A Comparison of Correlation Matrices of Nine Socio-Demographic Variables for the Bronx and for Seattle, 1960: An Empirical Test of the Generality of Schmid and Tagashira's Variables as Revelatory of the Structure of the Large Urban Community

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AND TAGASHIRA'S VARIABLES AS
REVELATORY OF THE STRUCTURE OF THE LARGE
URBAN COMMUNITY

by
Terrence R. McGovern

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PREFACE

The subject matter of this thesis was first suggested to the writer by Professor Mary Powers of Fordham University. Professor Paul Mundy of Loyola University, the mentor of the thesis, explained its possible relevance to an ongoing debate between the proponents of two different schools of thought within human ecology. The writer is particularly indebted to Professor Mundy for his guidance in formulating the basic problem with which the thesis is concerned and for his careful reading and criticism of the text.

In addition to Professor Powers, Professor Nathan Kantrowitz of Kent State University and Professor William Bates of Loyola University have helped the writer with their criticisms concerning the methodology of the thesis. The writer is also indebted to Professor Jerome McElroy of The John Jay College of Criminal Justice for his encouragement and to Professor Joseph Scheuer of Fordham University for his challenging questions concerning the relevance of the thesis.

The writer is also indebted to Miss Nancy Purcell of Hunter College of the City University of New York and to Miss Carol Ryan of the Academy of Our Lady, Chicago, for their careful check on the accuracy of the statistical computations in the thesis. Mrs. William R. Zinthefer and Miss Mary Jane Ryan are
to be thanked for their typing of the manuscript.

The writer alone is responsible for any errors in the thesis.
VITA

Terrence R. McGovern was born in Chicago on November 26, 1938, to Terrence J. and Bernadine Sullivan McGovern. Upon graduating from St. Ignatius High School, Chicago, in 1956, he entered the Society of Jesus, remaining in that Order until October, 1962. He received the A. B. degree from Loyola University, Chicago, with a major in Latin in 1961. After leaving the Jesuit Order he worked for a year as a clinical caseworker for the Illinois Youth Commission at the Illinois State Training School for Boys in St. Charles, Illinois. During the next two years he was a research analyst in the Division of Research and Statistics of the Cook County (Illinois) Department of Public Aid.


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CHAPTER I

INTRODUCTION

The concern of human ecology has been differently defined by human ecologists throughout its history. George Theodorson, in a review of the field,\(^1\) presents four general positions concerning the study of human ecology that have been held by ecologists over the years.

The first was the classical position. According to the founders of the field, men such as Robert E. Park, Ernest W. Burgess, R. D. McKenzie and Louis Wirth, human society is seen as organized on two levels: the biotic and the cultural. The biotic level is subsocial. It is organized around basic, nonthoughtful adjustments of men to a competitive struggle for existence that holds men in an automatic and unplanned degree of competitive cooperation and interdependence. These nonthoughtful adjustments are referred to as symbiotic relationships and place men in spatial relationships to one another. The cultural level is considered a superstructure resting upon the biotic level and is organized around communication and consensus among men. The

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nonthoughtful adjustments to the competitive struggle for existence is seen as the proper study of human ecologists.\textsuperscript{2} This model of society was developed under the influence of biology in sociology.\textsuperscript{3}

The second position presented by Theodorson, the neo-orthodox, rejects the biotic-level, cultural-level distinction made by the classical ecologists, but maintains the classical position that ecology should be concerned with the study of spatial distribution of social characteristics in so far as they reflect patterns of community structure. Community structure is seen as the way a population organizes itself for survival in a particular habitat.\textsuperscript{4} James A. Quinn, Amos H. Hawley, Otis Dudley Duncan, and Calvin F. Schmid are among the ecologists holding this position.

The third position, social area analysis, also rests on the proposition that community structure is reflected in the distribution of social characteristics and that this is the proper study of ecology. However, social area analysis emphasizes the systematic character of society. Society becomes less complex, remains static, or becomes more complex holistically\textsuperscript{5}

\textsuperscript{2}Ibid., 4.


\textsuperscript{4}Theodorson, 129-130.

through the differentiation of status and role. Eshref Shevyk and Wendell Bell are the principal proponents of this position.

The fourth position, socio-cultural ecology, emphasizes culture as a primary explanatory concept in the study of human ecology. Social characteristics are not always unintended adaptations to survival needs in a struggle for existence, but have meaning in the lives of the people possessing them. Meaning partially determines the distribution of social characteristics in the social structure. Theodorson considers Walter Firey, Christen T. Jonassen, Jerome K. Myers and Albert L. Seeman among the socio-cultural ecologists.

In each of these four positions, human ecology is considered as the study of the distribution of social characteristics in so far as each reflects community structure. The intent of human ecology is to study community structure and to do so through the analysis of social characteristics.

A major methodological question arises in the ecological attempt to study community structure: how does the researcher arrive at knowledge of community structure through the analysis of the distribution of social characteristics? Once he has noted the differences in the age-sex structure of population units within a given area, the differences in the racial composition among the units of the area, and differences in average family size, how does the researcher use these data to make sense out of

6 Theodorson, 132.
the totality of the community?

One approach is straight deduction with empirical testing. In this case a theory of community structure is selected, including its postulates and propositions. A hypothetical model of community structure is deducted from the theory and logically related to specific statements concerning the inter-relationships of the social characteristics of the community. A series of indicators is constructed to mark the presence of these characteristics in such a manner that the statements can be quantitatively measured and demonstrated in the inter-relationships of the characteristics.

An example of this approach is social area analysis as developed by Eshref Shevky and Wendell Bell.7 Taking certain postulates concerning industrial society from the work of the economist Colin Clark.8 Shevky and Bell logically deduced certain propositions concerning social characteristics of industrial populations and then constructed a series of indices to measure the operations with which the propositions are concerned.

This logico-deductive approach is essential to the development of scientific knowledge. However, the process is as rewarding as the basic theory from which the hypothetical propositions are deduced is efficacious in explaining phenomena, and as the

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logic used in the deduction is sound, and as the propositions deduced are adequate to the analysis of the phenomena. A theory which misses its mark, or poor logic, or inadequate propositions leaves the researcher unable to make sense out of his data or leads him to faulty conclusions. For example, Otis Dudley Duncan rejects the validity of social area analysis on the grounds that the authors' theoretical reasoning does not necessarily lead to any unique set of measures for composition into indices or even lead to any useful criterion for selecting measures. In other words, their deduction from theory was not proper.

The history of modern science has demonstrated how well the logico-deductive method pays off in scientific knowledge when a developed mind attains the insight of a new theory and the probings of empirical research lead to suppositions, then propositions, concerning phenomena which that mind logically and adequately relates to that theory. The history of science has also demonstrated how impossible it is for that same developed mind to make propositional sense out of phenomena when that mind lacks an insightful theory or is incapable of seeing any logical link between propositions he might be able to develop and any ongoing theory.

When the state of a science is such that significant

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theory is lacking or that adequate proposition construction seems almost impossible, then another method of bridging the gap between theory and proposition might be fruitful. This is a process of induction through which the researcher, on the basis of educated guesses, allows the results of his data gathering to suggest hypotheses to him and then allows his developed hypothetical propositions to suggest theory to him. This process does not obviate the necessity of using the deductive method for arriving at valid scientific knowledge. But it can, however, excite the mind to develop significant theory. Barney G. Glaser and Anselm L. Strauss refer to such theory as "grounded theory" and suggest this inductive method as a valuable one for sociology today.\(^\text{11}\)

This inductive method is empirical and it is comparative. As empirical, the data are gathered in a categorized and measured form. This categorization and measurement presupposes conceptualization\(^\text{12}\) but also formulates concepts. As comparative, this method pits the concepts derived from one study against the concepts derived from a comparable study. Comparison not only points out differences in results but also suggests reformulations of concepts and propositions.


