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THE DEVELOPMENT OF AN URBAN SUBSYSTEM: THE CASE OF THE NEGRO GHETTO

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ABSTRACT. The Negro ghetto represents an expanding residential spatial configuration in all of the major metropolitan areas in the United States. The process of ghetto development is essentially related to the refusal of Whites to share residential space with Blacks on a permanent basis, and to the search behavior employed by Blacks in seeking housing accommodations. An attempt has been made to predict the changing scale of the ghetto configuration in Milwaukee, Wisconsin from 1960–1970. A simulation model was developed for this purpose. The model employed can be described as a strict segregation model since all Negro housing demand is satisfied within contiguous space, described here as ghetto space. It is apparent from the results that the model includes some inherent weaknesses, but only a few are related to its conceptual base. In general the simulated pattern of Negro residential occupancy in Milwaukee is characterized by general overprediction in a low income area along the eastern side of the ghetto and by underprediction along the northern margin of the ghetto. The actual pattern of black residential-movement in Milwaukee demonstrated that the heaviest entry occurred in an area of more desirable housing.

THE internal development of individual urban places has not traditionally been one of central focus in geography. This probably stems in part from the overriding emphasis on regions in general and the urban geographer's concern with the interrelationships among individual urban nodes. American geographers have only recently turned their attention to the internal structure of urban areas, no doubt an outgrowth of general interest in central place theory. Increasing interest in urban subsystems has resulted in a concomitant interest in the spatial structure of these systems. This paper attempts to provide insights on the spatial dynamics of a single subsystem within the metropolitan system, the Negro ghetto.

The Negro ghetto, as a universal and viable urban subsystem within the American urban

system, has evolved with the rise of the Negro population in northern urban centers beginning with the decade prior to World War I.¹ The almost continuous flow of Negroes from both the rural and urban South to the North and West has permitted and promoted the development of Negro ghettos in all of the nation's major population centers. By 1960 more than thirty percent of the nation's Negro population resided in twenty metropolitan areas. Whereas the Negro ghetto is found in nearly all 200 metropolitan areas in the United States, the basic concern of this study is with the processes responsible for its change in scale in northern urban centers. The previous legality of a system of racial separation in the American South served as an exogenous fac-

¹ A. Meier and E. M. Rudwick, *From Plantation to Ghetto* (New York: Hill and Wang, 1966), pp. 191–92.

tor, overriding all others, in the promotion and maintenance of residential clusters based on race. For a brief period there existed laws which were specifically designed to maintain residential segregation based on race. The Supreme Court outlawed attempts to maintain a legal system of residential separation in 1917, in the case of *Buchanan versus Warley*.² Such a legalized role-prescription tends to reduce the fruitfulness of a behaviorally oriented study, and thereby accounts for the limiting of this investigation to northern cities.

To date, only Morrill's pioneer work might be described as a spatial behavioral approach to the study of the changing state of the ghetto.³ The model he assembled was employed to replicate the process of ghetto development in Seattle. Other researchers are beginning to show increasing concern for the general problem, with emphasis on the spatial dimension. Beauchamp recently suggested the use of Markov Chain Analysis as a means of specifying or identifying territorial units as ghetto or non-ghetto by investigating the dynamic changes taking place in the racial composition of areas.⁴

The process of the changing ghetto state has been described elsewhere as a diffusion process.⁵ Diffusion models have attracted the interest of a small number of geographers who have employed them as a means of describing the spatial spread of an innovation. The more notable of these are associated with the work of Hägerstrand. The suitability of diffusion models as a means of describing the spread of the ghetto, however, is questionable. It appears that the spread of the ghetto is a phenomenon of a different type. More specifically, it appears that the spread of the Negro ghetto is a function of white adjustment to a perceived threat. The distinction between adjustment and diffusion was recently reviewed

by Carlsson.⁶ He averred that motivation and values transcend knowledge, in importance, in explaining certain types of behavioral change.⁷ If the diffusion thesis is accepted as a means of explaining rather than describing the expansion of the Negro ghetto, then it must be assumed that each metropolitan system operates as a closed system. Since this is not the case, the adjustment hypothesis which Carlsson supports is undeniably more appealing than the diffusion hypothesis as a means of explaining the spread of the ghetto. Admittedly, whites must first be aware of the presence of Negroes if a change in their normative mobility pattern is to occur, but awareness here promotes the kind of behavior which has also become accepted as normative. Thus, the necessary adjustment is made as a means of maintaining the steady state condition. The kind of behavior inferred here was described by Zelinsky as social avoidance.⁸ Morrill, who previously described the ghetto development process in terms of diffusion, now describes processes of this general type, which are interactional in nature, as quasi-diffusionary.⁹

INTRA-URBAN POPULATION MOBILITY

The spatial mobility of the American population, both in terms of long distance moves and intraurban shifts, was intensified during the decade of the 1950's. As major metropolitan systems were the target of most long distance moves, these moves resulted in the rapid dispersion of population into what was previously part of the rural countryside. The latter phenomenon has attracted the attention of researchers from a vast array of disciplines, geographers included. Geographers have also focused particular interest on the centrifugal flow of population, as this flow has had the most obvious impact on the form and areal magnitude of urban systems. But to consider the latter and ignore the role of the centripetal movement weakens the analysis of population shifts within the system and of the ensuing patterns which evolve.

² R. L. Rice, "Residential Segregation by Law," *The Journal of Southern History*, Vol. 34 (1968), pp. 194-99.

³ R. L. Morrill, "The Negro Ghetto: Problems and Alternatives," *The Geographical Review*, Vol. 55 (1965), pp. 339-61.

⁴ A. Beauchamp, "Processual Indices of Segregation: Some Preliminary Comments," *Behavioral Science*, Vol. 11 (1966), pp. 190-92.

⁵ Morrill, *op. cit.*, footnote 3, p. 348; R. L. Morrill, *Migration and the Spread and Growth of Urban Settlement* (Lund, Sweden: C. W. K. Gleerup, 1965), p. 186.

⁶ G. Carlsson, "Decline of Fertility: Innovation or Adjustment Process," *Population Studies*, Vol. 20 (November 1966), pp. 149-50.

⁷ Carlsson, *op. cit.*, footnote 6, p. 150.

⁸ W. Zelinsky, *A Prologue to Population Geography* (New York: Prentice-Hall, 1965), pp. 45-46.

⁹ R. L. Morrill, "Waves of Spatial Diffusion," *Journal of Regional Science*, Vol. 8 (Summer, 1968), p. 2.

