

THE UNIVERSITY OF MANITOBA

TESTING THE THEORY OF INCREASING SOCIETAL SCALE:

THE ECOLOGY OF TORONTO, 1951-1961

by

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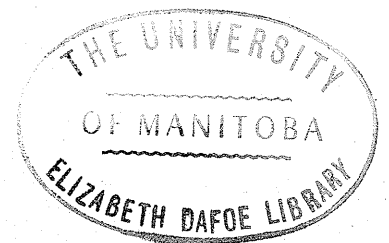
A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTER OF ARTS

DEPARTMENT OF SOCIOLOGY

WINNIPEG, MANITOBA

May, 1973



## ABSTRACT

The development of the theory of Increasing Societal Scale was traced from its initial formulation by Shevky, Williams, and Bell to the present. The various studies which have used factor analytic techniques to assess the generality of the social area constructs devised by Shevky, Williams, and Bell were reviewed. A more detailed analysis follows of the few longitudinal studies which attempt to assess the validity of the theory of increasing societal scale. On the basis of ecological theory and related research as well as of studies on Canadian society in general, a set of propositions was outlined for studying the ecological differentiation in Metropolitan Toronto for the years 1951 and 1961.

Generally consistent with what was expected, it would appear that the ecological structure of the city can be described in terms of three general constructs: ethnic status, familism, and social status. Certain of these constructs, however, differ in important ways from their counterparts in a study of Winnipeg and in studies of large American cities. The ethnic status factor greatly increased in its ability to differentiate among census tracts between 1951 and 1961 while the familism factor decreased in importance. Both trends were unexpected,

however, the third construct, the social status factor, declined as expected. In addition, the findings suggest that the overall level of ecological differentiation may have increased over time. This trend lends support to the hypothesis that increasing differentiation is a necessary consequence of increasing societal scale.

Margaret Pearl Keith

## ACKNOWLEDGEMENTS

I should like particularly to acknowledge the help I have received from two persons in the writing of this thesis. My advisor, Dr. A. H. Latif, has assisted me in comprehending the theoretical framework and conducting the research as well as in the writing of this work. My assistant advisor, Dr. A. A. Hunter, has aided me in performing the statistical analysis.

Margaret Pearl Keith

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## INTRODUCTION

The aim of this study is to gain a better understanding of social change in large cities and of the role of such cities in society. More specifically, this study is an attempt to understand changes in the dimensions which differentiate between urban sub-areas over time by comprehending the changes at the societal level which directly affect social relations. The theory of Increasing Societal Scale was relied upon for the identification of the major changes in various orders of organizational complexity associated with industrialization. The constructs of the social area model, assumed to represent these changes in metropolitan areas, were hypothesized to be important in differentiating residential sections of an urban area.

This research involves the analysis of the underlying dimensions of differentiation in an urban area in Canada in 1951 and 1961. It also searches for the changes taking place in the importance and independence of the major dimensions of social differentiation over the decade. Comparing the results of this study of Metropolitan Toronto with those of previous research conducted on Winnipeg, it is hoped that some general pattern can be found for the process of ecological differentiation among Canadian cities.

In Chapter I, the steps in the formation of the theory of increasing societal scale are outlined. Shevky, Williams, and Bell found the social change theory of Wilson and Wilson and the economic theory of Clark helpful in delineating changes at the societal level which are associated with industrialization. They devised the Social Area Model which associated variables that could be measured at the urban level, with changes in the structure of various orders of organizational complexity found in a modern society. Several studies are outlined which tested the generality of the model with the aid of factor analysis, and others which tested the validity of the theory of Increasing Societal Scale. Research in factorial ecology conducted on Canadian cities is analyzed, and hypotheses are suggested to test the validity of the theory of increasing societal scale by factor analyzing data on Metropolitan Toronto in 1951 and 1961.

Chapter II provides a historical sketch of Metropolitan Toronto as well as an indication of modern developments in the city. The population of the metropolitan area is examined, particularly the characteristics of its immigrant population.

In Chapter III, the sources of data, observational unit, rationale for the selection of variables, data preparation, factor model, as well as the statistical methods employed in analyzing changes in the dimensions

of differentiation over the decade are presented.

Chapter IV presents the findings of the factor analyses of the 1951 and 1961 data. Statements are made concerning the support for the hypotheses, and a general picture is drawn of the ecological structure of Metropolitan Toronto in 1951 and 1961. The trends in its ecological structure are outlined.

In Chapter V, a brief summary of the study is presented along with the contributions of this study and some suggestions for further research.

## CHAPTER I

### TOWARD A THEORY OF INCREASING SOCIETAL SCALE

#### Introduction

This study will draw upon the theory of Increasing Societal Scale. The theory was derived from the works of Shevky, Williams, and Bell (Shevky and Williams, 1949; Shevky and Bell, 1955) and has been given new emphasis by Greer (1962) and McElrath (1965, 1968). Shevky, Williams, and Bell expressed the idea that the city is the product of modern society; thus they asserted that social forms of urban life such as residential patterns can be understood within the context of the changing character of the society in which they occur.

Shevky drew on the works of Clark (1940) and of Wilson and Wilson (1945) in order to develop a theoretical orientation which took into consideration the historical and cultural context of development. According to Clark, the trend toward more complex economic organizations and higher levels of income can be related to the level of production which provided the economic base of the modern society. An examination of the distribution of the labour force in different countries, in different parts of the

same country, and in the same country over a series of years, revealed that modern economies move toward more complex organizations, greater division of labour, greater specialization of skills, and higher income levels in a series of steps. Clark identified these steps as follows: (1) intensification of primary production; (2) expansion of secondary production; and (3) proportionally greater expansion of tertiary positions.

Shevky and Williams found this movement of the working population from primary to secondary to tertiary functional areas to be the most important aspect of changes in productivity as well as in economic organization and, as a consequence of these, in social relations. Historically, increasing industrial development has resulted in a growing administrative personnel and the substitution of machines for men in secondary industry, with the result that more men have been freed from primary production for tertiary positions. One consequence of this process has been the rise of the new middle class with its greater diversity of skills, its increase in average level of income, and more varied leisure activities. This trend has also produced greater diversity in access to the rewards of the society. Changes in the character of economic activity have led to changes in regional specialization of industry and in the regional distribution of workers. These changes have resulted in greater social

heterogeneity of the population. Increasing interdependence and an expanding scope of interaction are associated with changes in regional specialization.

Wilson and Wilson (1945:25) defined "scale of society" as "the number of people in relation and the intensity of those relations." By the intensity of relations they meant the range of relations, the degree of interdependence, the intensity of co-operation, and of intellectual and emotional communication. They postulated that the difference between traditional societies and modern societies was related to their position on this societal scale. Thus, in a modern society, the range of relations is much wider than in a traditional society. Wilson and Wilson used the term "increase in scale" to imply not only a greater range of material relations, but also greater control of the natural environment, greater division of labour, greater importance of impersonality, and greater mobility. In a modern society, geographical expansion, an increase in population, or an increase in the intensity of the relations between races and classes can lead to an increase in scale.

Relying on Wilson and Wilson's definition of "scale of society," Shevky and Williams identified a series of changes which occurs simultaneously with increases in societal scale. These changes occurred in the patterns of functional differentiation, in the

complexity of organization, and in the range and intensity of relations within the population. They distinguished three broad and interrelated trends associated with these changes: (1) changes in the distribution of skills, (2) changes in the structure of productive activities; and (3) changes in the composition and distribution of the population.

Changes in the distribution of skills involve the growing importance of clerical, managerial, and supervisory positions and the weakening role of manual production. Communication skills and technical knowledge replaced age and seniority as the bases of rank allocation. Occupation becomes a very important characteristic which has technological meaning in that certain mental and manual operations of work are equated with an occupation, economic meaning in that occupations are related to specific levels of income; social meaning because a group of persons achieves status and rank by virtue of the members' occupations; and ecological manifestations in the residential distribution of people in an urban setting. Shevsky and Williams incorporated these changes in a social rank construct.

The second trend of increasing scale, changes in the structure of productive activities, was associated with a family status construct. The three aspects of social life believed to be affected by the changing nature

of production are: (1) the relationship between population and economy; (2) the range of social relations which are centered in the city; and (3) the structure and function of kinship units. The first aspect refers to the freedom of the population from the "Malthusian limits"<sup>1</sup> due to technological developments, the result being that population size became more a matter of individual choice than of ecological determinants. The individual decisions represent systematic preference patterns which are shaped by the character of the social structure and the value system.

Accompanying industrialization is an increase in the number and scale of industries and in the proportion of salary to wage workers. The control, co-ordination, and service functions are increasingly centered in large

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<sup>1</sup>It has been demonstrated that in large-scale industrial societies, population changes cannot be explained simply by changes in the agricultural sector of the economy or by the introduction of new medical practices. These societies are freed from the Malthusian limits, and population variations within them will be an expression of a wide range of alternatives for individuals, death rates being characteristically low and stable and variations in population growth being tied to variations in the birth rate rather than to variations in the death rate. That is, in these societies values regarding low death rates have been implemented fairly effectively and death rates have been reduced so that most people are living into old age. At the same time values regarding high and stable birth rates are subject to radical change as a consequence of the far-reaching economic transformations which have occurred with the transmutation of these societies from agrarian to urban-industrial types. (Bell, 1968: 146)

urban areas. With the growth of co-ordinating agencies, a new middle class is formed which processes and communicates orders, provides services, and controls business relations.

The role of the household has altered with the changing nature of production. As the household lost its utilitarian purpose, fixed alternative forms of family life became available to the urban population. Differences in family structure are no longer simply the reflections of differences in economic status, but rather reflect the choice between fixed alternative life-styles. Thus, a continuum of life-styles has been postulated which ranges from familism to urbanism. The familism life-style involves a high valuation of family living, early marriages, child-centeredness, and mothers who are not participants in the labour force. Urbanism as a way of life involves spending time, money, and energy on a career. It is characteristic of persons who engage in career-relevant activities to the partial exclusion of alternative activities. Among such persons delayed marriages and small families are common.

The third trend of increasing scale, changes in the distribution and composition of the population, is reflected in an ethnic status factor. These changes result in changing age-sex structures of the urban centers because of the migration of populations from diverse cultural and

geographic backgrounds toward urban centers. As a result, distinct sub-groups inhabit urban areas and have experienced differential access to opportunities such as residential location.

### The Social Area Model

Social area analysis was developed initially by Shevky and Williams (1949) and revised by Shevky and Bell (1955) as the logical complements of a general model of social change and of the role of the large city in society. The technique was first applied by Shevky and Williams to a study of Los Angeles and later applied by Shevky and Bell to a study of San Francisco. The constructs of the social area model--economic status, family status, and ethnic status--were deduced from the theory of increasing societal scale. Seven indicators were selected to measure the constructs in large modern cities: occupation, education, and rent--measures of social rank; fertility, women at work, and single-family dwellings--measures of family status; and racial and national groups in relative isolation--measure of ethnic status. Census tracts in the city were assigned scores on each of the composite indexes. A typology of social areas was formed by constructing a "social space" diagram in which the social area indexes became the dimensions of space. Populations near to each other in the diagram were grouped together

to form social areas.

Inherent in the social area model is the assumption that three interdependent trends, associated with increasing societal scale, provide the essential dimensions for differentiation of urban sub-areas along three independent axes. Several critics have indicated that the relationship between increasing scale and residential differentiation in the Shevky-Bell scheme remains unexplained. Hawley and Duncan (1957: 340) criticized the model for lack of an explanation of why residential areas within cities should differ from one another. In addition, they criticized the model for lack of empirical justification for the assumption that the three indexes are in fact the important dimensions of ecological differentiation. The presentation of the theoretical rationale by Shevky and Bell in 1955 appeared to Hawley and Duncan (1957: 339) as an "ex post facto rationalization for their choice of indices."

Greer (1962) attempted to interrelate Shevky's notion of social space with the classical notions of ecological space. The former involves a conceptual typology of aggregated positional characteristics, while the latter includes the idea of spatial continuity of people serving as the basis for association. He has clarified the theory of increasing societal scale by emphasizing the links between the city and the society in

which it is located. As a society becomes more industrialized, Greer (1962: 194) noted that the various organizations become increasingly dependent upon one another, and require large, specialized, organizational networks to co-ordinate their activities. In addition, he noted that large-scale organizations which are based on similar interests, rather than on a geographic location, widen their span of control. Greer emphasized the significance of such spatially unrestricted communities of interest as labour unions and corporations in contrast to spatially inclusive groups which represent only segments of the behavior of persons living in close proximity to one another. As a result of these changes at the societal level, he noted that sub-populations within the city become increasingly differentiated in terms of access to certain resources and rewards of their environment. This trend is reflected in the spatial isolation of sub-groups and their differential association with other groups of people.

McElrath (1965, 1968) gave greater scope to organizational considerations in his revision of the theory. He asserted that "change in the organization of developing societies is accompanied by changes in the dimensions of social differentiation." (1968: 33) Structural changes at the societal level, therefore, result in increasing social differentiation in an urban area. As a result of organizational expansion at the

societal level, McElrath identified structural changes in the urban area that occur in the distribution of skills, the structure of production, the aggregation of population, and the dispersion of resources. The first two trends are aspects of industrialization, the last two are part of urbanization. The dimensions of social differentiation which McElrath associated with these structural changes are similar to those of Shevky and Bell (1955) with the addition of migration status. This dimension was designed to account for the effects of varying migration experiences<sup>2</sup> of sub-groups who form a substantial proportion of the population of expanding cities. Migration status constitutes a basis for social differentiation to the extent that migration experience affects a group's participation in urban life.

### Testing the Social Area Model

#### Factor analysis of the basic social area variables

Several studies have tested the empirical validity and generality of the Shevky-Bell model by applying some form of factor analysis to the basic social

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<sup>2</sup>Migration experience refers to the distance travelled, disparity between the organizational complexity of the place of origin and the new urban center, time of migration, and age-sex structure of the group.

area indicators calculated for sub-units in a modern city. Bell's (1955) analysis of the factor structure of Los Angeles and San Francisco indicated that economic status, family status, and ethnic status were necessary to account for variations between census tract populations in terms of the seven social area indicators. The high inter-item correlations within the clusters of variables which related to social status and family status strongly supported the assumption that both factors form unidimensional instruments. However, the inter-factor correlations in the factor matrix, rotated to an oblique solution, were relatively high between the ethnic status factor and the economic status factor ( $-0.73$  in Los Angeles and  $-0.62$  in San Francisco).

Van Arsdol, Camilleri, and Schmid (1958a, 1958b) factor analyzed census data for ten medium-sized American cities<sup>3</sup> and found three separate factors. Contrary to Bell's hypothesis about the pattern of correlation of variables with the factors, they found that in four southern cities<sup>4</sup> with large Negro populations, fertility was related to social status, and in Providence, the proportion of single-family dwellings correlated with

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<sup>3</sup>Akron, Atlanta, Birmingham, Kansas City, Louisville, Minneapolis, Portland, Providence, Rochester, Seattle

<sup>4</sup>Atlanta, Birmingham, Kansas City, Louisville

social status. They concluded that the relatively large proportions of Negroes and their unfavourable economic position may have prevented the disassociation of the range of family forms in these cities, as indicated by the fertility measure from social status.

Recent studies by Cohen(1968), Peters (1968), and Spodek (1968) have revealed that the social area model is inappropriate for southern United States cities. No simple segregation factor emerged in the factor matrix in their analyses of southern cities<sup>5</sup>. In the analyses conducted by Cohen, Peters, and Spodek, the racial variable loaded negatively and most highly on a socio-economic status factor. It appeared that the segregation factor and the socio-economic status factor were interdependent.

### Factorial ecology

Several studies have tested the generality of the Shevky-Bell model by applying factor analytic techniques to an extended set of characteristics recorded for sub-areas, usually census tracts. The aim of these studies, referred to as studies in factorial ecology, was to discover the small number of factors which accounted for social differentiation that was assumed to be reflected in the input variables.

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<sup>5</sup>Birmingham, Louisville, Shreveport

A study of the ecological structure of Toledo by Anderson and Bean (1961) included seven variables in addition to the six basic social area indicators. Using the centried technique and orthogonal rotation, they found that the social status and ethnic status dimensions emerged as predicted in the Shevky-Bell model. The variables relating to the family status construct, however, split into uncorrelated factors. One factor described housing characteristics and the other described population characteristics. They concluded that these two factors, which they labeled urbanization and family status respectively, are both important in differentiating residential areas.

Schmid and Tagashira (1964) have tested the assumption that factors are invariant across analyses that include different variables. They conducted a factor analysis of sets of data on Seattle containing, respectively, forty-two, twenty-one, twelve, and ten variables. They found that the basic factors, socio-economic status, family status, and ethnic status, appeared in all four matrices. The factor matrix produced by the analysis of ten variables provided a good representation of the three basic dimensions found in the analysis of the forty-two variables. It appeared that increasing the number of variables led to the emergence of new specific factors along with the three or four basic factors.

The studies reviewed in this section which test the applicability of the social area model do not directly assess the validity of the theory of increasing societal scale.