\(^{12}\)Glaser and Strauss comment, "Of course, the researcher does not approach reality as a *tabula rasa*. He must have a perspective that will help him see relevant data and abstract significant categories from his scrutiny of the data." *Ibid.*, 3.
An example of such heuristic, inductive research is a monograph entitled, "Ecological and Demographic Indices: A Methodological Analysis," written by Calvin F. Schmid and Kiyoshi Tagashira in 1964. These researchers performed product-moment correlations of 42 socio-demographic variables for the census tracts of the city of Seattle in 1960 and found through multivariate analysis of the correlation matrix that ten of the variables were revelatory of the socio-demographic structure of the large urban community. In order for definite propositions concerning the inter-relationships of the social characteristics of urban populations to be formulated in hypothetical form and then empirically tested, other studies, similar to the Schmid-Tagashira study, should be performed as comparisons.

This thesis reports on one such comparative study. It presents a matrix of product-moment correlation coefficients of nine socio-demographic variables for the Bronx, New York City, in 1960, and compares this matrix to a similar matrix for Seattle in 1960 presented by Schmid and Tagashira. These variables are nine of the ten Schmid and Tagashira found revelatory of urban structure in Seattle.\[14\]

This thesis is merely a partial replication of the Seattle study. First of all, it presents statistics on only nine of the

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\[14\] The values for one variable could not be calculated for reasons stated below in Chapter 3.
42 variables presented by Schmid and Tagashira. Secondly, this study presents for comparison only the matrix of correlation coefficients of the significant variables rather than the complete multi-variate analysis. This comparison is all that is needed to demonstrate the point intended. Thirdly, the replication is a study of the community structure of only a part of a major American city, the Borough of the Bronx, New York City, while the Schmid-Tagashira study analyzes the structure of a whole city.

This third factor is a major drawback in the replication. Yet, it is an unavoidable drawback. Because the Bronx is not a whole city, it lacks some of the functional characteristics of the city. It has no central business district. Its business is predominantly small manufacturing, warehousing, wholesaling and retailing. Its population has resulted largely from an overflow from the Borough of Manhattan. It lacks the distribution of social class characteristics present in most American cities. Its history in the twentieth century includes the establishment and maintenance of working-class ethnic enclaves such as the Italian community in Belmont and the Irish community in Fordham.


It also includes the escape of the Jewish new middle-class from the Lower East Side of Manhatten to the Grand Concourse and to Tremont. Vivian Gornick recalls that "In the first talkie ever made, 'The Jazz Singer,' Al Jolson, having made it big on the Chicago vaudeville circuit, returns to the teeming Lower East Side ghetto from which he has only in a sense escaped, clasps his old mother in his arms, and announces loudly over the hysteria following his return: 'Mama, I'm rich! We're moving to the Bronx!'"17 Since the end of World War II the migration to the Bronx from Manhatten has been mostly from the Black population of Harlem and from the Puerto Rican population of East Harlem.18 Also, since the early 1960's the European ethnic populations have been moving out of the Bronx into the northern suburban Westchester County. As a result, the Bronx is populated mostly by the aged, poor Italians, Irish and Jews and young Blacks and Puerto Ricans. The Bronx population today has few upper-middle and upper class people.

However, it remains to be demonstrated that a "part" of a city the size of the Bronx, with a 1960 population of 1,424,81519 is significantly different in its ecological structure from whole large cities. Hadden and Borgatta include in

17Vivian Gornick, "You Can Go Home Again--But Don't," The Village Voice, Nov. 6, 1969, 1.
their single category of "largest cities" all those with populations in excess of 150,000. The Bronx is one of the largest urban areas in the country. Furthermore, because of the metropolitanization of our urban areas, every large American city is merely a "part" of a larger metropolis and is not functionally independent of the rest of the metropolitan area. So, to a certain extent, Seattle and every city lacks the same wholeness that the Bronx lacks.

This thesis can be considered in light of a dispute that raged in sociological journals between neo-orthodox ecologists Otis Dudley Duncan, Amos Hawley and Calvin Schmid and social area analyst Wendell Bell and Scott Greer in the late 1950's and the early 1960's. The dispute had to do with the validity and the generality of social area analysis as proposed by Bell and Eshref Shevky. In brief, the neo-orthodox ecologists criticized the work of Shevky and Bell for not being what its authors said it was: logical deduction and testable generalization. Calvin Schmid went further than mere criticism. He chose heuristic induction as a technique that might lead to generalizations that could be stated in a testable form. This thesis can be seen as one test of Schmid's generalizations.

The central problem with which this thesis is concerned is this: what is the generality of empirically, atheoretically

derived findings? Is it adequate to generalize about phenomena on the basis of particular findings? Specifically, Schmid and Tagashira assert that the final ten variables resulting from their multi-variate analysis represent sufficiently the basic socio-demographic structure of the large urban community. If this be true, then these ten variables, measured in another large urban community at the same time in history, should inter-relate in the same manner as Schmid and Tagashira found them to do. If not, then adjustments must be made in conceptualization and further comparative research performed before generalizations will be reliable. A further question, beyond the scope of this thesis, can also be raised. In heuristic, inductive research, what criteria determine the adequacy of variables chosen to reveal social structure? Schmid and Tagashira selected 42 variables from the census statistics. Why those 42 variables? What do the final ten variables mean? Is their social meaning in one urban area the same as it would be in another urban area?

As was mentioned earlier, the kind of research represented by this thesis lacks a theoretical base. Unlike social area analysis there is no pre-determined understanding of urban structure. Subsequently, there are no stated hypotheses of the relationship of variables considered elements in the organization of urban structure. Furthermore, there is no conceptualization of the relationship between variables chosen. This is a major

21 Schmid and Tagashira, 211.
difficulty in the inductive research that leads to grounded theory, since all understanding depends upon clear and concise concepts. This is a problem in the Bronx replication as it was in the original Seattle study.

The methodological technique used in this research is basically statistical. Data on variables gathered regularly by the U. S. Bureau of the Census for census tracts are correlated and presented in matrix form. The variables are defined by the Census Bureau, but conceptualization ends there. Since there is no theory, there is no understanding of what it means for the variables "percent male" and "percent under 5 years" to be highly correlated or for either to be uncorrelated with "percent of vacant housing units." And, at a deeper level of analysis, the finding that the underlying regularities in the intercorrelations indicate that the variables "median value, owner occupied housing units, " mean monthly rent," "median grade completed" and "male professional, technical and kindred workers" are significantly and highly related leaves the researcher relying on other researchers' ongoing theory or on common sense to give meaning to the relationships.

To properly use this methodology it is necessary for the researcher to rely upon abstractions of the mathematical variety to identify findings. So, the relationship between "percent male" and "percent under 5 years" is understood as ".544," indicating that the relationship is not due to chance variations. To merely rely on ongoing theory or common sense to explain the
findings is to beg the question and to give up the quest. However, to allow the statistical findings to suggest the beginning of a model of urban structure is to enter onto the discovery of grounded theory. This methodology, therefore, is heuristic and cannot be judged as adequate or inadequate on a theory-linked basis.

In conclusion, this thesis is presented as a comparison to Schmid and Tagashira's study into the ecological and demographic structure of the large urban community. As a comparison, this thesis is a first step in attempting to address the problem of theory generation within the neo-orthodox approach to human ecology.
CHAPTER II
REVIEW OF THE THEORETICAL LITERATURE

In the beginning of the article in which they report on their study, Schmid and Tagashira write:

In recent years serious attempts have been made to develop techniques for describing systematically the measurable spatial patterns of the urban community as well as their underlying social dimensions. These techniques are concerned with the ecological and demographic structure of the community as a whole, as well as the meaningful characterization of different types of areas in precise, quantitative form. Perhaps the best-known contributions are "social area analysis" by Esghref Shevky and his colleagues and "cluster analysis" by Robert C. Tryon and his collaborators. Both techniques, however, have been subjected to criticism with reference to their theory, methodology and utility.22

The authors then go on to introduce their own attempt, presenting its emphasis and objectives. In no other part of their paper do they allude to the similar attempts made by other scholars, either to compare their approach to the approaches of others or to present their approach as a contribution to a larger, developing school of thought.