Movements toward the periphery of the urban system, both from within the system and from without, have been principally responsible for the increase in the size of individual metropolitan aggregates. At the same time many central cities within metropolitan systems have suffered absolute losses in their populations. Thus, the centripetal flow into the central cities of metropolitan systems has seldom been sufficiently large to offset the counter flow. The most rapid and easily observed flow into the nation's larger central cities is that of Negro in-migration, a phenomenon which has had far-reaching effects on the color composition of metropolitan areas.¹⁰ By the mid-sixties there was official evidence that this process was continuing. The city of Cleveland, Ohio, undertook a special census on April 1, 1965. The results showed that the city had lost 91,436 white residents during the five years that had elapsed since the last census, while gaining an additional 26,244 Negro residents.¹¹ The Negro proportion of Cleveland's population rose by five percentage points during that period, from twenty-nine to thirty-four percent. Since the census was confined to the political city of Cleveland, it is impossible to determine the extent to which Negroes entered the stream of movers destined for suburbia.

In response to the changing magnitude and composition of metropolitan populations, a network of transport links has evolved to facilitate the spatial redistribution of the population. Where an individual chooses to locate himself within the urban system is a function of occupational status, income, place of employment, and social taste. The operation or interaction of these factors has produced a strongly segmented pattern of urban occupancy. A change in an individual's socioeconomic status frequently results in relocation within the metropolitan system. As the nation's occupational structure is being rapidly altered in the direction of a larger proportion of white collar workers, especially technical and professional workers, with a concomitant altera-

tion in the income structure, spatial mobility is further accelerated. Changes of this nature tend to produce shifts in territorial status assignment in urban space. Davis, in a recent study, described the magnitude of territorial shifts in the location of middle class housing areas in a selected group of American cities.¹² With the redistribution of the population towards the periphery, there has subsequently been an outward shift of the inner boundary of the zone of middle class housing. As a consequence, these shifts frequently create gray areas which act as zones of transition or buffers between middle and lower class occupancy. It is within these gray areas, with their high vacancy rates, that most of the centrifugal Negro flow is destined. The growing intensity of mobility within the metropolitan system has affected all segments of the population, although somewhat differentially. The pattern of movement of whites and nonwhites in urban space is akin to the pattern of inter-regional movement within the nation as a whole. In both instances nonwhite moves are characterized by short distance, whereas whites are more frequently engaged in long distance moves.

The nature of population movement within the urban system is highly related to the magnitude and form of the set of urban subsystems which evolve. The Negro ghetto which comprises one such subsystem or social area is directly related to this process. Since spatial mobility is related both to age and income, one would expect to observe the evolution of a series of patterns which reflect the economic health of a specific metropolitan system, the nature of its economic base, and its subsequent ability to attract population through the process of internal migration; the latter phenomenon has the effect of altering the age distribution of the population. If ability to purchase was the single most significant variable influencing the distribution of population in metropolitan space, it should be easy to predict the kind of sorting-out which eventually occurs. Although this can be done in a rather general manner, purchasing ability alone is far from adequate in explaining the

¹⁰ See H. Sharp and L. F. Schnore, "The Changing Color Composition of Metropolitan Areas," *Land Economics*, Vol. 38 (1962), pp. 169-85.

¹¹ Special Census of Cleveland, Ohio, April, 1965, *Current Population Reports*, Series p-28, No. 1390 (1965).

¹² J. T. Davis, "Middle Class Housing in the Central City," *Economic Geography*, Vol. 41 (1965), pp. 238-51.

development of the ghetto.¹³ The relative stability of the Negro's economic position vis-a-vis the white's during the last several years may have reduced or severely limited the ability of individual Negroes to cross critical rent isolines. On the other hand, the brisk hiring of Negroes to salaried positions by an increasing number of firms pledged to the goal of equality of opportunity, could have the effect of increasing the length of the individual move. It is impossible at this time to specify with any degree of precision the effect of either factor upon the pattern of Negro movement, even though they both may be significant.

Territoriality

The existence and persistence of the Negro ghetto as a spatially based social community may best be explained within the framework of the social assignment of territory. Once a slice of physical space is identified as the territorial realm of a specific social group, any attempt to alter this assignment results in group conflict, both overt and covert. Stea recently described this behavior in the following way: "We have reason to believe that 'territorial behavior,' the desire both to possess and occupy positions of space, is as pervasive among men as among their animal forbears."¹⁴ Weber attributed this kind of behavior simply to working class groups for whom physical space is an extension of one's ego.¹⁵

Human ecologists have employed terms such as invasion and succession to describe the process of residential change in which members of competing groups struggle for territory. Henderson recently questioned the employment of the term invasion to describe the process of Negro entry into areas bordering on the ghetto.¹⁶ Admittedly the term invasion appears to be appropriate only within the context of territorial conflict. Viewed out-

side this context, the term does not appear to be meaningful. A further point, no doubt the one which concerned Henderson, is that the term invasion not only reflects the white resident's perception of events, but the perception of the researcher as well. It has been said, "When our own tribe engages in this behavior we call it nationalism or aggression."¹⁷ From another vantage point, it would appear that the term retreat describes the process more accurately. Since both terms, invasion and retreat, refer to territorial conflict, no major point is settled by substituting one for the other. Nevertheless, it should be kept in mind that the nature of the behavior which occurs within this context does so within the context of a fear-safety syndrome.

The territorial acquisition by advancing Negro populations cannot always be viewed as a gain in this game of psychological warfare, for once the territory is transferred from one group to the other, it is perceived by the white population as having been contaminated and, therefore, undesirable. The formalization or codification of this attitude is associated with the Federal Housing Administration's policy of promoting racial homogeneity in neighborhoods during the period 1935-1950.¹⁸ Hoyt's classic study on the growth of residential neighborhoods strongly supported this position, and possibly served to support and justify the government's position.¹⁹ Thus, the whole notion of stable property values revolves around the transfer of the status designation from a group to the territory occupied by the group. More recently Bailey observed in one case that unstable property values were associated with those zones located in the shadow of the ghetto rather than in the ghetto itself.²⁰ However, it is the slack demand for housing in a racially changing neighborhood that is likely to drive down housing values. The unwillingness of whites to compete with non-

¹³ For a methodological discussion of this point see K. E. Taeuber and A. F. Taeuber, *Negroes in Cities* (Chicago: Aldine Publishing Co., 1965), pp. 78-95.

¹⁴ D. Stea, "Space, Territory and Human Movements," *Landscape*, Vol. 15 (1965), p. 13.

¹⁵ M. M. Weber, "Culture, Territoriality and the Elastic Mile," *The Regional Science Association Papers*, Vol. 13 (1964), pp. 61-63.

¹⁶ G. C. Henderson, "Negroes Into Americans: A Dialectical Development," *Journal of Human Relations*, Vol. 14 (1966), p. 537.

¹⁷ Stea, *op. cit.*, footnote 14, p. 13.

¹⁸ E. Grier and G. C. Grier, "Equality and Beyond: Housing Segregation in the Great Society," *Daedalus*, Vol. 95 (1966), p. 82.

