METROPOLITAN GROWTH AND SOCIOECONOMIC RESIDENTIAL SEGREGATION

Thesis for the Degree of Ph. D. MICHIGAN STATE UNIVERSITY WILLIAM LEIGH RAISER 1969 THESTS





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# presented by

William L. Raiser

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#### ABSTRACT

# METROPOLITAN GROWTH AND SOCIOECONOMIC RESIDENTIAL SECREGATION

By

### William Leigh Raiser

From its inception, an area of continuing research and theoretical concern for the human ecologist has been the settlement patterns in urban residential neighborhoods. Superficial observation indicates that such settlement is patterned. A crucial variable determining the nature of this patterning is the resident's social status. This thesis focuses on the more universalistic socioeconomic status criteria of occupation, education, and income as the status variables and utilizes census tract data for Des Moines, Iowa, 1950-1960.

All such research and theorizing assumes that status differentials and ecological differentials are directly related. The direct relationship between socioeconomic status differentials and ecological differentials was supported for occupations, education, and income.

Two models examine the relationship between socioeconomic residential settlement patterns and urban growth. The invasion-succession model, derived from the works of Burgess, states that with urban growth, the socioeconomic status of a given sub-area of the city will decline, The staged growth model, derived from

William Leigh Raiser

the works of Hoyt, states that with urban growth, the socioeconomic status of a given sub-area of the city will decline. The invasion-succession model is supported.

Two additional models examine trends in socioeconomic residential segregation. The evolutionary model posits increased segregation with urban growth, and the entropy model posits decreased segregation with urban growth. The evolutionary model is supported,

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# A THESIS

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

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#### CHAPTER I

### INTRODUCTION

From its inception, an area of continuing research and theoretical concern for the human ecologist has been urban residential neighborhood settlement patterns. In light of present day national problems, this concern has manifest itself most recently in research on Negro residential segregation patterns and changes in those patterns (e.g. Farley and Taeuber, 1968). Previous research has focused on ethnic minorities (e.g. Park, Burgess, Wirth, and the Chicago School of the twenties and thirties) with some limited focus upon socioeconomic segregation (e.g. Shevky and Bell, 1955 and Duncan and Duncan, 1955).

There was a rather serious limitation to much of this previous research. Primary interest was upon static patterns of segregation at a given point in time or upon ethnographic studies of a particular minority thru time. Few if any controls were introduced, and few if any comparisons were made. It is interesting that in much sociological research the first control and comparison introduced is some measure of social status, but not here.

In particular, the present interest in Negro segregation has not been matched by a comparable concern with socioeconomic segregation. Blau and Duncan in their study of the American occupational structure were quick to match the Negro populations they

studied with white populations of similar socioeconomic origins and not to compare their mobility patterns to those of the population as a whole. However, when Farley and Taeuber (1968) study segregation patterns of the Nagro no such comparisons are made or controls introduced. In this instance such a deficiency is perhaps understandable in that no comparable data is available for socioeconomic status variables for the time period 1960-1966. But, no trends were cited here or elsewhere for the 1950-1960 decade for which data is readily available.

This potentially introduces a rather serious distortion factor. Negro segregation may be increasing as a result of general increases in the segregation of the various socioeconomic strata rather than as a result of racial discrimination.

Present interest, therefore, is focused upon an exploratory study of socioeconomic residential segregation patterns. Such a study necessarily draws upon the literature relating to metropolitan growth because of two factors: 1) we are interested in patterns of segregation in urban areas which must be related to the overall development of the urban system and 2) the classical discussions of urban growth patterns dealt explicitly with the patterned distribution of socioeconomic classes. Primary concern is for consolidating and organizing what is already known and postulated in these areas. The resulting theoretical formulations will be subjected to exploratory empirical validation with the hope that these formulations can be sharpened. Further, it is hoped

that the empirical data will be of such a form as to allow some limited comparisons to be made with the literature on Negro segregation. This, however, is only a tertiary concern of the present research endeavor and will be the subject of passing interest in the final chapter.

### CHAPTER II

# THEORY

## Introduction

Herin, two pairs of theories, frames of reference, or empirical generalizations will be stated, juxtaposed, and examined 1) to determine if they make contradictory statements about the nature of relationships existent in the empirical world and if contradictions do exist 2) to determine which, if any, corresponds to existential reality. The task, then, is to clearly and concisely state the key elements of each of the theories under consideration. Such an exposition provides the basis for logically deducing a set of statements about relationships in the empirical world. This, in turn, provides the basis for determining if there are any contradictory statements made within and/or between theories. Also, such an exposition attempts to eliminate the possibility of arriving at alternative deductions from the same set of elementary statements as well as avoiding the possibility that due to their ambiguity the elementary statements allow for no deductive statements.

The first pair of theories to be considered deals with the nature of urban residential growth patterns, i.e. the invasionsuccession model and the staged growth model. The second pair

deals with the return of urbox residential distribution patterns, i.e. the evolutionary model and the entrupy model. The first pair is priented to the dynamic aspects of residential growth, and the second is cruented to the dynamic aspects of residential location.

Urban Mesidenti 11 Growth Models

The literature of urban sociology relating to residential structures has been dominated by three classical empirical generalizations or ideal types, Burgess' concentric zones (Park, 1925), Hoyt's sectors (Hoyt, 1939), and Harris and Ullman's multiple nuclei (Harris and Ullman, 1941). These three occupy places of security and honor in the literature. This is so much the case that no amount of empirical research seems destined to unseat the lct or to permanently enthrone one while permanently banishing the others. This is not to say that a great deal of research effort has not gone into testing the relative validity of their claims. It has, But dispite that, all three are still cited in the literature and encorporated in various research endeavors. The only "resolution" to their seemingly contradictory claims lies in the movement of the scientific enterprise which now finds other theoretical and research areas of greater interest thereby leaving these three to joust before an ever dwindling crowd. Here, however, the task begins.

The reader will not be burdened with another account of the basic outlines of these three ideal types. Acquaintance with

them is assumed. Attention is turned to the fallacy of past attempts to validate or invalidate these three, singly or in various combinations.

In this section, I have been particularly careful not to call these three "theories" but rather "ideal types" or "empirical generalizations." Herein lies the heart of the problem; in fact, two problems. 1) By examining the ideal types, i.e. primarily whether or not residential location patterns conform to zonal or sector geometrical configurations, research attention has focused on static structures. It has investigated the residential location patterns of a city or set of cities at a single point in time rather than thru time. 2) This was linked to the narrow concern with these particular geometrical patterns rather than the more significant underlying social and social psychological processes producing the patterns. Present interest focuses, therefore, on the dynamic processes underlying the patterning and is in keeping with the explicit intent of the original authors; e.g. Burgess titled his paper "The Growth of the City."

These three classic statements of urban structure are based on or provide the basis for two distinct models of urban structure and growth processes. These shall be referred to as 1) the invasion-succession model and 2) the staged growth model with Burgess' conceptualization fitting the invasion-succession model and Hoyt's conceptualization fitting the staged growth model. Harris and Ullman's conceptualization is a logical derivative of both.

The invasion-succession model is based upon three assumptions: 1) urban growth and the resultant settlement patterns proceed from the center outward; 2) the cost of land is inversely related to distance from the center; and 3) resources are differentially distributed among the residents of an urban area. These three factors, in combination, produce the settlement patterns characteristic of the Burgess concentric zonal model.

The center is the locus of growth because of the economic nature of the city. The city exists to facilitate interaction. i.e. the exchange of goods and services. It costs in time and dollars to interact over extended distances; so to reduce the friction of space, points of concentration have developed. It is interesting to note that with continuous technological advancement increasingly reducing the friction of space, urban centers have increased in size and concentration rather than the opposite. McKenzie, among others, noted that urban development has been greatly shaped and facilitated by the invention and increasing use of ships and boats, trains, and finally the automobile. (McKenzie, 1933) These advances in the transportation sector have been paralleled by those in other sectors, e.g. movable type, the telegraph, radio, telephone, and TV in the communications sector. This is indicative of the fact that the social system has increased in complexity at a pace matching or exceeding that in the technological sphere.