The primary author, Calvin Schmid, has taken a significant role in analyzing and criticizing Shevky's "social area analysis" approach, commenting on its methodology and utility.23 Yet, in

22Schmid and Tagashira, 194.
the Schmid-Tagashira paper, "social area analysis" and the criticism of it are merely mentioned in the "review of the literature" and are not referred to again. The authors leave the reader with the impression that their approach would obviate the criticisms directed against "social area analysis" and "cluster analysis." It should be noted, in addition, that all the criticism referred to by Schmid and Tagashira was made against "social area analysis." Tyron's "cluster analysis" technique was not examined in the critical literature to which the authors referred.

The "social area analysis" approach was first presented by Eshref Shevky and Marilyn Williams in a monograph published in 1949.24 This was a demographic description of the census tracts of Los Angeles County based on the Census of 1940 and in terms of three indexes: social rank, urbanization and


The authors stated that their study was concerned "with the description and measurement of social differentiation associated with the urban phenomenon of Los Angeles." This monograph was basically empirical and descriptive and was criticized for its lack of theoretical grounding.

In their monograph published in 1955, Shevky and Bell presented a detailed description of their steps in constructing indices of urban differentiation in modern industrial society.

The city is viewed as a product of the complex whole of modern society so that the structure of the city is to be understood within the context of the changing character of the larger society. Three postulates are made concerning industrial society: as a society becomes more industrialized, the range of social relations and the intensity of social relations change, social functions become more differentiated, and social organization becomes more complex. These postulated changes are considered "aspects of the increasing scale of society."

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25 Ibid., 33.


28 Ibid., 3.
"Scale" is conceived of as "the scope of social interaction and dependency."²⁹ Shevky and Bell state³⁰ that their use of the postulate of scale is derived directly from the work of Godfrey and Monica Wilson. The Wilsons define social scale as "the number of people in relation and the intensity of those relations," and "the total degree of interdependence, or intensity of relations."³¹ This concept of scale parallels Durkheim’s concept of the "division of labor."³² The Wilsons, however, hold that the concept differs from that of Durkheim. According to their presentation of the concept of increasing scale, as the range of relations increases, "the degree of dependence upon neighbors and contemporaries diminishes."³³ "Intensity in the narrow circles of relation necessarily diminishes as intensity in the wider circles increases."³⁴ The Wilsons claim that Durkheim missed this fact in describing the increase in the dynamic density between the previously separate "segments."

²⁹Ibid., 7.
³⁰Ibid.
³³Wilson and Wilson, 26.
³⁴Ibid., 40.
The three postulated changes in the scale of society are associated with three modes of social organization: changes in the range and intensity of relations are associated with changes in the distribution of skills; differentiation of function is associated with changes in the structure of productive activity; and increasing complexity of organization is associated with changes in the composition of the population.

In turn, Shevky and Bell associate these three modes of social organization with three specific changes in the structure of a given social system: changes in the distribution of skills are associated with changes in the arrangement of occupations based on function; changes in the structure of productive activity are associated with changes in the ways of living; specifically, there is a movement of women into urban occupations and there is a spread of alternative family patterns; changes in the composition of the population are associated with re-distribution of population components in space: specifically, changes in the proportion of supporting and dependent populations and the isolation and segregation of groups.

From these three structural changes in a given social system, three descriptive and analytic concepts are formed to reflect the more basic changes within society: social rank, urbanization and segregation.

To this point, the selection of concepts analytic and descriptive of social change has been achieved through logical deduction from postulates. In attempting to construct indices
revealing of these concepts, Shevky and Bell considered a number of census-tract measures possibly related to these concepts, and from these selected six census-tract measures to compose three indices reflecting the three concepts.

Social areas—areas which are similar in their measures of social rank, urbanization and segregation—can be defined by applying detailed computational procedures to the statistics of the six component measures for any given demographic unit of analysis, by computing three index scores for each demographic unit of analysis (in this case, census tract), and by grouping demographic units into categories according to their similarities of scores, using arbitrary points for segmenting categories.

In a review of Social Area Analysis, Otis Dudley Duncan indicated that the concepts "urbanization" and "social rank" lacked clarity and that "segregation" rests on an untenable assumption. For the purpose of comparing the Shevky-Bell approach to the Schmid-Tagashira approach, perhaps Duncan's most important criticism was that Shevky and Bell's theoretical reasoning does not necessarily lead to any unique set of measures for composition into indices or even lead to any useful criterion for selecting measures. The relationship between their statistical manipulation of the measures and their conceptual formulations remains merely nominalistic operationalization. As a result there is no adequate tying of the notion "social area"

to any theory of urban-area structure.

In his reply to these criticisms Bell attempts to answer Duncan's attacks on the three concepts, but avoids the charge of theoretical inadequacy in the choice of measures.

Subsequently, Duncan and Amos Hawley criticized the Shevky group for lacking any theory that relates hypotheses about urban areal structure to propositions about social differentiation. In brief, they made three points:

1. As a concept, "social area" is confusing. It is not necessarily intended to be defined geographically, but the units that Shevky and Bell do use for operationalizing the concept are geographical. No alternatives are offered in the technique for constructing social areas from non-geographic units.

2. The indices they constructed for differentiating social areas are derived from census-tract data. Yet there is no demonstrated relationship between census items tabulated for tracts and any theory of urban structure. Census-tract measures are insufficient to identify basic factors of urban differentiation.

3. "Social areas" are identified as areas relatively homogeneous in terms of index scores, yet no relationship is demonstrated between homogeneity of census characteristics and sociality. There is presented no theoretical explanation why areas are internally homogeneous and externally heterogeneous or
why homogeneous areas should be labeled social.36

They concluded their criticism by writing, "We have raised
the question of the theoretical justification of this approach to
areal differentiation and now venture the assertion that no such
justification has been provided. . . . The elaborate discussion
of social trends accompanying urbanization is nowhere shown to be
relevant to this problem."37

In the absence of any theory, Hawley and Duncan suggest
four possible theoretical approaches to the identification of
"social areas" which could use procedures of census-tract classi-

First, the concept of "social areas" may emerge more or less
directly from empirical observation and classification with
no discernible theoretical basis. Second, the anticipation
of "social areas" in the city may derive analogically from the
region concept. Third, the "social area" hypothesis may be a
deduction from stratification theory. And fourth, the pre-
sence of "social areas" might be inferred from a conception of
urban organization as a system of functionally interdependent
units.38

The first approach is descriptive of that use by Schmid and
Tagashiro.

Even without a discernible theoretical basis, the three
indices constructed by the Shevky group can be considered in terms

36 Amos Hawley and Otis Dudley Duncan, "Social Area
Analysis, A Critical Appraisal," Land Economics, XLIII
(November, 1957), 337-345

37 Ibid., 339-340

38 Ibid., 340
of their empirical generality. It is crucial to the generality of the indices that the six census measures be combined in a particular way so that comparisons can be made as of their applications to different urban areas.39 Regardless of what the indices say about urban-area structure, is there a generality to their interrelationships in a series of urban areas? Do they interrelate in the same way in the sampling of urban areas? If in such a test, the measures relate in the manner specified in the Shevky-Bell construction, then the indices do have some empirical generality, regardless of their theoretical usefulness.

Maurice D. Van Arsdol, Jr., Santo F. Camilleri and Calvin F. Schmid performed such a test using ten large American cities.40 In selecting the cities, consideration was given to their representatives in terms of size, geographic distribution by census regions, and areal, demographic, economic, and social characteristics.41 The measures and the indices were computed according to the Shevky formulations for each of the census tracts in each of the cities. Product-moment correlation coefficients were computed between the measures for the cities and a factor analysis was performed on the matrices of coefficients. The findings were that, given these six measures, three indices or factors were

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40Maurice D. Van Arsdol, Jr., Santo F. Camilleri and Calvin F. Schmid, "An Investigation into the Generality of Urban Social Area Indexes."