#### Testing the Theory of Increasing Societal Scale

Few studies (Udry, 1964; McElrath, 1962, 1968; Clignet and Sween, 1969) have attempted to measure the validity of the theory of increasing societal scale. With the aid of factor analysis, Udry (1964) tried to determine whether the trends which Shevky and Bell identified as aspects of increasing societal scale had occurred in the development of the United States between 1850 and 1960. He found that the hypothesized correlations between the trends and increasing societal scale appeared for the 1900 to 1940 period, but that there were several unexpected fluctuations in the trends over the century. His study partially confirmed the close relationship of the social rank and the urbanization axes with aspects of increasing scale. The segregation axis, however, appeared to be unrelated to increasing societal scale, to changes in the distribution of skills, and to urbanization.

A second method was applied by McElrath (1962, 1968) who compared the structure of ecological differentiation in cities located in societies which were at different levels of development. He attempted to test

the hypothesis that the lower the scale of a society, the more closely the sub-areas are found to be differentiated by only one dimension of the typology; the higher the scale of a society, the greater the factorial separation of the variables and the larger the number of dimensions that differentiate sub-areas. McElrath (1968) found that changes along the four trends associated with increasing societal scale had progressed from Ghana to Jamaica to Italy to the United States, and that development of the dimensions of social differentiation had progressed in a parallel order in their centers: Accra, Kingston, Rome, and ten medium-sized American cities<sup>6</sup> and the San Francisco Bay Region. He found that the social rank factor appeared as an independent dimension in societies, such as Ghana and Jamaica, where only limited changes in the distribution of skills had occurred. He concluded that the family status factor does not operate independently of the social rank factor in an urban area located in a society, such as Accra, in which only limited changes in the structure of production had taken place. This dimension increased its independence from other forms of differentiation as the scale of the society increased, reaching its greatest independence in urban centers

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<sup>6</sup> Akron, Atlanta, Birmingham, Kansas City, Louisville, Minneapolis, Portland, Providence, Rochester, Seattle

in large-scale societies, such as the United States. He found that the social rank factor also reached its greatest independence in large-scale societies, although both dimensions showed variations in independence within large-scale societies, with more independence in large metropolitan areas such as the San Francisco Bay Region than in smaller urban centers.

These findings concerning the social rank and family status dimensions support the hypothesis which states that increasing differentiation is a necessary consequence of increasing scale. In the absence of strictly comparable data, McElrath was unable to test this hypothesis for the migration and ethnic status constructs. McElrath suspected that migration status had declined in importance in recent years in the United States. He suggested that migration status probably lagged behind a declining rate of urban aggregation and ceased to be an important factor in social differentiation soon after the city had been built up. There is evidence to support his view that the ethnic status factor may be as enduring as the social status factor since it is an important dimension in low-scale and high-scale societies.

Clignet and Sween (1969) tested the validity of the theory of increasing societal scale by examining the form and extent of social differentiation in the major cities, Accra and Abidjan, of two African societies, Ghana

and Ivory Coast, with similarly low scalar positions and high scalar slopes, that is, rapid development. Clignet and Sween found that Accra and Abidjan differed in terms of the rank ordering and the discriminative power of the dimensions of differentiation. Also, the dimensions were more independent of one another in Accra than in Abidjan. They accounted for these differences in terms of the intervening effects of the city-size distribution, the political organization, and the origin and composition of the migrant population of each of the cities.

Clignet and Sween (1969) hypothesized that the main determinants of social differentiation in these two cities would be similarly limited in discriminative power and in independence. By comparing the analyses of variables associated with social rank and family status in Accra, Abidjan, Rome, and San Francisco, Clignet and Sween demonstrated that the discriminative power and independence of these factors were lower in the African centers than in the Italian and American cities and that the emergence of these two dimensions was sequential, as demonstrated by McElrath (1962). Speculating on the importance of migration and ethnic status, they suggested that these dimensions may operate only at certain points of scalar development, or may be more influenced by scalar slope than by the scalar positions of the societies investigated. Clignet and Sween (1969: 321) found support for the view that

"increase in scale is associated with a greater separation of the main determinants of social differentiation," although scalar slope and cultural variables may mask the effects of increase in scalar position upon urban sub-area differentiation.

The studies reviewed in this section have generally supported the hypothesis which states that increasing differentiation is a necessary consequence of increasing societal scale. Studies conducted in urban areas situated in low-scale or traditional societies revealed that the population was differentiated along a single dimension. Studies of urban areas located in high-scale societies have generally shown that three or four factors--social status, family status, as well as ethnic status and/or migration status--are necessary to account for variations between sub-area populations.

#### Changes in the Dimensions of Differentiation Over Time

Interest in studying changes in the structure of differentiation over time has mainly centered around generalizations made from cross-sectional data of urban areas situated in low-scale societies. Studies of this nature (Abu-Lughod, 1969; Berry and Rees, 1969; Schwirian and Smith, 1969) have aided in understanding the changes that occur in the relative importance of the ecological

dimensions over time.

Abu-Lughod (1969) factor analyzed social characteristics of Cairo, Egypt measured in 1947 and 1960 in order to test the hypothesis which states that social differentiation is less complex in low-scale societies than in high-scale societies. She found that indicators of social rank and family status did not separate into two factors as they had in studies of large-scale societies. Her findings indicated that the social area model is not applicable to low-scale societies because different patterns of relationships between social characteristics and dimensions of differentiation may be expected in low-scale and high-scale societies. This research led Abu-Lughod to outline the conditions under which one would expect social rank and familism to be disassociated from one another. These conditions are as follows:

(1) if stages in the life cycle were clearly distinguished from one another, each stage being associated with a change in residence; and (2) if sufficiently large sub-areas within the city offered, at all economic levels, highly specialized housing accommodations suited to families at particular points in their natural cycle of growth and decline; ... (3) cultural values permitting and favoring mobility to maximize housing efficiency, unencumbered by 'unnatural' frictions of sentiment, local attachments, and restrictive regulations. (1969: 209).

Berry and Rees (1969) have factor analyzed data on Calcutta in order to test the idea that the city is in some transitional developmental stage. This view contains

the assumption that the rapid rate of urbanization but slower rate of industrialization in India has resulted in the continued relevance of ethnicity for residential patterning in cities. Ethnic groups continued to live in separate areas of the city, to maintain their own culture and language, and to pursue a certain range of occupations because of the scarcity of jobs and the need for economic support from others. Berry and Rees found that the differentiating factors included ethnicity, familism, and specialization of land use along class lines that replaced ethnic lines. They were able to locate a separate family status factor, but the social rank and ethnic status factors were closely linked. The latter finding is characteristic of pre-industrial societies. They concluded that ethnicity was the fundamental social dimension of residential differentiation in Calcutta. The findings, which contain a mixture of pre-industrial and industrial ecologies, lend support to the view that Calcutta is in a transitional stage of development. Berry and Rees expect that as the industrialization process continues, the social rank and ethnic status dimensions will separate.

In a more recent study, Berry and Spodek (1971) extended the analysis to include the ecology of several Indian cities<sup>7</sup> in 1961, and of Poona between 1811 and 1954.

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<sup>7</sup> Ahmedabad, Bombay, Kanpur, Madras, Poona, Sholapur

Socio-economic status appeared to be the dominant theme in the residential geography of the Indian city in 1960. They reported that the traditional communal and caste statuses had been transformed into class status as an outgrowth of urbanization. There was also a strong familism factor which distinguished between familial areas and zones occupied by recent male migrants who were attracted by the industrialization of the cities. Berry and Spodek (1971) speculated on the future of these trends. They suggested that the emerging forms of differentiation may resemble in time the structure of differentiation found in the industrial metropolis located in a high-scale society, or that a new synthesis of traditional and modern ecologies may result. Landay (1971) has pointed out that there is a need for the development of a body of theory relating to the structure of each of the ethnic, religious, and racial groups, that is, to each ethnicity. Thus, in approaching Islamic cities, she proposed that the concept of ethnicity provides a viable synthesis of ecological, technological, and spatial theories, which takes into account sociological and religious factors.

Schwirian and Smith (1969) found support for the view that the extent and nature of social differentiation in cities located in societies undergoing economic development are determined by the size of the city in relation to other cities in the society, as well as by the

level of development of the society. They found that the social rank, familism, and ethnicity factors separated in San Juan, the primate city of Puerto Rico. This is similar to the pattern found in cities located in industrialized societies, although the correlations among all of the variables were greater in San Juan. Similar to the findings for cities in low-scale societies, no such factorial separation was found in Ponce and Mayaguez, secondary and isolated centers in Puerto Rico.

McElrath (1965, 1968) and Timms (1971) have made projections concerning the changes in the relative importance of the dimensions over time. McElrath (1968) predicted that in modern industrialized societies, familism would be the future dominant form of variation. McElrath suggested that the familial life-style was likely to be most prevalent in sections of urban centers with the greatest growth, the suburbs, and among those economic groups which have made the greatest gains in status, the upper and middle classes. The choice of life-styles, however, would become increasingly limited for those living in the central city due to their economic, ethnic, or migrant situation. He also suggested that the extreme form of migration status would likely disappear due to the reduced rate of rural to urban migration and the increased involvement of all persons in urban life. He suggested that ethnicity may become less important in restricting access of sub-populations to resources and rewards as the norms

and attitudes surrounding race and ethnic relations change.

Timms (1971) also suggested that the family status factor may become the most important single dimension of ecological structure in modern societies. He associated the structure of the urban residential system with the structure of consumption habits and relied on Abrams' (1968: 39-40) prediction that differences in standard of living will be related to stages in the life-cycle in the future, rather than to class differences as in the past.

There have been only a few studies (Udry, 1964; Hunter, 1971; Timms, 1971; Hunter and Latif, 1973) explicitly designed to examine changes in the dimensions of differentiation in an urban area over time. A related issue, that of change over time in the spatial patterning of social area dimensions, has been studied by Sweetser (1962), Pedersen (1965), Bourne and Barber (1971), and Murdie (1969). These studies have concentrated on approximating the pattern of growth of the underlying dimensions of social differentiation in an urban area with a sectorial, concentric, or multiple-nuclei pattern.

The analysis of Chicago by Hunter (1971) indicated that even in modern societies the overall level of ecological differentiation may increase over time as the society increases in scale. Hunter examined changes in the ecological structure of Chicago over time by factor

analyzing selected census data with "community areas" as the unit of observation from the 1930 through 1960 censuses. Economic status, family status, and racial-ethnic status factors were isolated for 1930. In 1940 these three factors were important as well as an additional factor with a high loading of percentage of single-family dwelling units and a moderate loading of percentage of females employed. In 1950 and 1960 the same four factors emerged, but no other variable besides percentage of single-family dwelling units loaded significantly on the fourth factor. These findings suggest that the distribution of housing types has decreasingly been related to the economic, family, and ethnic composition of the urban area. Hunter analyzed the relative and changing importance of each factor in differentiating the population between 1930 and 1960 by comparing the percentage of variance explained by the three main factors over the four decennial years. The explanatory power of the family status factor decreased over time while the power of the racial-ethnic factor increased. Hunter accounted for these changes in terms of the increased independence of the variable, percentage of single-family dwelling units, and the increasing association between the racial-ethnic status and family status factors due to the increasing segregation of foreign-born and Negro populations in Chicago and the different age structures of these two populations. Although the economic status factor replaced the family status factor

in 1940, 1950, and 1960 as the most important dimension, its relative position was mainly due to the changing significance of the other two factors. Furthermore, the percentage of total variance explained by the major factors decreased between 1930 and 1960, indicating that the local communities experienced increasing variability in their composition over the years.

Timms (1971: 185-191) assessed the stability of the social area axes over time through a factor analysis of Auckland, New Zealand data for the years 1926, 1936, 1951, and 1966. Family status, social rank, and ethnic status factors emerged as distinct, independent dimensions in each year. An additional factor, defined as urbanism-mobility, emerged in 1936. The importance of the family status factor greatly increased over the period while the power of the ethnic status factor and, to a lesser extent, the power of the social rank factor, decreased. The family status factor was the most important dimension in all four years. Between 1926 and 1966 there was a general increase in the proportion of total variance explained by the retained factors (all components with an eigenvalue greater than unity).

#### Research on Canadian Cities

Few studies in factorial ecology have been conducted on Canadian cities. Studies by Nicholson and

Yeates (1969) of Winnipeg, by Bourne and Barber (1971) of six small cities in Ontario and two in Quebec<sup>8</sup>, and by Murdie (1969) of Toronto mainly focused on the spatial patterning of social dimensions. Murdie also compared the factor structure of the 1951 analysis with that of the 1961 analysis as well as the total amount of variance these factors explained in each year. The results from these studies, however, are not readily interpreted because of the presence of statistical artifact. This problem will be discussed in Chapter III.

Cliffe-Phillips, Mercer, and Yeung (1968), Schwirian and Metre (1969), and Hunter and Latif (1973) have applied the theory of increasing societal scale to urban areas in Canada. In a study of the Montreal Metropolitan Area, Cliffe-Phillips, Mercer, and Yeung found a factorial separation similar to the separation found in studies of southern United States cities where ethnic factors loaded highly on a social rank factor such that only the social rank and life-style factors emerged as important (Cohen, 1968; Peters, 1968; Spodek, 1968). In Montreal the group loading significantly on a social rank factor was the English-speaking minority which occupies the higher end of the socio-economic scale, whereas in the southern United States cities, the significant minority group was

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<sup>8</sup> St. Catherines, Kingston, Sarnia, Brantford, Niagara Falls, Peterborough--Ontario; Trois Rivières, Sherbrooke--Quebec

the Negro population which occupies the lower end of the socio-economic scale.

Schwirian and Matre (1969) factor analyzed 1961 data on eleven principal Canadian cities.<sup>9</sup> The main factors, social rank, familism, and ethnicity, were fairly independent of one another. The exceptions included an association of fertility with the social rank factor in Toronto, and the correlations of the language variable with social rank measures in several eastern cities, including Toronto. The two measures of social rank, occupation and education, separated from one another in Edmonton, Vancouver, and Toronto. In all of the cities except Calgary and Hamilton, the three measures of family status separated from one another. These results plus those of Hunter (1971) indicate an even greater variation in life-style choices accompanying an increase in societal scale than was expected by Shevky, Bell, and Greer.

Hunter and Latif (1973) have studied the underlying dimensions of social differentiation in Winnipeg in 1951 and 1961, as well as the changes in their relative importance over the decade with the use of longitudinal data. In both years well-defined socio-economic status, familism, and migration status factors emerged as the most

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<sup>9</sup>Calgary, Edmonton, Hamilton, London, Montreal, Ottawa, Quebec, Toronto, Vancouver, Windsor, Winnipeg

discriminating dimensions of sub-areas in Winnipeg. The factor structures differed from Hunter's (1971) study of Chicago in that an ethnic measure loaded on the socio-economic factor in both years, percentage of single-family dwellings was increasingly involved in the familism factor, while percentage married loaded negatively on the migration factor in both years in their study of Winnipeg.

Comparing the factor structure in 1951 and 1961, Hunter and Latif found that the familism factor replaced the socio-economic status factor as the most important ecological dimension in 1961, while the migration status factor ranked third in both years. The importance of the familism factor greatly increased over the decade while that of the migration status factor decreased. The importance of the socio-economic status factor remained fairly constant between 1951 and 1961. Hunter and Latif accounted for the increasing importance of the familism factor partially in terms of the increasing involvement of the variable, percentage of single-family households, in this factor. Also, they claimed that suburbanization has been associated with differentiation along ethnic lines in the United States (Hunter, 1971), while in Canada the process has been associated with residential variation in life-styles, resulting in the increased importance of familism. Hunter and Latif found that the overall social differentiation in Winnipeg had decreased over time since there was an increase

in the percentage of variance in the matrix of inter-correlations explained by the major factors extracted from this matrix. Furthermore, familism remained a relatively independent dimension of ecological variation over the period, 1951 to 1961, while socio-economic status and migration status appear to have converged.

The studies in factorial ecology presented in the last two sections vary considerably in terms of their factor structures. Caution must be taken in comparing the results of these studies because the factor structures are a function of selected input variables, the number of variables, the observational area, the factor model, the rotation method, and the extent of urban community studied. Rees (1972: 289) stated that "only exact comparability of inputs is sufficient for the exact comparison of outputs in a comparative study."

### Hypotheses

On the basis of these findings, the following hypotheses are advanced for this study of Metropolitan Toronto:

1. At least three major dimensions will account for sub-area differentiation in the years 1951 and 1961.
2. The importance of the family status dimension in differentiating sub-areas of Metropolitan Toronto will increase between 1951 and 1961.

3. The importance of the social status dimension in differentiating sub-areas of Metropolitan Toronto will decrease between 1951 and 1961.
4. The importance of ethnic status and migration status dimensions in differentiating sub-areas of Metropolitan Toronto will decrease between 1951 and 1961.
5. There will be a decrease in the amount of variation in social differentiation explained by the main factors between 1951 and 1961.
6. The social status factor will be more closely associated with ethnic status and migration status in 1961 than in 1951.
7. The family status factor will be a fairly independent dimension of differentiation in 1951 and in 1961.

These hypotheses have been developed to investigate whether conclusions from previous studies apply to another Canadian city. If the results from this study corroborate previous findings with regard to the expected factor structures at two points in time as well as with regard to the changes in the relative importance of the ecological dimensions over time, then it may be argued that some consistency exists in the process of ecological differentiation among Canadian cities. It was proposed that the basic constructs of the social area model would be represented in the common factors. A examination of the results of studies of Canadian cities revealed that some variables selected to indicate socio-economic status

loaded significantly on an ethnic status factor and some variables selected to indicate ethnicity loaded significantly on a social status factor. Similar loadings were expected to result in this study of Toronto. It was expected that changes in the relative importance of the dimensions over time as well as changes in the overall degree of ecological differentiation over the decade would be similar to those found in the Winnipeg study.

