search for housing that better satisfies their residential preferences. Households evaluate residential opportunities based on their individual preference targets and a set of equations specifying the weight or priority to be given to different residential outcomes (e.g., housing quality, neighborhood status, neighborhood ethnic mix, etc.) When households identify a more attractive residential location, they may act on this by moving. In the simulations reported here, search and movement are constrained by means-testing (i.e., the household must be able to afford the housing it examines and moves to).⁴⁵ Household search and movement continues until the simulation experiment is completed (based on a prescribed amount of search activity). As search and movement continues, the SimSeg program updates relevant data arrays on an on-going basis. At periodic intervals (termed “cycles”), it computes and records the values of segregation measures and other variables of interest and updates graphical displays of the city.

For the interested reader, I provide a glossary of selected terms from the simulation and a “flowchart” representation of the crucial steps of a simulation trial in Appendix Figures 1 and 2. Interested readers can find the program and detailed technical documentation of the program at a web site I have established for the purpose of

⁴⁵In the simulations reported here, search and movement is not constrained beyond means-testing, but the SimSeg also permits the activation of algorithms that also constrain search and movement by simulating housing discrimination. These dynamics are not activated in the simulations reported here.

providing access to this material.⁴⁶ The technical documentation provides a lengthy description of the program, the key variables and algorithms it implements, and detailed discussion of how it can be used to perform simulation experiments.⁴⁷ Alternatively, a much simpler simulation program, SimSeg Lite, is implemented as a java applet that can be run via a java-enabled web browser. It can be found at a web site I have established for teaching purposes.⁴⁸ This program is relatively simple compared to the research version of the SimSeg program, but it is much easier to use and generates results that closely parallel those reported in this paper.⁴⁹

SIMULATION EXPERIMENTS

The SimSeg program gives the researcher control over a great many variables relating to urban and demographic structure, preferences, and institutional constraints on search and residential relocation. I cannot describe all of the variables and all of the possible configurations here. Instead, I provide additional details (to supplement the brief overview provided above) as I introduce each new simulation experiment. The first simulation experiment I review, Experiment 1, is a “baseline” model that produces no residential segregation over and above that resulting from random dynamics (per Winship, 1977). The simulation scenario for Experiment 1 is characterized by the following features. Regarding urban structure, the virtual city landscape consists of bounded neighborhoods laid out in a 12-by-12 square neighborhood grid. Each neighborhood has single-family housing units arrayed in a 7-by-7 grid and can thus house a maximum of 49 families. The corner neighborhoods in the square neighborhood grid are not used

⁴⁶The web address is <http://vlab-resi.tamu.edu/simseg/simseg.htm>. The program and documentation files are distributed in compressed “archives” (i.e., “zip” files). The documents are distributed as “PDF” files created using the Adobe Acrobat program.

⁴⁷The available documentation is for a DOS version of the SimSeg program (version 1.0). The simulation results presented here are generated by the Windows version of the program (SimSeg 2.00a). Separate documentation is not presently available for the Windows version of SimSeg, but all of its essential algorithms are identical to those used in the DOS version (the key differences are in the program’s user interface).

⁴⁸The SimSeg Lite program can be found at <http://vlab-resi.tamu.edu/simseg/simseg.htm>. This program cannot be used to reproduce the specific simulations reported in this paper. But it is much easier to use and can illustrate all of the major findings reported here.

⁴⁹The fact that this is the case indicates that SimSeg’s results are driven by the basic settings of its key variables. Complex refinements and enhancements allow for more precise representations of various theories, but generally do not alter simulation outcomes in substantively important ways.

(i.e., they are not assigned any housing stock). As graphical representations presented below will indicate, this gives the virtual city landscape a shape that is roughly circular. The resulting city landscape has 112 bounded neighborhoods and a total of 5,488 housing units.⁵⁰ The individual housing units vary in quality on a scale that runs from 1 to 99. Housing units are distributed randomly across housing locations so area variation in mean housing value is random.

Regarding demographic structure, the city is populated by 5,159 households with a 6% vacancy rate resulting in 329 vacant housing units. Of households, 60% are white, 20% are black, and 20% are Hispanic. Households in all ethnic groups vary in status (also scored on a 1–99 scale). In this first simulation scenario, all ethnic groups have identical relative frequency distributions for status. Thus, while some households have higher status than others, no group is advantaged relative to another in terms of ability to afford high-quality housing.⁵¹

Regarding preferences, the SimSeg program allows for three general kinds of preferences to be active: preferences for housing quality, preferences for neighborhood status, and preferences for neighborhood ethnic composition. This makes it possible (in later simulation experiments) to explore the hypothesis that competing preferences for non-ethnic outcomes will blunt the impact of ethnic preferences. In this baseline simulation scenario, ethnic preferences are not “active” in any way, but preferences for housing quality and neighborhood status are active. Specifically, all households are motivated to seek the highest quality housing they can, constrained only by their means.⁵² In addition, households also seek higher status neighborhoods. Thus, when choosing among houses of similar quality, they will choose the house with the highest neighborhood status (based on the average status of households residing in the area). This neighborhood status score serves as a summary indicator of amenities, services, and other characteristics associated with neighborhood status.

When a simulation experiment begins, SimSeg assigns households randomly to housing units whose value matches their socioeconomic

⁵⁰All results reported here have been replicated using virtual cities with larger numbers of neighborhoods and households. The neighborhood dimensions used here are selected to yield a graphical representation that is visually intelligible (i.e., in large cities, households become visually indistinct).

⁵¹The overall status distribution has a median of 35, an interquartile range of 30.0, and an interdecile range of 53.2. The distribution has considerable *intra*-group status inequality with a gini index of concentration of 30.2 and an interdecile range for status scores extending from 12.9 to 66.1.

⁵²Housing and status are measured on the same scale. Housing is means-tested against household status.

status. After the city landscape and population have been initialized, the program then selects households randomly and gives them the opportunity to search for available housing that better suites their preferences. If a searching household identifies a housing unit it prefers over its current residence, it moves to that location. If it prefers to stay in its current location, it does so unless it is subject to mandatory or forced movement. Forced moves are implemented on a random basis (with relative frequency controlled by a model parameter) to simulate the housing changes precipitated by job transfers, the expiration of leases, changes in household structure (e.g., divorce), the death of a householder, the formation of new households, and the like. In these cases, the household moves to the housing unit it identified that best satisfies its preferences.

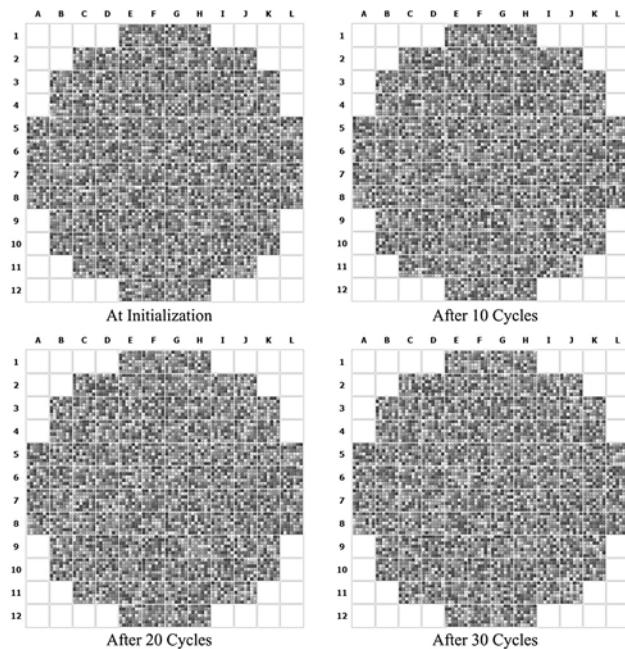
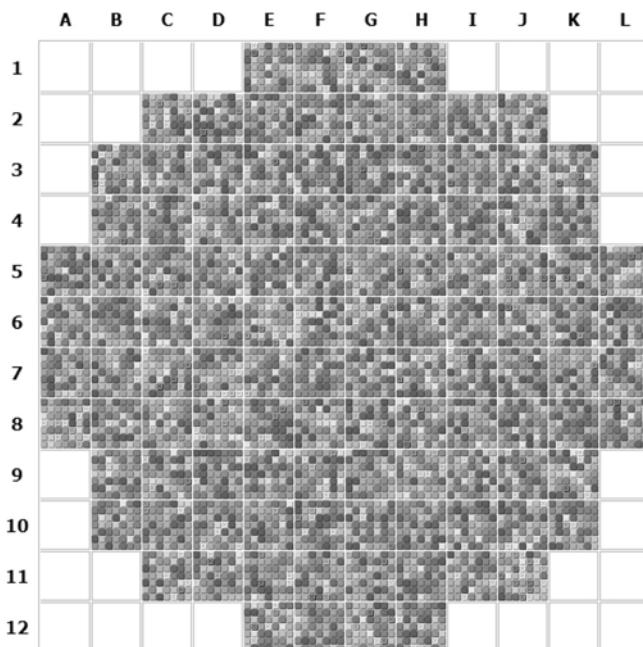
The simulation experiments reported in this paper run for a total of 30 “cycles.”⁵³ During each cycle, a random selection of 25% of city’s households is given the opportunity to search for housing and move if they can better their housing situation. Of these, one out of five (20%) are randomly forced to move to the best available housing unit they find even if they would prefer to remain in their present location.⁵⁴ Thus, a maximum of 25% of households can move in a single simulation cycle and a minimum of 5% (20% of the maximum) will move in every cycle. Each searching household examines a random selection of 12 housing units screened to be “affordable” based on the household’s socioeconomic status. In the simulation reported here, this “means-testing” is the only “external” constraint on housing search and movement.⁵⁵ Households evaluate their housing options based on a scoring system that considers how closely each housing unit’s characteristics match the household’s preference targets. Specifically, the program computes separate “dissatisfaction scores” for each active preference and then sums these to obtain an overall dissatisfaction score. Households rank their housing options and make location decisions based on these scores.

The animation sequence in Figure 1 shows that ethnic residential segregation is extremely low at the point when the simulation is initialized, and it remains low throughout the course of the 30 cycles of the

⁵³Cycles are the basic measure of time in the simulation. Under the settings used in these simulation scenarios, they roughly correspond to time periods of 6–12 months (based on comparisons with observed patterns of residential mobility and turnover).

⁵⁴This simulates a wide range of factors that generate household movement; for example, job transfers, changes in household form, the “death” and “birth” of households, and so on.

⁵⁵The SimSeg program provides for the possibility of activating algorithms that simulate institutional constraints (i.e., various types of housing discrimination). Not surprisingly, they can produce ethnic segregation when they are activated. However, since these algorithms are not relevant to the issues under review here, none were active in the simulation experiments performed for this paper.