Because of the numerous advantages of the center, the costs

of locating there are correspondingly high. Again, because of the economic nature of the city, it is the appropriate commercial and industrial firms which can and will bear this cost in order to reap the profits of centralization. Residences, then, being a necessary evil resulting from the fact that it takes people to man the center, are distributed around the center.

Determining the nature of residential distribution around the center requires consideration of the third assumption. If each individual or unit of individuals seeking a residential location were equally endowed with resources, they might all seek to locate in the same place or, failing that, locate on a firstcome-first-served basis, etc. However, that is not the case; and resources are differentially distributed among the population.

Since land is differentially priced and residents have differential ability to meet the cost of residential location, they each attempt to maximize their gratification. Now, inherent within the maximizing process is what might be termed a fourth assumption. That is, a degree of privacy, size of house, and size of surrounding grounds are maximally desirable. All would like to have a single family dwelling sufficiently large and with at least moderately spacious grounds. This is incompatable with 1) the high cost of land and 2) the concomitant process of urban concentration. Two processes, then, are at work; 1) the economic, i.e. urban concentration and resultant residential massing, and 2) the social, i.e. urban dispersion and resultant low residential

density. In terms of the maximizing process involved in residential decision making the second alternative is the more desirable; and, therefore, those with the greatest resources are most able to opt in this direction. Hence, the socioeconomic status of residents is directly related to distance from the center. This is the static version of Burgess' concentric zones slightly modified from zones to a gradient.

The stage is set for the analysis of the dynamics of this growth model which form the central focus of present concern. First, what is meant by "growth?" In the present context, two interrelated factors are involved, expanded size and increased structural complexity. Expanded size refers to increased numerical size and density. Increased structural complexity refers to intra- and inter-community differentiation. Increased structural complexity at the intra-community level leads to the discussion of socioeconomic residential segregation below, and increased structural complexity at the inter-community level leads to the multinucleated model of Harris and Ullman. These two aspects of growth --expanded size and increased structural complexity-- are interrelated phenomena.

Spencer postulated that increased population size and increased systemic complexity (heterogeneity) are inseparably linked in the evolutionary process. With the increased integration of matter comes the move from homogeneity to heterogeneity, both of which are so characteristic of Western urban-industrial society.

In Comte's terms, this is metaphysical theorizing in that the natural evolutionary force inevitably moves the course of world history in this direction (Rumney, 1966).

Durkheim was dissatisfied with this sort of a formulation and attempted, again in Comte's terms, to move from the metaphysical to the positivistic stage of theorizing and to formulate the causal chain explaining the rather high correlation, at least in the modern Western world, between population concentration and differentiation. He posited the operation of two key factors: 1) increased moral or dynamic density and 2) competition, which increases correspondingly. Hence, increased population size leads to increased structural complexity if and only if increased size also leads to increased rates of interaction --moral or dynamic density-- among the members of the population (Durkheim, 1933).

Hawley, then, completed the linkage by formulating the nature of the relationships between increased interaction, competition, and differentiation. These he set forth in four stages. "The initial stage appears whenever the number of individuals or units with similar demands, or rather the aggregate demand they represent, exceeds the supply of that which is sought." Increased population size and interaction rates initiate this stage. "A second stage is one of increasing homogeneity among the competitors. The singularity of the supply and the given character of environmental factors impose standard conditions of competition which call forth more or less uniform responses from all units

in the relationship....In the third stage the pressure of congestion begins to operate selectively, eliminating the weakest competitors....The deposed competitors may scatter to other areas which offer different opportunities and call forth different adaptations. The result is a territorial differentiation. Or they may remain in the home area and develop special abilities which will permit them to make oblique attacks on the supply....(Hawley, 1950: 202-203).

Both types of differentiation --territorial and functional-are involved in what Burgess calls "centralized decentralization" and what Harris and Ullman refer to as the development of multiple nuclei. Growth of the center involves the spin-off from time to time of commercial and industrial firms or sub-sections of them to outlying secondary centers of concentration (Haig, 1926 & Ogburn, 1946).

Further elaboration of this process of differentiation is not to the point of the present discussion. The primary purpose of the above is to demonstrate that the multipli-nucleated model of Harris and Ullman is not different from or in opposition to the assumptions of Burgess' formulation and, as will be shown below, to that of Hoyt. The centralized growth of the urban system leads to the development of sub-centers or multiple nuclei.

Also, with the present level of technological development in the West, increased population size may be only one factor, and a progressively minor factor, in increased structural complexity

or differentiation. If an increased rate of interaction is the crucial factor leading to differentiation, this is being facilitated more by advances in communication and transportation than by population concentration. In fact, as was indicated above, it may be more appropriate to posit that increased interaction potential leads to increased population concentration rather than the reverse.

Attention is now turned to the dynamic aspects of socioecenomic residential patterns during growth. The growth in size and complexity of the center brings corresponding growth in the residential population. Territorial differentiation associated with growth of the primary center does not alter the nature of the residential growth patterns. The gradient pattern radiates from each of the centers and the same basic processes are at work in each instance.

With the expansion of the center, surrounding residential land is invaded and becomes commercial-industrial in nature. Thus the commercial-industrial core of the city is surrounded by a zone in transition. Residents are leaving the area and these other functional types are taking over. This area becomes home for a highly mobile and unattached population. At the same time, those lower-class, unskilled laborers who once lived in this section of the city are now forced to find housing elsewhere. Their numbers are also increased by a steady flow of in-migrants to meet the increased labor demands. Therefore, this group

moves slightly further out, invading the older dwellings in adjacent zones. In like manner the process of invasion and succession moves toward the periphery of the urban area. Growth of the urban system takes the form of an increase in size but with the basic pattern of settlement remaining the same.

The pattern of growth is likened to that of a biological organism. The basic structure centered on the commercial-industrial nucleus forms the cell which increases in size up to a point and then divides adding another cell and thereby complicating the structure of the whole. Burgess' conceptionalization deals primarily with the basic cell and its growth while Harris and Ullman's conceptionalization begins to deal with the process of division and multiplication of cells.

The staged growth model is based upon two primary assumptions and one secondary assumption: 1) the impetus for growth originates at the center, 2) resources are differentially distributed among the residents of an urban area, and a) the cost of land varies inversely with distance from the center. These factors, in combination, produce the settlement patterns characteristic of the Hoyt sector model.

Again, the center is the locus of growth because of the economic nature of the city. The residential population of the city expands or contracts in response to the labor demands of the basic and non-basic sectors of the economy. This is not to negate the feed-back nature of the causal relationship. To a cer-

tain extent commerce and industry are drawn by a ready labor supply. However, primary importance for initiating growth is assigned to expansion of the economic base.

Therefore, primary importance for initiating growth is assigned to economic factors; but primary importance for determining the nature of residential settlement patterns is assigned to social factors. Social status is differentially distributed among the residents of an area. One way of solidifying differential status and/or of demonstrating it is to be able to associate with those of equal status and exclude association with those of inferior status. Thus, in the realm of residential settlement, different sectors of the city become associated with different status levels. Numerous informal and formal methods are utilized to insure the homogeneous nature of the neighborhood group from zoning and other forms of legal restraint to the application of highly effective informal social sanctions.

The static pattern resulting from these factors is that of a commercial-industrial center surrounded by settlement sectors representing the various status levels of the residents. Since it is assumed that each of the residents is attempting to maximize his status and does so to the extent of his resources, the ideal typical pattern of residential settlement would assign the most desirable location --economically and esthetically-- to those of highest status with the status of the residents decreasing in both directions from that sector. Thus, segregation be-

comes a matter of choice for the highest status groups and an imposition upon the lowest status groups.

Now for the dynamic growth process of this model. As noted above, the impetus for growth comes from expansion at the center. If this expansion involves more extensive use of the land as well as more intensive, those residential sectors immediately adjoining the center may decrease in value because of encroaching commercial-industrial usages. However, the major portion of residential growth involves additions at the periphery. With the influx of residents at all status levels new settlement occurs as an expansion of the existing status sectors in the only possible direction, outward from the center.