¹⁹ H. Hoyt, *The Structure and Growth of Residential Neighborhoods in American Cities* (Washington, D.C.: Government Printing Office, 1939), pp. 62 and 71.

²⁰ M. J. Bailey, "Effects of Race and Other Demographic Factors on the Values of Single-Family Homes," *Land Economics*, Vol. 42 (1966), pp. 214-18.

whites for housing in a common housing market, coupled with vacancy rates which frequently exceed Negro demand, could eventually lead to a lessening of values. Thus, land abandoned by whites on the margins of the Negro ghetto at some single point in time is almost never known to be retrieved by such residents.

The behavior described above is rapidly leading to the development in the United States of central cities within which territorial dominance is being relinquished to the Negro population. This fact has undoubtedly had much to do with the increasing demand by Negroes for black power, and logically so. If one inherits a piece of turf it is only natural for him to seek control of the area of occupancy. Thus, both the critics and supporters of black power have traditional white behavior and the public decisions stemming therefrom for its overt crystallization. Grier recently noted that it was not until President Kennedy signed his executive order of 1962, which treated the problem of discrimination in housing, had the federal government ever gone on record as opposing discrimination in housing.²¹ Yet even today, as the nation's ghettos continue to expand, public policy abets their existence and expansion.

THE MODEL

The previous description of a set of general processes goes far in explaining the continuous expansion of the Negro ghetto. The processes described reflect the values of society and, as Pahl recently pointed out, residential patterns are a reflection of the functioning of a social system.²² It is possible within the framework of systems analysis to devise a model which replicates the total process of metropolitan systems development, but such an understanding exceeds the skills of a single researcher or the knowledge and focus of a single academic discipline. However, a single researcher might attempt to develop a simple model which replicates some aspect of the development of the

metropolitan system. A model of this nature, although promoting keener insights into an understanding of processes operative at the micro-level, is characterized by serious shortcomings as it basically reflects the operation of endogenous processes. Nevertheless, the advantages emanating from the development of such models outweigh the previously specified shortcomings.

Components of the Model

A model of ghetto development is of the type described by Chorley and Haggett as normative.²³ An effective model describing ghetto development should include at least three basic components: 1) a demographic component, 2) a producer component, and 3) a consumer component. The data employed to describe these components serve as input for the model. The demographic component is employed to determine housing demand, the producer component to determine availability, and the consumer component to determine allocation. The operation of and subsequent interaction associated with these components permits the model to be placed in the category of behavioral models. The demographic and producer components are generated deterministically, whereas the consumer component is generated probabilistically. Thus, the spread of the ghetto is described in an indeterminate manner. The weakness of the simulation lies primarily in the gross assumption employed in the producer component and secondarily in the projections derived from the operation of the demographic components, both of which acutely affect the emerging pattern of ghetto development.

The Demographic Component

Gross changes in the magnitude of the ghetto are associated basically with the changing demographic character of the Negro population. The demographic characteristics of the white population residing in ghetto space will likewise influence the pattern or form of the ghetto at any point in time. The competition for housing and its subsequent allocation is largely influenced by the demographic characteristics of both the white and Negro populations. In order to better understand the

²¹ G. C. Grier, "The Negro Ghettos and Federal Housing Policy," *Law and Contemporary Problems* (Summer, 1967), p. 555.

²² R. E. Pahl, "Sociological Models in Geography," in R. J. Chorley and P. Haggett (Eds.), *Models in Geography* (London: Methuen and Co., Ltd., 1967), p. 239.

²³ Chorley and Haggett, *op. cit.*, footnote 22, p. 25.

role of population dynamics on ghetto development, interest is focused on the population occupying what is here identified as "ghetto space."²⁴ Ghetto space in the city selected for testing the model, Milwaukee, Wisconsin, spreads out over a twelve square mile area extending north and west from the central business district. The area in 1960 contained approximately 217,000 persons of which only twenty percent was nonwhite. Nested within ghetto space was a much smaller area, approximately four square miles in extent, which had already become identified as the ghetto. This smaller area included 92,000 persons of whom approximately sixty-eight percent were nonwhite. Thus, the area identified as the Negro ghetto was slightly more than two-thirds Negro and included many blocks which did not contain a single Negro household. In identifying the twelve square mile area as ghetto space, an assumption is posited that the spread of the Negro population will be largely confined to this area in the city of Milwaukee during the current decade and no doubt the decade which follows. By adopting this assumption it is clear that the model being developed here is a strict segregation model.

The principal reason for incorporating a demographic component in the model is to arrive at a reasonable estimate of housing demand. Demand is generated through the employment of an appropriate set of age-specific rates. Age-specific birth and death rates, by color, were applied to the population at one year intervals for a ten year period. This procedure permitted the recording of year by year changes in the population resulting from an excess of births over deaths. Since in-migration is also an important aspect of population change in the Negro population, a migration factor was included. Migration was not thought to contribute significantly to net changes within the white population residing in ghetto space and was omitted as a growth producing factor.

A major weakness of the above described procedure is that it allows a piling up of population in census tracts. This condition is an

outgrowth of the absence of a mechanism which would generate data on white out-movement at the tract level. The application of age-specific intracounty mobility rates could be applied to the white population as a means of generating a more accurate measure of the population actually in residence in a census tract at any given point in time. The employment of a correction factor of this type possesses the added advantage of enabling one to compare the actual rate of white movement from tracts with the expected rate; the expected rate would represent the number of movers generated through the use of intracounty mobility rates.

The Producer Component

The producer component is employed to create housing vacancies which might allow a Negro household to establish residence in a given block located in ghetto space. As few new housing units are constructed in older neighborhoods, residential space is essentially made available by white abandonment. It is generally agreed that there exists some level of tolerance beyond which whites will no longer continue to share a common residential space with Negroes. On the other hand, there is no general agreement on what whites perceive to be an acceptable residential mix. Nevertheless, a curve in which the leaving rate of whites is a function of the increase in the proportion of Negro households in a block may be described intuitively. Although it would be more logical to describe the leaving process as indeterminate rather than determinate, there is an absence of sufficient data upon which a stochastic process might be based. As the general leaving process becomes better understood, it may be described stochastically.

A shortcoming of the producer component based on assumed white leaving-rates is that it produces an excessive number of vacancies in those parts of the ghetto space which are somewhat remote from the main body of the ghetto. The social distance effect is not as pervasive over space as the vacancy-creating mechanism suggests. Some constraints should be placed upon the territorial limits of ghetto space that would be open to Negro occupancy during any given time interval, under conditions of strict segregation (in order to effect

²⁴ Ghetto space represents the area presently identified as the ghetto as well as that expanse of contiguous territory thought to be sufficiently adequate to house the net increase of Negro households over a ten year period.

a more realistic description of the actual process). The problem by nature suggests that ghetto space should be made available incrementally. These increments, which are unlikely to fall within the sphere of Negro residential search behavior during the initial time period, should not be influenced by the vacancy creating mechanism. The creation of vacancies on the periphery of ghetto space results in a series of random residential assignments which leads to a more dispersed settlement pattern than that which actually occurs. This suggests that interaction along what is perceived as the ghetto edge during any single time period is far more pervasive in its impact upon the actual ghetto form than interaction about individual clusters, which might evolve under conditions of random residential assignment if the total ghetto is available for entry throughout a ten-year time interval.

