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TRAVEL PATTERNS IN AN URBAN COMMUNITY: SOCIOECONOMIC AND FAMILY LIFE CYCLE DIFFERENTIALS IN DEPENDENCE RELATIONS AMONG CENTRAL AREAS AND RESIDENCE IN DETROIT, MICHIGAN, 1954.

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TRAVEL PATTERNS IN AN URBAN COMMUNITY: SOCIOECONOMIC AND FAMILY LIFE CYCLE DIFFERENTIALS IN DEPENDENCE RELATIONS AMONG CENTRAL AREAS AND RESIDENCE IN DETROIT, MICHIGAN, 1954

by
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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in the
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PREFACE

This research could not have been undertaken without the cooperative resources of the Detroit Area Traffic Study, under the sponsorship of the Department of Streets and Traffic of the city of Detroit, the Wayne County Road Commission, the Michigan State Highway Department, and the United States Bureau of Public Roads. The work was carried out during the author's employment by the Detroit Area Traffic Study.

To my doctoral committee members, Professors Hawley, Mayer, Morgan, Sharp, and Varley, I would like to express my deep appreciation for their efforts and guidance. Dr Mayer, associate professor of sociology at Wayne State University and director of the Detroit Area Traffic Study, was especially helpful and encouraging during the progress of this work. Professor Hawley, as committee chairman, provided many excellent suggestions and strong encouragement.

Clerical and computational tasks were carried out with considerable care and diligence by Miss Joanne Wallace, Mr. Gordon Wright, and Mr. Herschel Harrison. Several others who helped in many ways go without mention.

To my wife, Dolores Sutton, who is largely responsible for this work being undertaken, I owe a great debt of gratitude for her encouragement, wise suggestion, and perseverance.

TABLE OF CONTENTS

CHAPTER		Page
I.	INTRODUCTION	1
	The Problem	1
	Hypothetical Analysis	10
	Simple hypotheses	10
	Holding distance of residence from city center constant	10
	Relationships among distance of residence to city center and travel orientation and distance to destination	11
II.	DESCRIPTION OF DATA AND METHOD	12
	Unit of Analysis	14
	Travel Definitions	14
	The Independent Variables	17
	Distance of residence from city center	17
	Socioeconomic level	18
	Family life cycle	19
	Dependent Variables	20
	Mediating Variables of Trip Purpose and Travel Mode	20

CHAPTER Page

Summary 22

III. ANALYSIS OF DIFFERENTIALS IN CENTRALITY OF TRAVEL ORIENTATION 23

The Effect of Distance from City Center upon Orientation 23

Distance from residence to city center and trip purpose 25

Residence-to-center distance and travel mode 29

Differentials in Orientation by Income 32

Income and distance of residence from city center 32

Income and trip purpose 35

Income and mode of travel 38

Differentials in Orientation by Occupation of the Head of the Household 41

Occupation of head and distance of residence from city center 44

Occupation of head and trip purpose 44

Occupation of head and travel mode 48

Differentials in Orientation by Stage in Family Life Cycle 48

Family life cycle and distance of residence from city center 53

Family life cycle and trip purpose 55

Family life cycle and travel mode 59

CHAPTER Page

Conclusions--the Hypothetical Outcome 59

IV. AN ANALYSIS OF TRAVEL BY TRAVEL ORIENTATION 62

An Analysis of Centripetal Travel 64

The distribution of centripetal trips by deflection angle 64

Distance of residence from destination of centripetal trips by deflection angle 68

Distance of Travel by Orientation: a Comparison of Centripetal and Noncentripetal Travel 74

Comparison controlling for distance of residence from city center 76

Comparison controlling for income and distance of residence from city center 78

Comparison controlling for occupation of head and distance of residence from city center 81

Comparison controlling for family life-cycle groupings and distance of residence from city center 84

Comparison controlling for the mediating variables of travel purpose and travel mode with distance of residence from city center 87