**FIGURE 1 Animation Sequence for Experiment 1****FIGURE 1 Final Landscape for Experiment 1**

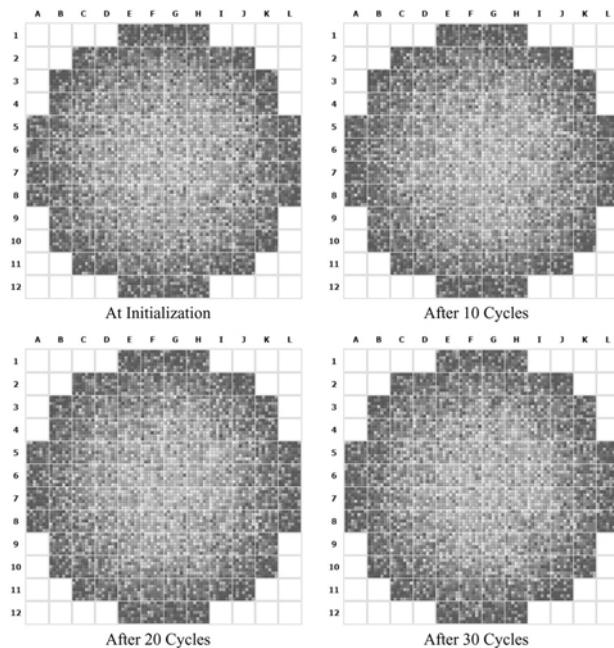


FIGURE 2 Animation Sequence for Experiment 2

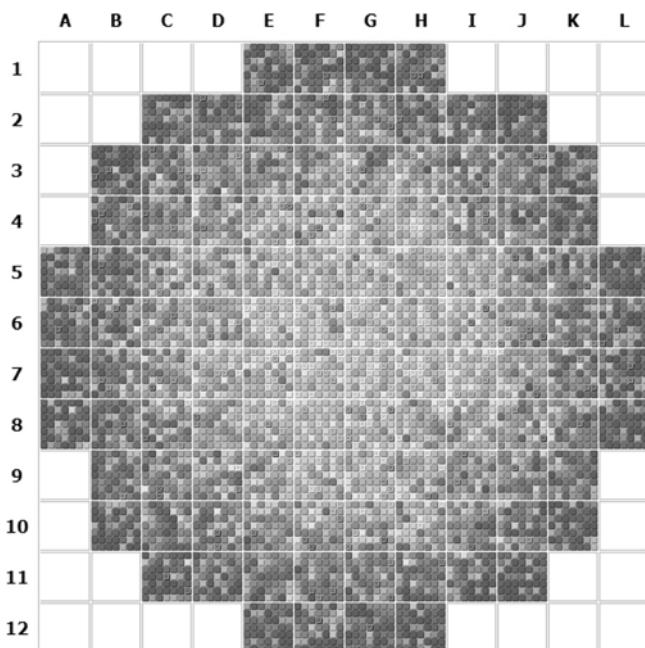


FIGURE 2 Final Landscape for Experiment 2

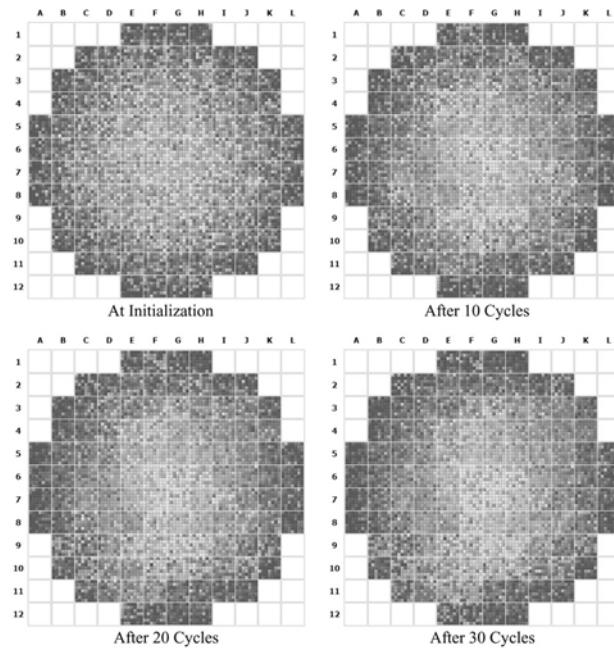


FIGURE 3 Animation Sequence for Experiment 3

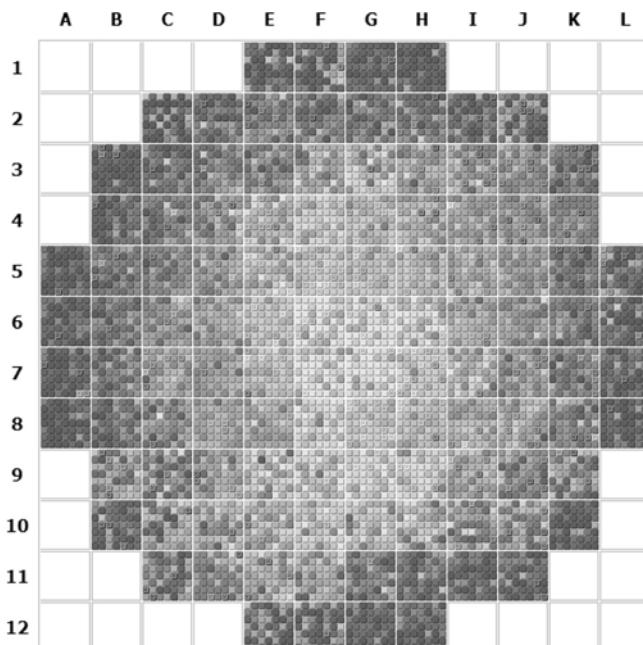


FIGURE 3 Final Landscape for Experiment 3

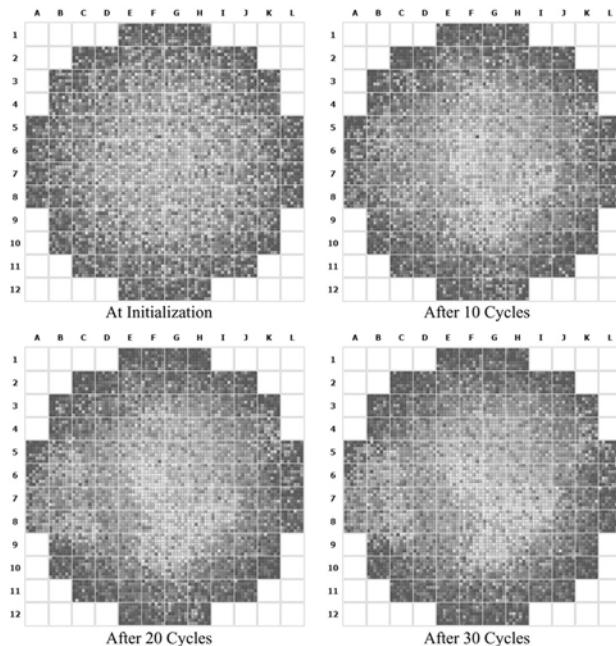


FIGURE 4 Animation Sequence for Experiment 4

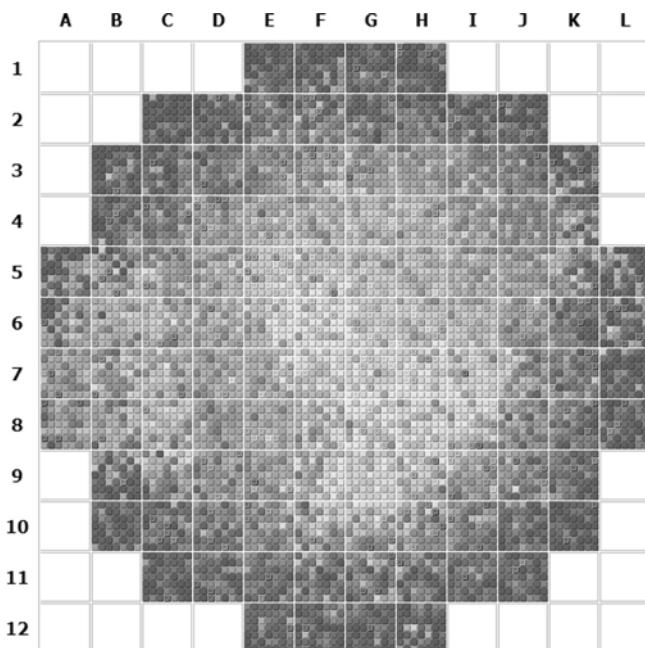


FIGURE 4 Final Landscape for Experiment 4

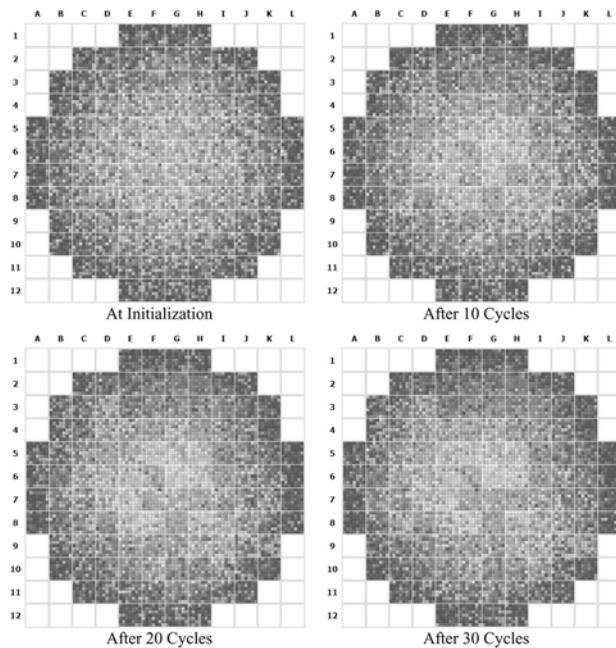


FIGURE 5 Animation Sequence for Experiment 5

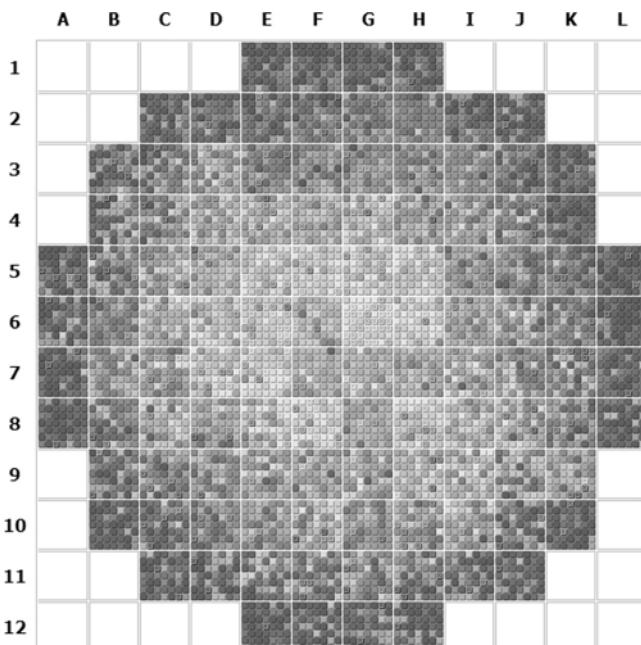


FIGURE 5 Final Landscape for Experiment 5

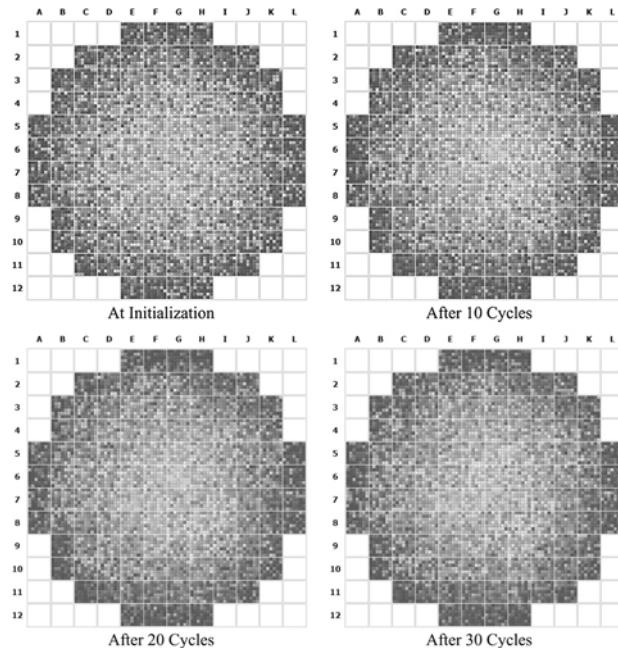


FIGURE 6 Animation Sequence for Experiment 6

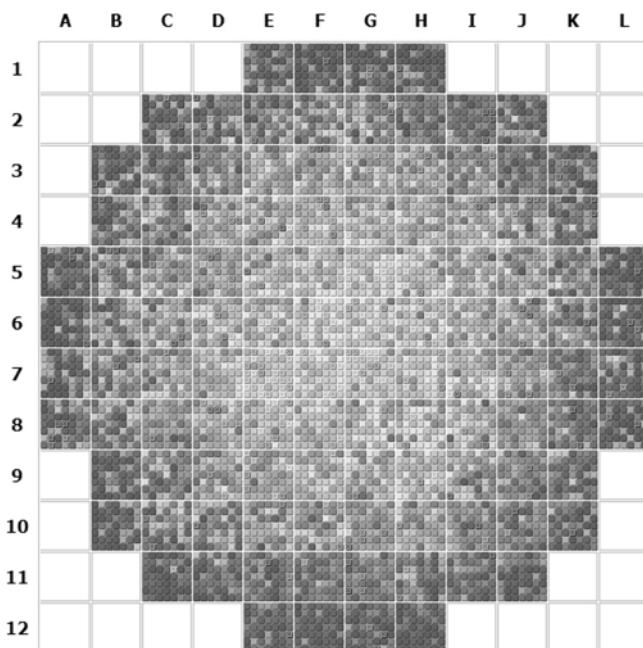


FIGURE 6 Final Landscape for Experiment 6

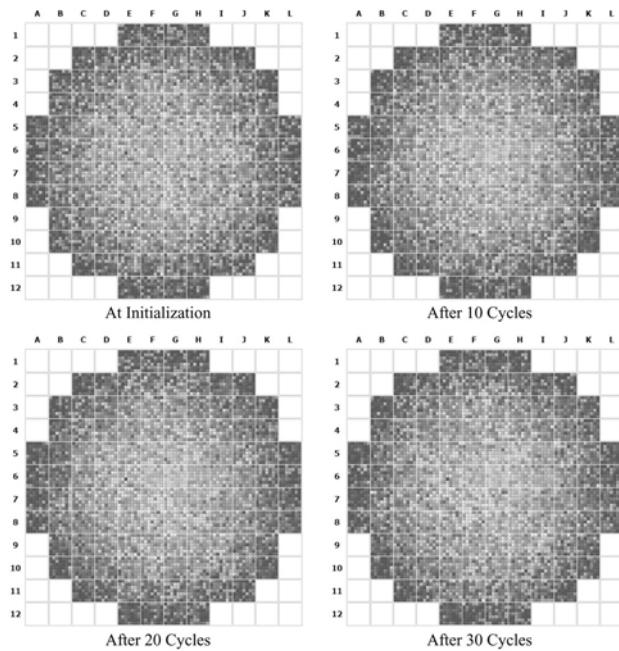


FIGURE 7 Animation Sequence for Experiment 7

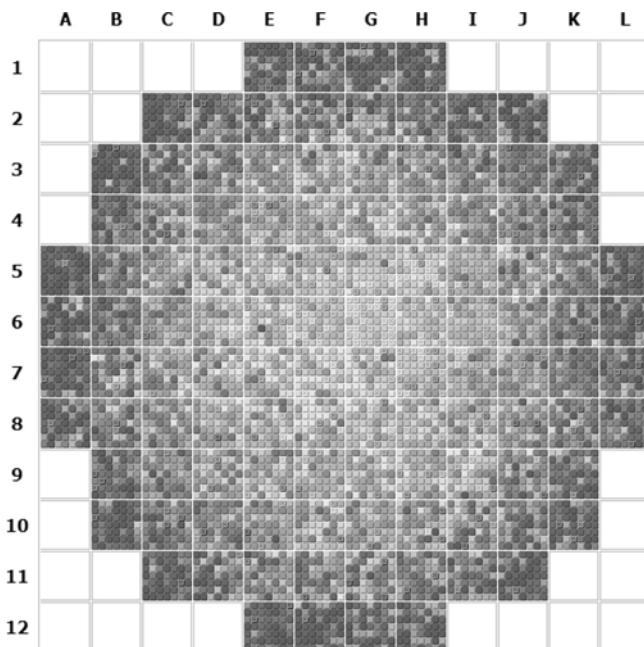


FIGURE 7 Final Landscape for Experiment 7

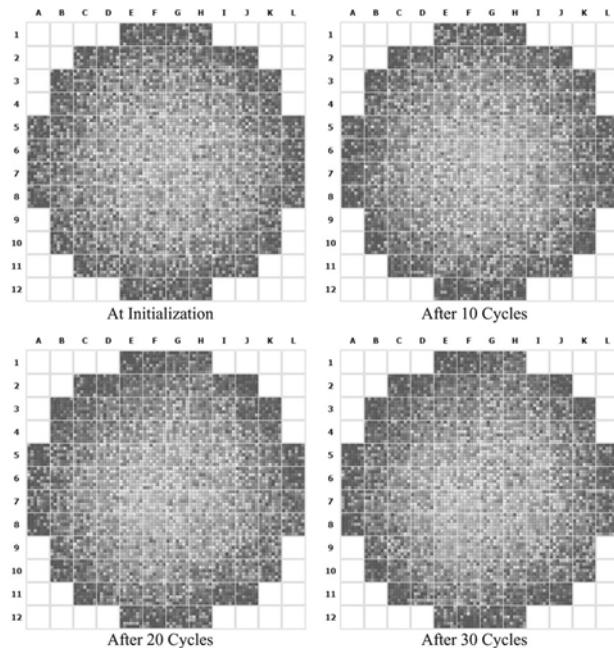


FIGURE 8 Animation Sequence for Experiment 8

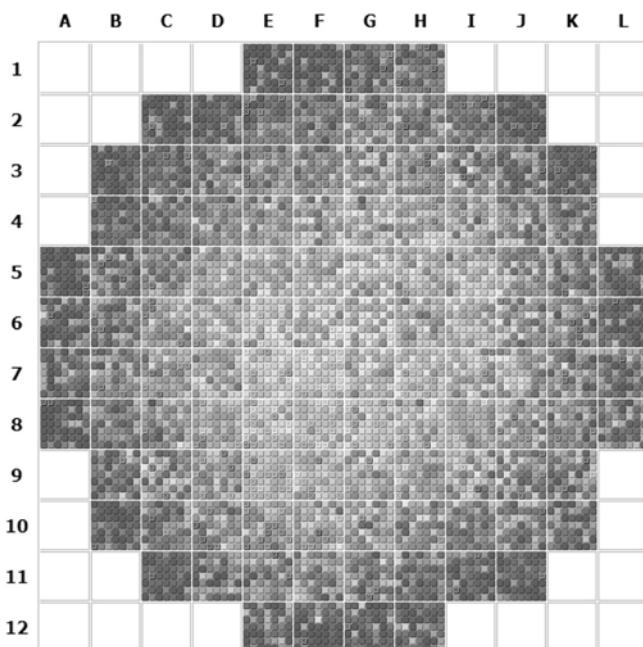
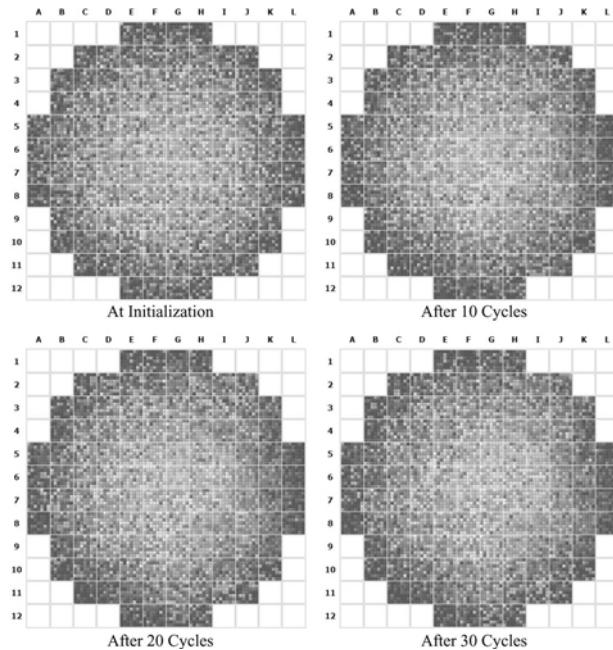
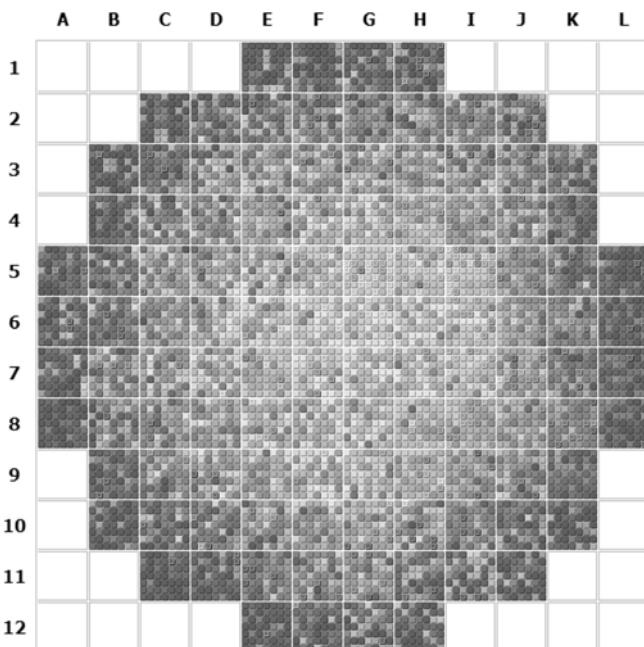


FIGURE 8 Final Landscape for Experiment 8

**FIGURE 9 Animation Sequence for Experiment 9****FIGURE 9 Final Landscape for Experiment 9**

Animation Sequence

Color signifies ethnic status. White households are depicted in blue, black households in red, and Hispanic households in green. Ten levels of color shading signify socioeconomic status with higher-status households depicted in darker shades. Vacant housing units are depicted by dark diagonal stripes on a gray square.