There is a certain amount of distortion potential resident in the operation of economic factors which attempt to make most intensive use of the valuable central properties. There are times when the economic and social values of particular urban land areas come into conflict. Firey (1945) noted this in his now classic study of Boston. The fact that sentiment and symbolism operate as ecological variables was not a new observation since that formed the basis of Hoyt's classic formulation some six years previously and has been in the literature of human ecolcgy almost from its inception. Of interest is his account of the manner in which conflict between these two interests was resolved.

In order for social commitments to a particular urban location to stand against economic pressures, a change in neighbor-

hoch structure needs to occur. Under "normal" conditions the neighborhood is a relatively homogeneous, categoric group having commensalistic relations and mechanical solidarity. In the face of conflict, however, a shift occurs; and a corporate group having symbiotic relations and organic solidarity emerges. This is in line with Hawley's contention that a task oriented group must, almost of necessity, develop corporate structure (Hawley, 1950). The residents of an area organize themselves into various neighborhood associations and enter into successful or unsuccessful conflict with the already relatively organized and powerful economic interests of the community. Therefore, the degree of distortion created by eqonomic factors in the ideal type pattern depends in large part upon the ability of the meighborhood to change from one type of group to another and having altered its structure to successfully compete.

Another source of distortion can enter this model in the same manner as the invasion-succession model. With growth, spinoffs from the center occur and satellite centers develop. Again, the pattern of residential development around these satellite centers takes the same form as that around the primary center. Therefore, the multipli-nucleated model of Harris and Ullman does not contradict or compete with either the Burgess or Hoyt model but may be derived as an advanced developmental stage of each.

Now, having set forth the essential characteristics of each of the growth models, I will juxtapose them and subject the con-

tradictions to empirical examination. The choice of titles for the two models is intenied to be suggestive of the inherent contradiction. For a given sub-area of the city, the invasion-succession model states that with growth its status will utimately decline. The above statement is qualified with the word "ultimately" because in the short run any given sub-area may be in the middle of a relatively homogeneous status band or sector and not immediately subject to invasion by those of lower social status.

For a given sub-area of the city, the staged growth model states that with growth its status will remain the same. This statement also needs to be modified slightly to incorporate the possibility and, in fact, the likelihood that growth will entail more extensive as well as more intensive use of the central land area by commercial-industrial concerns. This eventuality would lead to a decrease in residential status for those areas immediately affected, i.e. those immediately surrounding the center.

So two contradictory theoretical hypotheses are derived. Urban growth results in:

- 1. A decrease in the status of the residents of a given sub-area of the city (invasion-succession model).
- 2. No change in the status of the residents of a given sub-area of the city (staged growth model).

Added to these is a third hypothesis common to both of the models which will become of interest in the discussion below.

3. Since differential residential location results from differential access to social and economic resources, status differentials are directly related to ecological differentials, i.e. the greater the status differences existing between two individuals the less likely they are to live in preximity to one another.

#### Urban Residential Segregation Models

As noted above in the hypothesis common to toth of the growth models, implicit or explicit in discussions of this type is the assumption that segregated groupings of residents occur in the urban area. Such segregation may be based on any of a number of factors, but attention will be focused on socioeconomic segregation patterns since this is a particularly crucial dimension of status in modern Western industrial society. In this regard there are two theoretical models.

The first to be considered is the evolutionary model. Its major dimensions have already been discussed in connection with the two growth models above. With increased size and interaction in the social system come increased competition and differentiation. Therefore, the development of urban-industrial social systems is characterized by a high and increasing degree of differentiation at many levels. Previous discussion focused on intercommunity differentiation and functional integration. Present interest is focused on intra-community differentiation at the residential level.

The impetus to differentiation or segregation arises from two directions: 1) individual differentials in material resources, desired life styles, and consumption patterns and 2) aggregate attempts to facilitate optimal meeting of these differential de-

mands.

Social differentiation is nearly synonymous with industrialization and urbanization. As urban centers grow, there is a proliferation of job types and levels. The economic institutional stratification system has become increasingly differentiated and, in order to facilitate and coordinate interaction, increasingly structured. This, then, becomes one basis for differential access to material resources, life styles, and consumption patterns.

With increased systemic complexity and the wide ranging communications system integrating ever larger geographical areas, there have developed differential levels of systemic interest and competence. Certain individuals and groups of individuals are "citizens of the world." Their activities involve systemic integration, organization, and control on a wide ranging front. Other individuals and groups are more narrowly interested and competent at the national level, regional level, metropolitan level, medium sized or small community level, or intra-metropolitan level. Again, these various interests and competencies lead to differentials in material resources, life styles, and consumption patterns.

Closely linked with the above are the differentials in access to specialized types of education and advanced levels of education. These, too, contribute to the continuing and increased differentials in material resources, life styles, and consumption patterns.

The economies which acrue to the aggregate thru mass production encourage residential segregation. The differential desires for type of residence and location deriving from the above differentials can best and most economically be met when those with relatively similar desires are grouped together. Therefore, the differential demands of differential socioeconomic status are best met thru socioeconomic residential segregation.

Also, since status is solidified and demonstrated by one's ability to exclude association with those of lower status this aspect of socioeconomic status differentials is facilitated by socioeconomic residential segregation.

The second residential segregation model is the entropy model. "Entropy can...be thought of as a measure of chaos --which may be defined, oddly enough, as the most probable state of any system. Negative entropy can then be thought of as measuring the degree of organization, structuring, or improbability of a a system..." (Boulding, 1964: 139). Therefore, the entropy model posits that with continued "development" or "progress" of the system it will become increasingly unstructured and the parts increasingly homogeneous. This is, at least at first sight, contrary to the evolutionary model of systemic development (Rumney, 1965).

Boulding suggests, however, that the evolutionary process operates on the principle of "segregation of entropy." That is, as the system becomes more complex in one area or set of areas, it does so at the expense of complexity in another area or set of

areas. For example the movement from tribal hunting and gathering to urban-agrarian forms of societal organization entails a rather marked increase in organizational complexity in the economic and political spheres; however, at approximately this time a marked decrease in complexity occurred in the religious and kinship spheres. Hawley (1950) and others have also noted that there is a need to move from thinking in terms of dichotomous categories such as mechanical to organic solidarity, simple to complex, Gemeinschaft to Gesellschaft, sacred to secular, etc., to seeing the place of each structural type in all social systems at whatever level of development.

The question at present, therefore, is not whether the entire metropolitan system at all levels is becoming increasingly homogeneous and less structured but whether residential settlement patterns is one of the areas of decreasing complexity. Is increased complexity in some sectors of the system leading to decreased complexity in this? The evolutionary model above states the position for that not being the case, and attention is now turned to a statement in support of increased entropy in the area of socioeconomic residential segregation.

Several factors come to mind and have been discussed in the literature. The first is the influence of increased differentiation in the occupational sphere (Bogue, 1969). Increased differentiation in the occupational sphere is occurring; and, as was noted above, a case can be made that this leads to increased res-

idential segregation; but an alternative case can be made that this very fact leads to decreased residential segregation. The fact that differentiation has been carried to such an extreme in the form of various areas of specialization means that individuals are increasingly less able to identify and react to all of these gradations. With the proliferation of "gray areas" it becomes increasingly difficult and often impossible to distinguish black and white. Therefore, life styles, income, and consumption patterns become increasingly similar and there is less and less of a basis for segregation.

Likewise in the area of communication. With the increasing complexity of the urban and national systems there has been a proliferation of means of communication and an increased integration of the communication system into a single vast network. With this has come the rise of mass society and mass culture about which so much is written. Here again there is a decrease in life style and consumption differentials creating a diminishing basis for segregation.

Closely linked with the above is the spread of mass public education in this country. With broad exposure of the vast majority of the population to an increasingly standardized set of intellectual stimuli, the background factors contributing to behavioral patterns become increasingly similar leading to the expectation that the behavioral patterns themselves will be increasingly similar.

