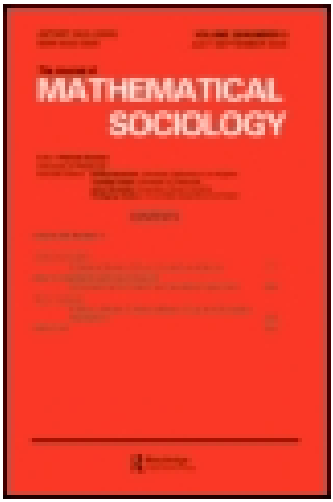

The Journal of Mathematical Sociology

Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/gmas20

Ethnic Preferences and Residential Segregation: Theoretical Explorations Beyond Detroit

MICHAEL W. MACY [a] & ARNOUT VAN DE RIJT [a]

[a] Department of Sociology , Cornell University , Ithaca, NY, USA

Published online: 21 Sep 2006.

To cite this article: MICHAEL W. MACY & ARNOUT VAN DE RIJT (2006) Ethnic Preferences and Residential Segregation: Theoretical Explorations Beyond Detroit, The Journal of Mathematical Sociology, 30:3-4, 275-288, DOI: 10.1080/00222500500544086

To link to this article: http://dx.doi.org/10.1080/00222500500544086

Journal of Mathematical Sociology, 30:275–288, 2006

ISSN: 0022-250X print/1545-5874 online
DOI: 10.1080/00222500500544086

Routledge
Taylor & Francis Group

Ethnic Preferences and Residential Segregation: Theoretical Explorations Beyond Detroit

Michael W. Macy
Arnout van de Rijt
Department of Sociology, Cornell University, Ithaca, NY, USA

We are strongly supportive of Fossett's theoretical approach and modeling methodology, which uses computational methods to perform thought experiments that generate compelling insights into the enigma of persistent residential segregation in the U.S. We also agree with his theoretical results, which challenge the prevailing view among demographers that institutional discrimination is the essential cause. However, we think he did not go far enough. Fossett limited his analysis to a narrow region of the parameter space that corresponded to conditions observed in one city at one time. This precludes generalization to other times and places and exploration of theoretically motivated "what if" scenarios that trespass beyond the Detroit city limits. When we extended the parameter space, we noticed two interesting results. First, Fossett's "paradox of weak minority preferences" requires qualification. Disproportionate in-group preferences among minorities are indeed segregation-promoting, not integration-promoting, but they generally have less impact on segregation than the in-group preferences of the majority. Second, not only are exclusionary practices and institutional discrimination not necessary for segregation (as Fossett demonstrates), we show that in certain regions of the parameter space they are not even sufficient.

Keywords: segregation, discrimination, agent-based modeling

INTRODUCTION

Housing discrimination has been illegal in the U.S. since the passage of the Fair Housing Act in 1968. Moreover, white hostility toward African Americans and Hispanics has declined markedly during this same period. Nevertheless, residential ethnic segregation persists (Charles, 2003: 172). Why is this?

Address correspondence to Prof. Michael Macy, Department of Sociology, Cornell University, Ithaca, NY 14853, 607-255-3820. E-mail: mwm14@cornell.edu

Mark Fossett addresses this puzzle using an agent-based model calibrated by empirical preference distributions reported by Krysan and Farley (2002: 949). He challenges the prevailing view among demographers that segregation is imposed by deliberate but stealthy collective actions that operate just inside the law, e.g., redlining by banks, ethnic steering by realtors, and exclusionary practices by whites (ranging from dirty looks to outright violence). He argues instead that segregation is "overdetermined" (page 2), the consequence of multiple sufficient causes. Discriminatory practices by institutions and white majorities may be sufficient to produce segregation, but eliminating these factors may have minimal impact on ethnic residential distributions due to the persisting effects of ethnic in-group preferences. His work extends Schelling's (1978) classic study that showed how segregation can self-organize as the unintended consequence of uncoordinated decisions by individuals who may be willing to tolerate greater diversity than what ultimately obtains. What is new and startling here is Fossett's claim that *the in-group preferences mainly responsible for segregation are not those of the majority but those of the minority*.