Consumer Component

The consumer component of the model is a residential assignment mechanism. The housing demand of the Negro population during any one-year period is derived by means of determining the number of households formed during the interval. Household formation is deduced by applying an appropriate set of age-specific marriage rates to that segment of the population classified as single. In a situation where in-migration is responsible for a significant proportion of the increase in the local population, it is difficult to choose the most appropriate marriage rates to be employed. In this case the rates characterizing the North Central region were employed. It is suspected that the employment of such rates under conditions of heavy in-migration is likely to produce a larger than actual number of marriages. The existence of a sizeable number of single persons in a new environment is thought to have a depressing effect on the formation of new households.

Negro household assignments were made annually on the basis of the group's known propensity to purchase (or rent) housing in specific price categories. In order to generate household assignments, every block in ghetto space was assigned a probability of receiving a Negro home seeker. The highest probabilities were assigned to those blocks in which the

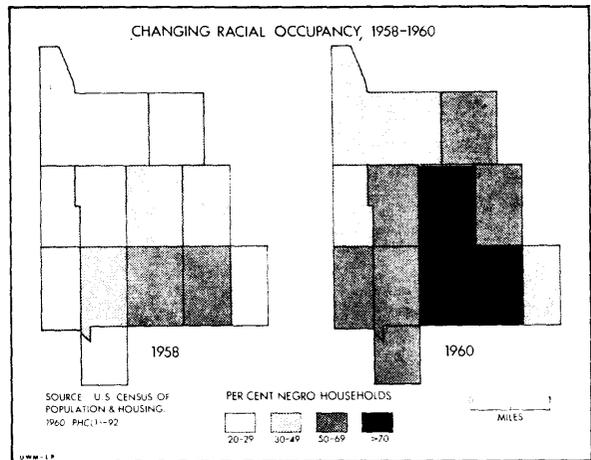


FIG. 1. The changing intensity of Negro occupancy within a segment of ghetto space over a two-year interval is graphically demonstrated. It is evident that the rate of change is essentially linked to the intensity of Negro occupancy in contiguous units in the previous time period.

median rent was in the \$60-69 range, as blocks characterized by such rents housed the largest percentage of the Negro population in 1960. An assignment could not be made in a block wherein an appropriate number of vacancies did not exist.

The model oversimplifies the process of housing competition in ghetto space in not permitting whites and Negroes to compete for housing in a common market. Obviously, whites continue to seek housing in ghetto space until some critical threshold level is attained. Data on white entry into census tracts in ghetto space which had a minimum of forty percent Negro occupancy by 1960, confirms that whites continue to seek housing in close physical proximity to Negroes until Negro occupancy attains a level of approximately thirty percent. And even then about one-fifth of the housing seekers continue to be white, but falling off sharply thereafter. In the one census tract in ghetto space which exceeded seventy percent Negro occupancy in 1958, there was only a negligible number of white entrants; less than two percent. Thus, the exodus of whites at the tract level takes place within a very short period of time, seemingly as a function of the Negro build up in contiguous space. This fact implies an initial saturation at the block level, proceeding outward from blocks with an already heavy Negro concentration (Fig. 1). Changes in Negro-

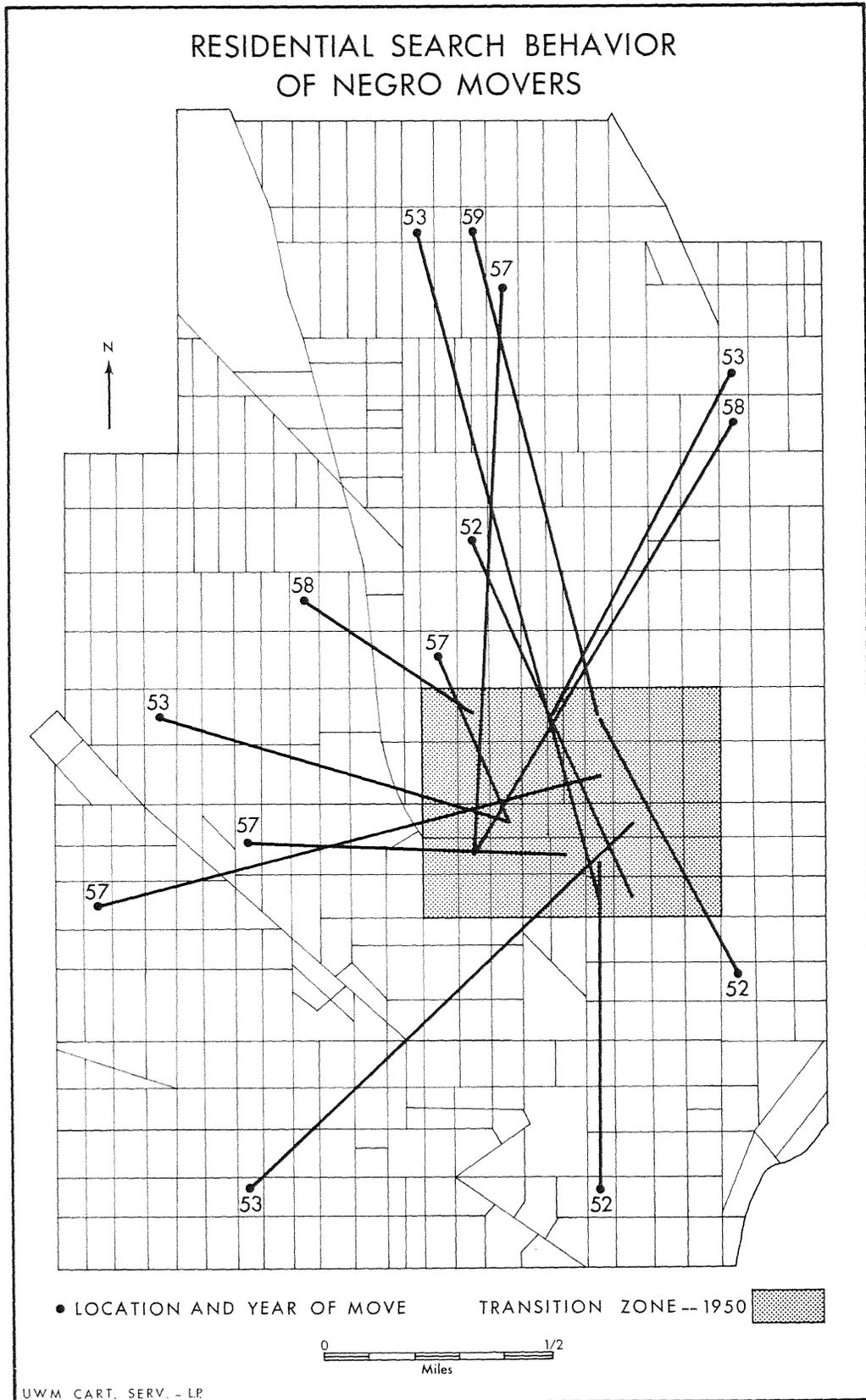


FIG. 2. Vectors are employed to show the direction, distance, and time of move of a sample of Negro movers who were residents of the ghetto edge in 1950. None of the sample movers chose to settle beyond the confines of ghetto space.