In the economic sphere, mass production means that more and more people are going to have access to standardized consumption items. Even though the quality of material and workmanship may vary greatly from the specialty shop to the department store model, the conspicuous differences are increasingly difficult to detect. Since the crucial variables in residential location are differential material resources, life styles, and consumption patterns, the decreased differentials in these areas occasioned by the nature of the present urban-industrial system lead one to posit a decreased basis for segregation according to socioeconomic status and, therefore, increased residential homogeneity.

We now have two urban growth models and two socioeconomic residential segregation models which present four logically possible combinations. Of the four, two have the greatest probability of empirical occurance and a third, moderate probability. Both of the growth models are based on the assumption of the existence of socioeconomic segregation as indicated by the hypothesis of the equivalency of status and ecological differentials common to both. Therefore, neither one is particularly compatible with the entropy model of socioeconomic residential segregation. However, a combination of rapid urban growth and an invasion-succession pattern of growth could give the appearance of decreasing segregation. With rapid growth, numerous sectors of the city would be invaded by individuals of differing socioeconomic status thereby causing a temporary decrease in segregation.

With a slower or relatively stable growth pattern, the lines of segregation become increasingly solidified.

Theoretical Hypotheses

- A. Growth Models:
  - 1. Invasion-Succession

If urban growth occurs, then the socioeconomic status of a given sub-area of the city will decline.

2. Staged Growth

If urban growth occurs, then the socioeconomic status of a given sub-area of the city will remain the same.

B. Socioeconomic and Ecological Segregation:

If residential settlement patterns are associated with the socioeconomic status of the residents, then socioeconomic status differentials will be directly related to ecological differentials.

- C. Socioeconomic Residential Segregation Models:
  - 1. Evolutionary

If urban growth occurs, then socioeconomic residential segregation will increase.

2. Entropy

If urban growth occurs, then socioeconomic residential segregation will decrease.

- D. Combinations of Growth and Segregation:
  - 1. If hypothesis A.1 is validated, then hypothesis C.1 will be validated under conditions of slow or stable growth and hypothesis C.2 will be validated under conditions of rapid growth.
  - 2. If hypothesis A.2 is validated, then hypothesis C.1 will be validated.

#### CHAPTER III

#### METHODOLOGY

This chapter discusses the research site, unit of analysis, dependent variables and indexes, and operational hypotheses.

## Research Site

The site selected for this research is Des Moines, Iowa, during the time period 1950-1960. Des Moines is selected for its size, location, and general growth pattern. In 1960, the city had a population of 266,315. This makes it a small to medium sized metropolitan center. Because of this it is large enough to evidence metropolitan patterns and small enough to make computation of indexes by hand reasonable. The size is limited to the corporate limits of the city because of the rather large census tracts found outside this area. (See below for further discussion of this point.)

Des Moines is located in the middle of Iowa in the west central United States. This location presents several advantages for an exploratory study of this type. First, the growth and areal patterns of the city are not influenced by adjacent urban centers or location in an urban strip such as the northeast corridor. The city is, therefore, relatively well contained and delimited. It comes close to providing the flat featureless plain of the model builder.

The growth pattern of Des Meines from 1950-1960 has been stable to moderate increases. The population increased 17.8% or roughly equivalent to that of the nation as a whole (18.4%). The density or population per square mile increased correspondingly 17.9%. Manufacturing and wholesale trade, basic sectors of the economy and region serving enterprises, increased 20.9% and 26.2% respectively. Retail trade increased only 13.1%. On the whole, then, the influence of unwanted factors derivative of very rapid growth, decline, and competing centers has been eliminated.

A word of caution, however. The very reasons which make Des Moines a good site for initial exploratory research make it a poor place to stop. The lessons learned here should be subjected to continued test in the more complicated environments characteristic of the greater part of our urban centers.

# Unit of Analysis

As noted in the theory section, this thesis deals with the urban center in general and with sub-units of the urban center in particular. Also, I am studying segregation and would, therefore, like to have the population as homogeneous as possible within the sub-unit. Present interest is focused on socioeconomic status characteristics of the population residing in the area. And, I am interested in studying thru time. These, then, are the four crucial factors in determining the choice of the appropriate unit of analysis, i.e. sub-division of an urban center, homogeneous population, data on socioeconomic characteristics of population,

and comparable data thru time. This means that census data will be utilized, and the only census unit which satisfactorily meets the above criteria is the census tract.

The census tract is an areal unit of metropolitan communities in the U.S. It is designed to have a relatively homogeneous population of approximately 4,000; and its boundaries remain nearly constant thru time. Therefore, it meets the conditions outlined above. It also has one more advantage in that numerous other studies have used it as their unit of analysis thereby allowing for possible comparison of findings.

Two aspects of the census tract are less than ideal. Both relate to problems in the temporal dimension of the research. Census tract data is available for Des Moines, the particular urban center of concern, from 1940 to 1960; but is not sufficiently comparable. This is true in the data relating to the occupational structure because of certain changes in the categories of classification and in the data on income distribution which is totally lacking for the 1940 census period. Because of the crucial nature of the data relating to the occupational distribution, the time series will have to be limited to the decade 1950 to 1960. The second difficulty arises in the rather large geographical area covered by some of the outlying census tracts. This factor is a possible distorting element in the thru time homogeneity of the tract population. Not much can be done here except to sound a cautionary note at the outset. Even with these defects,
however, the census tract provides a relatively good unit of analysis and will be utilized herein.

Dependent Variables and Indexes

Three separate but interrelated problems arise at this juncture: 1) how to assign a socioeconomic status score to each census tract, 2) how to measure status and ecological differentials, and 3) how to measure socioeconomic segregation.

# Assigning socioeconomic status scores to each census tract:

First the dimensions of socioeconomic status under consideration need to be delineated. For present purposes they are the big three: 1) occupation, 2) education, and 3) income. These three are used because appropriate census data is collected on all three and readily available. Also, in the stratification literature, these three have been the most commonly used singly or in combination. Since the occupational, educational, and income distributions for each of the census tracts is known, it seems that little difficulty should be encountered in assigning a status score to each. The problem, however, arises in determining the relative weight or rank of each of the status categories within and between distributions.

After numerous abortive forays into the stratification literature, I finally decided to utilize the Socioeconomic Achievement Index of Bogue (Bogue, 1969: 428-462). This index places primary emphasis in determining socioeconomic status on the equally

weighted variables of education and income. Bogue argues that the significant aspects of status in modern Western urban-industrial society have moved from an individual's or group's relations to the systems of production to their relations to the systems of consumption. Because of this, one's status is determined by one's ability to consume and the style or manner of one's consumption. Therefore, the key factors determining consumption and life style are income and education.

This, however, poses some additional problems. It is not possible to compute the Socioeconomic Achievement Index --hereafter referred to as the SEA index-- directly from the census tract educational and income distributions. The educational distribution refers to all individuals over the age of twenty five while the income distribution refers to families. The two therefore deal with separate populations and are not amenable to combination.

Hence, a second best alternative will be utilized. Bogue has computed the SEA scores for the broad census occupational categories; and these, in conjunction with the occupational distribution, can be used to arrive at a status score for the census tract. The male occupational distribution will be used since that is the basis for Bogue's scores and since the male is the primary status carrier in today's society. Then, by multiplying the number of individuals in a particular occupational category by the SEA score for that occupational category, summing, and dividing by the total males employed, a mean status score is computed for

each of the census tracts.

Table 3-1 SEA Indexes for Major Occupational Groups

Major Occupation Group	SEA Score
Professional technical and kindred	
workers	39
Managers, officials and proprietors	
except farm	37
Farm managers	20
Clerical and kindred workers	26
Sales workers	29
Craftsmen foremen and kindred	-,
Nonkana	27
	21
Operatives and kindred workers	23
Service workers except private	
household	20
Private household workers	ער
Tahonong except farm	18
THOOLELS EVCEDA TATH	10
Farm Ladorers	12
·	

(Bogue, 1969: 442)

A word of caution needs to be sounded with this procedure. The same SEA score will be used for both the 1950 and 1960 data. This eliminates the problem of making adjustments for the probable increased status of the entire population due to the increases in the general standard of living during the 1950-60 decade. No problems are caused as long as the intervals between the various occupational categories remain the same or if they all changed identically. However, if this is not the case, errors in assigning status scores will occur. Because of the nature of the present data and index, the assumption will have to be made that any errors introduced by this procedure will be relatively minor and not contribute to false interpretation of the data. This is a fairly safe and reasonable assumption since the consistency of occupation rankings thru time has been noted numerous times.