Most contemporary research on ethnic residential segregation is informed by three assumptions:

1) that minorities prefer to live in ethnically diverse neighborhoods with substantial majority representation,
2) that minority preferences for diversity are confronted with subtle discriminatory practices of institutions (realtors, mortgage companies, etc.) and not-so-subtle exclusionary practices of hostile majority residents (ranging from social ostracism to violence), and
3) in the absence of these discriminatory and exclusionary constraints, minority preferences would attenuate, if not eliminate, residential segregation.

Fossett does not challenge the first assumption, which is consistent with survey evidence on the current distribution of ethnic residential preferences in Detroit. Nor does he challenge the second assumption, which he is willing to grant as an empirical condition (at least for purposes of argument). Fossett challenges the third assumption, that deliberate and discriminatory collective action is necessary for segregation.

Fossett is not the first to challenge the theory that persistent segregation requires deliberate discriminatory and exclusionary practices. Urban ecologists, economists, and game theorists have long argued for a "bottom up" process in which segregation self-organizes out of

the individual decisions of households to locate in preferred neighborhoods (Alihan, 1938; Berry & Kasarda, 1977; Clark, 1986, 1988, 1989, 1991, 1992, 1996, 2002; Duncan, 1959, 1961; Firey, 1947; Frisbie & Kasarda, 1988; Getties, 1939; Hawley, 1944, 1950, 1986; Namboodori, 1988; Schelling, 1969a, 1969b, 1971a, 1971b, 1972, 1978; Turner, 1991).

Critics of self-organizing segregation raise two principal objections (Massey & Denton, 1993; Yinger, 1995, 1998; Krysan & Farley, 2002). First, survey evidence demonstrates that minorities prefer ethnic diversity. In the absence of discriminatory and exclusionary practices, minorities would move into neighborhoods with substantial white representation. The persistence of segregation is thus evidence for the persistence of those practices.

Second, whites and minorities have crosscutting residential preferences for quality housing in prestigious neighborhoods that compete with ethnicity in decisions about where to locate. Theoretical models like Schelling's that ignore these competing preferences overstate the tendency for segregation to emerge from the bottom up.

Fossett does not dispute the empirical preference distributions measured by Krysan and Farley (2002) using the Detroit Area Study. Instead, he uses an agent-based model to show that these observed minority in-group preferences are sufficient for segregation to self-organize in the absence of deliberate discriminatory and exclusionary practices. Further, he shows that competing preferences for housing quality and neighborhood status do not attenuate the effects of in-group preferences on the emergence of segregation.

We find Fossett's approach a refreshing alternative to conventional demographic treatments of the problem, for two reasons. First, although Fossett's explanandum is entirely macrosociological, he does not make the mistake of assuming that the explanans must therefore also be a macrosocial phenomenon. Instead, he explores the possibility that uncoordinated individual choices may generate macrosocial patterns that none of the individuals intended.

Second, although Fossett is careful to calibrate model parameters so as to challenge empirically based explanations of segregation, he does not fall into the empiricist trap of building a big empirically grounded forecasting model. Instead, his approach remains fundamentally theoretical. "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?" (35–36).

To pursue these questions, Fossett developed a versatile modeling platform (SimSeg) that allows for a wide array of model specifications, including:

- Bounded or site-centric neighborhoods of varying size
- Homogeneous or heterogeneous preferences
- Two or three groups (but not more than three, and no continuous shadings of ethnicity)
- Agents search all vacant cells or only a random sample (but no option to search only nearby cells)[1]
- An option for random forced moves (otherwise decisions are deterministic, not stochastic)
- An option to incorporate weighted preferences for neighborhoods with higher status and housing quality
- An option to constrain housing choices by price and income

In this study, Fossett assumes a flat (nontoroidal) spatial network with 5,159 members of three ethnic groups randomly distributed over 112 bounded neighborhoods, each containing 49 housing units, for a total of 5,488 units with a 6% vacancy rate. An agent is randomly selected and given the opportunity to search for a better location. The agent is offered 12 choices randomly selected from among all vacant locations anywhere in the city that the agent can afford, given the agent's income and the price of housing in different neighborhoods. Agents then identify the location with the highest utility, given the agent's weighted preferences, and then compare this location with the current one. The agent moves iff the best prospective location is preferable to the current one. After the agent moves, the neighborhood demographics are updated so that the next agent chosen to decide about moving uses current (updated) information.