Final Landscape

Color signifies ethnic status. White households are depicted in blue, black households in red, and Hispanic households in green. Ten levels of color shading signify socioeconomic status with higher-status households depicted in darker shades. Vacant housing units are depicted by dark diagonal stripes on a gray square.

simulation experiment. This visual impression is confirmed with quantitative measures of segregation. For example, the “raw” or unadjusted index of dissimilarity between blacks and whites at the end of the simulation is 15.1. This is scarcely different from the value of 15.3 that would be expected under a model of random assignment (based on Winship, 1977). Following Winship (1977), I norm dissimilarity scores against the value expected under random assignment.⁵⁶ The normed dissimilarity scores are near zero at initialization and stay near zero throughout the experiment. The final score for the normed index of dissimilarity between whites and blacks is -0.3, indicating that the result is slightly less than would be expected under random assignment. The baseline scenario used for Experiment 1 also produces very little segregation along status lines. For example, the normed dissimilarity score for the comparison of low- and middle-status whites is -0.9, indicating the “raw” score of 17.8 is slightly less than the score expected under random assignment of 20.1.⁵⁷ Housing moves are means-tested and households are motivated to seek higher-quality housing and higher-status neighborhoods, but urban structure (in the form of area stratification) does not provide a sufficient platform for status segregation to emerge.