white relations during the past few years may have altered the expected behavior in contiguous physical space.

The continual expansion of the ghetto is essentially dependent upon the collective behavior of individual residents of ghetto space, white and black. A strict segregation model, such as that developed here, is an attempt to add to an understanding of the operation of the residential market existing within ghetto space. Although knowledge of the behavior of individuals based on race aids in this understanding, it is by no means the only force operating to promote the expected pattern of residential behavior. The operation of exogenous forces are more unpredictable, but critically affect the ensuing pattern of racial residential development. In order to better understand the operation of the internal variables it is necessary to gain insights into the residential search behavior of prospective Negro home seekers as well as white propensity for residential desegregation. Morrill's ghetto residential assignment model was basically governed by the former consideration, whereas the model developed here emphasizes the latter as a means of shedding light on the dual problem.

Whereas Negroes move more often than whites, the lengths of the moves are usually shorter. A sample of Negro movers occupying units on the edge of the ghetto in 1950 exemplifies the pattern of intraurban movement attributed to Negro home seekers. Only four percent of the Negro movers selected housing located more than ten blocks beyond the original ghetto neighborhood, thirty-nine percent selected housing within five blocks of the ghetto, while forty-one percent acquired housing within the same neighborhood (Fig. 2).²⁵ A similar pattern apparently continued to persist as is evidenced by the number of Negro households occupying units located on the fringe of the ghetto in 1960. It seems safe to say that whites and Negroes seldom compete for housing in a common market over an extended period of time. Wolf, in analyzing the concept of the tipping point in neighborhood change, was concerned with the following question as one of those critical to an under-

standing of the tipping point: Does the tipping mechanism refer to the point at which whites begin to leave, or the point at which whites refuse to enter?²⁶ The answer is yet unclear, but it is apparent that both factors are at work. The model developed here is based on the former question, and some of its weaknesses undoubtedly stem from an initial ignorance of the latter question. An examination of the success of the model will demonstrate this more effectively.

Evaluation of the Model

Once a model of the type described above has been assembled, it can be treated in one of two ways. It may simply be judged on the basis of the logic employed in its construction or it might be made operational as a means of actually testing its validity. The latter course of action has been chosen in this instance. The construct described here is recursive, and is designed to generate changes in the spatial pattern of Negro occupancy over a ten-year period. An evaluation of the results of such a model is no mean task. The first problem is selecting the most appropriate method of evaluation. Opinion relative to this matter is mixed. Some researchers have employed various statistical techniques as a means of evaluating the goodness of fit between the simulated pattern and the actual pattern. Others have been content to evaluate the results empirically. Because of the nature of the data and the lack of precise information which can be employed to describe the actual pattern, an empirical analysis will be conducted. The lack of precise information in this case stems from the fact that the model which utilizes census data as input has been calibrated by employing the results of the 1960 census. The yearly changes in the spatial pattern of residential occupancy occurring after the base year can only be crudely evaluated at this time. Only after the results of the 1970 census are available can the model output be subjected to a more rigorous analysis.

A second question concerns the appropriate spatial unit to be employed in the evaluation. Data have been assembled at the block level, for it is generally assumed that race as a

²⁵ The zone of transition shown on Figure 2 is areally coincidental with what has been described above as the same neighborhood.

²⁶ E. P. Wolf, "The Tipping Point in Racially Changing Neighborhoods," *Journal of American Institute of Planners*, Vol. 29 (1963), p. 219.

factor in the promotion of residential mobility has its most pervasive impact at this level. Yet the prevalence of other forces located within what Wolpert identified as the action space of the individual must not be overlooked.²⁷ Any meaningful analysis on a block-by-block basis would strongly suggest the use of statistical rather than empirical treatment. Even then, the results of statistical tests applied to the aggregation of blocks constituting ghetto space could prove misleading. In order to eliminate a modicum of the chaos which might arise in this type of analysis, a subaggregation of blocks has been chosen for investigation. These subaggregations may be considered housing market areas.

Only two of the housing market areas in ghetto space have been chosen for intensive observation. One of these is situated on the western edge of the ghetto, and the other is situated several blocks to the north of the original Negro core. Considering the characteristics of these areas at the beginning of the period, they may be described as a declining blue collar housing area and a stable housing area of skilled and semi-skilled workers, respectively. These two prospective appendages of the ghetto are identified, respectively, as the West Central housing market area and the Keefe-Capitol-Congress housing market area.

These two housing market areas contained approximately 7,500 housing units in 1960, a number sufficient to satisfy approximately one-half of the anticipated Negro housing demand during the following ten years. The quality of housing in the two market areas differs significantly, with the quality in the West Central market being generally lower than that which Negroes had previously inherited on the northern margins of the ghetto. Thus, given a choice of housing available in close proximity to the existing ghetto boundaries, the Keefe-Capitol-Congress market area, with its more attractive housing, should prove to be the major target area for Negro occupation during the ensuing ten-year period.

The Keefe-Capitol-Congress area is in many ways similar in housing quality and population characteristics to the Baxter area of De-

troit, an area whose pattern of racial change was recently described by Wolf.²⁸ The Keefe-Capitol-Congress area includes the only sizable volume of single family detached structures in close proximity to the ghetto.

In 1960 the total number of Negro households situated in these two housing market areas numbered less than 150, with the great majority of these located in blocks contiguous to the ghetto. The northern and western margins of the market areas were beyond the distance which most Negro movers travel to seek housing accommodations. This being the case, one would normally expect a block by block filling in, proceeding from areas heavily built up with Negro households to those without Negro households in the initial time period. As a means of comparing the actual process of racial change with the results generated by the simulation model, it was necessary to devise a sampling frame. The question of the type of sample to be employed had to be confronted. Because of the nature of the question to which answers are being sought, it was finally decided that two different sampling techniques would be employed. As a means of gaining insights into the general pattern of household mobility in the two market areas, a stratified random sample stratified by block was employed. In order to reveal more clearly the changes in the pattern of racial occupation, a quadrat or cluster sample was also introduced. The latter technique allowed observation of all changes taking place within a micro-housing environment through time.