## CHAPTER II

### THE GROWTH OF METROPOLITAN TORONTO

#### Introduction

Metropolitan Toronto is located on the northwest shore of Lake Ontario in the Great Lakes-St. Lawrence Lowlands, the most highly urbanized and industrialized part of Canada. It is situated close to the heavily populated industrial regions of the United States. A great commercial, industrial, and cultural center, it has experienced tremendous growth since 1953 when it became the first metropolitan region in North America to establish a federal system of metropolitan government. Metropolitan Toronto is the second largest metropolitan area in Canada and the thirteenth largest in North America.

In this study, Metropolitan Toronto refers to the area covered by the Municipality of Metropolitan Toronto, the same area which the Dominion Bureau of Statistics include in Census Metropolitan Toronto. It resulted from the federation of the City of Toronto and twelve suburban municipalities: the towns of Leaside, Mimico, New Toronto, and Weston; the villages of Forest Hill, Long Branch, and Swansea; and the townships of North York, Scarborough, Etobicoke, York, and East York. These areas are indicated

in Figure 1. The thirteen municipalities vary widely in size and in population. The City of Toronto, with 38 per cent of the population, covers less than 15 per cent of the land area. The three outlying townships of Scarborough, North York, and Etobicoke, with 44 per cent of the total population, occupy more than 74 per cent of the land area of Metropolitan Toronto (Annual Report of Municipal Statistics, Province of Ontario, 1963).

As background to the analysis, the development of Metropolitan Toronto will be outlined. The growth in terms of population size, population density, the federation of the thirteen municipalities, industrial development, and population composition will be discussed.

#### Historical Background

Toronto was founded early in the eighteenth century as a French trading post. In 1793 Toronto was selected as the capital of the recently created province of Upper Canada because of its harbour which would facilitate military operations as well as commercial enterprises. For a few years the town grew slowly, but attracted a wave of immigrants after the termination of the War of 1812 and the Napoleonic Wars. By 1834, the year the townsite was incorporated, its population was over 9,000.

The morphology of early Toronto was largely a product of government planning. In 1864 the entire

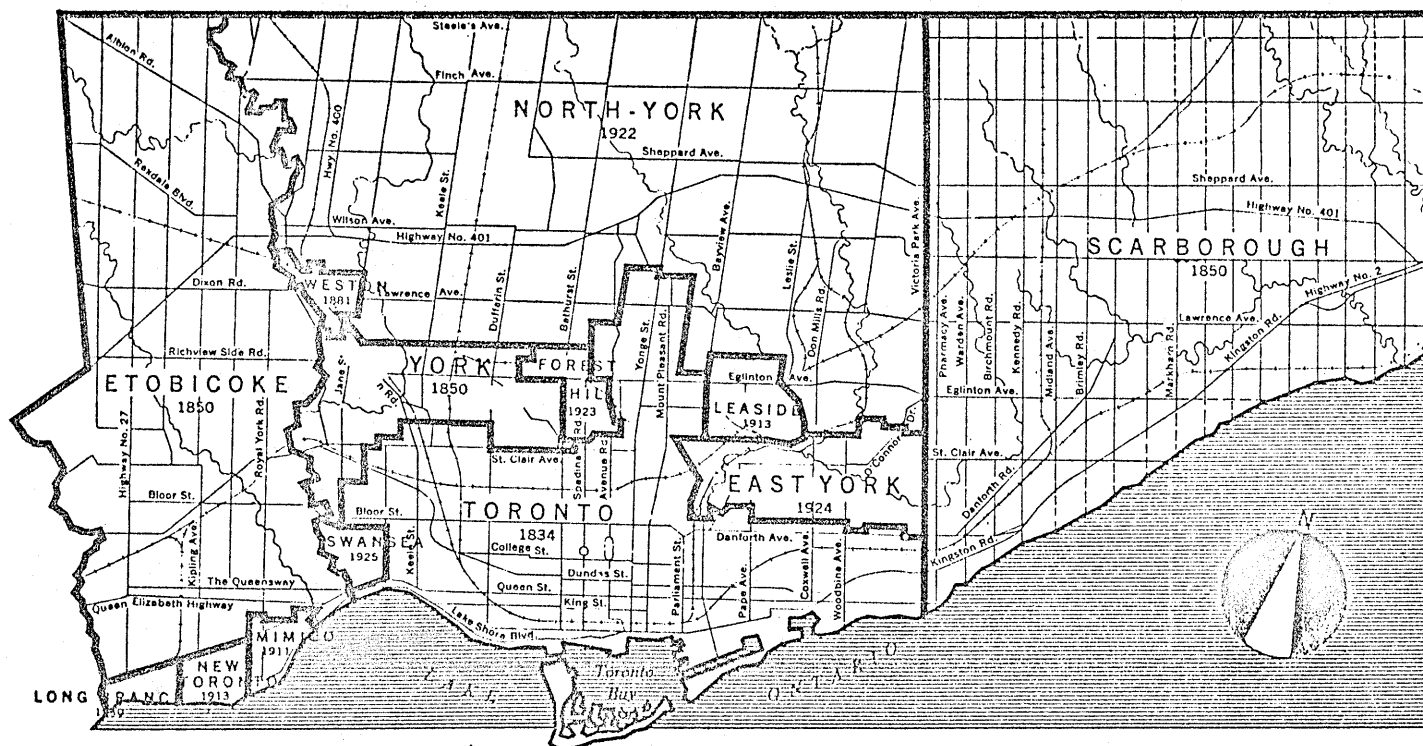


Fig. 1 THE MUNICIPALITY OF METROPOLITAN TORONTO

Source: H. Carl Goldenberg, Report of the Royal Commission on Metropolitan Toronto. Province of Ontario, 1965.

population of Toronto was packed into an area of a few square miles around Yonge Street, the main street running north from Lake Ontario.

The first major change in the physical pattern of Toronto came with the introduction of streetcars after 1880. Since the central city was the commercial center and held the workplaces of the population, residential development occurred along the streetcar lines. The main lines were a north-south line on Yonge Street, and east-west lines on Queen and Bloor Streets. Thus, according to Kaplan (1965), the City of Toronto developed like an inverted "T" with the bottom part running along the lake-shore and the vertical part running north on Yonge Street.

Kerr and Spelt (1965) have indicated other factors which they felt were responsible for the city's development toward the north and west. These included the physical difficulties in bridging the Don River, historical orientation along Dundas Street, the location of the main line of the Grand Trunk Railway to the northwest which encouraged industry, and the general "pull" of urban centers which lay to the west in the rich agricultural hinterland of Southern Ontario.

The first threat to this pattern came in the 1920's with the mass production of an inexpensive car, coupled with the spread of economic affluence, which enabled large numbers of people to own a car. Consequently, families

could spread out instead of clustering close to streetcar lines or the downtown area. Despite extensive physical growth, the physical pattern of the nineteenth century city remained until very recently when commercial and business enterprises have begun to decentralize.

Deacon (1944) described the morphology of Toronto in 1941. She located four social classes of residential areas in Toronto. These were the homes of newly arrived immigrants and unskilled workmen within and at the fringe of the central business district and warehouse areas in the oldest section of the city; the working class homes close to railway and industrial sites and in certain parts of the central city where high class homes had deteriorated; middle class homes on good topographic sites such as the Beaches area; and the first class residential areas which occupied hill sites overlooking forested ravines. Although immigration accounted for a large proportion of the city's population increase between 1911 and 1941, 78 per cent of Toronto's population was of British background in 1941. Deacon found that most of the non-British groups were centered in a tight nucleus immediately west of the central business district, and that only the Jewish group had penetrated outward from this core.

### Modern Developments

The formation of Metropolitan Toronto in 1953 and the European immigration following World War II played important roles in the rapid growth of the metropolitan area. The federation of thirteen municipalities enabled residential services, especially water and sewage facilities, to be provided to outlying municipalities at substantially reduced costs. The large wave of immigration sharply increased population and stimulated a strong demand for new housing units. Approximately one-fifth of Metropolitan Toronto's population in 1961 immigrated to that city since 1946 (Dominion Bureau of Statistics, Census of Canada, 1961, Bulletin CT-15, Table 1). The increasingly complex ethnic composition became an important factor in the differentiation of residential areas. Several studies (Richmond, 1967a, 1967b, 1972; Darroch and Marston, 1969, 1971; Lieberman, 1970) have concentrated on the residential distribution of immigrants and ethnic groups in Metropolitan Toronto. Since spatial distance between social groups directly affects the nature of social interaction and exchange, these researchers have identified residential segregation of ethnic groups as a key aspect of social organization within the city.

Richmond (1967a) described the population of Toronto as a "mosaic" in which many ethnic communities were institutionally self-sufficient to a high degree.

He also discovered a variety of economic, social, and recreational services in languages other than English which served to solidify the ethnic groups. Darroch and Marston (1969) measured the spatial separation of the ethnic groups in Toronto in 1961 on different dimensions. They found support for a multi-dimensional conception of ethnicity which included national or ethnic origin, race, religion, period of immigration, birthplace, and language. In another study of Toronto, Darroch and Marston (1971) found that socio-economic differences between ethnic groups accounted for relatively small proportions of ethnic residential segregation in 1961. They inferred that ethnic status may be more salient than social class in accounting for residential segregation in Canadian cities while social class is more salient in comparable cities in the United States.

#### Population of Metropolitan Toronto

As mentioned in the previous section, the formation of the Municipality of Metropolitan Toronto in 1953 and the large wave of European immigration following World War II have led to many changes in the spatial and social structure of the metropolitan area. The increasing industrial development of Toronto as well as the expanding transportation facilities and the spread of economic affluence played important roles in changing the structure

of residential patterning.

Table 1 outlines an analysis of socio-economic differentiation and change during the 1951-1961 decade. The analysis is conducted in sections corresponding to major divisions of population characteristics in the Canadian Census.

TABLE 1

SELECTED POPULATION CHARACTERISTICS OF METROPOLITAN TORONTO,  
1951, 1961, AND 1951-1961

Characteristics	1951 %	1961 %	1951-1961 %
<u>Population Growth</u>			
Population size	1,210,353 <sup>a</sup>	1,824,481 <sup>a</sup>	50.7
<u>Age and Sex Distribution</u>			
Under 5 years	9.3	11.2	19.3
Under 15 years	21.4	29.0	35.4
Males	48.7	49.5	1.7
<u>Ethnic Origin</u>			
British Isles	72.7	60.7	- 16.5
Other European	3.7	10.4	180.1
Italian	2.5	7.7	207.5
<u>Religion</u>			
Roman Catholic	16.8	26.2	62.5
Anglican	27.6	21.8	- 21.0
Jewish	6.0	4.9	- 18.7
<u>Language</u>			
Speak neither English nor French	1.1	2.9	172.6
<u>Birthplace</u>			
Born outside of Canada	..	33.3	..
Immigrated, 1946-1961	..	22.2	..
<u>Schooling</u>			
Beyond elementary level	67.7	60.2	- 11.0
<u>Families</u>			
Average size of families	3.1	3.4	9.7

TABLE 1--Continued

Characteristics	1951 %	1961 %	1951-1961 %
<u>Dwelling Characteristics</u>			
Single detached	52.1	55.7	7.0
Apartments and flats	22.0	26.7	20.8
Households with lodgers	23.1	14.8	- 36.5
<u>Women in the Labour Force</u>			
Women 15+ years working	34.5	39.3	13.8
<u>Female Employment</u>			
Professional-technical	9.7	11.4	18.0
Clerical	40.9	40.9	0.0
<u>Male Employment</u>			
Professional-technical	8.8	11.0	24.5
<u>Income (\$)</u>			
Average male income	2455 <sup>a</sup>	4330 <sup>a</sup>	76.4
Average female income	1535	2338	52.3

Sources: Dominion Bureau of Statistics, Census of Canada, 1951, Bulletin CT-6; Census of Canada, 1961, Bulletin CT-15; Census of Canada, 1961, Bulletin 7.1-2, Tables ix and x.

<sup>a</sup>absolute figures

The population of Metropolitan Toronto increased by approximately one-half between 1951 and 1961. This compared with an increase of 22.8 per cent between 1941 and 1951 (Dominion Bureau of Statistics, Census of Canada, 1951, Bulletin CT-6). The components of population growth in Metropolitan Toronto are displayed in Table 2. It appears that Toronto has experienced a larger percentage increase between 1951 and 1961 than the average for all metropolitan

areas in Canada, as well as a larger net migration ratio. An examination of the changes over this decade in the population of the city proper and of the suburban part reveals that the city proper lost population due to out-migration while the suburban part gained population due both to a large natural increase ratio and an even larger net migration ratio.

TABLE 2

COMPONENTS OF POPULATION GROWTH IN METROPOLITAN  
TORONTO COMPARED WITH ALL CANADIAN  
METROPOLITAN AREAS, 1951-1961

Area <sup>a</sup>	Population		% increase 1951-1961	% of 1951 population	
	1951	1961		natural increase	net migration
All metropolitan areas in Canada	5,263,383	7,443,749	41.4	20.6	20.9
Metropolitan Toronto	1,117,470	1,618,787	44.9	18.8	26.1
City proper	675,754	672,407	- 0.5	11.7	-12.2
Suburban part	441,716	946,380	114.2	29.5	84.7

Source: Dominion Bureau of Statistics, Census of Canada, 1961,  
Bulletin 7.1-2, Tables ix and x.

<sup>a</sup> area as of 1956 Census

The age distribution of Metropolitan Toronto displayed in Table 1 changed only slightly between 1951 and 1961. The proportion of younger persons increased over the decade. The males slightly improved their representation over the decade, but were still in the minority in 1961.

There were significant changes in the ethnic and religious composition of the population during the decade, primarily due to post World War II immigration. The British Isles group, although still the outstanding ethnic group in terms of size in 1961, decreased its proportion to 60.7 per cent. Persons of Italian and Other European (mainly from Greece, Hungary, and the Baltic countries) origins displayed the largest relative increases between 1951 and 1961. Table 3 displays the ethnic origin of the immigrants in Toronto in various time intervals. The largest proportion of postwar immigrants were of British origin (29.7 per cent) but the Italians and Other European groups also formed a large proportion of the postwar immigrants in Toronto (22.3 and 22.0, respectively). Similarly, the largest religious denomination of 1951, the Anglican Church, declined in size over the decade while the Roman Catholic Church increased in size such that it replaced the Anglican Church as the largest denomination. The Jewish group also declined in size but they represented only 6.0 per cent of the population

TABLE 3

PERIOD OF IMMIGRATION BY ETHNIC GROUP, METROPOLITAN TORONTO, 1961

Ethnic Group	Prewar %	Postwar				Total %
		1946- 1950 %	1951- 1955 %	1956- 1961 %	Total %	
British	66.32	35.23	26.98	29.88	29.7	41.91
French	0.67	0.50	0.54	0.62	0.6	0.61
German	1.87	2.56	12.98	10.50	10.1	7.33
Italian	2.84	7.37	23.57	26.94	22.3	15.83
Netherlands	0.56	2.24	4.89	2.65	3.4	2.47
Polish	5.53	11.84	4.24	2.70	4.8	5.07
Russian	1.49	1.08	0.67	0.27	0.6	0.87
Scandinavian	0.98	0.60	1.13	1.56	1.2	1.15
Ukrainian	3.56	9.21	2.91	0.85	3.1	3.23
Other European	13.81	27.92	20.32	21.09	22.0	19.25
Asiatic	1.64	0.88	1.16	1.60	1.3	1.42
Other & not stated	0.76	0.57	0.59	1.34	0.9	0.87
Total number	201,418	69,256	153,057	182,391	405,704	607,122

Source: Dominion Bureau of Statistics, Census of Canada, 1961,  
Bulletin 1.3-11.

in 1951. Table 4 illustrates the religious composition of the immigrants to Toronto. It appears that the large increase in the proportion of Roman Catholics in Toronto between 1951 and 1961 is partially due to the large percentage (45.5) of persons of the Roman Catholic Church among postwar immigrants.

TABLE 4

PERIOD OF IMMIGRATION BY RELIGION, METROPOLITAN TORONTO, 1961

Denomination	Prewar %	Postwar				Total %
		1946- 1950 %	1951- 1955 %	1956 1961 %	Total %	
Anglican Church	29.59	16.17	12.10	14.03	13.7	18.98
Baptist	3.39	1.64	1.31	1.16	1.3	2.00
Greek Orthodox	3.56	6.35	5.08	5.34	5.4	4.80
Jewish	9.55	9.32	3.49	3.47	4.5	6.17
Lutheran	2.41	8.63	12.95	8.16	10.2	7.62
Mennonite	0.06	0.07	0.03	0.02	0.0	0.04
Pentecostal	0.36	0.29	0.32	0.28	0.3	0.32
Presbyterian	12.50	7.08	6.52	6.18	6.5	8.48
Roman Catholic	14.47	31.30	45.31	51.00	45.5	35.14
Ukrainian Greek Catholic	1.87	6.37	1.70	0.70	2.0	1.99
United Church	17.69	8.62	6.65	5.42	6.4	10.19
Other	4.55	3.14	4.53	4.23	4.2	4.29
Total number	201,418	69,256	153,057	182,391	405,704	607,122

Source: Dominion Bureau of Statistics, Census of Canada, 1961,  
Bulletin 1.3-11.