The animation sequences are useful because the visual patterns provide an immediate, intuitive sense of several aspects of segregation at once. To ensure that the featured animation sequences were representative of the typical segregation outcomes resulting under the simulation scenario in question, I ran 1,000 replications of each experiment and prepared the animation sequence using the one whose outcomes most closely approximated the average outcomes over the 1,000 replications.⁵⁸ Appendix Table 1 provides a summary table reporting the values of selected quantitative measures of segregation for the *individual* simulation experiments featured in this paper (computed from the final city landscape at the end [i.e., cycle 30] of the experiment). Appendix Table 2 reports the means for these outcomes

⁵⁶This norming procedure is particularly relevant in the present case because neighborhood size is small. Non-normed values of D yield much *higher* segregation levels reflecting the fact (discussed earlier in the text) that random assignment produces considerable variation in neighborhood ethnic composition. See Fossett (2005) for a detailed discussion of measuring segregation in computer simulations.

⁵⁷Segregation between socioeconomic groups is not reported in the tables for space considerations.

⁵⁸To do this, I first calculated the absolute difference between the normed dissimilarity score between whites and blacks and the mean for this same score over 1,000 replications; I then repeated this calculation for the normed dissimilarity score for whites and Hispanics and the normed dissimilarity score between Hispanics and blacks; next I summed the three figures; and then selected the experiment where the sum was closest to 0.0. In all cases, the sum for the expected experiment was very close to 0.0.

based on 1,000 replications for each of the experiments. Inspection of these two tables shows that the quantitative outcomes for the individual experiments featured closely match those typically obtained. For example, the normed index of dissimilarity between whites and blacks at the end of Experiment 1 conclusion of the single experiment shown in Figure 1 is -0.3, as reported in Appendix Table 1. This is very close to the average for this measure over 1,000 replications of the experiment of -0.2, reported in Appendix Table 2.

Appendix Table 3 presents the standard deviations for these measures over the 1,000 replications of each experiment. It shows that the quantitative results obtained are highly consistent across repeated replications of the same simulation scenario.⁵⁹ I performed statistical analyses to formally assess whether segregation outcomes varied systematically from one experiment to another or over various stages (i.e., intervals) in the course of particular experiments. All statements describing systematic differences in segregation outcomes have been established as statistically significant using standard analysis of variance procedures (based on an alpha of 0.001).⁶⁰ Given the routine nature of these statistical analyses, I do not report them in summary tables or footnotes.

In Experiment 2, I modify the baseline scenario to explore the possibility that *status* segregation dynamics could produce *ethnic* segregation as a byproduct. I leave all model parameter settings from Experiment 1 unchanged with the exception of parameters related to area stratification and inter-group status inequality. Regarding area stratification, I change the model parameter that causes the average value of housing within bounded areas to vary systematically across areas of the city. Specifically, the model implements a neighborhood effect on housing quality based on a function of distance from the city center. The result is that neighborhoods on the perimeter of the city have higher average quality housing than neighborhoods located in the center of the city. For example, the top five neighborhoods have average housing values above 60 (compared to an overall mean of 37.5 and an overall median of 35) and are all located on the outermost “ring” of areas. In contrast, the bottom five neighborhoods have average housing values below 16 and all are in the middle of the city.

⁵⁹The variability in segregation outcomes depends on the outcome considered and the particular experiment. With 1,000 replications, however, it is easy to distinguish systematic differences. For example, the largest 95% confidence interval around a mean reported in Appendix Table 2 has a width of only 0.775 and most are well under 0.500.

⁶⁰Given the relatively low sample-to-sample variability in the outcomes and the sample size of 1,000, differences in means of 1.0 or more are significant at 0.001 using a two sample difference of means test. Accordingly, I focus on substantive significance (rather than statistical) significance when discussing results.

Overall, neighborhood location explains 60% of the variation in housing quality in a housing-unit-level analysis.⁶¹

Regarding inter-group status inequality, I set the model's parameters to create a clear pattern of inter-group inequality in status distributions with whites being considerably advantaged relative to both blacks and Hispanics, with Hispanics being slightly advantaged relative to blacks. This is reflected in the median status scores for each group, which are 40.6 for whites, 30.0 for Hispanics, and 24.8 for blacks.⁶² For the overall city, the 10th percentile status score is 12.9, the median is 35.0, and the 90th percentile status score is 66.1. Appendix Table 4 provides a summary of the values of model parameters that vary over the various experiments reported in this paper and highlights the ones that change from one experiment to the next.

The animation sequence in Figure 2 shows that ethnic residential segregation is relatively low at the initialization point in the simulation and remains low throughout the course of the 30 cycles of the simulation experiment. This visual impression is confirmed with quantitative measures of segregation. For example, the normed index of dissimilarity between blacks and whites at the end of the simulation is 13.9. This is higher than the comparable value of -0.2 observed for Experiment 1, but it is obviously low compared to levels observed in real cities. The results suggest that status dynamics by themselves cannot produce high levels of ethnic segregation, at least not under the conditions implemented in this simulation. This is an interesting finding because the scenario for Experiment 2 has all of the key ingredients of the standard economic differences-status dynamics hypothesis—neighborhoods are stratified on housing quality, households seek high-quality housing and high status neighborhoods, access to high-quality housing is constrained by means-testing, and ethnic groups differ significantly in their ability to afford high-quality housing. Yet the resulting ethnic segregation is low.⁶³

⁶¹That is, the r-squared statistic from the non-linear regression of housing value on distance from the city center is 0.60. This figure falls within the range of between neighborhood variation in housing values seen in “real” cities (based on data for block groups).

⁶²I report median status because it is easy for readers to interpret. For technical reasons, the SimSeg program uses Lieberson's index of net difference (ND) to quantify inter-group inequality. ND is 40 for the white-black comparison, 25 for the white-Hispanic comparison, and 15 for the Hispanic-black comparison.

⁶³Jaret's (1995) discussion of the status dynamics hypothesis suggests that a proponent of this hypothesis might object that the level of ethnic inequality implemented here is not extreme enough. The level implemented is within the ranges of inequality observed for education, occupation, and income in real cities. However, group inequality in wealth and credit worthiness, which might be seen as important in housing dynamics, may be even greater (Oliver and Shapiro, 1995).

The scenario used for Experiment 2 produces little ethnic segregation but does produce substantial segregation along status lines. For example, the normed dissimilarity score for the comparison of low- and high-status households exceeds 80 for all three ethnic groups.⁶⁴ This results because:

- (a) higher quality housing is distributed unevenly across neighborhoods and is over-represented in peripheral neighborhoods and under-represented in central neighborhoods;
- (b) households seek high-quality housing and higher-status neighborhoods;
- (c) access to high-quality housing is means-tested; and
- (d) there is substantial *intra*-group inequality in status.

Thus, status dynamics, that is, housing and status preferences coupled with market dynamics and intra-group status inequality, produce considerable status segregation in a city characterized by a fair degree of “area stratification” (i.e., variation in housing quality across neighborhoods). However, relatively little ethnic segregation is produced as a byproduct.

The scenario for Experiment 3 retains all of the features described for the scenario of Experiment 2. In addition, it adds in ethnic preferences and thus provides a basis for exploring the question of whether ethnic preferences can effect segregation in the absence of discrimination. Ethnic preferences are implemented in the following way. Consistent with evidence from survey research, the typical white household is given a preference for neighborhoods that are 90% white; the typical black household is given a preference for neighborhoods that are 50% black; and the typical Hispanic household is given a preference for neighborhoods that are 50% Hispanic. The SimSeg program allows the in-group preference targets for a group to be heterogeneous, that is, dispersed around the group’s central tendency. In the simulations here, preferences are heterogeneous and the preferences for typical households reflect the median value in the relative frequency distribution of in-group preference targets for their respective group. Dispersion around the central tendency of each group’s preference distribution is governed by a dispersion factor that creates heterogeneity consistent with results reported in survey research (e.g., Clark, 2002; Charles, 2001; Farley, Danziger, and Holzer, 2000). Thus, half of whites have in-group preference targets below 90 and many are well

⁶⁴As noted earlier, segregation between socioeconomic groups is not reported in the tables.

below the group median. Similarly, many minority households have in-group preference targets well below their group medians of 50, and many have in-group preference targets well above 50.⁶⁵ Appendix Figure 5 presents graphical representations of these distributions along with those used in other experiments.

SimSeg also allows for the specification of out-group preference targets and these are also heterogeneous with the restriction that they cannot conflict with in-group targets (i.e., the sum of the two cannot exceed 100). In this scenario, typical black and Hispanic households hold out-group preference targets of 30% and thus will try to avoid neighborhoods that are more than 70% black or Hispanic, respectively. This means that black and Hispanic households seek integrated neighborhoods (in the sense of mixed but not in the sense of proportionate representation). Finally, SimSeg allows out-group preferences to differentiate between groups. Following survey results (e.g., Bobo and Zubrinsky, 1996; Charles, 2001; Clark, 2002), I specify out-group preferences for black and Hispanic households that lead them to prefer out-group contact with whites rather than other minorities. Thus, black and Hispanic households seek integrated neighborhoods, preferring ones that give them contact with whites. In contrast to minority households, white households are not assigned positive preference for residential contact with other groups. However, following survey results reported in Bobo and Zubrinsky (1996) and Charles (2001), white households prefer out-group contact with Hispanics over out-group contact with blacks.

Households evaluate the satisfaction of ethnic preferences based on the ethnic mix in the immediate bounded neighborhood where the housing unit in question is located. Households also take account of the ethnic mix in adjoining areas, but attach less importance to this.⁶⁶

⁶⁵The dispersion factor is implemented as a random normal deviate applied to a log-odds (logit) version of the preference target. This is theoretically appropriate for working with a percentage score bounded at 0 and 100. The logit version of the preference targets are always normally distributed. The “raw” score preference targets are approximately normally distributed when the median raw score target is 50 percent. The raw-score distributions are skewed left when the median raw score target is above 50 and skewed right when the median raw score target is below 50. These patterns are consistent with observed preference distributions.

⁶⁶Ethnic mix in adjoining areas is given half as much weight as ethnic mix in the immediate area. Interestingly, consideration of ethnic composition in adjoining areas tends to diminish the effect of ethnic preferences on “evenness of distribution” (the dimension of segregation measured by the index of dissimilarity) – it creates a competing goal. However, it tends to accentuates the effect of ethnic preferences on the “clustering” dimension of segregation and drives overall residential patterns from “checkerboarding” and toward “ghettoization.”

When households evaluate available housing units, they give equal weight to each of three major concerns: ethnic concerns, concerns about housing quality, and concerns about neighborhoods status. This means that ethnic concerns are only one among three equally weighted considerations households take into account when they make decisions about residential locations.⁶⁷

Significantly, all households from all ethnic groups are “willing to mix” with all other ethnic groups and at any ethnic mix. Searching households inspect a sample of a dozen vacant households and evaluate them relative to their preference set. In one out of every five searches, the household cannot remain its current residential location and must move to one of the dozen vacant units it has evaluated. It will choose the least objectionable among them, but the algorithm does not allow any household to refuse to move to the least objectionable residential location. In this sense, they are willing to enter any neighborhood, but will enter lesser-preferred neighborhoods only when their search did not turn up houses in neighborhoods with ethnic mixtures consistent with their preference targets. One question of interest is whether these regular forced moves blunt the impact of top-ranking preferences on resulting residential patterns.