The results of the stratified random sample demonstrate that the West-Central housing market area is far less stable than its northern counterpart. Samples drawn from the two census tracts which largely comprise the west central market showed that sixty percent of the 1960 residents in the tract nearest the ghetto, and fifty-two percent of the residents of the tract more distant from the ghetto, were no longer residents of this housing market area by 1965. Likewise, Negro householders served as the basic replacement population in the eastern half of the housing market area, which in 1965 possessed a vacancy rate of twenty percent. The western segment of this market,

²⁷ J. Wolpert, "Behavioral Aspects of the Decision to Migrate," *The Regional Science Association Papers*, Vol. 15 (1965), p. 163.

²⁸ E. P. Wolf, "The Baxter Area: A New Trend in Neighborhood Changes?" *Phylon*, Vol. 26 (1965), pp. 347-48.

although exhibiting signs of instability, was not yet receiving large numbers of Negro householders. Negroes at this date constituted fewer than ten percent of the housing market entrants. The fact that five years had elapsed and Negro entrance into the western segment of the market was minimal, strongly supports the contention that Negroes do not search for housing far beyond the margins of already heavily built up Negro areas. The vacancy rate in the western segment of this housing market area was considerably less than that which characterized the east.

In the Keefe-Capitol-Congress housing market, residential mobility was less than half that which characterized the West-Central market. In the northern segment of this market only twenty percent of the original residents had abandoned the area by 1965. The higher level of stability in this housing market was no doubt influenced by its greater physical attractiveness, its higher incidence of owner occupancy and the prevalence of older families. The latter factor is only a temporary contributing factor which will have the opposite impact on stability at a later time. As was true in the eastern half of the West-Central housing area, Negro families represented the chief replacement households in the southern half of the Keefe-Capitol-Congress area. Only about one-third of the replacement households in the northern segment of the market were Negro. The peripheral segment of each of these housing market areas received a smaller number of Negro households during the five-year interval than did those segments of the market contiguous to the ghetto.

A number of blocks were selected at random within the two housing areas in which to observe the pattern of residential mobility of the universe of occupants located within those blocks. The city directory was employed as the basic source of information on the moves of individual occupants of the sample blocks on a year by year basis. It is often possible to determine the race of entering households on the basis of name, place of previous residence, and occupation data, all of which can be derived from the city directory. Although this technique is not without its shortcomings, it does enable one to arrive at crude index of racial change within a local housing environment.

Twenty-one sample blocks, or in this case quadrats, as the block configuration employed here is the census block rather than the linear block, were selected for intensive investigation (Fig. 3). Eleven of these quadrats are located in the Keefe-Capitol-Congress housing market area, and the remaining ten are in the West-Central housing market area. The sample blocks in the West-Central area are characterized by rental levels which were prevalent in areas already heavily Negro in 1960. The median rental levels of the sample blocks in the northern market were generally higher than those occupied by the Negro population in the initial year. Thus, the probability of a Negro household receiving an assignment in the latter market area is less than that of receiving such an assignment in the former area.

A sequential running of the model over a five-year period allowed comparison of the simulated pattern of Negro entry in the sample blocks with the observed actual pattern. In all but one of the sample blocks in the Keefe-Capitol-Congress area, the model underpredicted the number of entrants. The basic flaw leading to underprediction in these blocks is the lack of an owner-occupancy mechanism in the model. These are blocks in which most homes are owner occupied structures. This results in high median rental values being assigned them, thereby reducing the probability of a Negro occupant receiving an assignment. In actuality, this area is one in which Negro home purchases have been rather substantial, as Negroes constituted the principal entrants by 1965. A combination of distance and high rents led to a nearly congruent relationship between the actual and simulated pattern in the northernmost blocks in the housing market area.

In the West-Central housing market area the model tended to underpredict in those blocks nearest the ghetto edge and to overpredict in those blocks farther removed. In only three of the sample blocks was there any real similarity between the actual and simulated pattern of Negro entries. Overprediction near the margins of the ghetto suggests that the vacancy creating mechanism in the model requires modification as a means of improving its sensitivity to the presence of small numbers of Negro households within blocks. This lack of sensitivity results in too little concentration