41Ibid., 279
necessary to account for census tract variations and that the six measures related to the three indices in the matter stipulated by Shevky and Bell in eight of the cities. In the case of two cities, the expected relations did not hold. The authors considered it possible that this happened due to chance variation. The authors concluded their report by stating that their tests show that "the present form of the Shevky system has high generality for the cities included in the study."\textsuperscript{42}

In an earlier study,\textsuperscript{43} Bell empirically tested the hypothesis that the three indices of social rank, urbanization and segregation each represent a discrete social factor necessary to account for differentiation between the urban sub-populations in Los Angeles and San Francisco in 1940. He also hypothesized that the measures included in the indices do adequately measure the indices.

To test these hypotheses, he performed a factor analysis of the coefficient matrices of the measures for the census tracts of Los Angeles and then for the tracts of San Francisco. He found that the factor loadings that would be expected given the hypothesized relationship of the measures to the indices were observed in twenty of the twenty-one factor loadings for Los Angeles and in nineteen of the twenty-one factor loadings.

\textsuperscript{42}Ibid., 284.

\textsuperscript{43}Bell, "Letter To The Editor. . .," 260-261.
The results of his analysis showed that the three indices as formulated are necessary to account for the social differentiation of urban sub-populations in Los Angeles and in San Francisco in 1940. The results also showed that the measures composing each index had high patterns of intercorrelation with one another, indicating that the measures do adequately measure the indices.

It should be noted, however, that Bell's demonstration of the necessity of the three indices is made solely through the factor analysis of the seven Shevky-Williams variables. His finding that three factors are necessary to explain the variation of measure scores among census tracts and that these three factors contain factor loadings hypothesized in the Shevky index construction is valid only when considering the seven measures as the universe of census-tract variables. Add further measures to those already presented or substitute a new set of measures and the "necessity" of these indices may dissolve. At best, the findings of Van Arsdol, Camilleri, and Schmid, cited above, that, given the six measures, three indices are needed to explain the variation and that the measures are related as hypothesized by Shevky and Bell, are all that has been said of the empirical validity and generality of the Shevky-Bell indices.

The twenty-one factor loadings are the factorial scores for the correlation of the three indices to seven measures. The measure "average rent," which was one of the measures included in the origin Shevky-Williams index of social rank was subsequently dropped in the Shevky-Bell revision. See Shevky and Bell, Chapter IV, "Revisions."
While demonstrating some generality to the Shevky indices, Van Arsdol, Camilleri, and Schmid warn that it would be invalid to apply the Shevky indices to an empirical model of urban society. The limited generality of the indices was demonstrated through a factor analysis of the six measures and the three indices for ten representative cities. However, the authors point out that "... the general problems of sampling fluctuations of factorial structures has not been solved on a probability basis." Therefore, there is no basis for constructing a model which could be applied to any individual city outside the ten tested. Secondly, since the relationship between the indices and urban theory has not been demonstrated, there is no certain theoretical utility in the application of the Shevky-Bell typology to the study of other urban phenomena.

Not only are the Shevky-Bell indices not useful for the construction of the urban model, but also further research by Van Arsdol, Camilleri and Schmid showed that none of the Shevky-Bell indices are substantially more predictive of other urban structural phenomena hypothesized in the index construction than are some of the census-tract measures on which they are based.


46 Ibid., and Van Arsdol, Jr., Camilleri, and Schmid, "The Generality of..."

"Equally effective or superior results can be obtained without combining the census-tract measures into (the indices)."\textsuperscript{48}

To demonstrate this the authors chose two variables as criterion indices: spatial stability, measured by the percent of persons one year old and older residing in the same house in 1950 as in 1949, and the percent of the population sixty years old and older. Shevky and his associates imply that increases in spatial mobility and increases in proportions of dependent populations indicate increased organizational complexity. The index constructed for increased organizational complexity is "segregation."\textsuperscript{49} Segregation, then, should be negatively related to spatial stability and positively related to older population.

The utilitarian effectiveness of the indices was tested by relating the indices and the census-tract measures to the criterion variables and by observing the differences. Zero-order correlations were performed on the census-tract measures and the criterion index scores for each census-tract in each of ten representative cities. The same correlations were performed on the Shevky indices and the criterion indices. Mean coefficients and standard deviations were calculated and, from these, coefficients of variation were calculated to describe the consistency of association between the different measures and indices and the


\textsuperscript{49}Shevky and Bell, 4.
criterion indices.

Occupation, one of the social rank measures, correlated better (-.14) with spatial stability and with old population (.41) than did the social rank index, (-.10) and (.29), respectively. Multiple-family dwelling units correlated almost as well with spatial stability (-.48) as did its index, urbanization (-.49), while infertility, an urbanization index measure, correlated with older population much better (.62) than did its index (.43). The multiple linear correlation of the combined six measures correlated much better with spatial stability and older population, (.75) and (.79), respectively, than did the multiple linear correlations of the combined indices, (.65) and (.64), respectively. Furthermore, both criterion variables correlated with the segregation index in a relation inverse to what was predicted.

These observations indicate that some of the individual measures are more useful in area analysis than are the composite indices and suggests that the theoretical constructs in the Shevky-Bell scheme might not relate empirically to the indices as Shevky and Bell hypothesize.

In an article that appeared in the Spring of 1962, Bell and Scott Greer admit that there may be some truth in the criticisms of social area analysis. "The theoretical and conceptual aspects of social area analysis apparently have not been specified as clearly nor as fully as they might be -- at least.
in written, published form."50 They criticize Van Arsdol, Camilleri, and Schmid's choice of criterion indices in testing the utility of the Shevky indices with the argument that these critics misunderstood the framework of assumptions underlying the theory. Increased spatial mobility and changes in the proportion of dependent population are descriptive of long-term trends of whole societies. "To move from societal scale, on one hand, to the requisite nature of sub-populations on the other, is a major theoretical leap."51 Yet, is this not what is done with the selection of each census-tract measure?

In summary, the critics of social area analysis claim that it remains to be demonstrated that the indices are related logically to the concepts to which they have been referred and that their statements regarding social change and urban structure have not been stated in testable form. The Shevky group's theoretical reasoning does not necessarily lead to any unique set of measures for composition into indices or to any useful criterion for selecting measures. The concept of "social area" is confusing. No proper distinctions are presented for differentiating geographic units from areal units. No explanation is offered for the acceptance of homogeneous areas as social areas. The indices were found to be valid and general for a representa-

51 Ibid., 6.
...tion of cities, however, this validity does not allow for the development of an empirical model of urban society, which could be used for studying social differentiation in other cities. Although the indices were found useful in differentiating the representative cities, some of the census-tract measures which make up the indices were found to be more useful.

Van Arsdol, Camilleri and Schmid write, "It remains to be demonstrated that social area analysis offers any special advantages for studies of urban sub-areas. In light of these findings, it would appear that ecologists should look to other theoretical and empirical systems for describing the differentiation of census-tract populations." 52

In view of this statement and in view of Schmid and Tagashira's reference to the criticism of the Shevky-Bell approach at the beginning of their article, 53 it might appear that Schmid and Tagashira have chosen a heuristic inductive approach to urban sub-area differentiation to obviate the problems of the Shevky-Bell approach. However, aside from the social area analysis controversy, Calvin Schmid has been involved for some time in developing empirical techniques for the study of urban social structure.

In 1947, together with Julius Jahn and Clarence Schrag,

52 Van Arsdol, Jr., Camilleri and Schmid, "An Investigation of . . .", 32.
53 Schmid and Tagashira, op. cit., 194.
Schmid presented four indices as "objective and mensurative referents for the ecological concept of 'segregation.'" The authors emphasized that there is no one best index of any concept, that the correctness of an index depends upon the theoretical assumptions made and the measuring techniques, the correctness of the index is determined by its ability to predict those characteristics with which it was designed to correlate. In developing their indices, the authors concentrated on mathematical validation and empirical testing of their constructions. Little attention was given to any specific theoretical underpinnings.

In a rejoinder to a comment made about their work by Richard Hornseth the authors add a criterion of "reproducibility" to their previously stated criterion of prediction for determining the correctness of an index: "Given certain statistical manner and given the purpose of summarizing these data by one or a few numbers with a certain allowable amount of error, that 'Index of Segregation' which enables the researcher to 'reproduce' the

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55 Ibid., 293.


original data most accurately should be accepted for this use."