The animation sequence in Figure 3 shows that this simulation scenario produces very high levels of ethnic segregation. The level of ethnic segregation observed at the initialization stage of Experiment 3 is just as low as in the initialization stage of Experiments 1 and 2. However, segregation emerges rapidly and is clearly evident by cycle 10. This segregation pattern consolidates and remains stable throughout the remaining 20 cycles of the 30-cycle simulation experiment; once neighborhoods take on a homogeneous ethnic mix, that mix is highly stable for the remainder of the experiment. The visual impression of considerable ethnic segregation is confirmed with quantitative measures. For example, the normed index of dissimilarity between blacks and whites at the end of the simulation is 84.3 (the “raw” index score is 86.7).

The animation sequence in Figure 3 shows the results of Experiment 4, a variant of Experiment 3. This experiment differs from Experiment 3 only in the spatial domains considered when households assess ethnic preferences. In Experiment 3, households considered the ethnic mix in the bounded neighborhood and, to a lesser extent, the ethnic mix in immediately adjacent areas. In Experiment 4, households look only at the ethnic mix among “nearby neighbors,” that is,

⁶⁷The specific methods of weighting the various considerations are discussed at length in the program documentation (Fossett, 1998a).

households living within a radius of 5 housing units from the housing unit under consideration.⁶⁸ The results show that this change has little effect on the basic segregation patterns that emerge in the simulation. Segregation is just as pronounced as in Experiment 3. It differs only in that ethnic spatial separation does not closely follow the borders of bounded neighborhoods as it did in Experiment 3. This is hardly surprising given the difference in the specification of the relevant spatial context for evaluating neighborhood ethnic mix.

Several interesting conclusions can be drawn from Experiments 3 and 4. First, and most important, the results show that *ethnic preferences clearly have the theoretical capability, at least under the conditions specified in these simulation experiments, of produce substantial levels of ethnic segregation in the absence of housing discrimination*. Clear visual patterns of segregation are evident in the animation sequences and these impressions are confirmed by quantitative results reported in Appendix Tables 1 and 2. Significantly, ethnic segregation is very low at the initialization point in these experiments (reflecting means-tested random assignment of households) but is very high at the end. This indicates that social distance and preference dynamics have the capacity to “build” segregation rapidly even when households initially have very limited opportunities to act on ethnic preferences. The animation sequences show that segregation created by social distance and preference dynamics tends to be strongly self-reinforcing; neighborhood ethnic mixes and related segregation patterns “crystallize” quickly and remain highly stable once they take form. These findings are consistent with theoretical and analytic arguments advanced by Schelling and contradict the argument that ethnic preferences cannot have important consequences for segregation unless segregation is “jump started” by discrimination as some have argued.

SimSeg’s implementation of ethnic preferences in this simulation experiment is much more flexible and nuanced than that found in any analytic or simulation model previously reported in the literature. The parameter settings I use here specify considerable heterogeneity in preferences for in-group contact within each ethnic population and, in the case of minority populations, heterogeneous competing

⁶⁸This is controlled by activating the model parameter for considering ethnic mix among “nearby neighbors” and the associated model parameter that sets the “nearby-neighbor range” to 5. Activating these parameters greatly increases the computational burden of the simulation experiment. For this reason, and since the results are otherwise little different, these nearby neighbor calculations are not used in other simulations.

preferences for out-group contact.⁶⁹ Consequently, these results provide an initial basis for stating that, under at least the model conditions explored here, the effects of preferences for in-group contact are *not* strongly blunted by heterogeneity in preferences for neighborhood ethnic mix. I have explored this outcome further in other analyses (not reported here) by conducting experiments investigating various combinations of dispersion factors, out-group preferences, relative weights for preferences, salient neighborhood contexts, and other factors. These explorations lead me to hypothesize that the key factor shaping the impact of ethnic preferences is the central tendency (i.e., the median) of each group's in-group preference target distribution. The results I have obtained suggest that, when typical preference is held constant, the effects of in-group preferences are robust and generally do not vary significantly across different implementations of heterogeneity in preferences.

Another interesting finding seen in the results for these two experiments is that ethnic preferences and social distance dynamics not only generated high levels of majority-minority segregation, but they also generate high levels of minority-minority segregation, a pattern observed in many American cities. Massey (2000) reports data showing that minority-minority segregation levels are sometimes as high as white-minority segregation levels. Future research should give more attention to multi-group segregation patterns because theories emphasizing discrimination dynamics that constrain minority access to white residential areas do not easily account for minority-minority segregation, but theories emphasizing social distance and preference dynamics have clear potential in this area.

Experiments 3 and 4 also generate high levels of status segregation both within and across the three ethnic groups. This is suggested by the final city landscapes for Experiments 3 and 4 and confirmed by quantitative indices (not reported here). This suggests that, at least in the context of the theoretical model implemented in the simulation, middle- and upper-class households from *all* groups can meet goals of obtaining high-quality housing and higher status neighborhoods even under conditions of substantial ethnic segregation.⁷⁰ This finding

⁶⁹The 95% center spread (i.e., approximately ± 1.96 standard deviations) in the distributions of in-group targets is 26.5 for whites (70.6–97.1), and 57.8 for blacks and Hispanics (21.1–78.9). These percentage targets and spread ranges are obtained by transforming relevant deviates from the normal distributions of logit-transformed preference targets.

⁷⁰For example, in Experiment 3 most of the “suburban” fringe is higher-status white, but a higher-status black area coalesced around area D11 and higher-status Hispanic areas coalesced around areas K5.

contradicts the argument that social distance and preference dynamics based on ethnic status are not likely to produce much ethnic segregation because their effects will be blunted by the fact that households hold many preferences that they must satisfy simultaneously. Under the scenario investigated here, competing preferences for high-quality housing and higher-status neighborhoods do not prevent ethnic segregation from reaching high levels, even though the virtual city is characterized by high levels of area stratification and inter-group status inequality.

Certain aspects of the final city landscapes in Figures 3 and 4 are unpredictable (e.g., the ethnic composition of a *particular* bounded neighborhood), but as documented in Appendix Tables 2 and 3, city-level segregation outcomes for evenness, isolation, centralization, and clustering are consistently high over the 1,000 replication of each of the two experiments.⁷¹ Thus, the addition of ethnic-based social distance and preference dynamics consistently produces “hyper-segregation,” that is, high levels of segregation on several segregation outcomes, in a simulation scenario that does not include discrimination. Interestingly, hyper-segregation is more pronounced for blacks because Hispanics are less centralized than blacks (though they are more centralized than whites). Two factors account for this.⁷² First, following evidence from surveys, whites are specified to prefer out-group contact with Hispanics over contact with blacks.⁷³ Second, blacks have lower socioeconomic status than any group. Hispanics are disadvantaged relative to whites but have slightly higher socioeconomic status than blacks.

These results and results I have obtained in other experimentation lead me to hypothesize that scenarios containing the following key ingredients are likely to produce hyper-segregation of a minority group: (a) households in all groups have strong preferences for housing quality and neighborhood status, (b) neighborhoods are stratified in terms of housing quality, (c) area housing quality is positively correlated with distance from city center with central neighborhoods having substantially lower quality housing, on average, than outlying

⁷¹Concentration, the fifth of the five dimensions of segregation Massey and Denton (1988) identify, is not relevant here because the density of housing units does not vary by neighborhood. However, it might be assumed that, following standard urban patterns, average lot size increases with distance from the city center. Under that assumption, central neighborhoods will be more densely settled and concentration effects will follow centralization effects.

⁷²The following points are established by experiments not reported in this article.

⁷³Whites do not seek out-group contact, so this preference comes into play when whites are choosing among neighborhoods that have some nonwhite presence.

neighborhoods, (d) households in all groups hold preferences for co-ethnic contact that exceed proportionate representation, and (e) ethnic groups differ in average status and, in terms of its status distribution, the minority in question is significantly disadvantaged relative to some groups and is not significantly advantaged to any group. Since these basic conditions are approximated in many urban areas, the question arises as to whether hyper-segregation may be sustained, at least in part, by social distance and preference dynamics operating in urban-demographic settings that have the key ingredients needed to produce hyper-segregation.

The finding that hyper-segregation can be produced by simulation models that do not incorporate discrimination dynamics is an important theoretical result. But it is too soon to know what relevance this may or may not have for segregation in real cities. Demonstrating effects in a theoretical analysis is not the same thing as demonstrating that a similar process is important in a real system. Thus, this finding should not be seen as a basis for discounting the generally accepted hypothesis that discrimination plays an important role in creating and maintaining hyper-segregation in real urban systems. The best evidence suggests that on-going discrimination remains significant even though it may be declining. This leads me to hypothesize that ethnic segregation, including hyper-segregation, in real cities may be *overdetermined*; that is, it may be sustained by *multiple* sufficient causes including both discrimination *and* social distance and preference dynamics. Future empirical and theoretical analysis will be needed to determine whether this conjecture is correct. In the meantime, however, the findings reviewed here cast doubt on theoretical arguments that social distance and preference dynamics *cannot* contribute in an important way to ethnic segregation in American cities.

Several additional experiments provide further evidence to help support this point. Experiment 5 follows the scenario defined above for Experiment 3 with two key differences. First, ethnic groups are assigned preference targets for in-group contact that do not exceed their group's population representation; whites seek neighborhoods that are 60% white, blacks seek neighborhoods that are 20% black, and Hispanics seek neighborhoods that are 20% Hispanic. (As before, these are medians for group-specific distributions of preference targets and there is substantial variation around these values.) Second, all groups are indifferent to ethnic mix, so long as their in-group preference goal is met, and thus will tolerate high levels of out-group contact with all groups. These preference are definitely compatible with extensive neighborhood integration. However, this scenario generates surprisingly high levels of segregation. This can be seen visually in the

animation sequence shown in Figure 5 and confirmed quantitatively. Indeed, the mean for normed white-black dissimilarity (59.7) is more than four times higher than that seen for Experiment 2 (no ethnic preferences), and the mean for normed white-Hispanic dissimilarity (52.8) is more than eight times higher.

Why? The answer is that “60-20-20” neighborhoods are unstable because the balance of exact proportionate representation is fragile under these ethnic preferences. Visual inspection of the animation sequence suggests (correctly) that at initialization segregation is low. It also suggests that most neighborhoods are not too far from a fully integrated 60-20-20 ethnic mix, but a combination of random and systematic pressures (e.g., ethnic inequality in status combined with area stratification) “prime” the city for rapid movement toward segregation. At initialization, 73 of 112 neighborhoods have a 25% underrepresentation of at least one of the three ethnic groups, 53 areas have a 33% under representation of at least one group, and 19 areas have an 50% underrepresentation of at least one group. Such neighborhoods are unlikely to attract and retain members of the underrepresented group and are thus very likely to undergo transition to a two-group mix where the two remaining groups are represented at levels well above the minimum level that households from these groups are seeking.