With this procedure, the standard deviation for each tract can also be computed and utilized as one measure of segregation, i.e. the smaller the standard deviation the greater the homogeneity of the tract population.

# Measuring ecological and status differentials:

This problem is closely related to the above and is partially solved by the above. In measuring status differentials an ordinal ranking of the census status categories is desirable. The occupational categories can be ranked according to the SEA scores given by Bogue and utilized above. The educational and income categories present no problems in ordering since they are already logically ordered. Some modifications will be introduced by slightly collapsing the number of categories in both of these rankings. This gives the following status rankings.

Occupation	Education	Income
Professional	College:	10,000 & over
Managers	4 or more	7,000-9,999
Sales	1-3 yrs.	5.000-6.999
Craftsmen	High School:	3,000-4,999
Clerical	L yrs.	1,000-2,999
Op <b>erativ</b> es	1-3 yrs.	under 1.000
Service	Elementary:	
Laborers	1-8 vrs.	

Table 3-2 Status Rankings of Census Categories

There is one cautionary note relating to the occupational ranking. As will be noted from Table 3-1, the SEA scores of

Craftsmen and Clerical workers are very nearly the same --27 and 26 respectively. The present ranking runs contrary to that normally seen in the craftsmen and the other occupations lower on the scale are normally grouped together in the blue collar classification with the clerical workers being grouped with those above in the white collar classification. Duncan noted in his study of residence and occupation in Chicago that the present ranking gave some problems and that these two categories, craftsmen and clerical, might better be reversed for some purposes (Duncan & Duncan, 1955). This is a gray area in which the relative status of these two categories is in question. This may also be an area of variability from city to city depending upon the internal composition of each of these categories in the city under investigation. Since there is a rather wide range of occupational types included in any one of these occupational classifications, the particular composition of the local area may be crucial.

In order to measure ecological distance, an Index of Dissimilarity will be utilized. This index is taken from the work of Duncan; and I will, therefore, let him explain it.

"The spatial 'distance" between occupation groups, or more precisely the difference between their areal distributions, is measured by the index of dissimilarity. To compute this index, one calculates for each occupation group the percentage of all workers in that group residing in each areal unit....The index of

dissimilarity between two occupation groups is then one-half the sum of the absolute values of the differences between the respective distributions, taken area by area. In the accompanying hypothetical example the index of dissimilarity between occupations A and B is 20 percent (i.e., 40/2). This may be inter-

Area	Λ	В	Diff.
l	10%	15%	5%
2	20	15	5
3	40	25	15
Ĩ4	30	45	15
Total	100%	100%	40%

preted as a measure of displacement: 20 percent of the workers in occupation A would have to move to a different area in order to make their distribution identical with that of occupation B ...." (Duncan & Duncan, 1955: 494). In like manner, this index can be computed for the education and income categories.

"...a measure of dissimilarity in residential distribution can only approximate the spatial distance between groups --the index measures only the dissimilarity of the residential distributions with respect to a particular set of areas and is insensitive to other important aspects of the spatial pattern such as proximity of areas of concentration" (Duncan & Duncan, 1955, 497). Measuring socioeconomic segregation:

Two measures of socioeconomic segregation will be utilized, the Index of Segregation (Duncan & Duncan, 1955) and the Index of Homogeneity (Farley & Taeuber, 1968). The Index of Segregation is a simple variation of the Index of Dissimilarity above. "When the index of dissimilarity is computed between one occupation group and all other occupations combined (i.e., total employed males except those in the given occupation), it is referred to as an index of segregation. An equivalent and more convenient means of computing the segregation index is to compute the index of dissimilarity between the given occupation group and total employed males (i.e., all occupations), 'adjusting' the result by dividing by one minus the proportion of the total male employed labor force included in that occupation...." (Duncan & Duncan, 1955: 494). In the same manner the index may be computed for educational and income categories.

The Index of Homogeneity is the second measure of socioeconomic segregation. "By the segregation problem, we refer to the tendency of residential segregation to create racial homogeneity among neighborhood contacts (on the street and in stores, schools, and other neighborhood facilities). For an objective, censusbased measure of this type, it is necessary to assume that contacts within an area (census tract, city block, school district) are made at random from among the resident population. For a Negro chosen at random from the city's population, the probability of residing in tract i is  $n_i/N$ , where  $n_i$  is the number of Negroes in tract i and N is the total number of Negroes in the city. The probability that another individual randomly chosen from tract i is also a Negro is  $(n_i-1)/(t_i-1)$  where  $t_i$  is the

total population in tract i. For convenience, this term may be approximated by  $n_i/t_i$ . If we take the joint probability of the two events, sum over tracts, and express the result in percentage scale, we have

$$(100/N) \sum_{i=1}^{n^2/t} \dots$$
 (Farley & Tacuber, 1968: 4)

This index may be computed in the same manner for the socioeconomic categories of present interest.

Both of these indexes will be utilized to investigate their relative merits. In particular, there are some reservations regarding the Index of Homogeneity since Farley and Taeuber note that trends in this index are largely determined by trends in proportion of the total population occupied by the relevant category (Farley & Taeuber, 1968: 4). This is a serious defect since the primary reason for computing these indexes in the present instance is to measure segregation trends not proportional trends.

Another problem enters at this point with regard to the socioeconomic variables themselves. While the same occupational, educational, and income categories are used from 1950 to 1960, their meaning may have undergone some rather gross alterations. In terms of status comparability, the changes are not considered to be too drastic in the occupational and educational variables. That is, a person with a given occupation and education in 1950 and the same occupation and education in 1960 will have approximately the same status in both instances. This, however, is not

the case with income. Therefore, in order to accurately compare the segregation of income categories from 1950 to 1960 it is necessary to adjust for changes in the value of the dollar over that period. Unfortunately it is impossible once these adjustments have been made to utilize the income divisions provided by the census. Therefore, due to these data limitations no comparisons of segregation by income groupings will be undertaken.

### Operational Hypotheses

- A. Growth models:
  - 1. Invasion-Succession

If urban growth occurs, then the mean socioeconomic status of a given census tract will decline.

2. Staged Growth

If urban growth occurs, then the mean socioeconomic status of a given census tract will remain the same.

B. Socioeconomic and ecological segregation:

If residential settlement patterns are associated with the socioeconomic status of the residents, then status differentials in occupation, education, and income will be directly related to the Index of Dissimilarity for occupations, education and income.

- C. Socioeconomic residential segregation models:
  - 1. Evolutionary
    - a. If urban growth occurs, then the Index of Segregation for occupations and education will increase.
    - b. If urban growth occurs, then the Index of Homogeneity for occupations and education will increase.

- 2. Entropy
  - a. If urban growth occurs, then the Index of Segregation for occupations and education will decrease.
  - b. If urban growth occurs, then the Index of Homogeneity for occupations and education will decrease.
- D. Combinations of growth and segregation:
  - 1. If hypothesis A.1 is validated, then hypothesis C.1 will be validated under conditions of slow or stable growth and hypothesis C.2 will be validated under conditions of rapid growth.
  - 2. If hypothesis A.2 is validated, then hypothesis C.1 will be validated.

#### CHAPTER IV

#### HYPOTHESIS-TESTING

The first set of hypotheses to be tested are those relating to metropolitan growth.

1. Invasion-Succession model:

If urban growth occurs, then the mean socioeconomic status of a given census tract will decline.

2. Staged Growth model:

If urban growth occurs, then the mean socioeconomic status of a given census tract will remain the same.

Each of these hypotheses and those below will be tested against the data for Des Moines, Iowa, 1950-1960. As was noted in Chapter I, this middle sized metropolitan center has been growing over the time period under consideration. All indications are that it is a region-serving metropolitan center enjoying moderate growth. Therefore, the "if" clause of the hypothesis is satisfied.