The impact of the immigrants is also reflected in Table 1 in the proportion of the population who spoke neither English nor French, which greatly increased over the decade, but the percentage was still quite small in 1961 (2.9). The 1961 Census gives the birthplace and immigration experience of the urban population. One-third

of Metropolitan Toronto's 1961 population were born outside of Canada, and almost one-quarter of the area's population immigrated to Canada following World War II. This is in contrast to the American standard metropolitan statistical areas in which the proportion of foreign-born has decreased between 1951 and 1961, but where the rural to urban migration of Negroes, Puerto Ricans, and Southern Whites has greatly increased over the decade.

The summary measure of schooling used in this analysis, the percentage of persons not attending school who have education beyond the elementary level, gives an indication of those with sufficient knowledge to participate in an urban society. The fact that the percentage of the population with this amount of education declined between 1951 and 1961 may reflect the educational level of the recent migrants of Toronto.

Table 1 also shows that the average size of families increased between 1951 and 1961. Concerning dwelling characteristics, the number of single-detached units slightly increased over the decade and the number of apartments and flats increased to a greater extent. Table 5 displays the type of housing in Metropolitan Toronto by period of immigration. The postwar immigrants showed a greater tendency to live in single-attached units and apartments and flats but a lesser tendency to live in single-detached dwellings than Canadian-born persons.

TABLE 5

## TYPE OF HOUSING, METROPOLITAN TORONTO, 1961

Type of Housing	Canadian-born %	Immigrants		Total %
		Prewar %	1946-1961 %	
Single detached	59.11	59.47	43.88	55.75
Single attached	13.93	19.53	24.60	17.49
Flat or apartment	26.83	20.99	31.45	26.67
Owned	65.95	77.73	61.87	67.45
Rented	34.05	22.27	38.13	32.55
Reporting a mortgage	37.97	27.88	32.84	34.72
Number of households	174,441	99,106	108,943	482,940

Source: Dominion Bureau of Statistics, Census of Canada, 1961, Bulletin 1.3-11.

The general trend toward increasing labour force participation by women in Metropolitan Toronto is reflected in Table 1. There is also a slight increase in the percentage of the female labour force in professional-technical occupations. There is a greater increase in the percentage of the male labour force in this occupational category. The occupational structure of the experienced female labour force by period of immigration is displayed in Table 6. The postwar female immigrants appear to be over-represented in the service and recreation as well as in the craftsmen and production categories, and under-represented in the professional and technical occupations. Table 7 provides

TABLE 6

EXPERIENCED FEMALE LABOUR FORCE BY PERIOD OF IMMIGRATION,  
METROPOLITAN TORONTO, 1961

Occupation	Canadian-born %	Immigrants			Total %
		Pre-War %	Post-War 1946-1961 %	Total %	
Managerial	2.6	4.7	1.6	2.4	2.6
Prof. and tech.	14.3	7.0	7.3	7.2	11.4
Clerical	48.1	27.2	31.6	30.5	40.9
Sales	7.8	11.2	5.3	6.8	7.4
Service & recreation	12.4	29.0	25.5	26.4	18.1
Transport & Communications	2.7	2.0	0.9	1.2	2.1
Farmers, etc.	0.1	0.3	0.2	0.2	0.2
Craftsmen & production	9.3	16.3	24.2	22.2	14.6
Labourers, nes <sup>a</sup>	1.0	1.3	2.3	2.0	1.4
Occupation not stated	1.6	0.9	1.2	1.1	1.4
Total number	153,895	27,432	79,306	106,738	260,633

Source: Dominion Bureau of Statistics, Census of Canada, 1961 unpublished tables, appeared in Anthony Richmond, Immigrants and Ethnic Groups in Metropolitan Toronto, Toronto: Institute for Behavioural Research, York University, 1967, Table 22.

<sup>a</sup> not elsewhere stated

TABLE 7

EXPERIENCED MALE LABOUR FORCE BY PERIOD OF IMMIGRATION,  
METROPOLITAN TORONTO, 1961

Occupation	Canadian-born %	Immigrants			Total %
		Pre-War %	Post-War 1945-1961 %	Total %	
Managerial	15.4	19.1	8.5	11.7	13.8
Prof. and tech.	12.6	7.7	9.2	8.7	11.0
Clerical	12.6	9.3	7.8	8.3	10.7
Sales	9.8	6.2	4.8	5.2	7.8
Service & recreation	6.4	12.1	10.2	10.8	8.3
transport & communication	9.0	5.6	4.2	4.6	7.1
farmers, etc.	1.4	1.6	1.7	1.7	1.5
Craftsmen & production	26.2	33.0	41.7	39.1	31.8
Labourers, nes <sup>a</sup>	3.6	3.3	9.6	7.7	5.4
Occupation not stated	2.9	2.1	2.3	2.2	2.6
Total number	301,176	69,327	158,515	227,842	529,018

Source: Dominion Bureau of Statistics, Census of Canada, 1961  
unpublished tables, appeared in Anthony Richmond, Immigrants  
and Ethnic Groups in Metropolitan Toronto, Toronto:  
Institute for Behavioural Research, York University, 1967,  
Table 21.<sup>1</sup>

<sup>a</sup> not elsewhere stated

the experienced male labour force characteristics by period of immigration. The postwar male immigrants appear to be over-represented in the craftsmen and production category, as well as the labourers and service and recreational categories. They are under-represented in managerial, professional, technical, clerical, and sales positions.

The average income of both males and females greatly increased over the decade, according to the figures given in Table 1. This may be accounted for in terms of the increasing industrialization of the metropolitan area and the increasing economic affluence.

Thus, there were several significant trends during the decade, including the particularly large increase in population in the suburban part of Metropolitan Toronto, an increase in the proportion of young persons, an increase in the proportion of apartments and flats, an increase in the percentage of women in the labour force, an increase in the proportion of the male labour force in professional-technical positions, and an increase in the average wage for both males and females. One of the most significant areas of change was the ethnic structure. These changes were reflected in the ethnic origin, religious background, language, and birthplace of the residents of Metropolitan Toronto between 1951 and 1961.

## CHAPTER III

### RESEARCH METHODOLOGY

#### Sources of Data

Metropolitan Toronto, the urban area selected for study, is a large urban center in a modern society which, in the last century, has experienced rapid industrialization and urbanization. Census Metropolitan Toronto had a population of 1,824,481 in 1961 which renders it the second largest Canadian city. One of the largest cities was preferred to a smaller city because most of the research in factorial ecology has been conducted in cities with large populations. The changes in size and character of the population render Toronto a valuable center in which to examine the changes in the dimensions of social differentiation over time which accompany industrialization and urbanization. The years, 1951 and 1961, were chosen because the Census of Canada was not published for any preceding or intermediate years for small area data. It was hoped that data for the 1971 census could have been incorporated into this analysis, but the required data were not available when this research was undertaken.

Information concerning population and housing characteristics by census tracts gathered in 1951 and 1961

by the Dominion Bureau of Statistics (Census of Canada, 1951, Bulletin CT-6; Census of Canada, 1961, Bulletin CT-15) provided the data for this study.

According to the Dominion Bureau of Statistics, "census tracts are designed to be relatively uniform in area and population, and such that each is fairly homogeneous with respect to economic status and living conditions." (Census of Canada, 1961, Bulletin CT-15) The census tract was chosen as the unit of analysis because of its use in other studies, and the availability of information based on this unit. Index maps of the census tracts delineated in 1951 and 1961 are presented in Figures 2 and 3, respectively. Figure 4 illustrates the new tracts which have been delineated since 1951.

Some of the tracts delineated in 1951 and 1961 were not used because of lack of resident population, the presense of a hospital or similar institution, or lack of comparable boundaries between the two years. The 1951 tract boundaries were used as a basis for the analysis. Since boundaries of some of the census tracts were changed between the two years, mainly due to population increases, tracts were included whose boundaries were unchanged between 1951 and 1961 as well as tracts whose boundaries were changed such that one tract was subdivided into two or more tracts in 1961 and which together claimed only the area included in the 1951 tract. Consequently,

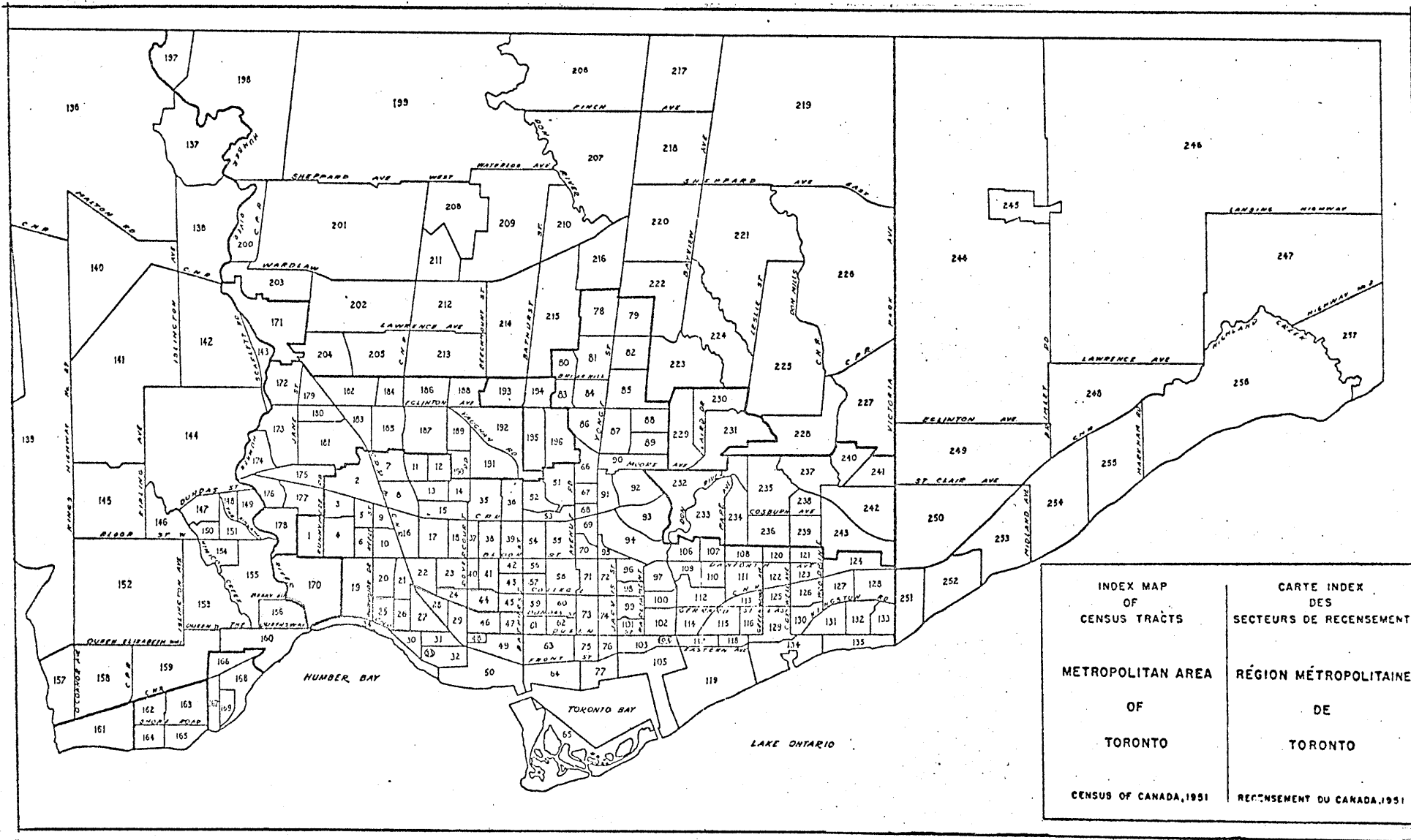
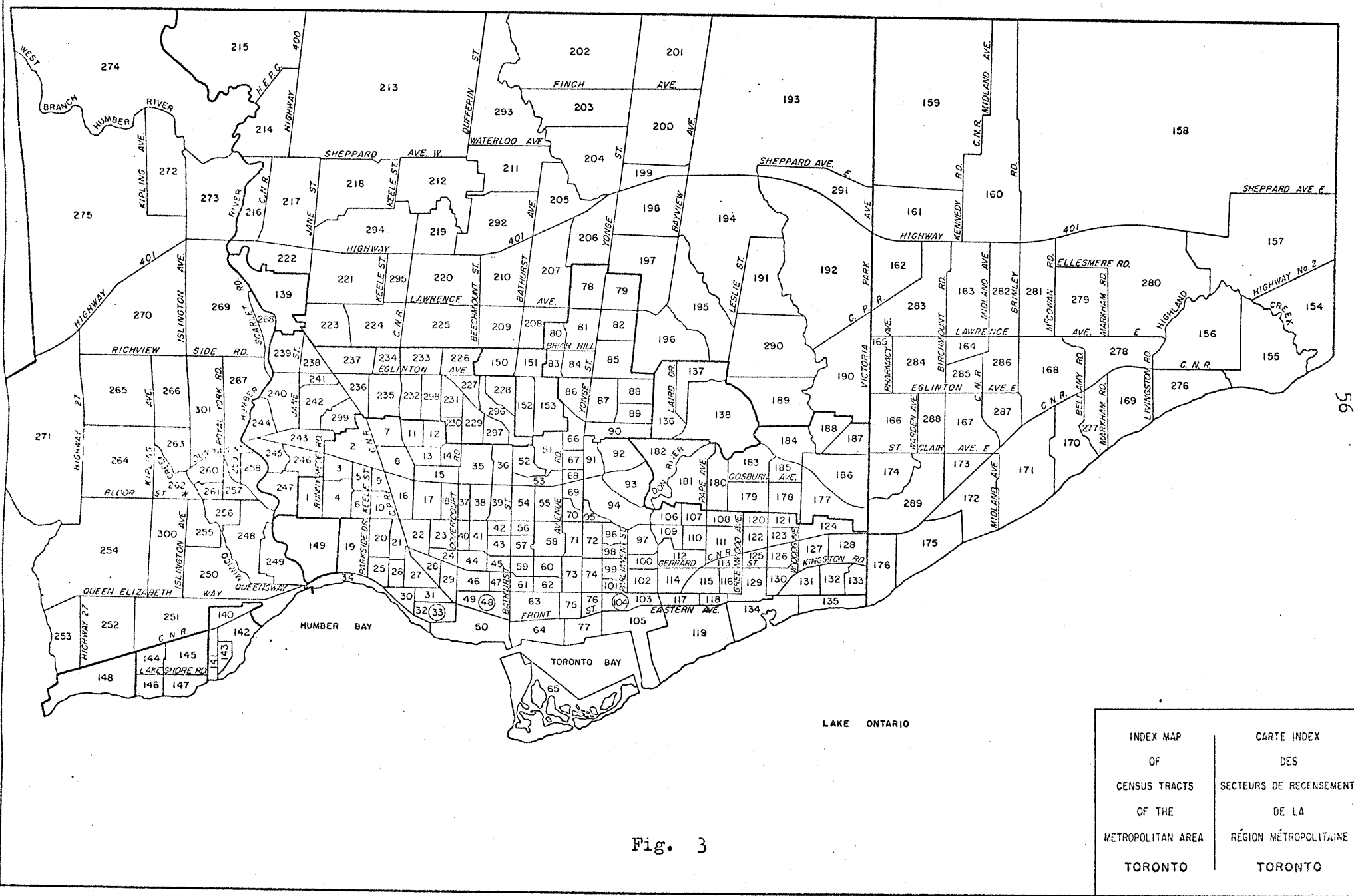