All two-group areas are more stable than the 60–20–20 three-group area, but black-Hispanic areas are the most stable of the two-group forms. White-black and white-Hispanic areas are more stable than three-group areas but are susceptible to “tipping” toward all white (if the minority falls below 20%) or tipping toward minority-minority (if whites drop below 60%). Thus, the final landscape has many predominantly white areas but relatively few areas that are predominantly black or Hispanic. The animation sequence shows that once areas make the transition from three-group to two-group, or two-group to one-group, the new state is highly stable and reverse transitions are rare. A clear theoretical implication flows from these results; *for preferences to be strongly integration-promoting, they must be more than simply compatible with integration (as the preferences in Experiment 5 are), they must draw people into areas with proportional ethnic mixes.*

Interestingly, at least one aspect of ethnic preferences active in this scenario featured here plays an integration-promoting role. Specifically, households in these simulations evaluate ethnic mix in adjacent bounded areas as well as in the immediate bounded area. Households give greater weight to the evaluation for the immediate area (by a 2:1 margin), but this macro area focus has a clear impact on segregation patterns. One that is not surprising is that it produces the clustering that is visually evident in

the animation sequence. However, it also makes white-minority two-group areas more stable because the minority representation in the macro-region is less susceptible to dropping significantly below 20% due to a random drift. Analyses not reported here show that this impact is substantial; when concerns for ethnic mix in adjacent areas is not activated, the city landscapes tend to congeal into “checker-board” patterns and clustering scores drop to very low levels. With the “brake” of adjacent area concerns removed, the means for normed white-black dissimilarity and normed white-Hispanic dissimilarity both increase by over 22 points and 24 points, respectively (to 81.3 and 76.8, respectively).⁷⁴

Experiments 6 and 7, graphical results depicted in Figures 6 and 7, respectively, provide evidence of another aspect of preferences that can promote integration—positive preferences for out-group contact. Experiment 6 restores the out-group preference targets and patterns used in Experiments 3 and 4 (i.e., black and Hispanics seek a minimum of 30% out-group contact and prefer out-group mixes with greater white representation; whites do not seek out-group contact but prefer contact with Hispanics over contact with blacks). The mean for normed white-black dissimilarity drops by about 14 points (to 45.8) compared to Experiment 5, and the mean for normed white-Hispanic dissimilarity drops by more than 25 points (to 27.1).⁷⁵ Experiment 7 raises the out-group targets to 60%, and the means for normed white-black and white-Hispanic dissimilarity drop an additional 6–7 points (compared to Experiment 6).

Clearly, positive preferences for out-group contact can be an integration-promoting force. But several points must be noted. First, the preferences implemented here do not lead to reductions in all forms of segregation; black-Hispanic dissimilarity *increases* since minorities are seeking contact with whites over minorities. Thus, black-Hispanic neighborhoods were less common in Experiments 6 and 7 than they were in Experiment 5. Second, while the segregation levels seen here are lower than those seen in Experiments 3 and 4, they are hardly trivial; all are much more pronounced than those observed in Experiment 2 where ethnic preferences were not active.

⁷⁴Again, this is another example of how simulation analysis produces results with interesting theoretical implications. Concerns for ethnic representation in the broader area increase clustering, but dampen dissimilarity and isolation. One key qualification, in this scenario the macro area is defined in terms of immediate adjacency. If it were instead defined in terms of a larger area with a fixed boundary (e.g., a school district), the effects could be quite different.

⁷⁵Analyses not reported here indicate that about half of that can be attributed to the introduction of out-group targets and about half can be attributed to the specific configuration of out-group preferences.

The mean for normed white-black dissimilarity is near 40, and the mean for normed black-Hispanic dissimilarity is even higher. This is a problem for critics of preference theories because very high levels of integration are clearly *feasible* under these preference settings. They do not occur, however, because no group actively *avoids* areas with above proportionate representations of their own group (e.g., minorities can choose areas with up to twice proportionate representation) as would be required if groups were motivated to seek areas with proportionate representation of *all* groups.

Third, these results provide additional evidence raising questions about the argument that competing preferences (in this case for high-quality housing and higher-status neighborhoods) will undermine the segregation-promoting effects of ethnic preferences. Concerns about neighborhood status and housing quality are both given the same weight as concerns about ethnic mix. Consequently, non-ethnic concerns outnumber ethnic concerns 2:1. However, households do not have to compromise much on housing quality and neighborhood status in order to realize their goals regarding neighborhood ethnic mix. If competing preferences do not fundamentally undermine the effects of ethnic preferences under the very favorable scenarios implemented in Experiments 5–7, how can they be expected to undermine ethnic segregation in more realistic scenarios where in-group preferences for all groups are strongly segregation promoting?

Finally and most important, the preference settings in these experiments are quite different from anything suggested by survey evidence (Bobo and Zubrinsky, 1996; Clark, 2002). In Experiment 7 minorities are not merely *tolerant* of out-group contact, they actively seek majority-white areas. Survey evidence suggests that first or second preferences for contact with whites at a minimum of 60% are very uncommon for black and Hispanic households (e.g., fewer than 10% of black households). Yet in many metropolitan areas minority preferences for contact with whites would have to be *stronger* than this (because white representation in the city population is higher) to motivate minority households to seek neighborhoods with proportionate representation of whites. Likewise, whites are specified as seeking only population representation of their group and readily tolerate high levels of out-group contact. Survey evidence suggests this also is uncommon.

Experiments 8 and 9, graphical results depicted in Figures 8 and 9, respectively, show how movements back toward preference specifications that are more realistic quickly bring a return to higher levels of segregation outcomes. Experiment 8 returns whites' preferences for in-group contact to the level reported in surveys (e.g., 90% in-group contact) and previously implemented in Experiments 3 and 4.

This leads to increases in the means for normed white-black and white-Hispanic dissimilarity of over 7 and 5 points, respectively.⁷⁶ Experiment 9 then sets minority preferences to in-group contact to 25%, up only 5 points and only *half* the level suggested by surveys. The paradox of weak minority preferences is again evident as this small increase in minority preferences for in-group contact produces an increase in mean normed white-black dissimilarity of over 12 points to an average level of almost 60. White-Hispanic segregation changes only slightly (up just over 4 points to about 30), but mean normed black-Hispanic dissimilarity increases by over 16 points to over 50.

When this set of simulation results is taken together, a clear pattern emerges. There can be little doubt that, in theoretical models, social distance and preference dynamics have the capacity to generate high levels of ethnic segregation, including multi-group segregation patterns and hyper-segregation of minority populations. This capacity has been underestimated in the past based on several widely accepted assumptions that are contradicted by the results reviewed above: (1) many preference patterns that in the past have been viewed by some as integration-promoting are in fact incompatible with integration and are strongly segregation-promoting, (2) many preference patterns that in fact *are* compatible with high levels of integration under certain conditions (e.g., strategic assignment) are nevertheless segregation-promoting rather than integration-promoting when individual household decisions are uncoordinated, and (3) assumptions that competing preferences and heterogeneity in ethnic preference distributions are likely to undermine the segregation-promoting impact of ethnic preferences are overdrawn.

DISCUSSION

Urban ecological theory in sociology generates the hypothesis that ethnic-based social distance dynamics contribute to the creation and maintenance of ethnic segregation in American urban areas. Micro-level choice theory in economics generates the closely related hypothesis that ethnic preferences play a role in ethnic segregation. The simulation experiments reviewed here provide evidence consistent with these hypotheses.⁷⁷ These results have important implications

⁷⁶Interestingly, the mean for normed black-Hispanic dissimilarity *declines* by over 8 points.

⁷⁷The notion of viewing the results of simulation models as “empirical evidence” regarding the behavior of a theoretical model is new in sociological research on segregation. But it is widely practiced in many fields where theoretical models are too complex to be investigated using deductive or analytic methods and instead must be explored using computational methods to generate data about model behavior.

for segregation theory. Specifically, these results provide compelling evidence that theoretical arguments seeking to discount the potential importance of social distance and preference effects, or dismiss them altogether, are suspect and should be reconsidered. Further research exploring the potential effects of social distance and preference dynamics on segregation is clearly justified.

As I stressed earlier, the evidence here pertains to the behavior of a theoretical model of segregation and thus the results have clear limitations. At this early stage in the development of simulation models of residential segregation, results from simulation experiments can help inform theoretical debate but cannot serve as a basis for assessing the actual impact of social distance and preference dynamics on segregation in real urban systems. This limitation is important, but the results reviewed here are not merely academic or narrowly theoretical. Questions concerning the effects of social distance and preference dynamics loom more important now than ever. The possibility that housing discrimination may be declining in many or even most American cities is increasingly plausible. Thus, it is increasingly relevant to ask, "What kinds of changes in segregation should we expect to see if discrimination were to decline?" The existing literature does not provide a sound basis for answering this question.

Based on the results presented here, I *speculate* that recent and future declines in discrimination may not necessarily lead to large declines in segregation *in the short run* (measured at least, I suspect, in decades). My conjecture is based on the hypothesis that segregation at present, and likely in the recent past as well, has been sustained by a combination of *two* sufficient causes—discrimination dynamics and social distance and preference dynamics. If this is the case, there is little reason to expect segregation to decline immediately and dramatically following declines in discrimination because another sufficient cause (namely, ethnic preferences) may still be operating to sustain segregation at high levels. Even if survey-based measurements of trends in racial attitudes about residential integration are taken at face value (a proposition many would view as optimistic), current data on ethnic preferences provides little basis for expecting high levels of residential integration to emerge from residential choice dynamics. The common presumption in the literature is that minority preferences would promote rapid residential integration if the residential movement of minority households was not constrained by discrimination. On closer inspection, however, minority and white preferences alike are segregation-promoting not integration-promoting. Hypotheses about possible integrating-promoting impacts of heterogeneity in ethnic preferences or other aspects of preferences such as

willingness to pioneer or mix are contradicted by the simulation results presented here. Thus, it would appear that it is difficult to justify the prediction that residential integration would decline rapidly if discrimination in housing were reduced significantly but *without* significant changes in patterns of prejudice and ethnic preferences.

Krysan and Farley (2002) look for reasons to be optimistic about the future direction of racial integration. On the positive side, they highlight the fact that data from the 2000 census show that the rapid decline of all-white suburbs (a trend Thernstrom and Thernstrom [1997] also stressed in their analysis) has continued apace and consequently suburbs with no blacks are now "difficult to find" whereas they were "common" in the Midwest and Northeast just two decades ago. They speculate that if pioneering black households have positive experiences, the pace of integration may quicken in future decades. At the same time, however, they point to the "crucial role that white preferences continue to play in maintaining segregation." Social distance and preference models would lend support to this concern but would go further in stressing that white avoidance behavior is generally facilitated, not countered, by minority preferences. It is, in fact, difficult to imagine minority preferences emerging in the near future that would sharply reverse this situation.

Aside from minority desires for integration, the literature presently does not point to specific mechanisms that would promote rapid movement toward residential integration in the short-run (i.e., in one or two decades). Status dynamics might be presumed to attenuate ethnic segregation as discrimination diminishes and minority populations consolidate and expand gains in education, occupation, and income. However, the analyses here suggest that, so long as ethnicity is a salient factor in choice behavior, status dynamics will not necessarily blunt its impact and ethnic segregation might well persist in the face of declining discrimination. This hypothesis is based on the conjecture that middle-class white and middle-class minority households alike may be able to meet their preferences for high-status neighborhoods, better services and amenities, and isolation from social problems (e.g., crime) by locating in ethnically segregated neighborhoods outside of inner-city areas characterized by highly concentrated poverty and social problems. This hypothesis receives at least superficial support from the fact that such neighborhoods have been emerging rapidly in American urban areas in recent decades.

One clear need is for future research to clarify not only the implications of preferences but also their historical origins and possibilities for change in the future. For policy, it is crucial to know whether white and black concerns about residential mixing are

grounded in exaggerated stereotypes that may wither in the future (as Krysan and Farley hope) or realistic assessments of on-going ethnic antagonism and conflict. Survey researchers and qualitative researchers need to probe in-depth into minority households' *abilities* to move into integrated or predominantly white areas and their *motivations* for wishing to do so or not. Thernstrom and Thernstrom, Patterson, and others have argued that minorities desiring to locate in integrated areas may encounter obstacles but generally can attain this goal if they in fact seek it. Discrimination researchers have not clearly refuted this hypothesis empirically or theoretically. Surprisingly, survey research assessing the attractiveness of different kinds of neighborhoods has not carefully explored whether respondents perceive they could locate in different kinds of neighborhoods if they wished to do so.