Again, the emphasis is on methodological, empirical validity.

In his article on "Generalizations Concerning the Ecology of the American City," Schmid uses indices to test theory. His central theory is that "the ecological structure of the large American city conforms to a consistent and regular pattern in which the socio-economic status of the population is the dominant feature." No demonstration is presented, however, of the logical or empirical relationship of the indices to the concept of socio-economic status or any other concept of the stated theory.

Theoretical generalization is made, however, on the basis of the "consistent and regular pattern" in which the indices are interrelated. A replication of this study was done by Schmid, MacCannell and Van Arsdol, Jr., to determine the "stability, comparability, and reliability" of the generalizations derived from the previous study. Again, a series of generalizations is made on the basis of the observed intercorrelations of indices.

The authors conclude their paper by writing, "As the next step

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58 Jahn, Schmid, and Schrag, "Rejoinder . . .", 216.
60 Ibid., 266.
62 Ibid., 392.
in attempting to clarify some of the problems raised in this paper, including the possible derivation of additional dimensions pertaining to the ecological structure of the large urban community, the authors are planning to apply factor analysis techniques to the basic data. 63

Schmid's first published factor analysis of a large urban community was his study of urban crime areas. 64 His purpose in the study was to analyze and "to describe with a high degree of specificity and more significant economic, demographic and social determinants and dimensions of crime areas in a large urban community." 65 Twenty crime categories composed of "offenses known to the police" statistics for Seattle (1949-1951) and of arrest statistics (1950-1951), and eighteen social, economic and demographic variables derived from official reports of the 1950 decennial census were factor analyzed. Eight factors were extracted, which accounted for most of the variance in the intercorrelations of the 38 variables. Then standard factor scores for each of the eight factors were computed for each of the census tracts, from which social profiles could be constructed of particular urban sub-areas.

63Ibid., 401.


65Ibid., 527.
Schmid's later study of Seattle, done in collaboration with Tagashira, represents his second multi-variate analysis of the social dimensions of a major American city.

In summary, then, Schmid and Tagashira mention the attempt of social area analysts Shevky and Bell to develop a technique to describe systematically the measurable spatial patterns of the urban community as well as their underlying social dimensions. They also refer to criticism this technique has received with reference to Shevky and Bell’s theory, methodology and utility.

This criticism has come first from neo-orthodox ecologists Hawley and Duncan who argued that Shevky and Bell present no adequate tying of their notion of "social areas" to their theory of urban-area structure. Later, Van Arsdol, Camilleri and Schmid found in an empirical test of the generality of the Shevky-Bell indices for eight large American cities that the indices were valid only for explaining the variation of the six measures that comprise their indices and only for the eight cities tested. Further research by Van Arsdol, Camilleri and Schmid demonstrated in a study of ten cities that the Shevky-Bell indices are not as useful for the construction of an urban model as the measures from which they were derived.

Following through on another, non-theoretical approach which he used with Jahn and Schrag in the late 1940's, Schmid has worked on index construction with emphasis placed on the empirical validation of the indices. Although he states that the correctness of an index depends upon the theoretical assumptions made and
although he states a central theory in his "Generalizations Concerning the Ecology of the American City," he does not in fact demonstrate the relationship of his indices to his theory. In his study of urban crime areas and in his and Tagashira's study of Seattle, he has relied on non-theoretical statistical analysis to uncover the underlying dimensions of the urban structure.
CHAPTER III

The methodology of this study is a partial replication of the Schmid-Tagashira factor analysis of socio-demographic measures for Seattle.\textsuperscript{66} For the first step in their analysis, Schmid and Tagashira performed product-moment correlations of 42 socio-demographic variables from the census-tract statistics for Seattle in 1960. In this thesis values for nine of the ten variables were computed for each of the 374 census-tracts existing in the Borough of the Bronx, New York City, for 1960. These computations were made on base data found in the Final Report of the U. S. Censuses of population and housing for New York City for 1960.\textsuperscript{67} Through multi-variate analysis ten of these variables were found to be highly correlated within three sub-sets grouped as indices. The authors concluded that these ten variables and the three resulting indicies reveal the basic dimensions of the socio-demographic structure of the large urban community.

One of the variables that Schmid and Tagashira computed for Seattle, "mean monthly rent," was not obtainable for the

\textsuperscript{66} Schmid and Tagashira.

Bronx in 1960, and so, has not been considered in this replication. The Final Report of population and housing for census tracts includes no "mean monthly rent" statistic. An approximated mean could be calculated for gross rent, but Schmid and Tagashira do not indicate whether their mean is of gross or contract rent.

Table 1 lists the socio-demographic variables used in this study and Table 2 presents the computational formulae for the variables. Each value score for each variable for each of the 374 census tracts in the Bronx was calculated on a Monroe "Epic 2000" programmed calculator. Once this calculator is programmed to perform a set series of arithmetic operations, e.g., to calculate a value score for variable No. 1, the arithmetical values of the components of the formula for the first census tract can be fed into the machine and the machine will automatically calculate the value score and prepare itself to receive the arithmetical values of the components for the next census tract, and so on. The accuracy of the calculations, then, depends on the accuracy of this machine.

As a check on the accuracy of the researcher's feeding of the component values into the machine, another person was used to check the component values recorded on the calculator tape against the component values listed in the Final Report and to copy the variable value scores onto worksheets for computer use. A check on the copying of the value scores from the tape onto the worksheets was done by the researcher reading the
Value scores from the worksheets to the other person who checked them against the tape. Except for possible machine error, the calculations appear accurate. 68

Table 1 presents a list of the socio-demographic variables used in this study. Enclosed in the parentheses to the right of each variable's number is the corresponding Schmid-Tagashira number for that variable. The X's and points enclosed in the parentheses to the right of the variable name indicates the number of integers used in the value score for each variable and the placement of the value score's decimal point.

**TABLE 1**

LIST OF SCHMID-TAGASHIRA SOCIO-DEMOGRAPHIC VARIABLES USED IN REPLICATION STUDY IN THE BRONX, 1960

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>Description</th>
<th>Schmid Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>(4)</td>
<td>Percent under 15 years</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>(8)</td>
<td>Percent Negro</td>
<td>XX.XX</td>
</tr>
<tr>
<td>8.</td>
<td>(9)</td>
<td>Percent other nonwhite</td>
<td>XX.XX</td>
</tr>
<tr>
<td>10.</td>
<td>(11)</td>
<td>Percent married</td>
<td>XX.X</td>
</tr>
<tr>
<td>15.</td>
<td>(16)</td>
<td>Median value, owner-occupied housing units</td>
<td>XXXXX.</td>
</tr>
<tr>
<td>18.</td>
<td>(20)</td>
<td>Median grade completed</td>
<td>XX.X</td>
</tr>
<tr>
<td>20.</td>
<td>(22)</td>
<td>Percent male professional, technical, and kindred workers (XX.X)</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>(27)</td>
<td>Percent females in labor force</td>
<td>XX.X</td>
</tr>
<tr>
<td>31.</td>
<td>(33)</td>
<td>Mean household size</td>
<td>X.X</td>
</tr>
</tbody>
</table>

* Schmid numbers in parentheses.

68 The conclusion of a sociological fact from inaccurate calculations is a real possibility in research work. Bernard Lander, Towards and Understanding of Juvenile Delinquency (New York: Columbia University Press, 1954), found through multivariate analyses that delinquency was related to anomic factors
Taking each component in the calculations from the statistics in the Final Report, the variables values for each census tract were calculated according to the formulae in Table 2.

These base data were then key-punched on IBM cards, and a matrix of product-moment coefficients of correlation were computed from these data with the use of a computer program from the library of the Computer Center of Fordham University.