Fig. 2



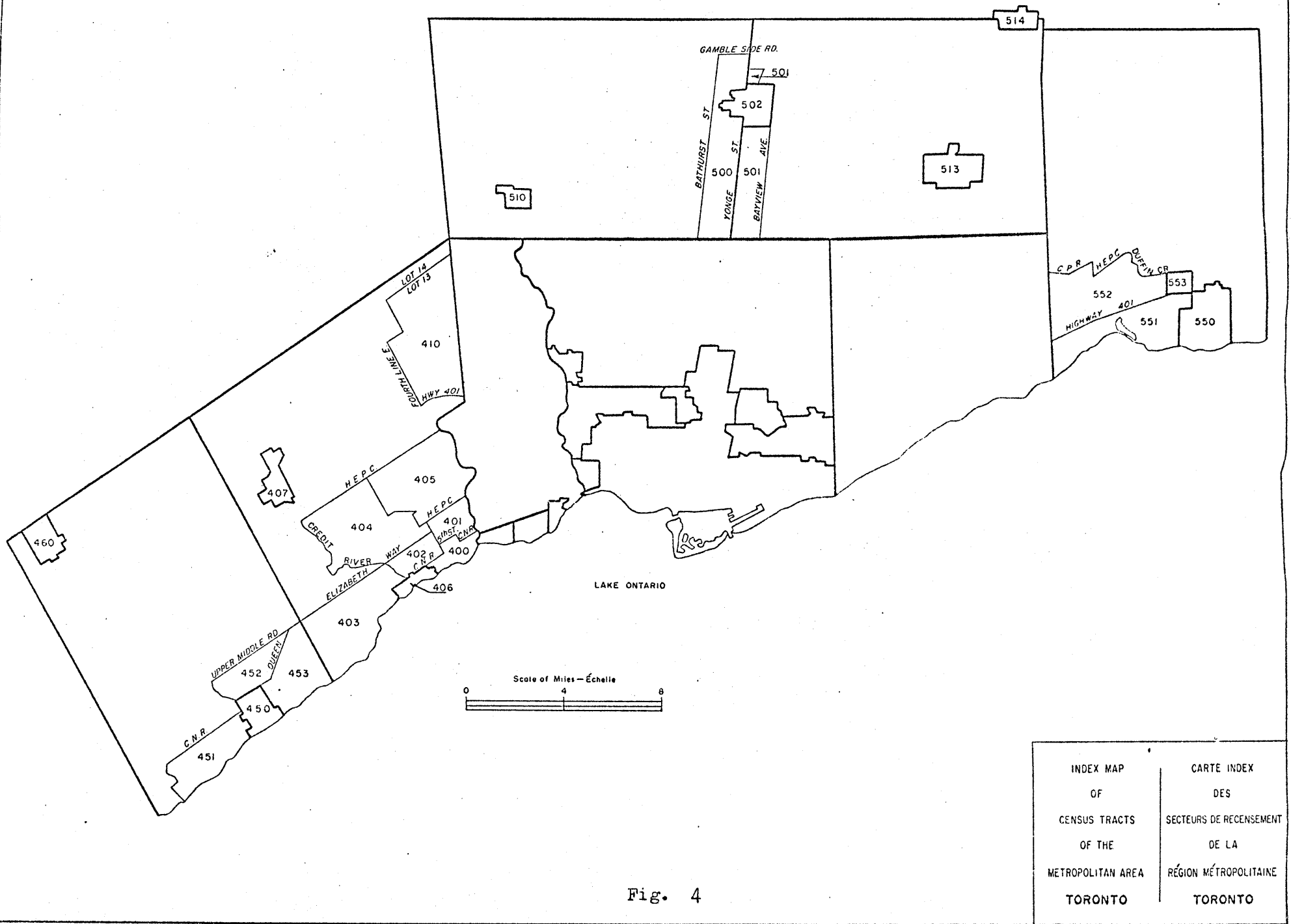


Fig. 4

79 per cent of the tracts delineated in 1951, that is, 204 tracts, and 69 per cent of the tracts delineated in 1961, that is, 225 tracts, were included in this study.<sup>10</sup>

### Data Preparation

Several factors were taken into consideration in selecting the variables. In order to produce results that would be directly comparable with those of other studies, variables were chosen which were similar to those found in other studies, especially with those found in Hunter and Latif's (1973) study of Winnipeg and Hunter's (1971) study of Chicago. Furthermore, in order to produce results which would be comparable between the two study years, the same variables were selected to be measured in both years.

Summary measures were selected in order to avoid the use of variables which form numerically dependent sets of multiple-category indicators. Latif and Hunter (1972) have drawn attention to studies in factorial ecology which involve problems of statistical artifact and yield results which are difficult to interpret due to the use of the latter type of variables (Nicholson and Yeates, 1969; Murdie, 1969; Jones, 1968; Berry and Rees, 1969). The presence of numerical dependence among sets of variables in these studies introduced serious statistical artifacts into the analysis. Since certain of the variables were

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<sup>10</sup> A list of census tracts eliminated from the analysis is provided in Appendix A.

perfect linear functions of other variables, available estimates of communality limited the number of iterations performed in obtaining final estimates, and the factor model was forced to fit. The problem of how to separate fact from artifact arose since there was confounding of numerical and empirical dependencies in such studies. The use of summary measures in this study allows the analysis to include a large number of observations relative to the number of variables, which would follow the statisticians' general acceptance of a ratio of three or four observations to each variable (Rummel, 1970: 221). This condition was not met by Nicholson and Yeates (1969), Murdie (1969), or Jones (1968).

Furthermore, the results of studies designed to test the importance of occupation, education, and income in determining socio-economic status, studies which examined the components of ethnicity, and studies which analyzed the effects of industrialization upon household and family characteristics, were taken into consideration. The list of variables also reflects the number and kind of variables available in the census tract bulletins as well as addition and deletion of variables between 1951 and 1961. With these considerations in mind, the following variables were selected:

1. percentage of males in the labour force employed  
in professional-technical occupations
2. percentage of females in the labour force employed in  
professional-technical occupations

3. percentage of non-school attenders with education beyond the elementary level
4. average male income
5. female labour force participation
6. percentage of single-detached dwellings
7. percentage of population under five years
8. average size of families
9. percentage British Isles
10. percentage who speak neither English nor French
11. sex ratio
12. percentage married
13. percentage Roman Catholic
14. relative population change quotient: 1941-1951, 1951-1961

The first four variables listed were selected as indicators of the social status construct. The theoretical relevance of these indicators has been demonstrated by several studies (Feldman and Tilly, 1960; Duncan and Duncan, 1955; Hunter, 1971). The measure of education selected was the best available indicator in the absense of a more sophisticated summary indicator such as median school years. The occupation of males and females were calculated separately in order to determine whether the distribution of this variable varied by sex.

Five variables were selected as indicators of

family status; female labour force participation; percentage of single-detached dwellings; percentage of population under five years; average size of families; and percentage married. The first two indicators have frequently been used in similar studies. Percentage of population under five years was selected as a substitute measure for the fertility ratio because of lack of information in 1951. The average size of families was selected as a measure of the extremes in family structure, grouping together the single population, the "potential families", and "old families" versus the households with relatively large families.

Percentage British Isles, percentage who speak neither English nor French, sex ratio, and percentage Roman Catholic were selected as indicators of ethnicity. The first two variables were selected on the basis of research by Hunter and Latif (1973) and Porter (1965) concerning the special position of the British ethnic group and the English-speaking population. The sex ratio was included to locate the new migrants in the urban area who are predominantly single males. The religious factor has its basis in Darroch's and Marston's (1969) study. Immigrant status and birthplace could not be employed here because of lack of data in 1951. The relative population change quotients for the two decades were suggested as crude measures of changes in societal scale by Hunter and Latif (1973).

The operational definitions of the variables are given in Appendix B. The variables were scored mainly in terms of percentages and averages. Definitions of the census terms which need to be elaborated upon are presented in Appendix C.

The results of the analyses depend to a large extent on the reliability of census data collected by the Dominion Bureau of Statistics. It is generally recognized by statisticians that at the level of small area statistics, some errors in the raw data are inevitable. The severity of such errors varies across the urban area depending on several characteristics such as the nature of the variable being measured, the biases and errors of both the enumerator and the respondent, and the sample size for the study of occupied dwellings. It is assumed, however, that these errors do not effect the overall pattern of structure and change in the metropolitan area.

#### Statistical Techniques

Factor analysis is the method applied in this study to identify the major underlying dimensions of social differentiation in Metropolitan Toronto. It is a method which examines simultaneously the inter-relationships among many variables as measured by many different observations and summarizes the important relationships in the form of a

few basic patterns called factors. The fact that several sociologists and geographers have used factor analysis was demonstrated in the review of literature relevant to this study.

A classical-factor solution was selected because the observed correlations in the zero-order correlation matrix were assumed to be mainly the results of some underlying regularity in the data. It was assumed that each observed variable was influenced by various determinants, some of which were shared by other variables in the set while others were not shared by any other variable. Furthermore, it was assumed that the common determinants would account for all of the observed relations in the data and that the number of common determinants or factors would be smaller than the number of variables. This factor technique is a type of inferential technique which replaces the main diagonal of the correlation matrix with communality estimates before factoring. The basic model may be expressed as follows:

$$z_j = a_{j1}F_1 + a_{j2}F_2 + \dots + a_{jm}F_m + d_jU_j$$

where  $z_j$  = variable  $j$  in standardized form

$F_1$  = hypothetical factor

$U_j$  = unique factor for variable  $j$

$a_{j1}$  = standardized multiple-regression coefficient of variable  $j$  on factor 1 (factor loading)

$d_j$  = standardized regression coefficient of  
variable  $j$  on unique factor  $U$

$m$  = number of common factors

$n$  = number of observed variables

The particular type of classical-factor analysis used in this study is the principal-factor solution (Harman, 1967: 137-146). From the above formula, any term  $a_{j1}^2$  indicates the contribution of the factor  $F_1$  to the communality of  $z_j$ , while the sum of squares of factor coefficients gives the communality of a particular variable. The squared multiple correlation between a given variable and the remaining variables in the correlation matrix provided the initial estimate on communality of each variable. Factors with eigenvalues equal to or greater than unity in the unreduced correlation matrix were retained for rotation. An iteration procedure was included to improve the communality estimates. The main diagonal elements of the correlation matrix were replaced by the initial estimates of communality, the same number of factors were extracted from this reduced matrix, and the initial communality estimates were replaced by the variances accounted for by these factors. The process continued until the differences between two successive communality estimates were negligible. By this method, factors were extracted in order of their contribution to the total variance of the correlation matrix.

In order to produce a theoretically meaningful factor matrix, the factors were rotated by the varimax criterion, a form of orthogonal rotation (Harman, 1967: 334-341). This rotation method requires orthogonality among the factors, that is, the factors must not be correlated. This criterion centers on simplifying the columns of a factor matrix since the variance of the squared loadings in each column is maximized. The varimax criterion requires that the final factor loadings be such as to maximize the function:

$$V = \sum_{i=1}^m \sum_{j=1}^n (a_{ji}/h_j)^4 - \sum_{i=1}^m \left( \sum_{j=1}^n a_{ji}^2 / h_j \right)^2$$

where V = varimax criterion

$a_{ji}$  = specificity of variable  $z_j$

$h_j$  = communality of variable  $z_j$

The factor analysis program<sup>11</sup> used in this analysis outputs the correlation matrix for the variables, the initial factor loadings, and the factor loadings. The factor loadings were examined in order to identify the basic patterns underlying the original data matrix.

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<sup>11</sup> The sub-program FACTOR outlined in SPSS: Statistical Package for the Social Sciences was used to perform the analyses. The PA2 (principal factor with iteration) factoring method was used with the varimax rotation method, both described in the guidebook to SPSS (Nie, Bent, and Hull, 1970).

Since it was assumed that the factors are independent and additive, they are conceptually related to the theory of increasing societal scale as presented in Chapter I.

Hunter (1972) has drawn attention to the fact that the results one obtains in factorial ecology vary according to the factor and rotation models one employs, and there is no one solution which is preferred over all others. As a result, he proposed that in such studies, several different computing algorithms for obtaining initial solutions as well as both orthogonal and oblique rotation procedures be applied simultaneously to avoid the possibility that the results one obtains are not method-dependent. Hunter suggested that in studies of cities located in low-scale societies, referring explicitly to the study of Cairo in 1947 and 1960 (Abu-Lughod, 1969), it is possible that the orthogonality restriction prevented the social status and familism factors from emerging as distinct factors. Thus, an oblique solution, which assumes that correlations exist among the factors, is the more appropriate rotation method for studying ecological differentiation of cities within low-scale societies. Studies in factorial ecology of cities located in modern societies have typically used the varimax criterion, an orthogonal method. This method appears to be appropriate for such studies as well as for this study since the dimensions of differentiation may be assumed to be relatively independent in a modern society.

Following Hunter's suggestions, the analysis of the data has been conducted for three initial solutions, principal components, alpha, and image analysis, in addition to the principal-factor solution, and the matrices were rotated to an oblique solution as well as to the varimax criterion. An outline of the different initial and derived methods is presented in Appendix E.

Hunter's (1971: 434) method of analyzing the relative and changing importance of the major factors over time was used in this study. He compared the amount of variance each major factor explained over the years in his analysis.

The techniques used to analyze the direction of change in the overall degree of differentiation over time are those employed by Hunter (1971) and Hunter and Latif (1973). Hunter (1971: 433) compared the percentage of total variance in the matrix of inter-correlations explained by the major factors for the four years. If the inter-correlations among the variables declined such that the percentage of explained variance decreased, he took this as evidence of an increase in ecological differentiation. In addition, Latif and Hunter examined the inter-correlations among the factors using oblique rotation (Harman, 1967: 334-341). They expected that if the inter-correlations decrease over time, the factors are becoming increasingly independent, indicating an increase in ecological

differentiation. The latter procedure was also used to provide information concerning the relative independence of the major dimensions of differentiation.

The results of Hunter and Latif's (1973) study of the ecological structure of Winnipeg in 1951 and 1961 and the results of this study may be directly compared, assuming that the addition of one variable, percentage of families with less than three children, and the smaller number of census tracts delineated in Winnipeg, do not affect the results to a significant extent. The results of Hunter's (1971) study of Chicago in 1950 and 1960 and the results of this study must be compared with caution, since the studies differ in terms of the nature and size of observational areas as well as in terms of selected variables.

## CHAPTER IV

### FACTOR STRUCTURE OF METROPOLITAN TORONTO: 1951 AND 1961

#### Factor Structure, 1951

The factor loadings presented in Table 8 are the result of the analysis of the 1951 data. The columns contain the loadings of the variables on the three common factors, that is, factors which were retained because of an eigenvalue equal to or greater than unity. These results lend support to the first hypothesis which stated that at least three major dimensions would account for sub-area differentiation in both years. Study of the factor loadings indicates that the three common factors have loadings very similar to the classical familism, social status, and ethnic status dimensions which were hypothesized by Shevky and Bell and later confirmed in factor-analytic studies of census tract data for a number of North American and European cities. The three common factors accounted for 74.2 per cent of the total variance in the 1951 analysis.

As shown in Table 8, the first factor is strongly related to measures of young population, marital status, population change, family size, type of housing, and the participation of women in the labour force. These

TABLE 8

FACTOR STRUCTURE RESULTING FROM PRINCIPAL-FACTOR  
SOLUTION WITH VARIMAX ROTATION, 1951

Variable	Factor I Familism	Factor II Social Status	Factor III Ethnic Status
1. % males prof. and tech.	0.01	0.82	0.24
2. % females prof. and tech.	-0.12	0.81	0.06
3. % education beyond elementary	0.11	0.62	0.52
4. average male income	0.10	0.49	0.23
5. % females 14 <sup>+</sup> years working	-0.43	0.20	-0.10
6. % single-family dwelling units	0.48	0.11	0.37
7. % under 5 years	0.91	-0.31	0.07
8. average family size	0.53	-0.14	0.00
9. % British	0.11	0.08	0.85
10. % speak neither English nor French	-0.06	-0.16	-0.85
11. sex ratio	0.18	-0.21	-0.29
12. % married	0.76	-0.19	0.17
13. % Roman Catholic	-0.17	-0.24	-0.45
14. % population change, 1941-1951	0.73	0.20	0.07
Percentage of variance explained	37.6	27.6	9.1
Eigenvalue	5.26	3.86	1.27

relationships suggest that this is the familism dimension which has been identified in previous studies. An analysis of the factor loadings suggests that this factor places tracts on a continuum. At one end are census tracts characterized by large, young families, few women working outside of the home, and single-family dwellings.

Conversely, census tracts at the other end of the continuum are characterized by small families, more women in the labour force, and a high proportion of multiple dwellings. This factor, which is the most important dimension, explained 37.6 per cent of the variance.

Study of the factor loadings in the second column indicates that this dimension reflects the social status dimension which has been identified in previous studies. High, positive loadings were found for the four variables selected to indicate social status. These are: percentage of males professional and technical, percentage of females professional and technical, percentage of population with education beyond elementary, and average male income. An examination of the factor loadings on this dimension indicates that tracts are placed on a continuous scale. At one end are those tracts occupied by persons working in professional and technical positions, with high incomes and high levels of education. At the other end are those tracts characterized by labourers who characteristically have low incomes and low levels of education. This factor, which is second in importance, explained 27.6 per cent of the total variance.

The third factor has high and appropriately signed loadings of variables related to ethnic origin, language, and religion. Because of the close association of these variables with the third factor, this dimension has been

labeled ethnic status. Examination of the factor loadings indicates that at one end of the scale this dimension isolates tracts with a relatively large proportion of persons of British origin, who speak either English or French, have high levels of education, and are not Roman Catholics. At the opposite end of the scale are tracts with a relatively large proportion of persons of non-British origin, who do not speak either of the official languages in Canada, have low levels of education, and are Roman Catholics. This factor accounted for 9.1 per cent of the total variance.

On the basis of previous studies in factorial ecology of cities located in modern societies, the significant loading of the third variable, percentage population with education beyond elementary, on the ethnic status factor was unexpected. The positive association between this variable and the variable, percentage British, and the negative association between the education variable and the variables, percentage who speak neither English nor French and percentage Roman Catholic (which is revealed in the zero-order correlation matrix presented in Table 11 in Appendix D) suggests that there is an inverse association between educational level and ethnic status, that is, census tracts with a large proportion of British, English-speaking, Protestant persons generally are characterized by persons with high educational levels. This is not a new

discovery for Canadian cities since John Porter (1965) has noted that the Anglo-Saxon, Protestant group as a whole in Canada is better educated than groups of Italians, Ukrainians, and of other ethnic backgrounds.

The sex ratio was included in the analysis as an indicator of the migrant population since a large proportion of migrants to Canada have been young, single males (Richmond, 1967b). The failure of this variable to load on the ethnic status factor as well as its low communality (0.41), given in Table 13 in Appendix E, may indicate that sex ratio is not a good indicator of ethnicity.