Agents have three preferences for ethnic mix, quality housing, and high status neighborhoods. The relative weight of each preference is exogenously determined, as is the correlation among these three attributes of different neighborhoods. Although agents may differ in their own status and income, agents (presumably) do not differ from one another in their preferences for quality and status (i.e., all agents will rank a set of houses the same way in terms of relative quality and status).

However, agents do not have identical preferences for ethnic mix. Within each group, individual preferences are randomly distributed

[1]Fossett does not explore what happens if search is constrained by distance. Assuming spatial correlation in ethnic distribution, local search should make it more difficult for agents to find more ethnically diverse places to live.

about the group median with heterogeneity corresponding to observed distributions. More importantly, ethnic groups differ in their median intolerance of and attraction to out-group neighbors. Ethnic distribution (60% white, 20% black, and 20% Hispanic) and ethnic preferences are calibrated to approximate the distributions observed in the Detroit Area Study. Whites will tolerate no more than 10% minority neighbors and are happy to have zero. Blacks and Hispanics will tolerate up to 50% out-group neighbors and are content to have up to 70% in-group neighbors, but no more. Agents prefer locations where the proportion of neighbors from each ethnic out-group does not fall below the minimum they desire or rise above the maximum they will tolerate. Agents will never choose to leave a location that falls between these upper and lower bounds. Outside these bounds, the relative preference decreases linearly with the size of the discrepancy. Thus, whites prefer locations with more white neighbors over those with fewer white neighbors, up to 90% white, above which they are indifferent. Below 50% in-group, minorities prefer locations with more in-group neighbors over those with fewer in-group neighbors. Above 50% and up to 70%, they are indifferent, and above 70%, they prefer locations with *fewer* in-group neighbors to those with more in-group neighbors.[2]

Fossett also considers site-centric neighborhoods (defined relative to each housing unit), such as the widely used nine-member Moore neighborhoods that include every house adjacent to a given location. He reports no important effects on the results. However, O'Sullivan, Macgill, and Yu (2003) found that bounded neighborhoods generally produce higher levels of segregation (as measured by the *D* index) by allowing agents to have "dissimilar immediate neighbors across district boundaries" (2003: 9). "This is a direct result of the presence of bounded neighborhoods 'steering' local segregation to fit inside the boundaries, so that a higher dissimilarity index is observed." They also found that stable patterns emerge more quickly in bounded neighborhoods, "as a result of preferential movement into neighborhoods that are tipping into exclusive occupation by one or the other type of agent" (2003: 14). They used a much simpler model than Fossett's that stayed as close as possible to Schelling's classic specification. We also found similar results with SimSeg (v2.0). Over a wide range of parameters, we found that site-centric neighborhoods with a radius of 3 units

[2]Charles (2003: 185) observes how "preferences for integration decline as the number of out-group members increases." Fossett does not explore that possibility in this paper, but Charles' empirical observation suggests an intriguing possibility for future theoretical research.

generally produced substantially less segregation, compared to bounded neighborhoods of the same size (49 units).

Fossett addresses the puzzling persistence of residential segregation in the U.S. despite dramatic improvements in housing laws, discriminatory practices, and ethnic prejudices over the past 50 years. Fossett's research question is, "Can ethnic preferences and social distance dynamics create and *sustain* [italics ours] significant levels of segregation in a theoretical system where discrimination is absent?" (35–36). His computational experiments systematically investigate whether co-ethnic preferences can generate segregation in the absence of institutional discrimination. Following Schelling, Fossett starts with a random ethnic distribution and tests for the emergence of segregation among populations that vary in preferences for in-group ethnicity, housing quality, and neighborhood status. Yet the U.S. did not start with ethnic integration and then "tip" into segregation. If we want to understand the persistence of segregation, we need to start with a perfectly segregated population and look for the conditions in which the population can "tip" into integration. Unfortunately, Fossett's SimSeg program[3] does not offer this as an option.

Nevertheless, it is readily apparent that perfect segregation is an equilibrium even for populations who not only tolerate diversity but actively seek it out or who are indifferent to ethnicity altogether. Diversity-seekers will not be happy living in all-in-group neighborhoods, but they will not move to locations surrounded by out-group members either, since these are also not multicultural. However, this equilibrium is highly unstable. Even small amounts of noise[4] are sufficient to trigger a cascade that leads to integration. As forced moves produce multicultural clusters, these will expand as both groups seek to move in.