The data of Table 4-1 do not, as is so often the case, give a clear cut answer to the question of which of the above hypotheses is the more valid. Some tracts have increased in mean socioeconomic status; some have remained the same; and some have declined. At the outset, then, neither hypothesis is clearly validated nor invalidated. However, because of the greater number of decreases than no changes, the first inclination is toward the

invasion-succession model. Attention will have to be turned to the qualifications indicated in Chapter II.

Table 4-1 Changes in Census Tract Mean Socioeconomic

Status Score.	Des	Moines: 1950-1960.
Change Category	No.	No. Mires Center
Increase 1/ Increase 1	2 8	1 7
No change	16	15
Decrease l Decrease l/	14 4	10 3
Total	44	36

With the staged growth model it was noted that, due to more extensive center land use by commercial-industrial firms, the socioeconomic status of the central tracts might decrease. What happens then, if these central tracts are removed from consideration? In the second column of Table 4-1, we note that this improves the case for the staged growth model. There are still a number of tracts which decline in status but not as many as remain the same.

Those tracts which increased in value run contrary to the predictions of both hypotheses, and the same qualification applies to both. Expansion into the outlying areas may lead to an initial increase in the status value of these areas. Of the ten tracts which increased in value six are outlying tracts. Only four do not conform to expectations. This, however, helps both hypotheses equally.

With the invasion-succession model it was noted that, in instances of relatively short time intervals, the socioeconomic status value of certain tracts not on the periphery of invasion areas might remain the same. Therefore, a closer look needs to be taken at those tracts whose socioeconomic status value remained the same.

If, even though the socioeconomic status of these tracts remained the same, the range of socioeconomic types increased, indicating a trend toward heterogeneity in possible anticipation of future changes in status, this would validate the invasion-succession hypothesis. If, on the other hand, the population of these tracts was becoming more homogeneous, this would tend to validate the staged growth model.

Upon examination of the standard deviations of the sixteen tracts whose socioeconomic status score remained the same, nine increased, six decreased, and one didn't change. The prevelance of increases over decreases validated the expectations of the invasion-succession hypothesis. Also, in light of all the above and the considerations of hypothesis D.1, even those tracts which did become increasingly homogeneous are not a clear violation of the expectations of the invasion-succession hypothesis. (Hypothesis D.1 states that under conditions of slow or stable growth segregation is expected to increase in both models of metropolitan growth, and the present is a case of slow growth.)

Therefore, upon closer examination, the data supports the original inclination and validates the expectations of the invasion-succession model of metropolitan growth.

The next hypothesis to be tested is that relating to socioeconomic and ecological segregation.

If residential settlement patterns are associated with the socioeconomic status of the residents, then status differentials in occupation, education, and income will be directly related to the Index of Dissimilarity for cocupations, education, and income.

Tables 4-2, 4-3, 4-4, and 4-5 show the occupational Index of Dissimilarity in standard and adjusted form for 1950 and 1960. In both the standard and adjusted forms, occupational status decreases from top to bottom and from left to right. In the standard form at the top of each page, the occupations are ranked according to their SEA score (Bogue, 1969). In the adjusted form at the bottom of each page, the rank of clerical workers and craftsmen are reversed in accordance with the findings of Duncan and Duncan (1955). The dissimilarity scores themselves should increase with movement away from the diagonal.

It is rather clear from a comparison of the tables for each year that the adjusted form conforms more nearly to the expectations of the hypothesis. In each instance the clerical workers have a lower Index of Dissimilarity than the craftsmen.

The overall patterns indicate quite clearly that, in Des Moines, socioeconomic status differentials are directly related to ecological differentials. One problem area --again, the same

	Prof.	Mgrs.	Sales.	Craft.	Cler.	Oper.	Sery.	Lah.
Prof. Mgrs. Sales. Craft. Cler. Oper. Serv. Lab.	0 10 12 38 23 46 44 53	0 12 32 20 41 41 41	0 28 14 39 37 45	0 17 14 27 24	0 29 29 36	0 25 17	0 20	0

Table 4-2 Occupational Index of Dissimilarity Des Moines: 1950

 Table 4-3
 Adjusted Occupational Index of Dissimilarity

 Des Moines: 1950.

	Prof.	Mgrs.	Sales.	Cler.	.Craft.	Oper.	Serv.	Lab.
Prof. Mgrs. Sales. Cler. Craft. Oper. Serv. Lab.	0 10 12 23 38 46 44 53	0 12 20 32 41 41 47	0 14 28 39 37 45	0 17 29 29 36	0 14 27 24	0 ' 25 17	0 20	0

Table	e 4-4 Occupational Index of Dissimilarity Des Moines: 1960.							
	Prof.	Mgrs.	Sales.	Craft.	Cler.	Oper.	Serv.	Lab.
Prof. Mgrs. Seles. Craft. Cler. Oper. Serv. Lab.	0 10 12 40 27 48 47 51	0 11 37 26 45 46 48	0 31 17 41 39 45	0 21 13 25 24	0 29 29 34	0 23 18	0 21	0

	4-5 Adjusted Occupational Index of Dissimilarity Des Moines: 1960.							
	Prof.	Mgrs.	Sales.	Cler.	Craft.	Oper.	Serv.	Lab.
Prof.	0							
Mrgs.	10	0						
Sales	. 12	11	0					
Cler.	27	26	17	0				
Craft.	. 40	37	31	21	0			
Oper.	48	45	41	29	13	0		
Serv.	47	46	39	29	25	23	0	
Lab.	51	48	45	34	24	18	21	0

Table but Adjusted Commetional Index of Dissimilarity

that Duncan and Duncan noted --- is the service workers. And Again, a probable explanation lies in the fact that a portion of these individuals live at their higher socioeconomic status place of employment thereby decreasing their dissimilarity.

Occupational grouplags, in accordance with those suggested by the respective SEA scores, can also be noted. One group consists of professionals and managers at the top of the white collar group with salesmen ranking very close and as a sort of transition to the lower white collar and upper blue collar occupations. Clerical workers and craftsmen represent this lower white collar upper blue collar area with operatives, service workers, and laborers filling in the bottom rungs of the status ladder.

In comparing the 1950 and 1960 tables, it will be noted that they are patterned nearly identically. The same rankings and groupings occur. Occupational differentials and ecological differentials were and are directly related, thereby supporting the expectations of the hypothesis.

An examination of the educational and income Indexes of Dissimilarity in Tables 4-6, 4-7, 4-8, and 4-9 indicates that the same findings hold true here but with greater strength. The direct relationship between educational and income status diferentials and ecological differentials holds with only two exceptions. These exceptions are in the ten thousand and over income rows for the two years. Each of these contains one pair of soores which is identical.

Dea	Moines: 195	0.			-	
C. Barth Characteric Content on Statements and a second	Elementary	High S	School	Co	llege	1.48 . Date
	0-8	1-3	4	1-3	4 or \$	, 
Elementary:	0					
High School:	Ū					
1-3	11	0				
4	26	19	0			
College:						
1-3	42	34	20	0		
4 or 7	52	144	32	15	0	

Table 4-6 Educational Index of Dissimilarity Dex Moines: 1950.

Table 4-7	Educational Des Moines:	Index 1960.	of Dissim	ilarity
	Elementa	ary Hi	gh School	College

	Dichentery	111 811	OHOUT	00	TTOPO	
	0-8	1-3	4	1-3	4 or	<u>F</u>
Elementary: 0-8	0					
High School: 1-3 4	9 26	0 20	0			
College: 1-3 4 or /	կկ 58	37 53	21 37	0 17	0	

.

	Des	Moines	1950.			
Window and provide a set of the set		Income	Interva	ls (in	thousa	rids)
	0-0.9	1-2.9	3-4.9	5-6.9	7-9.9	10 & 7
0-0.9	0					
1-2.9	11	0				
3-4.9	25	20	0			
5-6.9	33	30	15	0		
7-9.9	44	43	30	20	0	
10 & 🗲	60	59	41	41	28	0

Table 4-8 Income Index of Dissimilarity

Table	4-9	Income Index	of Dissimilarity
		Des Moines: 1	.960.