In order to determine whether the results obtained in this study are dependent upon the method of factor analysis--principal-factor solution with varimax rotation--a multi-method approach has been taken. Tables 14, 15, and 16 in Appendix F show the results of the analysis of the 1951 data, using four initial solutions with varimax rotation. By examining Tables 14, 15, and 16, the loadings of the variables on three common factors appear to be very similar across the four solutions. These findings seem to indicate that the factor structure resulting from the application of the principal-factor solution with varimax rotation is not dependent on the initial solution employed.

Very different factor structures for the 1951 data are noted in Tables 17, 18, and 19 in Appendix F which were obtained by applying an oblique rotation method to

the factor matrices of the four initial solutions. Three common factors emerged in the four analyses, however, there is no clear pattern of factor loadings and the factor which accounted for most of the total variance in all four cases is a general style-of-life factor. These findings are in contrast to those of Hunter and Latif (1973), who found in their analysis of 1951 and 1961 data in Winnipeg, similar factor structures for these four initial solutions using orthogonal and oblique rotation with the exception of the combination of oblique rotation with alpha analysis and with image analysis.

The findings in this study would seem to indicate that the choice of one of the initial solutions does not affect the results, but that the choice of the rotation method is important in factorial ecology. The orthogonal rotation method was declared in Chapter III to be the appropriate method for this study, since the dimensions of differentiation may be assumed to be relatively independent in Toronto, a large city in a high-scale society. Therefore, the results reported in Table 8 are valid.

The ecological structure of the city of Toronto, then, can be described in terms of three general constructs which have been named familism, social status, and ethnic status. In general, the factor loadings indicate that in 1951 the ecological structure of Toronto is similar to the structure found for Winnipeg and for Chicago.

The construct labeled familism was consistent with comparable constructs found in American studies. Similarly, the social status factor was consistent with the social rank construct proposed in the Shevky-Bell model and confirmed in factor-analytic studies of American cities. The major anomaly which occurred with regard to the ethnic status factor concerned the significant loading of the educational variable on this factor. This suggests that at least a moderate association exists between ethnic status and social status in Canada.

Concerning the relative importance of the factors, the familism factor accounted for the largest proportion of the total variance, the social status factor ranked second in importance, and the ethnic status factor ranked third.

#### Factor Structure, 1961

The factors summarizing the ecological structure of Metropolitan Toronto in 1961 are presented in Table 9. Three factors which had eigenvalues equal to or greater than unity were retained for rotation. These findings lend support to the first hypothesis which was concerned with the importance of at least three major factors in differentiating census tracts in Toronto in 1951 and 1961. Examining the factor loadings, the three common factors are similar to the classical ethnic status, familism, and

social status dimensions which have been identified in several factor-analytic studies as well as in the analysis of the 1951 data in this study. The three common factors account for 73.4 per cent of the total variance in the 1961 analysis.

TABLE 9

FACTOR STRUCTURE RESULTING FROM PRINCIPAL-FACTOR  
SOLUTION WITH VARIMAX ROTATION, 1961

Variable	Factor I Ethnic Status	Factor II Familism	Factor III Social Status
1. % males prof. and tech.	0.38	0.12	0.61
2. % females prof. and tech.	0.26	-0.05	0.88
3. % education beyond elementary	0.66	0.22	0.37
4. average male income	0.41	0.58	0.41
5. % females 15 <sup>+</sup> years working	-0.14	-0.84	-0.07
6. % single-family dwelling units	0.29	0.76	0.09
7. % under 5 years	0.24	0.09	-0.39
8. average family size	-0.07	0.36	-0.07
9. % British	0.70	0.20	0.12
10. % speak neither English nor French	-0.95	-0.03	-0.11
11. sex ratio	-0.26	-0.01	-0.19
12. % married	-0.07	0.63	-0.41
13. % Roman Catholic	-0.81	-0.24	-0.25
14. % population change, 1951-1961	0.10	0.13	0.02
Percentage of variance explained	41.5	24.8	7.1
Eigenvalue	5.81	3.47	1.00

The first factor, which accounts for 41.5 per cent of the total variance, is the most important dimension of the ecological structure of the metropolitan area in 1961. It summarizes a number of variables related to ethnic status. This factor has high coefficients on the following variables: percentage who speak neither English nor French, percentage Roman Catholic, percentage British, percentage of population with education beyond elementary. This factor also has a non-trivial loading of the variable, average male income. It appears that tracts could be arranged along a continuum. At one end are those characterized by persons who speak one of the official languages in Canada, non-Roman Catholics, of British origin, with high levels of education and income. At the other end of the continuum are tracts occupied by persons who do not speak either of the two official languages, Roman Catholics, of non-Anglo-Saxon background, with low levels of education and income. The zero-order correlation matrix presented in Table 12 in Appendix D, shows positive correlations of the variable, percentage British, with the education and income variables as well as the negative correlations of the variables, percentage Roman Catholic and percentage who speak neither English nor French, with the education and income variables. These correlations seem to indicate a close association of income and educational levels with ethnic composition in the residential patterning of

Metropolitan Toronto in 1961. Reviewing the sixth hypothesis, it stated that the social status factors would become increasingly associated with the ethnic and migrant status factors over the decade. It appears that the hypothesis is partially supported since the education variable loaded significantly (0.52) on the ethnic status factor in 1951, while in 1961 the education variable as well as the income variable loaded significantly (0.66 and 0.41, respectively) on this factor.

Sex ratio did not load significantly on the ethnic status factor in 1961 just as it did not load significantly on this factor in 1951. This variable shares very little common factor variance with other variables, a fact revealed in its low communality (0.26) presented in Table 13 in Appendix E. It appears that this variable does not relate closely to any of the variables which were selected to formulate an ecological structure of Toronto.

The factor which accounted for the second largest amount of explained variance resembles the classical familism factor. High factor loadings were found for the following variables: percentage of females 15 years and over working, percentage of single-family dwelling units, percentage married, and average male income. These loadings reflect a pattern in which census tracts at one end of a continuum are inhabited by married persons who live in

Leaf blank to correct numbering.

single-family dwelling units, where the women do not work outside of the home, and where the males have high incomes. At the other end are tracts occupied by single persons, who live in multiple dwelling units, where women participate in the labour force, and men generally have low incomes. This factor appears to reflect characteristics of urbanization and housing preferences more than characteristics of family life, since the variables, percentage of population under five years and average family size, did not load significantly on this factor. Comparing these results with those of Anderson and Bean (1961) in a study of Toledo, the second factor in this study appears more like the urbanization factor than the family status factor found in the study of Toledo.

The findings of this study indicate that an important distinction can be made between census tracts occupied by persons who prefer to live in multiple-dwelling units, and who have low incomes, and those tracts characterized by persons who prefer a familial life-style, living in single-family dwelling units, and where the women do not work outside the home. This is similar to the results of the Winnipeg study conducted on 1961 data by Hunter and Latif (1973).

The third common factor, which accounted for 7.1 per cent of the total variance, is made up of a set of variables measuring occupational and income levels.

It appears to reflect the classical social status dimension. The education variable, however, does not load as highly as expected on the basis of the social area model. In fact, the education variable loaded significantly on the ethnic status factor. The loading of this variable has been discussed previously in the analysis of the ethnic status factor. It appears that social status is not an independent dimension of differentiation in 1961. The other unexpected finding was the non-trivial loading of percentage married on the social status factor (0.41). This variable, which was selected to indicate family status, loaded highest on the familism factor, but its loading on the social status factor is unusual. Its negative association with measures of occupational and income levels indicates that the factor differentiates between census tracts characterized by single persons with high incomes working in professional or technical occupations and census tracts occupied by married persons with low incomes and occupations of low status.

Similar to the multi-method research strategy applied to the 1951 data, four initial and two derived solutions were applied to the 1961 data. Tables 20, 21, and 22 in Appendix F give the results of the analysis for the three common factors, ethnic status, familism, and social rank, across the four initial solutions with orthogonal rotation. The factor loadings appear to be

very similar across the four initial solutions. Consequently, the factor structure obtained by using principal-factor analysis does not appear to be dependent on the type of initial solution employed.

Similar to the findings of the analysis of the 1951 data, the factor structures presented in Tables 23, 24, and 25 in Appendix F, which resulted from the application of oblique rotation across the four initial solutions to the 1961 data, are very different from the factor structures resulting from the application of orthogonal rotation. As in the earlier year, a general style-of-life factor is the most important factor. The orthogonal rotation method is the appropriate method for this study. Consequently, the factor structure presented in Table 9 resulting from the application of an orthogonal rotation method, is valid.

The ecological structure of Toronto, then, in 1961 can be described in terms of dimensions reflecting the ethnic status, familism, and social status constructs of the social area model. Certain of these dimensions, however, appear to differ in important ways from those formulated in the study of Winnipeg, in the study of Chicago, as well as in other studies.

The first construct, ethnic status, had, in addition to the loadings of variables selected to indicate ethnicity, significant loadings of the education and male

income variables. These unexpected loadings indicate a close association of educational and income levels, which were selected to indicate socio-economic status, with ethnic composition in the residential patterning of Toronto in 1961. Similarly, Hunter and Latif (1973) indicated an association among these variables since the variable, percentage British, loaded significantly on the socio-economic status factor in their analysis of Winnipeg in 1961.

The loadings on the second factor, which was labeled familism, differed from those on family status constructs in other studies in that the variables, percentage of population under five years and average family size, did not load significantly on this factor in the present study. It appears that, similar to Hunter and Latif's conclusions, an important distinction in characterizing census tracts in Canadian cities can be made between those occupied by persons who adopt urbanism as a way of life--single persons or small families, living in multiple-dwelling units-- and those occupied by persons who have adopted familism--married persons living in single-detached dwellings where the women do not participate in the labour force.

The third construct, social status, which is relatively weak, is indicated only by the occupational and income variables of those selected to tap socio-economic status. The higher loading of the income variable on the

family status construct than on this construct further illustrates the failure of the variables which typically indicate socio-economic status to form an independent dimension of differentiation. It appears that the social status construct has become increasingly dependent on the ethnic status construct over the decade.

#### Changes in the Factor Structure, 1951-1961

Reviewing the results of the two analyses for the years, 1951 and 1961, presented in Tables 8 and 9 and discussed in the preceding two sections, it appears that relatively well-defined common factors were delineated. In both years these factors were labeled familism, social status, and ethnic status. As mentioned in the previous two sections, the findings from both analyses confirm Hypothesis one which indicated that at least three major dimensions would account for sub-area differentiation in Toronto in 1951 and 1961.

With regard to the familism factor, there are a number of differences between the results of the 1951 analysis and those of the 1961 analysis. First, the variable, average male income, loaded significantly on this factor in 1961. The variables, percentage of population under five years, average family size, and percentage population change, did not load significantly on the familism factor in 1961 as they did in 1951. Third, the variables,

percentage females 15 years and over working and percentage of single-family dwelling units, were more involved in the familism factor in 1961 than in 1951.

Concerning the social status factor, there are three major differences between the results for 1951 and those for 1961 which require discussion. First, the variable, percentage of population with education beyond elementary, is more highly involved with this factor in 1951 than in 1961. Second, the income variable loaded significantly on all three factors in 1961, and most significantly on the family status factor, while in 1951 it loaded as expected with only a significant coefficient on the social status factor. These two anomalies in the 1961 analysis appear to indicate the growing weakness of this factor over the decade. The socio-economic variables, expected to load on the social status factor, do not appear to form an independent underlying dimension of differentiation. The socio-economic variables seem to be more closely associated with variables selected to indicate ethnicity in 1961 than in 1951. The weakness of the social status dimension in differentiating tracts in 1961 is also revealed in the small percentage of total variance which this factor explained (7.1 per cent).

Regarding the social status factor, the third difference between the results of the 1951 and 1961 analyses is the significant loading of the variable,

percentage married, on the social status factor in 1961. This finding adds evidence to the lack of independence of the social status dimension in 1961.

With regard to the ethnic status factor, the loadings of the variables, percentage who speak neither English nor French and percentage Roman Catholic, indicate that these two variables are more highly involved in this factor in 1961 than in 1951. Their increasing importance is also revealed in the communalities of these variables, listed in Table 13 in Appendix E, which increased over the decade. The other difference between the results of the two years is the significant loading of the variable, average male income, on this factor in 1961. These findings as well as the fact that the loading of the variable percentage of population with education beyond elementary increased, indicate a greater association between the ethnic status factor and the social status factor over time. A similar trend was reported for Winnipeg (Hunter and Latif, 1973). The large influx of immigrants to Toronto during the decade of the 1950's --immigrants who tended disproportionately to rank low in socio-economic status--probably accounts for the converging of the social status and ethnic status factors in this study.

An important difference between the two sets of analyses has to do with the relative importance of each of the factors in 1951 and 1961. In 1951, familism was the most

important factor, social status next, and ethnic status was third in importance. In 1961, ethnic status was the most important factor, followed by familism and then by social status. Examining Table 10 which gives the importance of the retained factors in 1951 and 1961, there was considerable change in the absolute amount of variance which the three factors explained.

TABLE 10

IMPORTANCE OF RETAINED FACTORS WITH PRINCIPAL-  
FACTOR SOLUTION AND VARIMAX ROTATION,  
1951 AND 1961

Factor	Percentage of Variance Explained	
	1951	1961
Familism	37.6	24.8
Ethnic status	9.1	41.5
Social status	27.6	7.1
Total	74.2	73.4

The importance of the familism factor declined slightly. This finding is in contrast to the trend expected since Hypothesis two stated that the importance of this factor would increase over the decade. The third hypothesis, which proposed that the importance of the social status factor would decrease over time, is supported by the results. The social status factor accounted for

27.6 per cent of the total variance in 1951 and 7.1 per cent of the total variance in 1961. Hypothesis four indicated that the importance of the ethnic status dimension would decrease from 1951 to 1961. This is not confirmed. The importance of the ethnic status factor showed the largest change. Accounting for 9.1 per cent of the total variance in 1951, the ethnic status factor increased its importance such that in 1961 it accounted for 41.5 per cent of the variance.

These results are very different from the study of Winnipeg. Hunter and Latif (1973) found that the importance of the socio-economic status factor remained relatively constant between 1951 and 1961, while the importance of the familism factor greatly increased and that of the migrant status factor slightly decreased.

Comparing the results of the present study with those of Hunter's (1971) study of Chicago, there are similarities in the changes in the importance of the dimensions over time. In his study, the importance of the familism factor remained relatively stable while the importance of the economic status factor declined considerably, and the importance of the racial-ethnic factor moderately increased (from 20.1 per cent in 1950 to 25.6 per cent in 1960).

It would appear that the trends in the relative importance of the factors presented in the study of Winnipeg are not found in Toronto. A very significant

difference lies in the decrease in the factor loadings for the variables, percentage of population who speak neither English nor French and percentage Roman Catholic, over the decade in the Winnipeg study in contrast to the increase in the factor loadings of these two variables in the present study. Probably the larger European immigration to Toronto between 1951 and 1961 than to Winnipeg played an important part in creating differences in ecological structure between the two metropolitan areas. The decreasing importance of familism in the present study may be due partially to the decreasing involvement of the variables, percentage of population under five years and average family size, with this factor.

In order to assess the changes in the overall degree of ecological differentiation between 1951 and 1961, the percentage of variance which was explained by the three common factors is compared for the two years. From an examination of Table 10, it appears that there has been a very slight increase in the overall ecological differentiation of Metropolitan Toronto between 1951 and 1961, since the percentage of explained variance slightly declined. This finding lends support to hypothesis five which proposed that there would be a decrease in the amount of variance explained by the main factors over the decade. Another method proposed to gauge the temporal changes in ecological differentiation, that of examining the

inter-correlations among the factors using an oblique rotation, cannot be applied in the present study because the oblique rotation consistently produced factor structures with three common factors that were different from those obtained by applying orthogonal rotation. Furthermore, this procedure was expected to provide some additional information with regard to changes in the relative independence of the common factors over time. Thus, Hypothesis Six, which stated that the social status factor would become more closely associated with ethnic status and migration status factors over the decade, and Hypothesis Seven, which proposed that the family status factor would remain a relatively independent dimension of differentiation over the decade, cannot be tested using this procedure. By reviewing the changes in the factor loadings between 1951 and 1961, however, it appears that the social status factor and the ethnic status factor converged, which confirms Hypothesis Six. The failure of all the socioeconomic status variables to load significantly on one factor as well as the small percentage of the total variance which the social status factor explained in 1961 reflects the decreasing independence of these variables. Since the variables selected to measure family status loaded significantly on only one factor in both years, with the exception of the non-trivial loading of the variable, percentage married, on the social status factor

in 1961, the family status factor appears to have remained relatively independent over the decade. This finding lends support to Hypothesis Seven.

Reviewing the importance of the common factors in 1951 and 1961 presented in Table 10, the European immigration appears to have greatly affected the ecological structure of Metropolitan Toronto. In 1951, familism and social status were the important dimensions of residential differentiation. In 1961, however, ethnic status and familism were the important dimensions of differentiation. These results suggest that the changes in the ethnic composition of the population had a very significant impact on the residential patterning of the metropolitan area.

## CHAPTER V

### SUMMARY AND DISCUSSION

The purpose of this study is to assess the validity of the theory of increasing societal scale through a longitudinal analysis of the ecological structure of Metropolitan Toronto. A theoretical framework was developed from the social area analysis-factorial ecology tradition. Originally formulated by Shevky, Williams, and Bell, the social area model delineates three constructs--social rank, family status, and ethnic status--designed to reflect aspects of increasing societal scale. Factorial ecology developed out of the need for a technique to test the generality of the social area model and the validity of the theory of increasing societal scale.