Schmid and Tagashira give no rationale for the selection of their variables. Yet one of the major objectives of their study was " . . . to identify and evaluate . . . variables that can be utilized to differentiate and describe parsimoniously the ecological and demographic structure of the large urban community."\(^{69}\) This lack of a rationale suggests that the authors feel that the ecological and demographic structure underlying rather than to socio-economic factors, as was concluded in many other studies. Ronald J. Chilton, "Continuity in Delinquency Area Research: A Comparison of Studies for Baltimore, Detroit, and Indianapolis," ASR, XXIX (February, 1964), 71-83, however, pointed out that Lander had confused the signs of four of his factor loadings and thereby misinterpreted his data. Robert A. Gordon, "Issues in the Ecological Study of Delinquency," ASR, XXXII (December, 1967), 927-944, states that Chilton was mistaken in his criticism of Lander, but that there are other important faults in Lander's procedures that completely invalidate his conclusions. Lander, "Ecological Studies of Delinquency: A Rejoinder to Robert A. Gordon," ASR, XXXIII (August, 1968), 594-597, in response, defended the accuracy of his calculations while indicating that he would not bother to check the accuracy of Gordon's recalculations of his calculations. Until the accuracy of Lander's calculations is demonstrated, it would seem to be unwise to accept his conclusions.

\(^{69}\) Schmid and Tagashira, 194.
the intercorrelations of these 42 variables could be considered the ecological and demographic structure of the large urban

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPUTATIONAL FORMULAE FOR VARIABLES USED IN REPLICATION STUDY IN THE BRONX, 1960</td>
</tr>
</tbody>
</table>

| 3. Percent under 15 Years: | Divide the sum of Male and Female under 15 Years by the sum of Total Male and Female. |
| 7. Percent Negro: | Divide Negro by Total Population. |
| 8. Percent Other Nonwhite: | Divide Other Nonwhite by Total Population. |
| 10. Percent Married: | Divide Married by Total: 14 Years and Older. |
| 15. Median Value, Owner-Occupied Housing Units: | Copy out Median Value, Owner-Occupied Housing Units. |
| 18. Median Grade Completed: | Copy out Median School Years Completed. |
| 31. Mean Household Size: | Copy out Population per Household. |
community. However, the authors do note that "the general context and emphasis of this paper are fundamentally experimental." Yet, this qualification does not appear sufficient to legitimate the assertion that the analysis of the interrelationship of the variables they selected would differentiate and describe the ecological and demographic structure of the large urban community.

In a similar study presented in 1958, Kaplan indicated his criteria in choosing variables:

1. They should be representative of the theoretical formulations on urban characteristics that were available.

2. They should be selected with a view to their utility as manifested by the common usage of the data in past research.

3. The replication of variables should be avoided.

The criteria of his selection imply the limitations on his generalizations. Moser and Scott describe well the nature of such limitations in their interpretation of their own multivariate analysis of the variables they chose to use in their study of British towns:

These attempts at interpretation should not lead one to regard component analysis as a magical process whereby the structure of British towns can be transformed from a state

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70 Ibid.

of statistical chaos to a system of well ordered functional groups. It may produce an ordering which makes sense, but its generality is restricted by the choice of the primary series. If we had analysed a different set of 57 variables, the components extracted would have been different. Up to a point "what comes out" depends on "what goes in." All we can say is that the selection of variables was dictated by the data available, and was not made with an eye on the component analysis. We aimed to get as representative and far-ranging a set of variables as could be compiled. But this does not alter the fact that the results apply only to this particular set of data.

How far the process of selection has influenced the findings is difficult to say. Social class would probably emerge as a dominant factor in any set of variables covering the major aspects of urban structure. The second component (population growth), also, had high correlations spread over a wide variety of variables, ranging from demographic characteristics to housing and retail sales. The third component (unnamed) would have disappeared in its present form had we failed to include the series relating to events since 1951, but this makes it no less valuable.

None of these considerations is of great importance to the analysis. It is sufficient to realise that the problem of the "input-output" relationship exists and to acknowledge the limited generality of the results. 72

If the variables and techniques chosen by Schmid and Tagashira are in fact somewhat revelatory of a basic demographic and ecological structure of the urban area, that is to say, if their discriminating variables are generally reliable and the application of their techniques to their variables in another urban community is valid, then that application should result in a matrix of correlation coefficients of discriminating variables structured similarly to the Seattle matrix. However, if the valid application of their technique to these measures in

72 C. A. Moser and Wolf Scott, British Towns (Edinburgh: Oliver and Boyd, 1961), 76.
another urban community does not result in a similar matrix, then the Schmid-Tagashira findings are not reliable for that urban community. If the basic demographic and ecological structure of that community is to be revealed, it will not be done with the aid of the Schmid-Tagashira factors.

In considering the methodology of this replication, then, the important questions are 1) is the replication valid? and 2) are the original generalizations reliable?

In order for a replication study to be valid there must be certain similarities between the initial study and the replication study: the dependent variables must be structurally defined in the same way, the independent variables must be compositionally defined and statistically derived in the same way, and the techniques relating the independent variables to the dependent variables must be the same.

As stated above, the dependent variables for the Schmid-Tagashira study form the ecological and demographic structure of the large urban community, and the independent variables were the stated 42 socio-demographic variables for Seattle in 1960. The dependent variables for the Bronx study form an ecological and demographic structure of the Bronx in 1960. So stated, the dependent variables of the Seattle study and the dependent variables of the Bronx study are structurally similar.

Nine of the ten significant variables in the initial study are presented in the replication study. The exclusion of the one variable should not damage the validity of the
replication, since its inclusion or exclusion would have no bearing on the results of the rest of the matrix. Schmid and Tagashira give little information as to how they derived their variable scores from the census data, leaving the solution to the question up to the common sense of the reader.

Schmid and Tagashira are quite clear in describing how they related their independent variables to their dependent variables, i.e., how they derived a set of indices from a set of variables. They write, "as the first step in the evaluation and analysis of the 42 variables, a product-moment intercorrelation matrix was computed (Tables 1, 2, and 3)."73 The same technique was used in the replication study, but only for the nine relevant variables. It appears, then, that this replication is valid.

A generalization is considered reliable if it consistently results from the repeated application of a study or a technique to different sets of data. If a generalization is reliable, absolute consistency can be expected under the ideal conditions in which the data in each study have the exact same characteristics and each study is carried out in the exact same manner. Insofar as the conditions are not ideal, i.e., the characteristics of the data differ or the conditions of the technique differ, error variance should enter in and reliability

73 Schmid and Tagashira, 196-197.
diminish.

Schmid and Tagashira's generalizations concerning the basic ecological and demographic structure of "the large urban community" are probably not reliable since the characteristics of the population of Seattle differ in varying degrees from the population characteristics of other large American cities.

The population characteristics of the Bronx constitute a case in point. As was discussed in Chapter I, the Bronx is merely a borough of a city, lacking the fuller population distribution characteristic of most cities. The history of population migration within New York City has produced specialized populations within the Borough: ethnic enclaves and a built-up residue of the urban poor. However, both Seattle, a city, and the Bronx, a borough, could fit within the ambit of Schmid and Tagashira's concern: the urban community. Considering the metropolitanization of urban areas, it becomes increasingly difficult to differentiate structurally a borough from a city.

Secondly, the population of Seattle in 1960 was 557,087, while the population of the Bronx in that year was


Hadden and Borgatta found in their attempt to classify American cities through factor analysis that population size was the most significant variable in differentiating cities:

While these facts are more or less obvious, we sometimes overlook them and fail to see the city for the buildings. The dominance of the Total Population Size factor in our earlier analyses dramatically demonstrated the importance of the concept size for the comprehension of the salient features of cities.

In summary, it is an inescapable conclusion that sheer size has a tremendous effect on many structural aspects of cities.

Yet their single category of "largest cities" includes all those with populations in excess of only 150,000. Both Seattle and the Bronx would fit into this category. Whether population size would remain a significant variable differentiating socio-demographic structures in a comparison of cities of a half million people and cities of a million and a half people remains to be demonstrated. So, it is quite possible that a basic ecological and demographic structure found underlying the variable


78 Hadden and Borgatta, 39-40.
intercorrelations of a city of half a million might not underlie the variable intercorrelations of a much larger city.

Thirdly, the product moment correlation of the variables for Seattle and then for the Bronx presented in the next chapter indicate significantly different correlational matrices for the two cities, further weakening the probability of the reliability of the Schmid-Tagashira generalizations concerning the ecological and demographic structure of the large urban community.