More research is also needed in the areas of minority and majority preferences. *All* reasons for finding neighborhoods attractive (or not) or acceptable (or not) must be considered, and methods need to be devised for empirically assessing the relative importance of different considerations. Such research should focus on both minority and majority groups in order to better identify similarities and differences between the outcomes they desire and their motivations for preferring them. The nature of minority preferences for co-ethnic presence needs to be explored more carefully. Despite suggestions by some that ethnic preferences are relevant for segregation only if they rooted in self-conscious ethnic nationalism, preference theory is much more flexible and ethnic preferences can be rooted in subtler relationships between ethnic mix and notions of "comfort," "fitting in," "sense of community," "acceptance," and so forth. These sentiments and their implications need to be sorted out. Similarly, minority concerns about indifference and hostile reception needs to be explored more carefully. In an era where minority access to higher-quality housing, services, and amenities does not absolutely require movement to predominantly white areas, why would minority households subject themselves to indifference or lack of acceptance on the part of whites? Massey and Denton have suggested that many blacks have a commitment to integration (I would say diversity) as an end in itself. Is this sentiment strong enough to lead minorities to reside in areas where their group is represented at low levels consistent with even distribution when they are merely tolerated rather than fully welcomed? In all of this, it is crucial for both theory and policy to recognize the distinctions between at least three circumstances minorities may face: exclusion and restricted access, access but only grudging tolerance, and indifference and access with full acceptance.

Finally, the findings presented here suggest that the mere persistence of segregation does not constitute strong evidence that discrimination is undiminished. Many overviews of racial segregation strongly discount the role of factors other than housing discrimination in racial segregation. It is a short leap from that position to argue that the persistence of segregation suggests that discrimination is not declining. The results reviewed here suggest that segregation *created* by discrimination could potentially be *maintained* by social distance and preference dynamics under prevailing patterns of ethnic preferences.⁷⁸ Thus, the persistence of segregation by itself is not a sufficient basis for concluding that housing discrimination is undiminished. Future research should try to clarify this situation by not only documenting the persistence of discrimination, which informed observers readily acknowledge, but also by assessing its implications for segregation when operating in conjunction with other forces capable of promoting and maintaining segregation.

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General

Model parameters – The variables in the simulation model. “Fixed” parameters cannot change over the course of a simulation experiment (e.g., city size and number of neighborhoods). “Variable” parameters can change over the course of a simulation experiment (e.g., preferences, search constraints, and housing discrimination). (Note: In the simulations reported in this paper all variable parameters are unchanged over the simulation experiments.)

Model processes – Algorithms simulating behavioral processes (e.g., housing search and evaluation).

Scenario – A specific configuration of values for the variables in the simulation model.

Trial – A single simulation experiment executed using a particular simulation scenario.

Stage – A period of simulation activity during which model parameters are *unchanged*. Any change in model parameters marks the end of one stage and the beginning of a new stage. Within stages, activity is organized into cycles, periods of search activity. (Note: The simulations reported in this paper are “single-stage” simulations; variable model parameters *do not change* during the simulation trials.)

Cycle – A period of housing search activity determined by the variables governing housing search.

Model parameters cannot change during a cycle.

(Note: In the simulation reported in this paper, cycles are calibrated to yield city-wide residential turnover comparable to that seen in “real” cities in a period of 6-12 months.)

Housing Stock and Neighborhoods

Area grid and housing grids – The spatial geography of the city consists of a grid of “bounded areas” each of which contains a square “grid” with a fixed number of housing units.

Housing unit and housing quality – A housing unit consists of a house and parcel of land at a fixed spatial location in the city. The “quality” and market value of each housing unit is measured on a scale ranging from 1-99. The city-wide distribution of housing values

matches the distribution of socioeconomic status scores for the city’s households.

Bounded areas (neighborhoods) – Fixed geographic areas containing housing units. Bounded areas are the residential context used in computing area characteristics such as ethnic mix and mean socioeconomic status.

Nearby neighbors – An alternative specification of neighborhood context based on housing units within a specified search radius of a focal housing unit.

Area stratification – Area variation in housing quality resulting from the positive association between housing values and distance from the city center.

Vacancies and vacancy rate – At any given time, a user-specified portion of the housing stock is “vacant”. Households engaged in search do so by examining samples of vacant housing units.

Population

Households – A group of individuals who reside together. Households are assigned an ethnic status and a socioeconomic status score. Households can engage in housing search. They evaluate current and prospective housing based on the characteristics of the housing unit and the household’s prioritized preferences.

Ethnic status – Household are placed in one of three ethnic categories: “White”, “Black”, or “Hispanic”.

Socioeconomic status – Households are assigned a socioeconomic status score from 1-99. This determines their “means” (i.e., purchasing power) in housing search.

Intra- and inter-group inequality in socioeconomic status – Intra-group inequality is regulated by the settings for center, spread, and skew in the city’s overall status distribution. Inter-group inequality refers to the degree that minority groups are advantaged or disadvantaged relative to whites.

Preferences – Households may be “motivated” by preferences relating to three residential outcomes: housing quality, area ethnic mix, and area status.

When a particular preference is “active”, households evaluate current and prospective housing units by assessing whether the housing units satisfy the house-

holds’ “targets” (i.e., goals) relating to that preference.

Preference targets – Goals that households seek to attain regarding specific residential outcomes.

Preference priorities – The relative importance assigned to different residential outcomes (based on the values of preference “weights” for different housing outcome such as housing quality, area status, area ethnic mix).

Housing Search, Evaluation, and Movement

Housing search – A sequence wherein a household is selected and given the opportunity to examine available housing units with the possible chance of moving to one that better satisfies the household’s preferences. *Means-testing* – When active, searching households can only consider “affordable” housing units (relative to the household’s purchasing power as determined by its socioeconomic status).

Specific preference evaluation – A household’s assessment of dissatisfaction with a housing unit relative to a particular preference target.

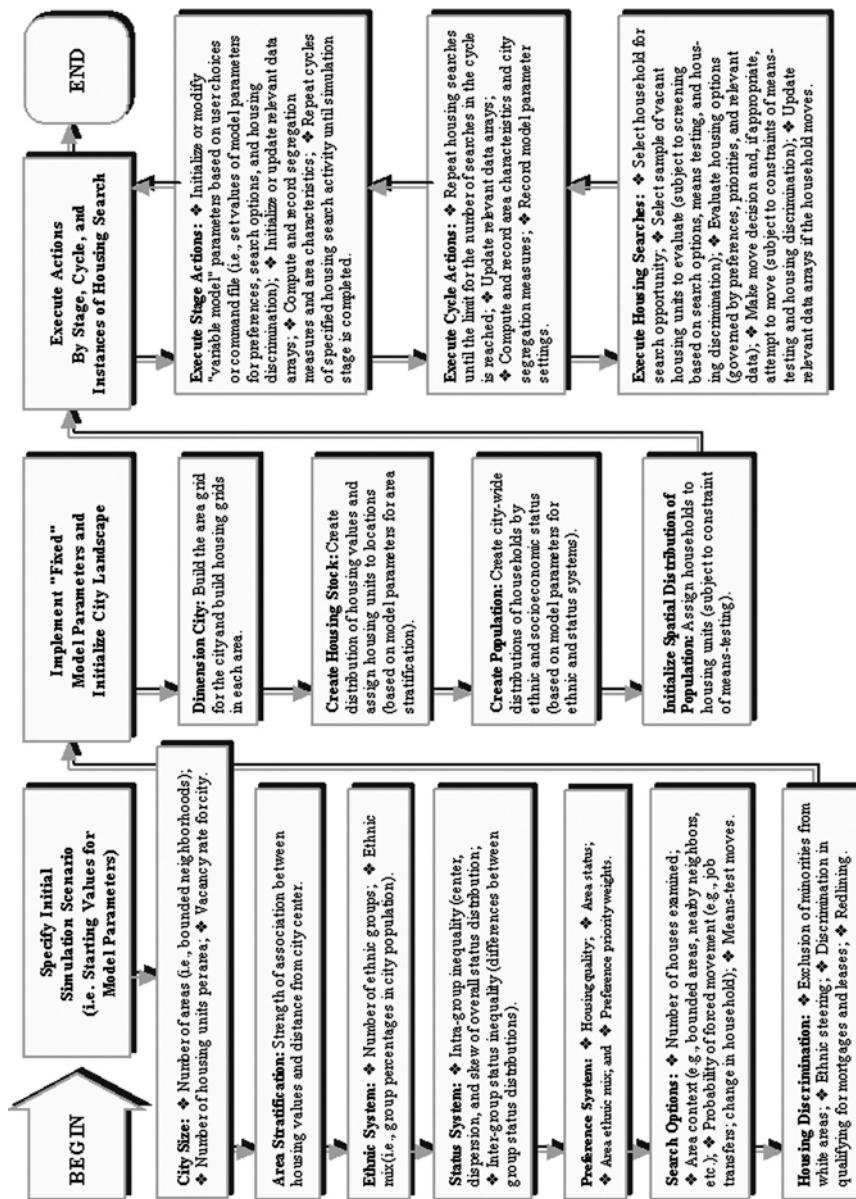
Global preference evaluation – An overall assessment of a housing unit based on the priority-weighted sum of all specific preference evaluations.

Move decision – Search ends in a decision to stay or to move to the best available housing unit (as evaluated in relation to the household’s preference priorities).

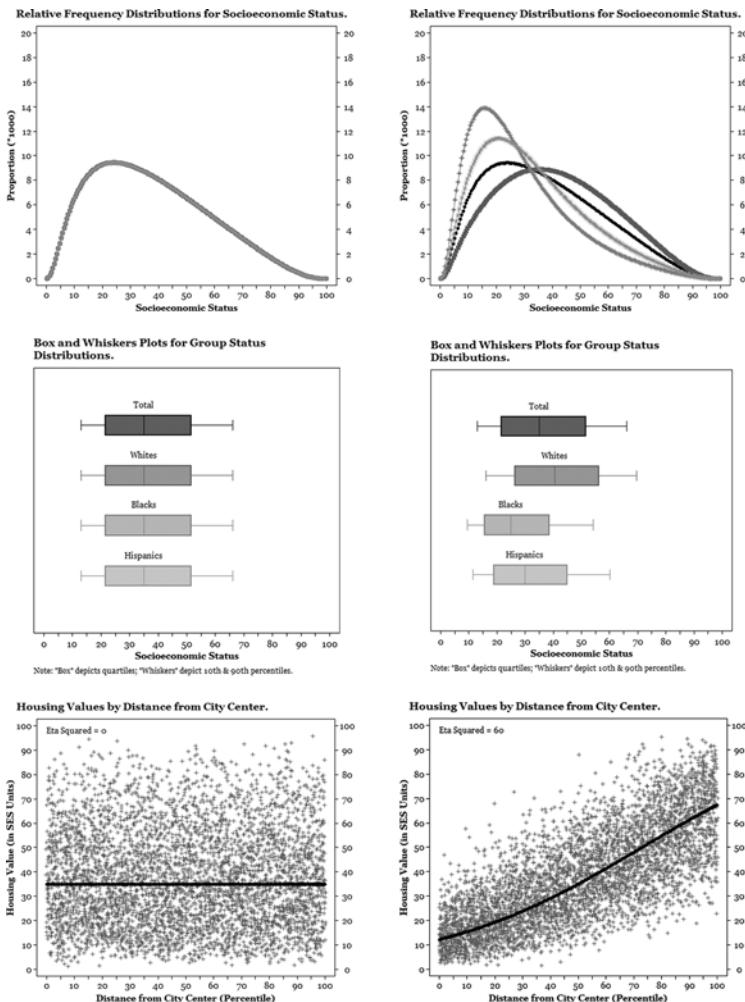
Housing discrimination – Various model processes of housing discrimination can be activated. These include exclusion of minorities from predominantly white areas, ethnic steering, discrimination in qualifying for leases or mortgage loans, and redlining. (Note: In the simulations reported in this paper, discrimination processes are not active.)