Several hypotheses were formulated for the study of Metropolitan Toronto on the basis of the postulates of the theoretical framework as well as the findings of factor-analytic studies conducted in cities located in high-scale societies. It was proposed that at least three dimensions would differentiate sub-areas of Metropolitan Toronto in 1951 and 1961. Concerning changes in the relative importance of the dimensions in differentiating sub-areas of the city, it was proposed that the familism factor would increase in importance between 1951 and 1961

while the social status and ethnic status factors would decrease in importance. Consistent with one of the basic assumptions underlying the ecological theory which states that increasing differentiation is a necessary consequence of increasing societal scale, it was proposed in this study that the common factors would account for less of the total variation in 1961 than in 1951. It was also hypothesized that the familism factor would remain relatively independent over the decade while the ethnic status and social status factors would converge, consistent with other findings concerning the Canadian situation but contrary to one of the postulates of the ecological theory.

Information concerning the social characteristics of Metropolitan Toronto in 1951 and 1961 collected by the Dominion Bureau of Statistics was employed in this study. The hypotheses were tested by an application of factor analytic-techniques to selected variables calculated in 1951 and 1961 on the basis of the census data.

The results of this research indicate that, as expected, the differentiation of sub-areas of the city in both years can be described, at least partly, in terms of three general constructs. These constructs, which were labeled ethnic status, familism, and social status, differ, however, in important ways from their counterparts in a study of Winnipeg and in several studies of American cities. The major anomaly which occurred with regard to the ethnic

status factor was the increasing involvement of socio-economic variables with this factor. With regard to the familism factor, the variables measuring the percentage of young population and the average family size did not load significantly on this factor in 1961 as expected.

The hypotheses referring to the changes in the relative importance of the dimensions over time were only partially supported. Contrary to what was proposed, the importance of the ethnic status factor greatly increased over time, while the familism factor became less important in differentiating sub-areas of Metropolitan Toronto. The social status factor declined in importance, as hypothesized. In addition, the findings suggest that the ecological differentiation in Toronto has slightly increased over time, since the three common factors accounted for less of the total variance in 1961 than they did in 1951.

The hypotheses concerned with changes in the relative independence of the dimensions over the decade were supported. The familism factor remained relatively independent while the ethnic status and social status factors grew increasingly interdependent.

The results of this research indicate that sub-areas of Metropolitan Toronto in 1951 and 1961 were differentiated according to the classical dimensions of social status, familism, and ethnic status. Furthermore, the results indicate that while the familism and social

status factors were the most important dimensions of differentiation in 1951, in 1961 the ethnic status factor as well as the familism factor formed the major axes of differentiation. It appears that the large European immigration greatly affected the ecological structure of the city, since the ethnicity dimension greatly increased in importance between 1951 and 1961 and the socio-economic variables became more highly involved with the ethnic status factor over the decade.

The results of this study run counter to those of a factorial study of Winnipeg for the same period. This suggests that the ecological differentiation of a city is determined by other factors besides the level of scale of the society in which it is located. The results of this study indicate that the volume of migration plays an important role in differentiating sub-areas of the city. The unique elements of the historical background of an urban center, then, have a very significant effect on its ecological structure.

#### Suggestions for Further Research

The results of this research have pointed to differences in the ecological structure of two urban centers within the same society. This suggests that a better method must be found to test the validity of the theory of increasing societal scale; a method which

produces consistent results in studies conducted in one society regardless of inter-city differences in migration experiences or other population characteristics. The method devised by Udry (1964) to test the theory of increasing scale involved the analysis of trend data for the hypothesized correlates of increasing societal scale. He selected seven variables on the basis of their relationship with increasing scale and measured and plotted them for the United States over a period of 120 years. A similar analysis could be undertaken using census data for Canada as a whole, and measuring a wider selection of variables for the census years since 1851. This approach would focus on measuring the validity of the theory of increasing societal scale on the basis of an entire society rather than on one or more of the larger urban centers.

## APPENDIX A

### CENSUS TRACTS ELIMINATED FROM THE 1951 AND 1961 ANALYSES

#### Reasons for elimination:

1. Information on all selected characteristics was not given separately in the Census of Canada bulletins for the following tracts and their counterparts in the other census year:<sup>a</sup>

19\*, 33\*, 34\*, 48\*, 50\*, 64\*, 76\*, 77\*, 90\*, 104\*,  
105\*, 134\*, 140 (270,275), 164 (146), 174 (244),  
205 (224), 208 (212,292), 225 (189,191,290),  
226 (192,291), 228 (138), 240 (188).

2. Changes in the tract boundaries between 1951 and 1961 so the following tracts could not be compared in the two years:

1951: 136-139, 141, 142, 149, 152, 153, 155, 156, 159,  
160, 198, 200, 201, 203, 209, 219, 221, 231, 232,  
235, 244-248, 252-255.

1961: 157-165, 168, 170-172, 175, 182, 183, 193, 194, 211,  
214-218, 222, 248-251, 254, 255, 258, 265, 269,  
271-174, 277-286, 294, 300.

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<sup>a</sup> A \* refers to the tract in 1961 with the same number as in 1951. A ( ) contains the 1961 census tract number(s) with boundaries comparable to those of the 1951 tract number directly preceding the number(s) in brackets.

3. 1961 census tracts formed after 1956:

400-407, 410, 450-453, 460, 500-502, 510, 513,

514, 550-553.

## APPENDIX B

### OPERATIONAL DEFINITIONS OF THE VARIABLES

1. percentage of males in the labour force employed in professional-technical occupations;<sup>a</sup>

$$\frac{\text{males (professional-technical)}}{\text{total number of males in labour force}} \times 100$$

2. percentage of females in the labour force employed in professional-technical occupations;<sup>a</sup>

$$\frac{\text{females (professional-technical)}}{\text{number of females in labour force}} \times 100$$

3. percentage of non-school attenders with education beyond the elementary level:

1951:

$$\frac{\text{non-attenders with (9-12) years + (13<sup>+</sup>) years}}{\text{total number of non-attenders (5<sup>+</sup> years of age)}} \times 100$$

1961:

$$\frac{\text{non-attenders with high school (1-2 yr. + 3-5 yr.) + univ.<sup>b+</sup> years of age)}}$$

X 100

4. average male income:

1951: median earnings of males

1961: average wage and salary income of males

---

<sup>a</sup>The occupations listed under the "professional" category in 1951 are exactly comparable to those listed under the "professional-technical" category in 1961.

<sup>b</sup> "univ." is the abbreviation for "university"

5. female labour force participation:<sup>c</sup>

$$\frac{\text{females in labour force}}{\text{females, 14}^+ \text{ years}} \times 100$$

6. percentage of single-detached dwellings:

$$\frac{\text{single-detached occupied dwellings}}{\text{households (occupied dwellings)}} \times 100$$

7. percentage of population under 5 years:

$$\frac{\text{population (0-4 years)}}{\text{total population}} \times 100$$

8. average size of family:

average number of persons per family

9. percentage British Isles:

$$\frac{\text{British Isles as ethnic group}}{\text{total population}} \times 100$$

10. percentage who speak neither English nor French:

$$\frac{\text{population who speak neither English nor French}}{\text{total population}} \times 100$$

11. sex ratio:

$$\frac{\text{number of males}}{\text{number of females}} \times 100$$

12. percentage married:<sup>c</sup>

$$\frac{\text{number married}}{\text{population (14}^+ \text{ years)}} \times 100$$

---

<sup>c</sup>This statistic was calculated for females 14 years and over in 1951, and for females 15 years and over in 1961 in the Census bulletins.

## 13. percentage Roman Catholic:

$$\frac{\text{population Roman Catholic}}{\text{total population}} \times 100$$

## 14. relative population change quotient:

1951:

$$\frac{\text{population (1951)}}{\text{population (1941)}}$$

X 100

---


$$\frac{\text{Metropolitan Toronto population (1951)}}{\text{Metropolitan Toronto population (1941)}}$$

1961:

$$\frac{\text{population (1961)}}{\text{population (1951)}}$$

X 100

---


$$\frac{\text{Metropolitan Toronto population (1961)}}{\text{Metropolitan Toronto population (1951)}}$$

## APPENDIX C

### EXPLANATIONS OF CENSUS TERMS<sup>a</sup>

Census Date. The official census dates were June 1, 1951 and June, 1, 1961.

Ethnic origin. A person's ethnic origin is traced through his father. The language spoken at the time of the census by the person or by his paternal ancestor was used as an aid in the determination of the person's ethnic group.

Schooling. In 1951 the total number of school years the person attended any kind of educational institution beyond kindergarden, such as elementary or secondary school, college, or university are counted. Private study and part-time attendance at classes count for the number of years of formal schooling to which they are equivalent. In 1961 a person was considered as attending school if his main day-time activity at any time between September, 1960 and June 1, 1961 was attending an elementary or secondary school, university, or an institution providing an equivalent type of general education.

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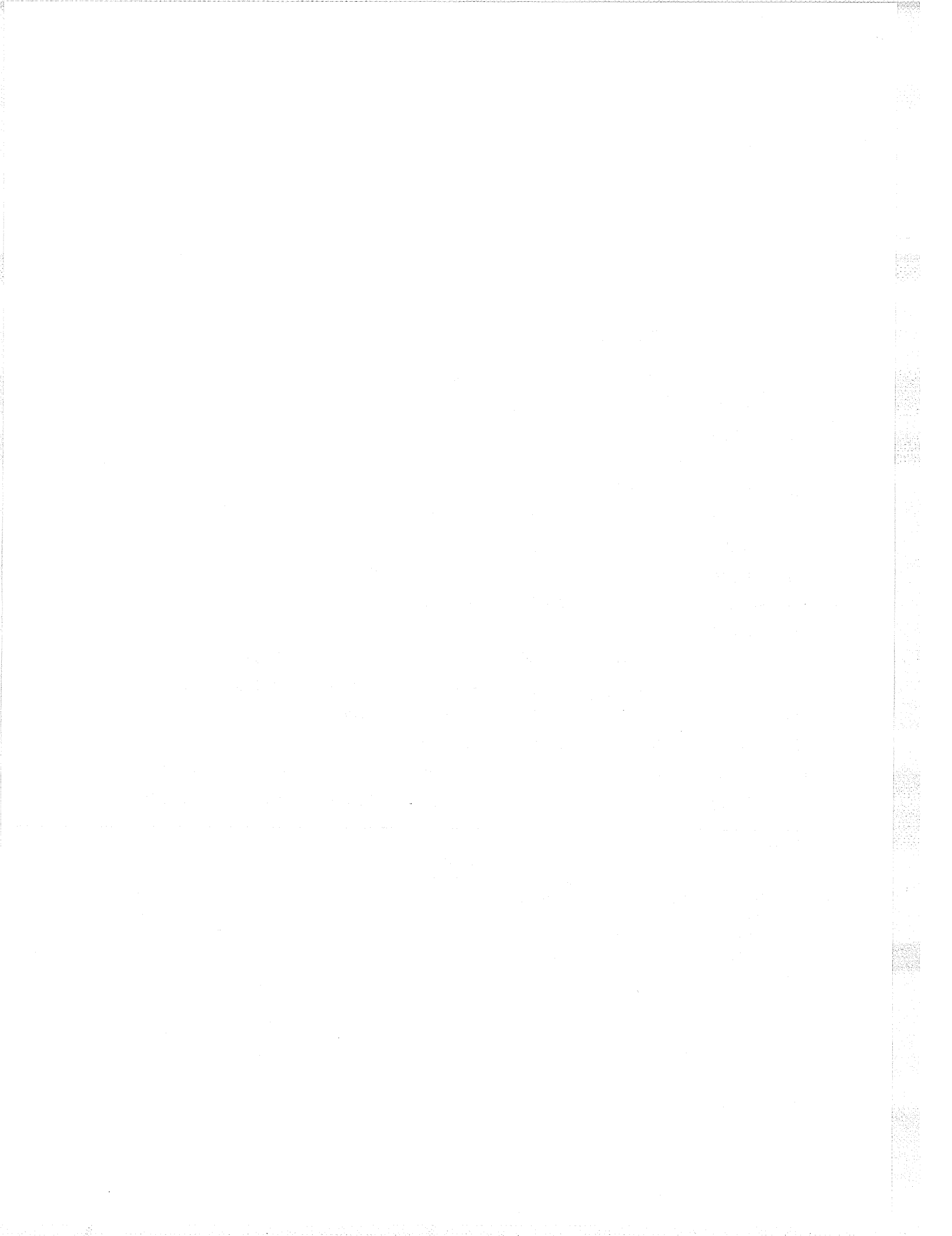
<sup>a</sup>Explanations are included only for those definitions which need clarification. For a more complete list see Dominion Bureau of Statistics, Census of Canada, 1951, Bulletin CT-6 and Census of Canada, 1961, Bulletin CT-16.

Household. A household includes a person or group of persons occupying one dwelling. Every person is a member of some household and the number of households equals the number of occupied dwellings.

Children in families. Unmarried children under twenty-five years of age living at home are counted as children in families. All children who have never married and are living at home, regardless of age, are considered to be members of the family.

Labour force. In 1951 the labour force included all persons 14 years of age and over and in 1961, all persons 15 years of age and over, who were reported as having a job of any kind, either part-time or full-time (even if they were not at work) or were reported as actively looking for work, during the week prior to enumeration, except those reported as seeking their first job during this week.

Income. Income figures are for both full-time and part-time employees. In 1951 the median earnings are given and in 1961 the average wage and salary income is given. It should be noted that the figures reflect the dependency of earnings on the number of weeks of employment and the number of hours usually worked, especially in the case of female wage-earners, since a greater proportion of females than males are engaged in part-time employment.



## APPENDIX D

## CORRELATION MATRICES

TABLE 11

CORRELATION MATRIX, 1951

Variable	1.	2.	3.	4.	5.	6.	7.
1.	1.000						
2.	0.614	1.000					
3.	0.862	0.458	1.000				
4.	0.707	0.285	0.699	1.000			
5.	-0.087	0.335	-0.193	-0.569	1.000		
6.	0.318	-0.002	0.458	0.578	-0.731	1.000	
7.	-0.226	-0.380	-0.078	0.045	-0.659	-0.540	1.000
8.	-0.221	-0.199	-0.181	0.133	-0.631	0.484	0.742
9.	0.314	0.101	0.566	0.334	-0.200	0.438	0.147
10.	-0.414	-0.150	-0.633	-0.388	0.183	-0.450	-0.070
11.	-0.458	-0.208	-0.553	-0.344	-0.061	-0.109	0.264
12.	-0.043	-0.286	0.107	0.328	-0.785	0.717	0.807
13.	-0.480	-0.166	-0.602	-0.476	0.407	-0.534	-0.147
14.	0.225	0.063	0.274	0.253	-0.364	0.449	0.610

## Variables

1. % males professional and technical
2. % females professional and technical
3. % education beyond elementary
4. average male income
5. females 14<sup>+</sup> years working
6. % single-family dwelling units
7. % under 5 years
8. average family size
9. % British
10. % speak neither English nor French
11. sex ratio
12. % married
13. % Roman Catholic
14. % population change

TABLE 11--Continued

	8.	9.	10.	11.	12.	13.	14.
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.	1.000						
9.	0.056	1.000					
10.	0.018	-0.770	1.000				
11.	0.432	-0.337	0.370	1.000			
12.	0.649	0.253	-0.201	0.223	1.000		
13.	0.099	-0.494	0.533	0.341	-0.401	1.000	
14.	0.367	0.155	-0.158	0.086	0.595	-0.236	1.000

TABLE 12  
CORRELATION MATRIX, 1961

Variable	1.	2.	3.	4.	5.	6.	7.
1.	1.000						
2.	0.756	1.000					
3.	0.854	0.613	1.000				
4.	0.752	0.531	0.820	1.000			
5.	-0.022	0.161	-0.142	-0.486	1.000		
6.	0.305	0.152	0.476	0.627	-0.626	1.000	
7.	-0.612	-0.588	-0.493	-0.382	-0.294	0.043	1.000
8.	-0.346	-0.306	-0.287	-0.032	-0.577	0.224	0.735
9.	0.448	0.335	0.658	0.573	-0.206	0.414	-0.236
10.	-0.497	-0.356	-0.733	-0.495	0.129	-0.322	0.317
11.	-0.498	-0.364	-0.519	-0.377	-0.124	-0.198	0.305
12.	-0.375	-0.476	-0.131	0.041	-0.600	0.514	0.731
13.	-0.656	-0.474	-0.811	-0.647	0.261	-0.461	0.387
14.	0.082	-0.002	0.214	0.185	-0.245	0.197	0.399

- Variable
1. % males professional and technical
  2. % females professional and technical
  3. % education beyond elementary
  4. average male income
  5. females 14+ years working
  6. % single-family dwelling units
  7. % under 5 years
  8. average family size
  9. % British
  10. % speak neither English nor French
  11. sex ratio
  12. % married
  13. % Roman Catholic
  14. % population change

TABLE 12--Continued

	8.	9.	10.	11.	12.	13.	14.
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.	1.000						
9.	-0.095	1.000					
10.	0.118	-0.687	1.000				
11.	0.312	-0.349	0.301	1.000			
12.	0.570	0.004	0.096	0.135	1.000		
13.	0.135	-0.652	0.836	0.352	0.058	1.000	
14.	0.286	0.038	-0.146	0.001	0.429	-0.180	1.000

## APPENDIX E

TABLE 13

COMMUNALITIES OF THE VARIABLES, 1951 AND 1961

Variable	Communality	
	1951	1961
1. % males prof. and tech.	0.98	0.85
2. % females prof. and tech.	0.40	0.57
3. % education beyond elementary	0.92	0.93
4. average male income	0.68	0.93
5. % females 14 <sup>+</sup> years working	0.74	0.67
6. % single-family dwelling units	0.75	0.62
7. % under 5 years	0.81	0.81
8. average family size	0.63	0.56
9. % British	0.71	0.54
10. % speak neither English nor French	0.75	0.92
11. sex ratio	0.41	0.26
12. % married	0.89	0.81
13. % Roman Catholic	0.51	0.82
14. % population change	0.35	0.19

## APPENDIX F

### MULTI-METHOD RESEARCH STRATEGY

Four initial solutions and two derived solutions will be outlined in this section. It is important to understand the distinguishing properties of the initial solutions--principal-factor, principal components, image analysis, and alpha analysis--in applying this multi-method strategy.