This is not the case, however, for populations who who seek diversity but, failing that, prefer to outnumber than to be outnumbered (Pancs and Vriend 2003). Nor is it the case for populations who tolerate diversity but who do not prefer it (i.e., their minimum in-group preference is less than unity and their minimum out-group preference is near zero). If there is an in-group bias, neither preference for nor tolerance of

[3]According to Fossett (private communication), newer versions of SimSeg do have this option, but these are not publicly available.

[4]Fossett implements noise as "forced moves" induced by evictions, job changes, or the like. However, he did so to make the model more realistic, and did not consider the theoretical importance of forced moves for perturbing an unstable equilibrium so that more stable solutions might obtain. To that end, noise could also be implemented by replacing Fossett's deterministic rule for moving with a stochastic rule in which the probability of moving increases monotonically with the increase in utility.

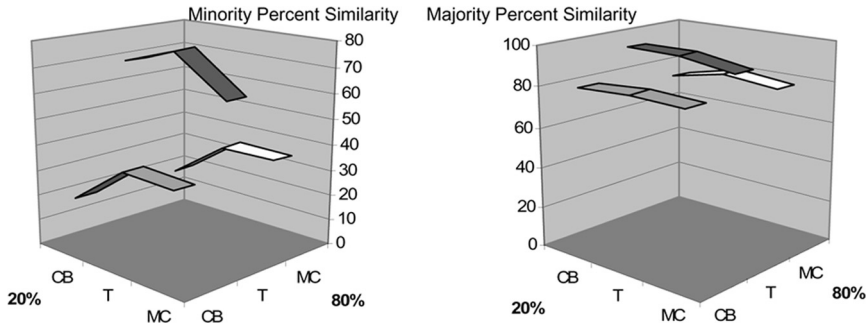

FIGURE 1 Effects of color-blindness (gray), tolerance (white), and multi-culturalism (black) by minority (20%) and majority (80%) on persistence of segregation, with 1% forced moves and heterogeneous preferences. Segregation is most persistence when both groups are tolerant of diversity. Majority preferences matter most; it makes little difference whether minorities are color blind, tolerant, or actively seek diversity.

diversity may be sufficient to disturb a segregated equilibrium, even in the presence of noise. We tested the effects of color-blindness, tolerance, and multi-culturalism by minority and majority on persistence of segregation using a variant of Schelling's classic model, with 1% forced moves and heterogeneous neighborhoods[5] in a bi-ethnic 80–20 population. We found that segregation is most persistent when the majority and minority are tolerant of diversity. However, majority preferences matter most. Indeed, it makes little difference whether minorities are color blind, tolerant, or actively seek diversity, so long as the majority prefers to have in-group neighbors (see Fig. 1).

PARADOX OF WEAK MINORITY PREFERENCES

Starting with a random ethnic distribution, Fossett argues that any in-group preference that exceeds that group's relative frequency must destabilize a proportional distribution of ethnicity, leading to increasing dissimilarity in the ethnic composition of neighborhoods. Stable integration is only possible within a window such that every group's proportion of the population is greater than or equal to the in-group preference of its members. For example, in the scenario that Fossett derives from observed distributions of ethnicity and ethnic preferences, each minority group is 20% of the population and can thus expect to

[5]We introduced neighborhood heterogeneity using Voronoi diagrams (Flache & Hegselmann, 2001) instead of regular grids.

have 20% of the neighborhood composed of in-group members. "This is far below the in-group preferences of almost all minority households, given a median preference of 50%. Any neighborhood that randomly deviates from the proportional distribution, even slightly, will attract more minority members than will other neighborhoods, thereby increasing the deviation, and attracting still more members, and so on, until the in-group proportion exceeds the level given by the out-group target (Fossett, 2006)."

Fossett's analysis leads to an intriguing insight he calls "the paradox of weak minority preferences" (196). The paradox is that "while blacks' preferences for in-group contact are much weaker than those observed for whites, they nevertheless are segregation-promoting, not integration-promoting" (196). Critics might regard this paradox as an artifact of an inappropriate definition of "segregation." Suppose a large population is 99% blue and 1% red, and each neighborhood is smaller than 1% of the population. It is thus possible to live in a neighborhood that is 100% red. Fossett argues that maximal integration occurs when every neighborhood is 99% blue, since this most accurately reflects the ethnic distribution of the city. This implies that a neighborhood that is 50% red is substantially less integrated than a neighborhood that is 100% blue. Yet most people would not call an all-blue neighborhood integrated.