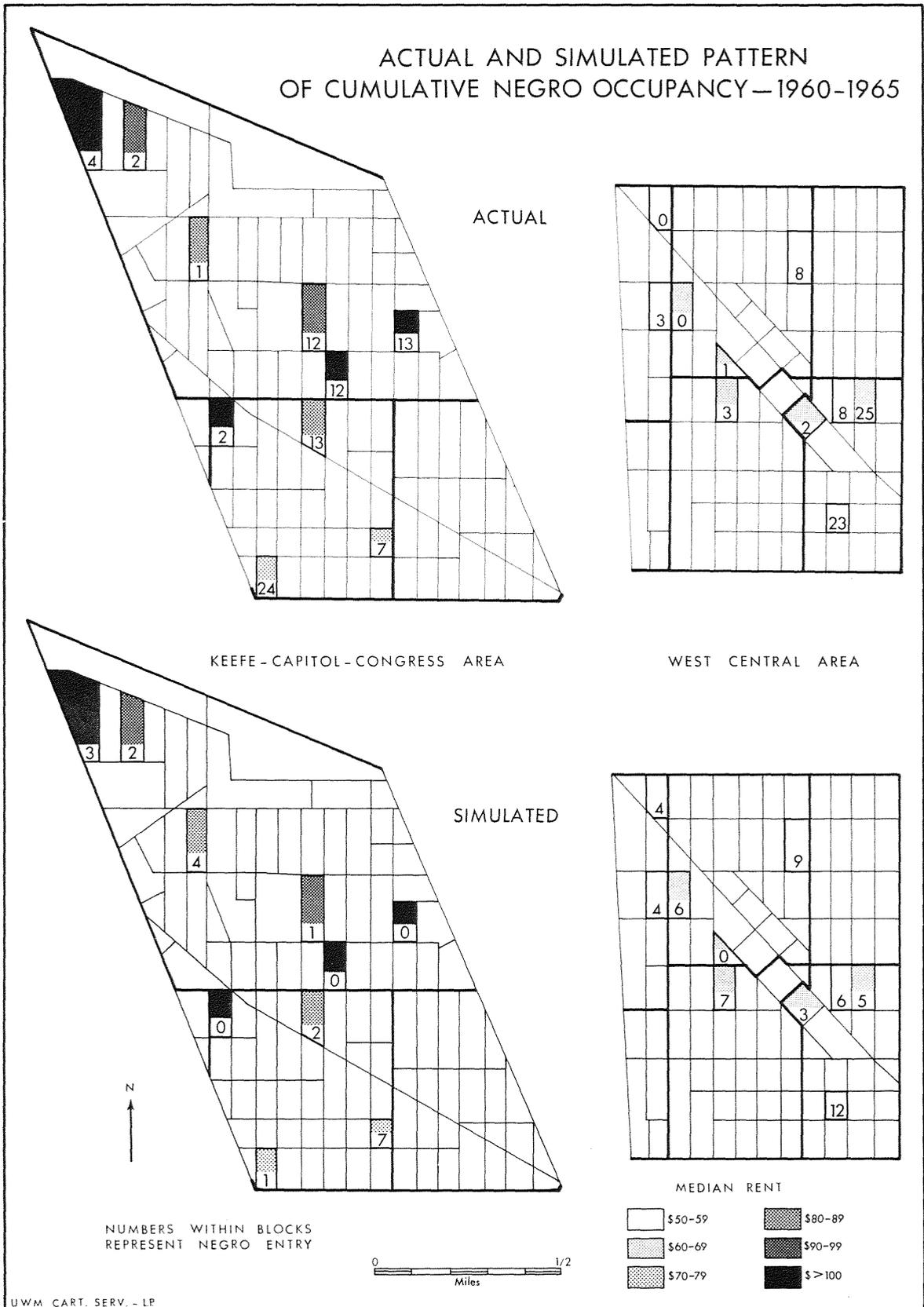


FIG. 3. The actual and simulated number of Negro movers entering two ghetto fringe housing market areas is shown above. Visual variations in the goodness of fit can be observed within the set of sample blocks.



FIG. 4. The actual intensity of Negro occupancy within the context of ghetto space, as of 1960, is revealed above. The non-shaded blocks within the interior of the ghetto represent non-residential blocks, or blocks with a minimal number of housing units.

along the ghetto edge and too much dispersion in the outer areas of ghetto space, especially when blocks in the outer areas possess similar rental characteristics to those in the ghetto. This weakness was apparent in the overall simulation pattern characterizing ghetto space, as well as in individual housing market areas (Figs. 4 and 5).

A total view of the ghetto configuration is described in Figure 4. Figure 5 reveals the simulated state of the ghetto in 1968. The overall weakness of the model can best be detected by viewing the excessive dispersion of the Negro population along the western edge of ghetto space and the current under concentration along the northern margin of the ghetto (Fig. 5). Several nonresidential blocks within the interior of the ghetto are shown on these maps, without shading. Maps of the type represented by Figures 4 and 5 can be produced for each year, over the ten-year period, from computer output generated by the model.

In evaluating the model it is apparent that the model's performance in the Keefe-Capitol-Congress housing market surpassed its performance in the West-Central market. This fact partially reflects the lack of constraints other than housing costs, to access to all housing in ghetto space. The sequential opening of segments of ghetto space within a time frame should result in a general improvement in the level of model performance. This further indicates that the ghetto resident is engaged in a series of short distance moves, seldom exceeding a ten-block distance and most frequently confined to distances of less than six blocks. This practice permits whites to continue to compete for housing only a short distance from the margin of the ghetto, as the slow process of filling-in occurs along the ghetto edge.

The Validity of the Conceptual Model

The previous discussion which dealt with the behavior of whites and nonwhites in a common housing market was an attempt to demonstrate the soundness of the use of the previously specified components as input in a ghetto developer model. As the behavior of the individual decision maker operating within a common market is based on a host of factors, it is an inconceivable task to disaggregate all

factors impinging on one's decision to move. Nevertheless, the role of the racial composition of the population in housing sub-markets has been employed as the principal factor generating a reduction of white demand and a corresponding intensification of Negro demand in such areas. The question which arises here concerns the validity of the assumptions employed as the basis for model calibration. Since the model described here is a strict segregation model, employing the terminology of Thompson, it may be considered by many to be a distortion of the real-world process of residential household allocation.²⁹ Admittedly, it is an oversimplification of the process, but it generally appears to provide a closer approximation of racial residential patterns than an open system operating without social constraints.

Unless there is a radical departure in the behavior of individual householders, both white and black, as well as the innumerable exogenous forces whose impact is heavily felt in influencing the racial makeup of residential space, the strict segregation model will be effective in simulating the pattern of ghetto development for some time to come. Ghetto maintenance is strongly rooted in the nation's institutional mores. Whereas some question the wisdom of maintaining the ghetto intact, especially after a series of very hot summers, it appears that many professionals and a much larger segment of the lay population feel either that the task of breaking it up is an impossible one or that its maintenance is desirable. The recent flurry of open occupancy laws, at both the state and national level, do not alter this fact.

It appears that many social scientists, regardless of their basic motivations, currently support what Downs describes as a ghetto enrichment strategy.³⁰ Piven and Cloward, writing recently, strongly suggest that efforts at integration have worked against the Negro's acquisition of adequate housing.³¹ This same

²⁹ W. R. Thompson, *A Preface to Urban Economics* (Baltimore: The Johns Hopkins Press, 1965), pp. 309-13.

³⁰ A. Downs, "The Future of American Ghettos," *Daedalus*, Vol. 97 (1968), pp. 1346-47.

³¹ F. F. Piven and R. Cloward, "The Case Against Urban Desegregation," *Social Work*, Vol. 12 (1967), p. 12.