		THO THOUGH	1/000				
	Income Intervals (in thousands)					nds)	
	0-0.9	1-2.9	3-4.9	5-6.9	7-9.9	10 & /	
0-0.9	0						
1-2.9	16	0					
3-4.9	19	15	0				
5-6.9	30	28	16	0			
7-9.9	38	37	25	15	0		
10 & 🖌	48	48	38	31	19	0	

Again rather distinct groupings appear. In the educational tables three groups appear: 1) those with three years of high school or less; 2) those with four years of high school; and 3) those who have gone to college. In the income tables four groups appear: 1) those earning less than \$3,000 per year; 2) those earning from \$3,000-6,999 per year; 3) those earning from \$7,000-9,999 per year; and 4) those earning more than \$10,000 per year.

The data, therefore, strongly supports the direct relationship between the adjusted occupational, educational, and income status differentials and ecological differentials in both 1950 and 1960. The hypothesis is validated for Des Moines.

The tables above can be compared in an additional manner in transition from the testing of this hypothesis to the testing of the following set of hypotheses. Changes in the occupational and educational dissimilarity scores from 1950 to 1960 can be noted. These can be used to indicate general trends in segregation patterns. For the occupations, dissimilarity increased in sixteen instances, decreased in six, and remained the same in six. For education, dissimilarity increased in eight instances, decreased in one, and remained the same in one. It is clear that the general trend in residential segregation as indicated by this index is toward increased segregation.

This leads to direct consideration of the hypotheses related to socioeconomic residential segregation.

- 1. Evolutionary model:
  - a. If urban growth occurs, then the Index of Segregation for occupations and education will increase.
  - b. If urban growth occurs, then the Index of Homogeneity for occupations and education will increase.
- 2. Entropy model:
  - a. If urban growth occurs, then the Index of Segregation for occupations and education will decrease.
  - b. If urban growth occurs, then the Index of Homogeneity for occupations and education will decrease.

The testing of these hypotheses is complicated by the fact that two levels of questioning are involved. First, there is the level of trying to discriminate between the conflicting claims of the two theoretical positions. Second, there is the level of evaluating the utility of the methodological techniques employed. The procedure to be followed will involve 1) examining the theoretical questions, giving equal weight to the methodological procedures; 2) examining the relative merits of the methodological procedures; and 3) re-evaluating the theoretical questions in light of the discussion of methodology.

Upon examination, the occupational and educational Indexes of Segregation --Tables 4-10 and 4-12-- present approximately the same picture of changes in segregation from 1950-1960 as was indicated by the examination of the changes in the Index of Dissimilarity above. This is not surprising since there is a very close relationship between the two indexes as indicated in the procedures of their calculation. Occupational segregation increased

1950	1960	A	the first state of the local date	Statement, Alternational Street
		Occupation	1950	1960
29	32	Professional	29	32
26	29	Managers	26	29
21	22	Salesmen	21	22
16	17	Clerical	11	13
11	13	Craftsmen	16	17
25	27	<b>O</b> peratives	25	27
26	27	Service	26	27
30	28	Laborers	30	28
	29 26 21 16 11 25 26 30	29       32         26       29         21       22         16       17         11       13         25       27         26       27         30       28	2932Professional2629Managers2122Salesmen1617Clerical1113Craftsmen2527Operatives2627Service3028Laborers	29       32       Professional       29         26       29       Managers       26         21       22       Salesmen       21         16       17       Clerical       11         11       13       Craftsmen       16         25       27       Operatives       25         26       27       Service       26         30       28       Laborers       30

Table 4-10 Occupations 1 Index of Segregation Des Moines: 1950-1960.

Table 4-11Occupational Index of Homogeneity<br/>Des Moines: 1950-1960.

	Index		Adjusted	Index	
Occupation	1950	1960	Occupation	1950	1960
Professional	14	16	Professional	14	16
Managers	20	19	Managers	20	19
Salesmen	14	13	Salesmen	14	13
Craftsmen	22	22	Clerical	11	11
Clerical	11	11	Craftsmen	22	22
Operatives	22	24	Operatives	22	27
Service	11	9	Service	11	ģ
Laborers	11	10	Laborers	11	10

TENTE	4-16	Des Moines:	1950-1	.960.
			Ind	X
dente e constitución	Educat	tien	1950 !	.960
	Elemen	ntary:		
	0-8		26	28
	High S	School:		
	1-3		13	17
	4		13	13
	Colleg 1-3 4 or	ge: c /	27 39	27 44

Table 1-12 Educational Index of Segregation

Table	4-13	Educational Des Moines:	Ind <b>ex</b> 1950-3	of 1960	Homogeneity
			Ind	өх	
	Educa	tion	1950	1960	)
	Eleme 0-8 High 1-3 4 Colle 1-3 4 o	ntary: School: ge: r /	35 20 35 14 16	32 21 32 10 10	2 L 3 5

Tudan of them -----

in all but one instance. That one instance was the decrease in segregation for laborers. In education the picture was not as clear since increases occurred in only three out of the five cases. The other two cases, however, remained the same and did not decrease. The data for the Index of Segregation, therefore, highly supports the evolutionary hypothesis.

Upon examining the occupational and educational Indexes of Homogeneity --Tables 4-11 and 4-13-- the picture is much less clear. Occupational homogeneity increased in two cases, did not change in two, and decreased in four. Educational homogeneity increased in two cases and decreased in three. Therefore, the data from the occupational and educational Indexes of Homogeneity do not clearly support either of the hypotheses; but more support is given to the entropy hypothesis due to the greater number of decreases than increases.

As was noted in the methodology section, some questions have arisen as to the utility of the Index of Homogeneity. It was noted that changes in the index are heavily influenced by changes in the proportion of the total population represented by the category under consideration. To find out to what extent this is the case, changes in the proportion of the total population represented by each occupational and educational category were calculated and compared with changes in the Index of Homogeneity. Sixty two percent of the time the changes were identical.

When juxtaposing the Index of Homogeneity and the Index of

Segregation, it is interesting to note that the settlement patterns of a particular occupational or educational category may become increasingly different from those of other occupational and educational categories while at the same time the contact frequencies based on spatial proximity may decrease. Which, therefore, is the more significant? In light of previous observations, it would seem that the segregation patterns and not the homogeneity patterns are the most significant. They are the result of individual decision-making. Differential settlement within the city is influenced by individual decision-making much more than the changes in aggregate proportions in status categories, which so largely determine changes in homogeneity.

Also, as Greer (1962) has noted, there is an increasing bifurcation of membership and spatial groups. Individuals do not interact randomly, as the Index of Homogeneity assumes; and, increasingly, they do not interact on the basis of spatial proximity, at least within the urban center or a rather large sector of it. Therefore, increased differentiation of residential settlement is the crucial factor.

Re-examination, then, indicates that the strong support given to the evolutionary hypothesis by the <sup>I</sup>ndex of Segregation causes it to be validated for the city of Des Moines. Also, the utility of the Index of Homogeneity, at least in this context, is seriously questioned.

One other factor can also be noted from the data of Tables 4-10 and 4-12. The degree of segregation is curvilinearly related

to occupational and educational status, i.e. high and low status positions are highly segregated with middle status positions moderately so. This conforms to the findings of Duncan and Duncan (1955) for Chicago in 1950. High status individuals probably segregate themselves thru choice while low status individuals are segregated thru negative social sanctions. Interestingly, the positive choice segregation is the most productive.

Attention is now turned to the final set of hypotheses relating to combinations of growth and segregation.

- If hypothesis A.1 (invasion-succession growth model) is validated, then hypothesis C.1 (evclutionary segregation model) will be validated under conditions of slow or stable growth; and hypothesis C.2 (entropy segregation model) will be validated under conditions of rapid growth.
- 2. If hypothesis A.2 (staged growth growth model) is validated, then hypothesis C.1 (evolutionary segregation model) will be validated.

As indicated above, the invasion-succession growth model was validated. Des Moines was in a stage of slow growth for the 1950-1960 period, and the evolutionary segregation model was validated. Therefore, hypothesis 1 is validated in part. The portion of the hypothesis relating to conditions of rapid growth is not subject to test under present conditions due to lack of data, thereby making it impossible to test the validity of this portion of the hypothesis.