Although this counterargument appears compelling, we agree with Fossett's definition of integration as an even ethnic distribution. Advocates of the 50–50 standard forget one important detail. That is, in a population of 5,000 households that is 1% red, for every 100-house neighborhood that is 50% red there must be 49 other neighborhoods with no minority representation whatsoever. In contrast, for every neighborhood that is 100% blue, there can be as many as 49 neighborhoods that have at least some minority representation. 50–50 appears integrated only until one steps back and ponders the implications for the other neighborhoods.

The paradox of weak minority preferences has several interesting ramifications. By definition, the smaller the minority, the more "segregation-promoting" is a minimum in-group preference of 50% or above. This implies greater segregation[6] as the disparity between the majority and minority increases (e.g., from 10% minority to 50% in the two-group case), holding constant each group's in-group preferences. We tested this by manipulating the disparity in a population with the 90% and 50% in-group preferences that Fossett

[6]We measured segregation using Fossett's modified index of dissimilarity, which is normed to be margin free.

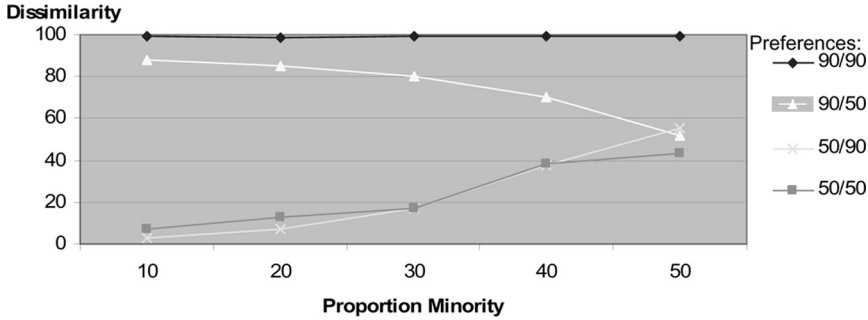

FIGURE 2 The effect of disparity in group size on segregation, depending on majority/minority preferences (with 20% vacancy rate, 1% forced moves, heterogeneous preferences). "90/50" refers to a majority preference for 90% in-group & 0% out-group and a minority preference for 50% in-group and 30% out-group. Segregation increases with minority size only when majorities are relatively tolerant (50% in-group, 30% out-group), regardless of minority preferences.

attributes to whites and minorities, respectively (along with the respective 0% and 30% out-group preferences). In order to isolate the effect of ethnic distribution, we also reversed these preference assignments (50/90 instead of 90/50), and in two additional conditions we assigned both groups identical in-group preferences (90/90 and 50/50). In all conditions, we used a 20% vacancy rate, 1% forced moves, and heterogeneous preferences, and no status differences or competing preferences. The results are displayed in Figure 2 and are consistent with the paradox of weak minority preferences when preferences correspond to Krysan and Farley's (2002) observations, as assumed by Fossett (90/50). When majorities want 90% in-group neighbors, dissimilarity declines as the majority gets smaller relative to its in-group preference. That is because a minority of 10% that seeks 50% in-group neighbors is more segregation-promoting than a majority of 60% that seeks 90% in-group neighbors, which is consistent with Fossett's argument. However, when we explored other preference distributions, we discovered a very different story. When those preference assignments are reversed, segregation increases as the ethnic size disparity gets larger. That is also the outcome when both groups are equally tolerant (50/50). Segregation decreases with minority size only when majorities are relatively tolerant (50%), regardless of minority preferences.

Although a majority preference for at least 90% in-group neighbors might seem less tolerant of diversity than a minority preference for

50%, Fossett argues that this need not imply greater responsibility for segregation. For example, in a bi-ethnic population with 85% in the majority, a preference for at least 90% in-group neighbors implies little tolerance of minorities, compared to an in-group preference of 50%. Nevertheless, Fossett contends, "whites' relative intolerance for out-group contact would produce a surprisingly low level of segregation" (p. 14).