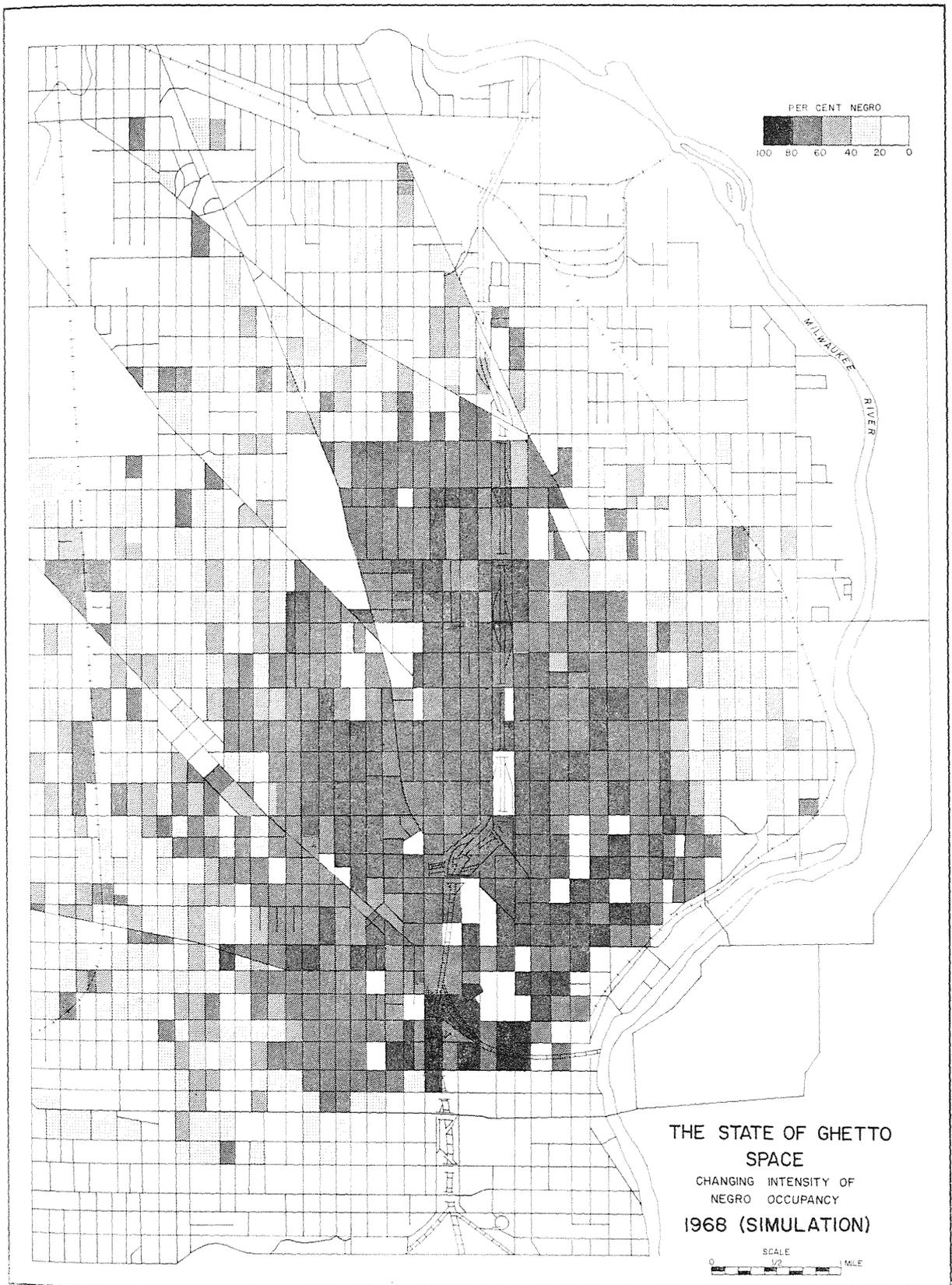


FIG. 5. The simulated pattern of Negro residential expansion through an eight-year period can be observed above. The simulation is subject to maximum error along the eastern and western edges of the simulated zones of intensive Negro occupancy.

type of reasoning was recently but somewhat more subtly stated by Spengler, who tends to emphasize the role of a satisfactory social environment.³² Keller, a planner and strong advocate of the promotion of homogeneous communities, denied that one must favor complete segregation, but admitted that one should use caution in mixing neighborhoods in light of the evidence assembled.³³

Thus, those in the ghetto who strongly advocate the development of black power and likewise opt for an enrichment strategy, and who consequently tend to be generally opposed to dispersion, seem to have strong professional backing. Downs, unlike Piven and Cloward, in evaluating the enrichment strategy, expressed uncertainty about its potential for success. Yet Grier has openly stated that public policy in the United States should be aimed at allowing the Negro to enter the mainstream of American life and not to solidify the structure of the ghetto.³⁴ After reviewing the evidence there appears to be strong support for the conceptual validity of something approaching a strict segregation model.

Depending upon the direction and impact of public policy on individual residential location choices, an alternative model might be developed. Such a model might generate specific levels of ghetto escapement on the basis of changing patterns of behavior, growing out of modified economic policies and social relations. But even if all future housing demands on the part of a rapidly growing urban black population are satisfied outside of the ghetto, the ghetto configuration will continue to generate conditions which may be thought to be inimical to the best interests of the nation. There is little question that the phenomenon treated here is complex and transcends the more simplistic problem of understanding housing markets. The ghetto is not simply a spatial configuration, but a social and ideological configuration that has spatial expression.

Models of the type described here might

³² J. J. Spengler, "Population Pressure, Housing Habitat," *Law and Contemporary Problems*, Vol. 32 (1967), p. 172.

³³ S. Keller, "Social Class in Physical Planning," *International Social Science Journal*, Vol. 18 (1966), pp. 506-07.

³⁴ Grier, *op. cit.*, footnote 21, p. 560.

be employed with some modifications to aid in the planning process, if the ghetto enrichment strategy is chosen. Similarly, with additional modifications, such models might be employed as an aid in predicting the location and intensity of certain types of economic and social problems. If one opts for a strategy of dispersal, the strict segregation model will no longer represent a conceptually valid construct. An open system model might be developed which could generally be described as a "ghetto destroyer" model. At the moment there exists no body of information which might serve as a foundation for the development of a model of this type. Furthermore, such a model could only be employed to generate residential spatial patterns which do not currently exist on any meaningful scale. Yet, these currently non-existent patterns could become a reality by altering human behavior as a result of major decisions emanating from both the public and private sectors of the economy.

SUMMARY AND CONCLUSIONS

An attempt has been made here to describe the basic behavior of individuals which gives rise to residential ghettos in northern metropolitan systems. After gaining limited insights into the behavioral dimension, a model was developed using these basic insights as input. The model, described as a ghetto-developer model, was employed to predict the future state of the ghetto. The state of the ghetto reflects the intensity of the spatial concentration of the Negro population within a contiguous area. Although models of this type can never be expected to duplicate the existing pattern, they can replicate in a general way the real-world process, which leads to the development of spatial patterns that bear varying degrees of similarity to the actual pattern. Whereas models of this type have some predictive value, the real merit derived from them is the gaining of additional understanding of the processes one is attempting to simulate.

The ghetto-developer model was run using data from Milwaukee, Wisconsin. The results provided evidence of deficiency in some of the basic assumptions incorporated in the model, both in terms of the aggregate simulated ghetto spatial pattern, as well as the

resulting pattern occurring within individual housing market areas. The employment of the model to generate ghetto expansion in a series of urban systems should permit one to ascertain if a general set of assumptions might be employed to describe fairly accurately the process of ghetto formation.

Models of the type described above are attempts to replicate an actual ongoing process. The initiation of strategies designed to alter the existing process would tend to invalidate the model. At the same time, models may be

developed based on the behavior necessary to modify the existing residential spatial pattern. Models of this type could very well serve as planning models, providing that in this case there is a national opting for an alternative strategy. The strict segregation model currently generates a spatial pattern that approaches the actual pattern, even though, in reality, ghetto escapements occur. But the extent of such occurrences are not sufficiently significant to alter the spatial configuration of the ghetto.

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