In summary, this thesis is a partial replication of Schmid and Tagashira's empirical study of Seattle in 1960. The replication is partial in that it studies a part of a city instead of a whole city, its independent variables are only nine of the ten significant variables of the 42 socio-demographic measures used by Schmid and Tagashira, and it's comparison is at the first level of analysis used in the Seattle study: a matrix of product-moment correlation coefficients. Every attempt was made to compute the correlations accurately in replication, although common sense was needed in many instances to determine computational formulae for the variables used.

This thesis appears to be a valid replication of the Seattle study. However, due to the differences in population characteristics between Seattle and other urban areas, it appears that the indices derived from the Seattle study should not be reliable beyond the Seattle city limits. In the specific instance of the Bronx, the findings presented in the next chapter indicate the unreliability of the Schmid-Tagashira
generalizations for that Borough.
CHAPTER IV

THE FINDINGS

The purpose of this thesis is twofold: to construct a matrix of coefficients of correlations of measures listed in Appendix A and to compare this matrix to that of the Seattle study in order to test the reliability of the Schmid-Tagashira variables as descriptive of the "ecological and demographic structure of the large urban community," and as descriptive of the ecological structure of the Bronx in particular. If there is no significant difference between the ecological correlations in the Bronx and the ecological correlations in Seattle, then the Schmid-Tagashira indices might be reliable.

Table 3 presents the matrix of product-moment coefficients of correlation for the nine significant socio-demographic variables for Seattle in 1960, and Table 4 presents the matrix for the Bronx in 1960.

In his article, "Generalizations Concerning the Ecology of the American City," Schmid stated that in his study of 20 American cities of comparable size he found that, "The ecological structure of the large American city conforms to a

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79 Schmid and Tagashira, 194
80 Calvin F. Schmid, "Generalizations Concerning the Ecology of the American City," ASR, XV (April, 1950), 264-281
<table>
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<tr>
<th>Variable No.</th>
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</table>

*3 Percent under 15 Years
10 Percent Married
25 Percent Females in Female Labor Force
31 Mean Household Size
15 Median Value, Owner-Occupied Housing Units
18 Median Grade Completed
20 Percent Male Professional, Technical, and Kindred Workers
7 Percent Negro
8 Percent Other Nonwhite
TABLE 4

MATRIX OF CORRELATION COEFFICIENTS OF NINE OF THE TEN VARIABLES COMPOSING THE SCHMID-TAGASHIRA FACTORS FOR THE BRONX, 1960

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>(3)</th>
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<th>25</th>
<th>31</th>
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<td>.341</td>
<td>.038</td>
</tr>
</tbody>
</table>

* 3 Percent under 15 Years
10 Percent Married
25 Percent Females in Female Labor Force
31 Mean Household Size
15 Median Value, Owner-Occupied Housing Units
18 Median Grade Completed
20 Percent Male Professional, Technical, and Kindred Workers
7 Percent Negro
8 Percent Other Nonwhite
consistent and regular pattern in which the socio-economic status of the population is a dominant feature.\textsuperscript{81} This dominance is specified in a series of generalizations, the first of which states that "the most highly intercorrelating variable in the ecological patterning of the large urban community is the educational status of the population as measured by median school grade completed."\textsuperscript{82}

A follow-up article, "The Ecology of the American City: Further Comparison and Validation of Generalizations," by Schmid Earle H. MacCannell, and Maurice D. Van Arsdol,\textsuperscript{83} restates the same general conclusion: "Both studies clearly indicate that the ecological structure of the large American city manifests a regular and pervasive pattern in which the socio-economic status of the population is an important feature."\textsuperscript{84}

A change in this thought appears in the Schmid and Tagashira analysis of their Seattle correlations. "The most significant implications of the correlation matrix, of course, are the various patterns and interrelationships that are revelatory of the ecological and demographic structure of the city.

\textsuperscript{81} Ibid., 226.
\textsuperscript{82} Ibid., 280.
\textsuperscript{84} Ibid., 400.
Generally, these patterns are regular, definitive, and pervasive.\footnote{Schmid and Tagashira, 197.} Again, "median grade completed" is presented as an index of socio-economic status and its high correlation with other socio-economic variables in Seattle in 1960 is presented as evidence. However, another trend is also implied on the basis of the matrix: an index of family status, "percent of the population 14 years of age and over that is married" is highly correlated with several other family-status variables and various other variables. In the Seattle study, socio-economic variables are not placed in the unique position of "dominance," in relation to the other variables. Rather, a particular variable, "median grade completed", is presented to indicate a socio-economic pattern of interrelationships in the matrix and another particular variable, "percent married", is presented to indicate a family pattern in the same matrix.

In order to test the comparability of the two matrices and, thereby, the reliability of Schmid and Tagashira's generalizations, a rank-order correlation was performed on the Seattle and Bronx correlations of each variable with the other variables. If the nine variables under consideration are revelatory of the basic socio-demographic structure of the large urban community in the manner in which Schmid and Tagashira assert that they are, then the nine variables should
interrelate in the Bronx as suggested and rank-order correlations of each variable to the others in Seattle and in the Bronx should be significant.

The findings of this rank-order correlation are as follows:

<table>
<thead>
<tr>
<th>Variable No.</th>
<th>Variable Description</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Percent under 15</td>
<td>.67* (Significant)</td>
</tr>
<tr>
<td>10</td>
<td>Percent Married</td>
<td>.74</td>
</tr>
<tr>
<td>25</td>
<td>Percent Females in the Labor Force</td>
<td>-.62 (Insignificant)</td>
</tr>
<tr>
<td>31</td>
<td>Mean Household Size</td>
<td>.60</td>
</tr>
<tr>
<td>15</td>
<td>Median Value Owner-Occupied Housing Units</td>
<td>.55</td>
</tr>
<tr>
<td>18</td>
<td>Median Grade Completed</td>
<td>.14</td>
</tr>
<tr>
<td>20</td>
<td>Percent male Professional, Technical, and Kindred Workers</td>
<td>.18</td>
</tr>
<tr>
<td>7</td>
<td>Percent Negro</td>
<td>.36</td>
</tr>
<tr>
<td>8</td>
<td>Percent other Nonwhite</td>
<td>.33</td>
</tr>
</tbody>
</table>

The correlation indicating significance at the 5% level of probability is .643.

Seven of the nine variables found by Schmid and Tagashira to reveal the basic socio-demographic structure of the large urban area were found not to interrelate in the Bronx in the manner in which Schmid and Tagashira presented. This could mean that the Bronx is structurally different from Seattle, or that the variables have differing sociological meaning between the two cities, or it could mean nothing. However, this ranking does indicate that the Schmid-Tagashira generalizations are not reliable for another kind of large urban community.
An interesting dissimilarity between the matrix for the Bronx and the matrix for Seattle appears in the correlations of No. 25, "females in the female labor force", with the two variables, No. 3, "population under 15", and No. 10, "married". In Seattle, there was a high negative correlation in each case, -.689 in the former and -.671 in the latter. In the Bronx, however, "females in the female labor force" correlated significantly and positively with "Population under 15" (.341) and with "married" (.585).

In a study he did on Seattle census tracts in 1950, Schmid found a correlation of -.702 between the percent "married" and "females in the female labor force" and a correlation of -.852 between the fertility ratio and "females in the female labor force". The Bronx statistics, on the other hand, indicate that census tracts high in young, dependent populations tend also to be high in the percent of women working, and tracts low in young, dependent populations tend to be low in the percent of women working. Also, census tracts high in the percent of the population that is married tend to be high in the percent of women working, and tracts low in the percent of the population married tend to be low in the percent of women working.

An explanation of this phenomenon might be found in a generally low economic rating for families in the Bronx.

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requiring both parents to participate in the labor force to meet the generally high living costs in the New York Metropolitan Region. On an explanation might be found in an unusually large percent of three-generation families among the several ethnic groups that predominate in the Bronx, in which a mother or grandmother might work while the other cares for the home and children. Also, areas in the Bronx with relatively low dependent youth populations might be characteristically areas with high concentrations of retired senior citizens, or of families with adult children, or of unattached individuals. In any case the positive relationship of women in the labor force to these two family variables is interesting and would appear to be an extensive study in itself.