We tested Fossett's hypothesis by implementing the scenario that Fossett proposes—an 85-15 bi-ethnic distribution. We wanted to see what level of segregation would emerge when either the majority or minority group is assumed to be color-blind (in-group preferences ranging from 0 to 100%), while the other group had an in-group preference corresponding to Farley's experiments (90–100% for the majority, 50–70% for the minority). With a color-blind majority and a minority seeking in-group neighbors between 50% and 70%, $D = 79$. With a color-blind minority and a majority seeking in-group neighbors between 90% and 100%, $D = 64$. Although the latter might not be regarded as a "low level of segregation," the 15-point spread is clearly consistent with Fossett's prediction.

We then repeated our experiment, this time using the 60-20-20 three-group distribution that Fossett uses in all his experiments, with the same majority and minority ethnic preferences that he adopts from Krysan and Farley (2002). We also used a two-group 80-20 distribution to see what happens as we increase the size of the majority group while holding constant the size of one minority. In addition, we controlled for the departure of in-group preferences from the population proportions, ranging from 0 (i.e., a minority of 20% wants 20% in-group neighbors) to $P + 40$ (that same group now wants 60% in-group neighbors). Thus, instead of comparing an 80% majority seeking 90% in-group neighbors (a preference of $P + 10$) with a 20% minority seeking 50% in-group neighbors (a preference of $P + 30$), we now compare the two groups when their preferences are identical relative to their relative population proportion. Again following Fossett, we assume that minorities want at least 30% out-group neighbors, while whites want none, and these values remain constant as in-group preferences vary.

The results appear in Figure 3, with white solid lines for the effects of majority preference (when minorities are color blind) and black lines for the effects of minority preferences (when majorities are color blind). For the two-group experiment, the results are again consistent with Fossett's theory, which is not surprising since an 80-20 division is close to an 85-15. Only when the 80% group wants 100% in-group neighbors does the majority produce as much segregation as a 20% group seeking a comparable disproportionate level of in-group representation (40%). Note however, that segregation is far more

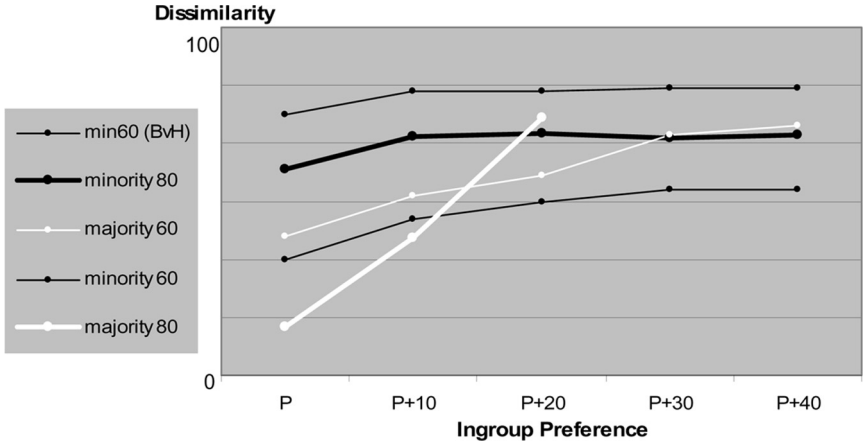

FIGURE 3 Effect of disproportional in-group preference when all other groups are color blind, by group (majority = white line and minority = black) and majority size (80% or 60%). In the 80-20 case (thick lines), dissimilarity is consistently higher when the color blind group is the majority, regardless of the strength of minority in-group preference. In the 60-20-20 case (thin lines), it is the other way around.

sensitive to majority departures from proportionality, compared to minority departures, which produce only a modest increase in D.

When we turn to the three-group case, the results do not support the implication that minority preferences are more segregation promoting than are majority preferences. A 60% majority produces more segregation (when the minorities are color blind) than do two 20% minorities (when the majority is color blind). This is the case for all preference levels, from proportionality up to $P+40$ (where the majority now wants all-white neighbors), and the gap actually widens with in-group preferences. On the other hand, dissimilarity between the two minority groups is extremely high, approaching the upper limit of D. We conclude that this implication of the "paradox of weak minority preferences" holds for the two-group case, and for segregation between minorities in the three-group case. However, these results suggest the need for caution in attributing the persistence of segregation in the U.S. to the disproportionate in-group preferences of minorities.

IS INSTITUTIONAL DISCRIMINATION EVEN A *SUFFICIENT* CAUSE OF SEGREGATION?