#### Summary

The invasion-succession model of growth which posits the decline in socioeconomic status of a given sub-area of the city with growth was supported.

The direct relationship between socioeconomic status differentials and ecological differentials was supported for occupation, education, and income.

The evolutionary model of socioeconomic residential segregation which posits increased segregation was supported for occupations and educational categories.

In light of the above, the hypothesized combination of invasion-succession growth with evolutionary segregation under conditions of slow growth was supported.

#### CHAPTER V

#### IMPLICATIONS

This chapter will tie up some of the loose ends from earlier chapters and indicate some directions of future research in the area. Three topics will be the focus of discussions 1) the correlation between the findings of the present research on socioeconomic residential segregation and that on Negro residential segregation, 2) key areas of additional testing of the present theory and hypotheses, and 3) the projected shape of future theoretical and empirical work in the area.

Negro and Socioeconomic Residential Segregation

The data indicates an increase in the Negro Index of Dissimilarity, Des Moines, 1960-1966, from 76.7 to 77.3 (Farley & Taeuber, 1968: 3). Therefore, the direction of change is the same for Negro residential segregation and socioeconomic residential segregation. This presents several alternatives for future investigation.

1) If the Negro population of the city constitutes a relatively homogeneous socioeconomic status category, then increased segregation would be expected on the basis of this factor alone. Race could be considered an aggravating factor only if segregation increases for Negroes were greater than those for whites of corresponding status.

2) If the Negro population of the city does not represent a relatively homogeneous socioeconomic status category, then segregation of the whole would be expected on the basis of increased segregation of a significant proportion of the sub-categories. The case here is analogous to that above in which the Index of Segregation increased for a particular occupational category when the Indexes of Dissimilarity for that occupation with each of the other occupations correspondingly increased in a significant portion of cases. Here again, racial segregation becomes a factor only in as much as Negro segregation surpasses that of the corresponding white categories.

3) If the Negro population of the city does not constitute a relatively homogeneous socioeconomic status category and the socioeconomic Index of Dissimilarity between the Negro sub-categories does not increase, then any increases in segregation for the Negro population as a whole run counter to expectation. Segregation is increasing not because of the expected increases in segregation of the socioeconomically homogeneous sub-categories but because of the racially homogeneous whole.

The presently available data does not allow for an examination of these alternatives, but the present research does indicate that such an examination should be made. Socioeconomic status is a control variable which one should reasonably expect to find included in a discussion of racial segregation patterns.

### Implications for Additional Testing

In light of the findings of the present research, an obvious area of additional research is the testing of hypothesis D.1 under conditions of rabid growth, i.e. the combination of invasionsuccession growth model and entropy segregation model. The results of such testing would be rather ambiguous since finding a direct relation between instances of rapid growth and decreasing segregation would not validate the entropy hypothesis but would validate the presence of at least the illusion of entropy. The present theories indicate that it is just an illusion but the empirical evidence, in this instance, would be unable to distinguish between illusion and reality. Two additional observations would lend credence to the entropy hypothesis: 1) a general decline in segregation throughout the entire urban center and 2) a general decline in segregation in an urban center or set of urban centers experiencing stable or moderate growth. All of this indicates the need for additional testing under conditions of varying rates of growth.

Testing also needs to occur under differing urban environmental conditions. The atypical nature of Des Moines was noted when discussing its selection as the site of the present research. The validity or lack of validity of the hypotheses needs to be investigated in various regions of the country and at various locations within the urban system. Such an expanded investigation brings into consideration a number of additional variables.

Three variables are particularly relevant and interrelated, size, age, and stage in the growth process. The tendency is for these three to vary directly with one another, i.e. the greater the size, the older the center, and the further it has progressed in the growth process. Before going further, some amplification is in order on the distinction between "size" and "stage in the growth process." As Schnore (1958) points out, size is not necessarily directly related to increases in structural complexity. Expanded size can occur thru the settlement of relatively simplex groups in geographic proximity to one another. This, however, is not characteristically the case, particularly in the West. Therefore, interest ought to focus upon the comparative study of the socioeconomic residential segregation patterns of communities at various size, age, and growth levels as well as the longitudinal study of the development of individual communities.

I see no theoretical or subjective reasons for suggesting that comparative examination of alternative centers at a given point in time or comparative examination of given centers at alternative points in time will arrive at conclusions contrary to or different from those of the present research. That is, I would expect continued investigation to indicate that the populations of urban centers in and thru time are socioeconomically segregated in their settlement patterns, that the patterns of segregation are fluid thru time, and that segregation is generally constant to increasing. I qualify the latter part of the state-

ment because of the possible exceptions to increased segregation noted above in cases of rapid growth in size and complexity. Another reason for the qualification is the impossibility of being more than totally segregated, and I would expect segregation to reach a maximum some time prior to reaching the analytical potential, due to the constant fluidity of the urban center.

These expectations are based on the plethora of urban research of the past, particularly that on "natural areas" (Hatt, 1946). Urban populations have continually based their settlement patterns upon some kind of segregation criteria, e.g. the streets and sections of medieval cities segregated according to guild and social status criteria (Sjoberg, 1960). With the continuing movement from particularistic to universalistic criteria of evaluation, socioeconomic criteria should remain crucial in the immediate and foreseeable future.

## Future Urban Theory

I think that two key factors are going to shape the future development of urban theory: 1) increased understanding of the center of the metropolis --the CBD or "loop"-- and 2) increased understanding of settlement patterns --both residential and commercial-industrial-- as reference group phenomena creating categoric residential nedes and corporate commercial-industrial nodes. Implicit in this is the notion that the urban scene will remain fluid in the future.

The fluidity of the metropolis is keyed to the changing nature of the metropolitan center or core. The nature of this core area is not static, and the changes are not merely quantitative but also qualitative in nature. These qualitative changes are particularly crucial. At this point expansions and refinements of economic base theory are appropriately introduced. As one suggestive point of departure, Thompson enumerates five stages of urban growth intimately tied to corresponding changes in the nature of the activities of the core: 1) export specialization, 2) export complex, 3) economic maturation -- service sector puberty, 4) regional metropolis --export of services, and 5) technicalprofessional virtuosity --national specialization (Hauser and Schnore, 1967: 431-490). These qualitative changes in the nature of the metropolitan center need, then, to be linked to the timing and nature of spin-offs of satellite commercial-industrial centers and the corresponding expansion and shifting of the residential population.

These commercial-industrial spin-offs do not distribute themselves randomly throughout the urban space but concentrate in satellite sub-centers to facilitate access to the center, to other centers and sub-centers, and to the population which they service. As indicated above, residents do not locate themselves randomly throughout the urban space either. They form status groupings because of the action and interaction of two factors: 1) segregation occurs because of economic and cultural similarity with

these having similar characteristics tending to choose similar locations thru equivalent maximizing processes and 2) segregation occurs because those of similar status desire to associate with those of similar status and exclude association with those of differing status.

Another peripheral but highly related area of further research and theoretical endeavor should deal with the spatial patterning of segregated areas. It was noted at the beginning of this thesis that past research was inadequate because of the emphasis upon examining specific geometrical patterns. It was also noted in the methodology section that the measures of segregation utilized in this thesis say nothing about this spatial patterning. In the future, however, work needs to be done to determine the crucial variables affecting the spatial patterning of the city's settlement patterns instead of merely examining the relative validity of two or three specific geometrical patterns applied to all urban communities at all times. The fluidity of urban centers evidenced by the findings of the present research indicate that one ought not to expect a given geometrical pattern or small set of patterns to apply to all urban centers at all points in time. Rather, the relationship between a list of variables yet to be determined and the shifts and changes in geometrical spatial patterns needs to be investigated and clarified.

I think that much of the research of the recent past has placed too much emphasis upon testing in a highly sophisticated

manner obsolete aspects of prior formulations. New creativity needs to be applied to the development of a more inclusive and dynamic understanding of the urbanization processes and the development of urban systems.

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