Forced movement – The requirement (initiated on a probabilistic basis) that a searching household must move even if they prefer to remain in their current housing unit. This represents housing movement precipitated by job transfers, expiration of leases, changes in family structure (e.g., divorce), the dissolution of existing households, the formation of new ones, and related factors that prompt residential moves.

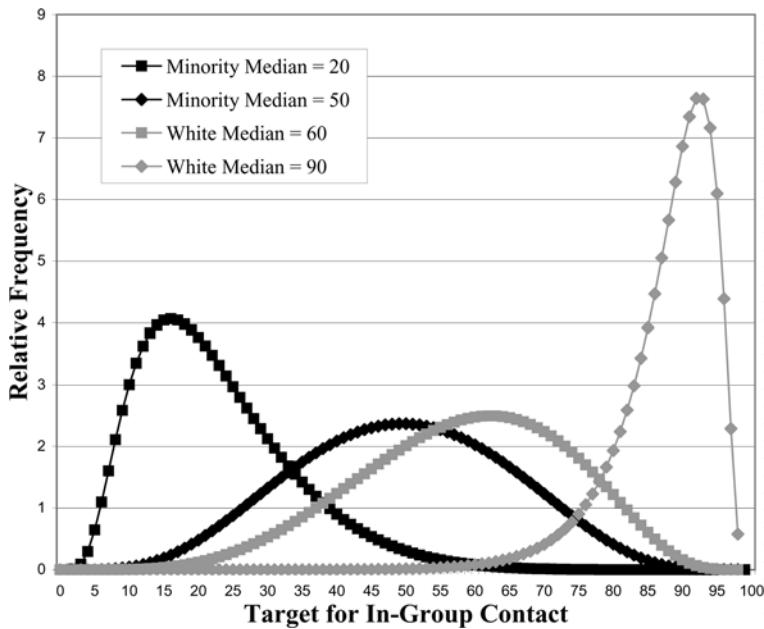
APPENDIX FIGURE 1 Glossary of selected terms for the SimSeg simulation.



APPENDIX FIGURE 2 Flowchart depicting implementation of SimSeg simulation trial.



APPENDIX FIGURE 3 Variations in inter-group status inequality and area stratification.



APPENDIX FIGURE 4 Distributions of preference targets for in-group contact.

APPENDIX TABLE 1 Selected Quantitative Indices of Segregation Calculated from the Distribution of Households in the Final Landscape for Each Featured Simulation Experiments Shown in Animation Sequences

	Simulation experiment								
	1	2	3	4	5	6	7	8	9
<i>Evenness of Distribution (Index of Dissimilarity normed per Winship [1977])^a</i>									
White-Black	-0.3	13.7	84.3	80.2	59.9	46.3	38.2	47.1	59.5
White-Hispanic	-0.3	6.3	61.2	62.1	52.2	27.1	21.1	26.4	30.5
Hispanic-Black	-0.3	1.6	80.3	70.6	31.5	41.4	42.5	33.7	50.9
<i>Isolation^b</i>									
Whites	60.9	62.5	82.6	82.2	77.5	68.1	65.3	68.6	70.3
Blacks	21.8	24.3	77.8	70.8	42.2	39.9	38.2	39.8	49.4
Hispanics	21.7	22.4	54.2	51.2	38.3	29.2	28.8	28.4	31.0
<i>Centralization^c</i>									
Whites	1.9	-30.8	-44.6	-51.0	-41.7	-43.4	-39.5	-36.0	-40.0
Blacks	1.2	22.6	36.3	42.9	33.6	35.3	31.6	28.3	31.2
Hispanics	-1.8	7.6	23.3	26.0	16.8	16.4	13.6	16.2	18.4
<i>Clustering^d</i>									
Whites	60.1	60.7	72.1	74.5	64.8	63.4	61.9	64.0	64.8
Blacks	19.9	22.2	42.4	54.0	29.1	28.6	27.8	28.1	34.8
Hispanics	19.8	20.3	33.3	38.1	24.9	23.1	22.7	22.5	24.3

^aNorming yields *lower* numerical scores. The procedure is discussed in the text.

^bMeasured by in-group representation in bounded neighborhood. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

^cMeasured using an index which yields -100 when all group members are on the periphery, 0 when group members are randomly distributed, and 100 when group members are at the city center. Negative values are observed for all groups in Experiment 0 because vacancies are concentrated in central neighborhoods.

^dMeasured by in-group representation in adjacent bounded neighborhoods. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

APPENDIX TABLE 2 Means for Selected Quantitative Indices of Segregation Calculated from the Distribution of Households in the Final Landscape for 1,000 Replications of Each Featured Simulation Experiment

	Simulation experiment								
	1	2	3	4	5	6	7	8	9
<i>Evenness of Distribution (Index of Dissimilarity normed per Winship [1977])^a</i>									
White-Black	-0.2	13.9	84.8	80.5	59.7	45.8	38.2	47.4	59.7
White-Hispanic	-0.3	6.3	61.1	62.2	52.8	27.1	21.2	26.4	30.7
Hispanic-Black	-0.1	1.7	80.1	70.2	31.9	41.6	42.5	33.8	50.6
<i>Isolation^b</i>									
Whites	60.9	62.7	81.9	82.4	77.6	68.0	65.4	68.6	70.6
Blacks	21.7	24.3	77.0	70.4	42.7	40.6	37.8	39.8	49.6
Hispanics	21.7	22.3	52.8	51.6	38.2	29.6	28.6	28.4	31.3
<i>Centralization^c</i>									
Whites	-0.0	-31.2	-44.6	-50.0	-41.5	-41.7	-38.7	-36.8	-36.7
Blacks	0.1	23.1	34.3	41.0	34.5	33.6	30.5	29.7	28.7
Hispanics	0.0	9.2	24.5	25.5	15.8	15.6	14.1	14.6	16.7
<i>Clustering^d</i>									
Whites	60.0	60.8	71.5	73.8	67.8	63.1	61.8	63.6	64.9
Blacks	20.0	22.4	46.9	51.4	30.7	29.0	27.4	28.2	33.3
Hispanics	20.0	20.6	28.7		27.4	22.1	21.8	21.8	24.3

^aNorming is discussed in the text. Normed measures yield *lower* numerical scores.

^bMeasured by in-group representation in bounded neighborhood. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

^cMeasured using an index which yields -100 when all group members are on the periphery, 0 when group members are randomly distributed, and 100 when group members are at the city center. Negative values are observed for all groups in Experiment 0 because vacancies are concentrated in central neighborhoods.

^dMeasured by in-group representation in adjacent bounded neighborhoods. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

APPENDIX TABLE 3 Standard Deviations for Selected Quantitative Indices of Segregation Calculated from the Distribution of Households in the Final Landscape for 1,000 Replications of Each Featured Simulation Experiment

	Simulation experiment								
	1	2	3	4	5	6	7	8	9
<i>Evenness of Distribution (Index of Dissimilarity normed per Winship [1977])^a</i>									
White-Black	1.30	1.26	2.58	3.22	3.97	2.70	2.37	2.90	3.15
White-Hispanic	1.26	1.30	3.98	4.37	4.10	2.31	1.94	2.63	3.22
Hispanic-Black	1.59	1.61	3.48	5.17	5.36	4.18	3.94	3.96	4.53
<i>Isolation^b</i>									
Whites	0.12	0.18	1.32	1.59	1.61	0.55	0.33	0.67	0.87
Blacks	0.24	0.34	2.84	3.38	2.20	1.91	1.58	1.81	2.43
Hispanics	0.23	0.27	2.70	2.83	1.92	0.87	0.80	0.81	1.09
<i>Centralization^c</i>									
Whites	1.82	1.05	2.16	1.82	1.74	1.27	1.21	1.56	1.78
Blacks	2.00	1.19	2.64	2.60	1.67	1.59	1.49	1.65	1.90
Hispanics	2.07	1.21	2.24	2.04	1.78	1.62	1.53	1.50	1.72
<i>Clustering^d</i>									
Whites	0.13	0.18	2.20	2.04	1.81	0.45	0.30	0.74	1.03
Blacks	0.13	0.23	6.25	5.32	1.96	1.65	1.39	1.64	2.91
Hispanics	0.14	0.15	3.57	3.61	1.97	0.84	0.72	0.71	1.08

^aNorming is discussed in the text. Normed measures yield *lower* numerical scores.

^bMeasured by in-group representation in bounded neighborhood. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

^cMeasured using an index which yields -100 when all group members are on the periphery, 0 when group members are randomly distributed, and 100 when group members are at the city center. Negative values are observed for all groups in Experiment 0 because vacancies are concentrated in central neighborhoods.

^dMeasured by in-group representation in adjacent bounded neighborhoods. Expected values under random assignment are approximately 60, 20, and 20 for whites, blacks, and Hispanics, respectively.

APPENDIX TABLE 4 Summary of Settings for Model Parameters that Vary Across Two or More Simulations^a

			Simulation experiment								
			1	2	3	4	5	6	7	8	9
In-Group Preference Targets											
Whites	0	0	90	90	60	60	60	60	90	90	90
Blacks	0	0	50	50	20	20	20	20	20	20	25
Hispanics	0	0	50	50	20	20	20	20	20	20	25
Out-Group Preference Target											
Whites	0	0	0	0	0	0	0	0	0	0	0
Blacks	0	0	30	30	0	0	30	60	60	60	60
Hispanics	0	0	30	30	0	0	30	60	60	60	60
Out-Group Ethnic Mix Preference											
Whites prefer contact with Hispanics	N/A ^b	N/A	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Blacks prefer contact with whites	N/A	N/A	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Hispanics prefer contact with whites	N/A	N/A	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Relevant Geographic Context for Evaluating Ethnic Mix											
Bounded Neighborhood	N/A	N/A	Yes	No	Yes						
Adjacent Bounded Neighborhoods	N/A	N/A	Yes	No	Yes						
Nearby Neighbors	N/A	N/A	No	Yes	No						
Area Stratification			0	60	60	60	60	60	60	60	60
Eta ² for housing value by distance											

(Continued)

APPENDIX TABLE 4 Continued

	1	2	3	4	5	6	7	8	9	Simulation experiment
SES Percentiles & Intergroup Inequality^c										
Median SES – Whites	35.0	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6
Median SES – Blacks	35.0	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8
Median SES – Hispanics	35.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
10th Percentile SES – Whites	12.9	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2
10th Percentile SES – Blacks	12.9	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
10th Percentile SES – Hispanics	12.9	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
90th Percentile SES – Whites	66.1	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5	69.5
90th Percentile SES – Blacks	66.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1	54.1
90th Percentile SES – Hispanics	66.1	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2	60.2
Median SES – Total	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Inter-Quartile Range for SES – Total	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
White-Black Net Difference SES	0	40	40	40	40	40	40	40	40	40
White-Hispanic Net Difference SES	0	25	25	25	25	25	25	25	25	25
Hispanic-Black Net Difference SES	0	15	15	15	15	15	15	15	15	15

^aGray shading indicates that the model parameter value is changed relative to the previous scenario.

^bNot applicable because processes drawing on this model parameter are not active.

^cSES distributions are determined by five model parameters (the last five items shown in this section of the table). Other SES outcomes are reported for descriptive purposes, but, strictly speaking, are not model parameters and thus are not shaded.