Fossett challenges the claim that institutional discrimination and deliberate exclusionary practices are necessary for white-minority

segregation. He argues instead that segregation is overdetermined (pages 2, 7, 10, 17, and 32) by multiple sufficient causes, including institutional discrimination. Although he provides a compelling demonstration that institutional discrimination is not necessary, he acknowledges that it is sufficient,[7] but without actually testing this hypothesis. When we did so, we found that institutional discrimination may not even be a sufficient cause, depending on the distribution of ethnic preferences. Moreover, the ethnic preferences that are decisive here are not minority preferences, but the desire of majorities to avoid living with minorities. Otherwise, institutional discrimination cannot prevent the emergence of stable integration, even if minorities seek to avoid living with the majority.

Fossett's SimSeg allows for the implementation of institutional discrimination through two main mechanisms: white realtor exclusion success rates (0–100%) and the extra percentage minorities must pay to overcome institutional barriers (0–50%). We varied these two institutional discrimination parameters simultaneously, with exclusion success rates at 100 (high), 67 (medium), 33 (little), and 0 (no) and institutional barriers at 50, 33, 17, and 0, respectively. We tested the sufficiency of institutional discrimination using the Detroit status and population distributions that Fossett used throughout his paper. However, we assumed that all three ethnic groups not only tolerate diversity, they prefer it to living mainly with their in-group (i.e., no in-group preferences and out-group preferences of 40%).

The results in Figure 4 show that majority-minority segregation positively varies with institutional discrimination. Whites, blacks, and Hispanics have a harder time ending up in mixed neighborhoods under high institutional discrimination, but the amount of segregation remains modest. Hispanics and blacks cannot enter white-dominated neighborhoods, but the population remains relatively integrated as whites flee their all-white neighborhoods in search of minority neighbors. (We repeated the experiment with a bi-ethnic population and observed a similar result.) We conclude that institutional discrimination is not sufficient to explain the persistence of high segregation without the additional assumption that households have a preference for in-group neighbors.

That is the essential message of Fossett's paper—ethnic preferences matter. It is a message with which we are in full agreement. Fossett demonstrates this for ethnic distributions and preferences that correspond to those observed in a particular time and place. Although the

[7]Fossett does point out, however, that these practices are not sufficient to explain segregation between ethnic minorities.

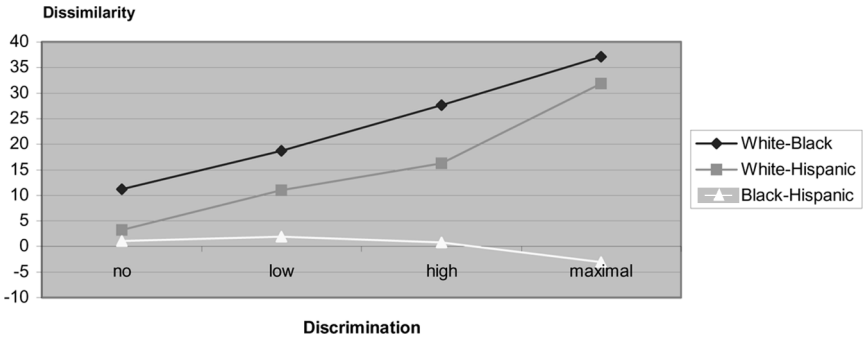

FIGURE 4 Pairwise dissimilarities by level of institutional discrimination. Whites, blacks, and Hispanics have a harder time ending up in mixed neighborhoods under high institutional discrimination, but the amount of segregation remains very modest.

realism in that approach might be more persuasive for demographers, we believe it is necessary to also consider what-if scenarios, using simpler and more abstract models, if we are to better understand the underlying causal mechanisms.

REFERENCES

Alihan, M. A. (1938). The doctrine and its setting. *Social Ecology: A Critical Analysis*, (pp. 1–10). NY: Cooper Square Publishers.

Berry, B. J. L. & Kasarda, J. D. (1977). *Contemporary Urban Ecology*, New York: MacMillan.

Charles, C. Z. (2003). The dynamics of racial residential segregation. *Annual Review of Sociology*, *29*, 167–207.

Clark, W. A. V. (1986). Residential segregation in American cities: a review and Interpretation. *Population Research and Policy Review*, *5*, 95–127.

Clark, W. A. V. (1988). Understanding residential segregation in American cities: Interpreting the evidence: Reply to galster. *Population Research and Policy Review*, *7*, 113–21.