In 1950, 23.0 percent of the wives in husband-wife families living in American urban areas participated in the labor force.87 In 1960, 33.2 percent of the American women who were married and living with their husbands in the central cities of Standard Metropolitan Statistical Areas participated in the labor force.88 The decade of the 1950's saw a sizable increase in the percent of urban married women working. By 1960 three out of ten urban married women were working. This general statistic

87 Paul C. Glick, American Families (New York: John Wiley and Sons, 1957), 93.

appears more in agreement with the finding of the Seattle study than it does with the finding of the Bronx study. Shevky and Bell hypothesize that the variable, women in the labor force, reflects changes in the function and structure of the family. This variable, along with the "fertility ratio" and the "percent of single-family dwelling units," became the components of their Urbanization Index. As a society increases in scale, the economic functions of the family are separated from the kinship functions of the family. The size and nature of the family no longer are determined by the family's status within the economy. Rather, a functional relationship exists between characteristics of the family and the economy. This relationship allows for alternative forms of family structure to relate functionally to the economy. As the society becomes urbanized, the conjugal family becomes isolated from the extended family; there is a wider range of choice of family size; and women begin to move into the labor force. The separation of the economic and the kinship functions of the family weaken traditional familialistic values due to the fact that individuals can participate in the economy largely independent of their kinship ties. In constructing their Urbanization Index, Shevky and Bell hypothesized that as a society becomes more urbanized, the fertility ratio goes down and the percent of the women in the labor force goes up. In responding to the changing structure of productive

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89 Shevky and Bell, 17.
activity in the trend toward urbanization, the family man becomes isolated in conjugal families, tends to have less children and experiences a greater participation of the female members of the family in the labor force.

The findings of Schmid and Tagashira in Seattle seem to contribute to the verification of Shvyky and Bell's hypothesis. The findings in this study of the Bronx, however, do not. While the variable "female in the female labor force" does relate significantly to the family status variables, "population under 15 years of age" and "percent of the adult population that is married", the relationship is directly opposed to that hypothesized by Shvyky and Bell and demonstrated by Schmid and Tagashira.

In Seattle, the correlation coefficient between variables No. 7, "Negro", and No. 8, "other nonwhite" was .524. In the Bronx, however, the coefficient of these two variables was only .036 (insignificant). In fact, no set of variables was found in the Bronx suggesting an ethnic dimension in its ecological structure.

This again demonstrates the lack of generality of the Schmid and Tagashira indices. The Bronx has many ethnic groups: old European, Negro and Puerto Rican. In 1960, approximately half of the Borough's population was of foreign stock, 13 percent was Puerto Rican, and 11.5 percent was Negro. No more than one-fourth of the population was native-born white of origin.
native-born white parentage. In all probability, ethnicity should be one of the basic characteristics of the Borough. However, the population variables Schmid and Tagashira chose to include in their study would not be sufficient to uncover this factor in the Bronx. Their measures, "Negro" and "Other nonwhite" would not reflect the large Puerto Rican population since the Census Bureau categorizes all Puerto Ricans as "white" regardless of the color or racial characteristics of the individual.

In summary, a matrix was constructed of correlation coefficients of 9 socio-demographic variables for the Bronx in 1960 that could be used in comparison to a similar matrix for Seattle which was suggested as revelatory of the underlying ecological structure of the large urban community. Secondly, this matrix was compared to the Seattle matrix to test the reliability of the Schmid-Tagashira variables as descriptive of the ecological and demographic structure of the large urban community and, specifically, as descriptive of the ecological structure of the Bronx.

The findings of this study indicate that there are few similarities between the Bronx matrix and the Seattle matrix. This demonstrates the lack of reliability of the Schmid-Tagashira indices as revelatory of the basic socio-demographic structure of the Bronx. Furthermore, ethnicity, one of most obvious of the

population characteristics of the Bronx, is not revealed as important through the correlation of the Schmid-Tagashira variables in the Bronx. In fact, it appears that the Schmid-Tagashira selection is incapable of revealing the Bronx ethnicity.
CHAPTER V

SUMMARY AND CONCLUSIONS

This thesis reports on a partial replication of a study of a series of socio-demographic variables gathered from census tract data by Calvin Schmid and Kiyoshi Tagashira for Seattle in 1960. This replication presented a matrix of product-moment correlation coefficients of nine socio-demographic variables for the Bronx, New York City, in 1960 and a comparison of this matrix to a similar matrix constructed by Schmid and Tagashira in their study of Seattle in 1960. This comparison is made in working toward the generation of ecological theory concerning urban structure.

Through rank-order correlations of the variables presented in this thesis, significant differences were found between the Bronx matrix and the Seattle matrix, suggesting that the Schmid-Tagashira generalizations are almost useless for studying the Bronx.

The findings of this study suggest several conclusions, some methodological and others theoretical.

First, if generalizations are to be made about the ecological structure of a type of urban community based on heuristic, inductive multi-variate analysis, there is a need to standardize the selection process of variables included in the
analysis. This is necessary to assure the comparability of the studies and so the reliability of the generalizations. Since this kind of research is heuristic, the choice of variables are not deduced from theory. However, since this kind of research is oriented toward generating theory, the researchers in standardizing the selection of variables may be influenced by ongoing theory. Simply because a variable is present is no reason to include it in an analysis. Because of the nature of multi-variate analysis, the inclusion of a variable can lead one away from the insight to theory as well as can the exclusion of a variable. Definite criteria, then, should be agreed upon for selecting variables.

Secondly, there is a need to standardize sociological units for empirical studies that are intended to uncover ecological structures. Schmid and Tagashira sought to expose the underlying ecological and demographic structure of the large urban community. Yet, both a large city like Seattle and an extra large borough like the Bronx would fit that definition. Because these are different types of urban community, their underlying structures might be quite different. Until empirical research has identified the similarities and differences between types of urban communities, it should be profitable to specify the dependent variable of these studies as the structure of a specific type of urban community. Perhaps, as a start, the studies could be of Standard Metropolitan Statistical Areas. Once generalized dimensions are discovered about these units, studies could be
made of their sub-units.

In regard to theory, the findings indicate that the Schmid-Tagashira generalizations are not only not reliable for the Bronx, but also they have the same shortcomings that Hawley, Duncan, Van Arsdol, Camilleri and Schmid found in the Shevky-Bell indices: they are not logically related to the concepts which they were intended to indicate and they lack generality. The Shevky-Bell indices were considered invalid logically because the authors did not demonstrate the necessity in the logical deduction of their indices from their concepts. From the other direction, Schmid and Tagashira, while giving empirical content to their indices, did not demonstrate that these factors necessarily indicated their concepts. Although Van Arsdol, Camilleri and Schmid did demonstrate that the Shevky-Bell indices were reliable for the cities that Van Arsdol, Camilleri and Schmid studied, their findings were that the indices were reliable for those cities alone and only on the basis of the variables chosen. The very same conclusion can be drawn concerning the Schmid-Tagashira study.

Finally, the multi-variate analytic techniques used by Schmid and Tagashira and many others, appear to be valid in studying the ecological structure of the urban community. They do reveal regular relationships operating among the ecological and demographic characteristics of the community. If rigid controls are maintained in selecting independent variables and in defining the dependent variables, comparison is possible and
theory generation is hoped for. Besides generating theory, empirical techniques can provide indices for differentiating sub-areas within urban communities according to theoretically significant differences. This can result in an ecological mapping of urban communities and the significant study of the relationship between a basic ecological structure of an urban community and other sociological characteristics of that community.

This thesis can be considered as a small contribution to the generation of grounded theory concerning the ecological structure of an urban community. It is hoped that the subsequent empirical research of urban areas will contribute further to the theoretical base in the ecological study of the urban community.
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The thesis submitted by R. Moore has been read and approved by the advisor and reader.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Arts.

[Signature of Advisor]

Date