Principal components and image analysis are similar in that they yield factors which are located within the space defined by the variables. In both of these methods, the main diagonal of the correlation matrix is not altered so unities are found in the diagonal. As a result, the factors which are extracted from the correlation matrix of the variables are defined as exact mathematical transformations of the original variables.

In contrast to these procedures, principal-factor solution and alpha analysis yield factors which lie without the variable space. In these two methods, the unities in the main diagonal are initially replaced with communality estimates such as multiple-correlation coefficients. Consequently, the factors are hypothetical constructs.

More specifically, principal components, which is not a classical-factoring method, does not require any

assumptions about the general structuring of the variables. According to Harman (1967: 136), this method involves "the rotation of coordinate axes to a new frame of reference in the total variable space." The new components account for a maximum amount of variance of the variables, so the first principal component contributes a maximum to the total variance of the original variables. Furthermore, the principal components can be expressed simply in terms of the observed variables.

Image analysis, a classical-factoring method, implicitly assumes that a variable can be decomposed into two parts: one part due to common factors and the other a unique part unassociated with other variables. Image analysis, developed by Guttman (1953), provides an approximation of the proportions of these two parts. The method involves the formulation of an anti-image covariance matrix which reveals certain properties that are useful in determining the validity of the factor-analytic assumptions about the structure of the variables (Kaiser, 1963).

Principal-factor solution (Harman, 1967: 137-146) has been outlined in Chapter III. In alpha analysis (Kaiser and Caffrey, 1965), as in other classical factoring methods, the variables are assumed to consist of two parts: one that is determined by common factors and one that is unique to each variable. The variables included in the factor analysis are considered a sample from the

universe of variables. This procedure involves a psychometric inference; inference about the universe of variables from a sample of variables. The aim of this method is to define factors that have maximum generality with other variables in the universe.

The two types of derived solutions are orthogonal and oblique rotation. The former method has been outlined in Chapter III. The conditions specified for an oblique rotation (Harris and Kaiser, 1964) do not require orthogonality among the factor axes. In principal, the initial factor axes are allowed to rotate freely to best summarize any clustering of variables. The direct oblimin criterion is usually applied. This involves the direct calculation of a primary-factor pattern without calculating an intermediate reference structure, as well as a minimizing criterion.

TABLE 14

FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR FAMILISM, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.01	-0.16	-0.07	0.02
2. % females prof. and tech.	-0.12	-0.18	-0.22	-0.11
3. % education beyond elementary	0.11	-0.12	0.02	0.11
4. average male income	0.10	0.22	0.21	0.09
5. % females 14 <sup>+</sup> years working	-0.43	-0.71	-0.70	-0.43
6. % single-family dwelling units	0.48	0.52	0.63	0.48
7. % under 5 years	0.91	0.76	0.88	0.91
8. average family size	0.53	0.95	0.76	0.52
9. % British	0.11	0.12	0.13	0.10
10. % speak neither English nor French	-0.06	0.01	-0.08	-0.06
11. sex ratio	0.18	0.23	0.30	0.17
12. % married	0.76	0.65	0.85	0.76
13. % Roman Catholic	-0.17	-0.15	-0.24	-0.17
14. % population change, 1941-1951	0.73	0.29	0.67	0.73
Percentage of variance explained	37.6	37.6	44.0	37.6
Eigenvalue	5.26	5.26	28.81	5.26

TABLE 15

FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR SOCIAL STATUS, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.82	0.79	0.70	0.83
2. % females prof. and tech.	0.81	0.28	0.72	0.80
3. % education beyond elementary	0.62	0.69	0.54	0.62
4. average male income	0.49	0.90	0.37	0.50
5. % females 14 <sup>+</sup> years working	0.20	-0.41	0.19	0.19
6. % single-family dwelling units	0.11	0.33	0.07	0.12
7. % under 5 years	-0.31	-0.15	-0.23	-0.32
8. average family size	-0.14	-0.05	-0.14	-0.13
9. % British	0.08	-0.13	0.07	0.08
10. % speak neither English nor French	-0.16	-0.22	-0.14	-0.16
11. sex ratio	-0.21	-0.26	-0.18	-0.21
12. % married	-0.19	0.09	-0.16	-0.19
13. % Roman Catholic	-0.24	-0.29	-0.18	-0.24
14. % population change, 1941-1951	0.20	0.16	0.25	0.25
Percentage of variance explained	27.6	27.6	7.2	27.6
Eigenvalue	3.86	3.86	4.74	3.86

TABLE 16  
FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR ETHNIC STATUS, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.24	0.20	0.37	0.24
2. % females prof. and tech.	0.06	0.05	0.11	0.06
3. % education beyond elementary	0.52	0.47	0.61	0.52
4. average male income	0.23	0.16	0.32	0.23
5. % females 14 <sup>+</sup> years working	-0.10	-0.04	-0.14	-0.10
6. % single-family dwelling units	0.37	0.31	0.41	0.37
7. % under 5 years	0.07	0.08	0.05	0.07
8. average family size	0.00	-0.01	-0.09	0.01
9. % British	0.85	0.91	0.76	0.85
10. % speak neither English nor French	-0.85	-0.89	-0.77	-0.86
11. sex ratio	-0.29	-0.23	-0.44	-0.29
12. % married	0.17	0.12	0.17	0.17
13. % Roman Catholic	-0.45	-0.34	-0.55	-0.46
14. % population change, 1941-1951	0.07	0.06	0.11	0.08
Percentage of variance explained	9.1	9.1	33.4	9.1
Eigenvalue	1.27	1.27	21.91	1.27

TABLE 17

## FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR STYLE OF LIFE, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis		Alpha Analysis
			Factor I	Factor II	
1. % males prof. and tech.	0.67	0.09	0.59	0.67	0.57
2. % females prof. and tech.	0.21	-0.16	0.15	0.35	0.16
3. % education beyond elementary	0.64	0.24	0.74	-0.74	0.69
4. average male income	0.92	0.49	0.71	0.45	0.61
5. % females 14 <sup>+</sup> years working	-0.71	-0.83	-0.59	0.13	-0.61
6. % single-family dwelling units	0.64	0.95	0.75	0.10	0.70
7. % under 5 years	0.14	0.65	0.32	-0.44	0.26
8. average family size	0.24	0.56	0.22	-0.53	0.22
9. % British	0.26	0.31	0.61	0.43	0.52
10. % speak neither English nor French	-0.32	-0.32	-0.65	-0.51	-0.57
11. sex ratio	-0.24	0.02	-0.35	-0.68	-0.32
12. % married	0.44	0.84	0.55	-0.28	0.58
13. % Roman Catholic	-0.46	-0.42	-0.73	-0.40	-0.81
14. % population change, 1941-1951	0.30	0.42	0.40	-0.10	0.34
Percentage of variance explained	37.6	37.6	44.0	33.4	37.6
Eigenvalue	5.26	5.26	28.81	21.9	5.26

TABLE 18  
FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR FAMILISM, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	-0.33	-0.27	0.21	-0.34
2. % females prof. and tech.	-0.30	-0.26	0.00	-0.31
3. % education beyond elementary	-0.27	-0.23	0.30	-0.28
4. average male income	0.04	0.11	0.31	0.03
5. % females 14 <sup>+</sup> years working	-0.64	-0.68	-0.55	-0.62
6. % single-detached dwelling units	0.43	0.46	0.61	0.42
7. % under 5 years	0.77	0.81	0.74	0.75
8. average family size	0.85	0.97	0.53	0.85
9. % British	0.05	0.07	0.24	0.06
10. % speak neither English nor French	0.04	0.06	-0.22	0.04
11. sex ratio	0.34	0.38	0.10	0.34
12. % married	0.51	0.67	0.73	0.48
13. % Roman Catholic	-0.05	-0.08	-0.34	-0.04
14. % population change, 1941-1951	0.25	0.33	0.76	0.22
Percentage of variance explained	27.6	27.6	5.9	27.6
Eigenvalue	3.86	3.86	3.88	3.86

TABLE 19

FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR ETHNIC-ECONOMIC STATUS, 1951

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	-0.43	-0.40	-0.49	-0.67
2. % females prof. and tech.	-0.16	-0.16	-0.18	-0.83
3. % education beyond elementary	-0.69	-0.66	-0.71	-0.48
4. average male income	-0.42	-0.36	-0.46	-0.25
5. % females 14 <sup>+</sup> years working	0.21	0.15	0.26	-0.50
6. % single-family dwelling units	-0.50	-0.44	-0.53	-0.09
7. % under 5 years	-0.12	-0.09	-0.14	0.50
8. average family size	-0.02	0.01	-0.01	0.29
9. % British	-0.87	-0.94	-0.78	-0.08
10. % speak neither English nor French	0.89	0.93	0.80	0.14
11. sex ratio	0.41	0.38	0.43	0.21
12. % married	-0.26	-0.19	-0.28	0.38
13. % Roman Catholic	0.58	0.52	0.62	0.13
14. % population change, 1941-1951	-0.19	-0.15	-0.23	-0.04
Percentage of variance explained	0.1	9.1	7.2	9.1
Eigenvalue	1.27	1.27	4.74	1.27

TABLE 20

FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR ETHNIC STATUS, 1961

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.38	0.37	0.39	0.38
2. % females prof. and tech.	0.26	0.20	0.25	0.26
3. % education beyond elementary	0.66	0.60	0.64	0.65
4. average male income	0.41	0.33	0.41	0.41
5. % females 15 <sup>+</sup> years working	-0.14	-0.14	-0.12	-0.14
6. % single-family dwelling units	0.29	0.25	0.30	0.29
7. % under 5 years	-0.24	-0.25	-0.24	-0.24
8. average family size	-0.07	-0.06	-0.11	-0.08
9. % British	0.70	0.53	0.67	0.70
10. % speak neither English nor French	-0.95	-0.94	-0.85	-0.95
11. sex ratio	-0.26	-0.18	-0.27	-0.25
12. % married	-0.07	-0.06	-0.03	-0.07
13. % Roman Catholic	-0.81	-0.86	-0.77	-0.81
14. % population change, 1951-1961	0.10	0.12	0.12	0.10
Percentage of variance explained	41.5	7.1	55.4	41.5
Eigenvalue	5.81	1.00	42.81	5.81

TABLE 21

## FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR FAMILISM, 1961

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.12	0.02	0.06	0.12
2. % females prof. and tech.	-0.05	-0.01	-0.10	-0.05
3. % education beyond elementary	0.22	0.19	0.18	0.22
4. average male income	0.58	0.33	0.52	0.58
5. % females 15 <sup>+</sup> years working	-0.84	-0.47	-0.79	-0.84
6. % single-family dwelling units	0.76	0.88	0.70	0.76
7. % under 5 years	0.09	0.18	0.19	0.09
8. average family size	0.36	0.14	0.40	0.37
9. % British	0.20	0.15	0.20	0.20
10. % speak neither English nor French	-0.03	-0.03	-0.04	-0.04
11. sex ratio	-0.01	-0.05	0.02	0.00
12. % married	0.63	0.66	0.59	0.62
13. % Roman Catholic	-0.24	-0.19	-0.20	-0.24
14. % population change, 1951-1961	0.13	-0.10	0.15	0.13
Percentage of variance explained	24.8	24.8	6.7	24.8
Eigenvalue	3.47	3.47	5.15	3.47

TABLE 22

FOUR FACTOR SOLUTIONS WITH ORTHOGONAL ROTATION FOR SOCIAL STATUS, 1961

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.61	0.74	0.83	0.59
2. % females prof. and tech.	0.88	0.93	0.73	0.89
3. % education beyond elementary	0.37	0.51	0.66	0.36
4. average male income	0.41	0.53	0.65	0.40
5. % females 15 <sup>+</sup> years working	0.07	0.09	0.04	0.07
6. % single-family dwelling units	0.09	0.17	0.18	0.09
7. % under 5 years	-0.39	-0.47	-0.55	-0.38
8. average family size	-0.07	-0.12	-0.30	-0.07
9. % British	0.12	0.16	0.24	0.11
10. % speak neither English nor French	-0.11	-0.14	-0.23	-0.11
11. sex ratio	-0.19	-0.21	-0.41	-0.18
12. % married	-0.14	-0.44	-0.41	-0.40
13. % Roman Catholic	-0.25	-0.30	-0.39	-0.25
14. % population change, 1951-1961	0.02	0.03	0.06	0.02
Percentage of variance explained	7.1	41.5	24.1	7.1
Eigenvalue	1.00	5.81	18.63	1.00

TABLE 23

FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR STYLE OF LIFE, 1961

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	0.94	0.62	0.80	0.88
2. % females prof. and tech.	0.64	0.45	0.63	0.60
3. % education beyond elementary	0.85	0.81	0.85	0.83
4. average male income	0.69	0.59	0.66	0.63
5. % females 15 <sup>+</sup> years working	0.06	-0.18	-0.10	0.14
6. % single-family dwelling units	0.32	0.38	-0.33	-0.30
7. % under 5 years	-0.50	-0.41	-0.53	-0.45
8. average family size	-0.39	-0.16	-0.45	-0.42
9. % British	0.46	0.67	0.53	0.47
10. % speak neither English nor French	-0.46	-0.96	-0.54	-0.44
11. sex ratio	-0.58	-0.33	-0.59	-0.61
12. % married	-0.26	-0.13	-0.24	-0.23
13. % Roman Catholic	-0.60	-0.95	-0.62	-0.55
14. % population change, 1951-1961	0.10	0.14	0.12	0.08
Percentage of variance explained	41.5	41.5	55.4	41.5
Eigenvalue	5.81	5.81	42.81	5.81

TABLE 24

FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR SINGLE, WORKING CLASS, 1961

Variable	Princ. Factor	Princ. Comp.	Image Analysis	Alpha Analysis
1. % males prof. and tech.	-0.05	-0.04	-0.14	-0.01
2. % females prof. and tech.	0.11	0.07	0.06	0.13
3. % education beyond elementary	-0.28	0.26	-0.36	-0.25
4. average male income	-0.48	-0.45	-0.57	-0.45
5. % females 15 <sup>+</sup> years working	0.74	0.68	0.77	0.74
6. % single-family dwelling units	-0.81	-0.93	-0.79	-0.79
7. % under 5 years	-0.33	-0.32	-0.27	-0.35
8. average family size	-0.40	-0.36	-0.40	-0.29
9. % British	-0.31	-0.26	-0.36	-0.29
10. % speak neither English nor French	0.18	0.15	0.24	0.16
11. sex ratio	0.09	0.08	0.10	0.07
12. % married	-0.82	-0.78	-0.69	-0.84
13. % Roman Catholic	0.32	0.29	0.37	0.29
14. % population change, 1951-1961	-0.29	-0.26	-0.33	-0.30
Percentage of variance explained	24.8	24.8	5.2	24.8
Eigenvalue	3.47	3.47	18.63	3.47

TABLE 25

FOUR FACTOR SOLUTIONS WITH OBLIQUE ROTATION FOR THE THIRD FACTOR, 1961

Variable	Ethnic-economic Status		Single-mobile	
	Princ. Factor	Image Analysis	Princ. Comp.	Alpha Analysis
1. % males prof. and tech.	0.50	-0.63	-0.09	-0.07
2. % females prof. and tech.	0.32	-0.44	0.03	0.03
3. % education beyond elementary	0.57	-0.83	-0.24	-0.22
4. average male income	0.89	-0.64	-0.20	-0.16
5. % females 15 <sup>+</sup> years working	-0.67	0.20	0.24	0.23
6. % single-family dwelling units	0.59	-0.43	-0.20	-0.19
7. % under 5 years	-0.28	0.37	-0.46	-0.48
8. average family size	0.15	0.15	-0.29	-0.31
9. % British	0.46	-0.73	-0.05	0.00
10. % speak neither English nor French	-0.33	0.87	0.14	0.14
11. sex ratio	-0.17	0.38	0.02	-0.01
12. % married	0.09	0.07	-0.50	-0.50
13. % Roman Catholic	-0.47	0.87	0.17	0.17
14. % population change, 1951-1961	0.06	-0.16	-0.98	-0.83
Percentage of variance explained	7.2	6.7	7.1	7.1
Eigenvalue	1.0	5.2	1.0	1.0

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