Clark, W. A. V. (1989). Residential segregation in American cities: Common ground and differences in interpretation. *Population Research and Policy Review*, *8*, 193–197.

Clark, W. A. V. (1991). Residential preferences and neighborhood racial segregation: A test of the Schelling segregation model. *Demography*, *28*, 1–19.

Clark, W. A. V. (1992). Residential preferences and residential choices in a multi ethnic context. *Demography*, *30*, 451–466.

Clark, W. A. V. (1996). Residential patterns: avoidance, assimilation, and succession. In Roger Waldinger & Mehdi Bozorgmehr, (eds.), *Ethnic Los Angeles*. Russell Sage, 435.

Clark, W. A. V. (2002). Ethnic preferences and ethnic perceptions in multi-ethnic settings. *Urban Geography*, *23*, 237–256.

Duncan, O. D. (1959). Human ecology and population studies. In Philip M. Hauser & Otis D. Duncan, (eds.), *The Study of Population* (pp. 678–716). Chicago, IL: University of Chicago.

Duncan, O. D. (1961). From social system to ecosystem. *Sociological Inquiry*, *31*, 140–149.

Flache, A. & Hegselmann, R. (2001). Do irregular grids make a difference? Relaxing the spatial regularity assumption in cellular models of social dynamics. *Journal of Artificial Societies and Social Simulation*, www.soc.surrey.ac.uk/JASSS/4/4/6.html.

Firey, W. (1947). *Land Use in Central Boston*, Cambridge, MA: Harvard University Press.

Fosset, M. (2006). Ethnic preferences, social distance dynamics, and residential segregation: Theoretical explorations using simulation analysis. *Journal of Mathematical Sociology*, *30*, 185–273.

Frisbie, W. P. & Kasarda, J. D. (1988). Spatial processes. In Neil J. Smelser, (ed.), *Handbook of Sociology* (pp. 629–666). Beverly Hills, CA: Sage.

Getties, W. E. (1939). Human Ecology and Social Theory. *Social Forces*, *18*, 469–476.

Hawley, A. H. (1944). Ecology and human ecology. *Social Forces*, *22*, 398–405.

Hawley, A. H. (1950). *Human Ecology: A Theory of Community Structure*, New York: The Ronald Press Company.

Hawley, A. H. (1986). *Human Ecology: A Theoretical Essay*, Chicago, IL: University of Chicago.

Krysan, M. & Farley, R. (2002). The residential preferences of blacks: Do they explain persistent segregation? *Social forces*, *80*, 937–980.

Massey, D. S. & Denton, N. A. (1993). *American Apartheid: Segregation and the Making of the Underclass*, Cambridge, MA: Harvard University Press.

Namboodori, K. (1988). Ecological demography: Its place in sociology. *American Sociological Review*, *53*, 619–633.

O'Sullivan, D., Macgill, J. R., & Yu, C. (2003). *Agent-based residential segregation: A hierarchically structured spatial model*. Presented at Agent 2003 "Challenges in Social Simulation," October 2–4, University of Chicago and Argonne National Laboratory, IL.

Pancs, R. & Vriend, N. (2003). Schelling's Spatial Proximity Model of Segregation Revisited. *Economics Working Paper 487*, London: University of London.

Schelling, T. C. (1969a). *Models of Segregation*, Santa Monica, CA: Rand Corporation.

Schelling, T. C. (1969b). Models of segregation. *American Economic Review, Papers and Proceedings*, *59*, 488–93.

Schelling, T. C. (1971a). Dynamic models of segregation. *Journal of Mathematical Sociology*, *1*, 143–186.

Schelling, T. C. (1971b). On the ecology of micromotives. *The Public Interest*, *25*, 61–98.

Schelling, T. C. (1972). The process of residential segregation: Neighborhood tipping. In Anthony Pascal, (ed.), *Racial Discrimination in Economic Life* (pp. 154–187). Lexington, MA: D.C. Heath.

Schelling, T. C. (1978). *Micromotives and Macrobehavior*, New York: Norton.

Turner, J. (1991). *The Structure of Sociological Theory*. 5th edition. Belmont, CA: Wadsworth.

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

Yinger, J. (1998). Housing discrimination is still worth worrying about. *Housing Policy Debate*, *9*, 893–927.