Conclusions 92

CHAPTER Page

V. SUMMARY AND CONCLUSIONS 98

Summary 98

Conclusions 101

APPENDIXES 107

A. DATA AND METHOD 108

Source of Data 109

Procedures 110

Nonsampling Bias 112

B. TRAVEL ORIENTATION RATIO TABLES 117

C. TRAVEL FREQUENCY TABLES 175

LIST OF REFERENCES 214

LIST OF TABLES

TABLE		Page
1.	Centripetal Travel Ratios for Households by Distance of Residence from City Center for Trip Purpose	24
2.	Centripetal Travel Ratios for Households by Distance of Residence from City Center	26
3.	Centripetal Travel Ratios for Households by Distance of Residence from City Center for Travel Mode	30
4.	Centripetal Travel Ratios for Households by Income for Distance of Residence from City Center	33
5.	Centripetal Travel Ratios for Households by Income for Trip Purpose	36
6.	Centripetal Travel Ratios for Households by Income for Travel Mode	39
7.	Centripetal Travel Ratios for Households by Occupation of Head of Household for Distance of Residence from City Center	42
8.	Centripetal Travel Ratios for Households by Occupation of Head (Blue-Collar, White-Collar) for Distance of Residence from City Center	45
9.	Centripetal Travel Ratios for Households by Occupation of Head of Household for Trip Purpose	46

TABLE Page

10. Centripetal Travel Ratios for Households by Occupation of Head (Blue-Collar, White-Collar) for Trip Purpose 49

11. Centripetal Travel Ratios for Households by Occupation of Head of Household for Travel Mode 50

12. Centripetal Travel Ratios for Households by Occupation of Head (Blue-Collar, White-Collar) for Travel Mode 52

13. Centripetal Travel Ratios for Households by Stage in Family Life Cycle of Household for Distance of Residence from City Center 54

14. Centripetal Travel Ratios for Households by Stage in Family Life Cycle of Household for Trip Purpose 56

15. Centripetal Travel Ratios for Households by Stage in Family Life Cycle of Household for Travel Mode 58

16. Distribution of Centripetal Trips by Deflection Angle for Distance of Residence from City Center 65

17. Distribution of Centripetal Trips by Deflection Angle for Occupation of Head of Household and Distance of Residence from City Center 67

18. Number, and Mean Distance ($\bar{X}$) from Residence to Destination (in Miles) of Centripetal Trips by Deflection Angle for Distance of Residence from City Center 69

19. Percent of Centripetal Trips Having Destinations in the Central Business District by Distance of Residence from City Center 71

TABLE

Page

20. Number, and Mean Distance ($\bar{X}$), from Residence to Destination (in Miles) of Centripetal Trips by Deflection Angle for Occupation of Head of Household and Distance of Residence from City Center 73

21. Percentage Distribution and Mean Distance from Residence to Destination of Internal Trips by Orientation 75

22. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Orientation 77

23. Mean Distance from Residence to Destination of Internal Trips by Income for Orientation 79

24. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Income and Orientation 80

25. Mean Distance from Residence to Destination of Internal Trips by Occupation of Head of Household for Orientation 82

26. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Occupation of Head of Household and Orientation 83

27. Mean Distance from Residence to Destination of Internal Trips by Stage in Family Life Cycle of Household for Orientation 85

TABLE Page

28. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Stage in Family Life Cycle of Household and Orientation 86

29. Mean Distance from Residence to Destination of Internal Trips by Trip Purpose for Orientation 88

30. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Trip Purpose and Orientation 90

31. Mean Distance from Residence to Destination of Internal Trips by Travel Mode for Orientation 91

32. Mean Distance from Residence to Destination of Internal Trips by Distance of Residence from City Center for Travel Mode and Orientation 93

33. Summary Report on Home Interviews: Detroit Metropolitan Area Traffic Study, Continuing Survey, 1954 113

34. Distribution of Trips by Distance from Residence to Destination for Distance of Residence from City Center 115

35. Mean ($\bar{X}$) Distance from Residence to Destination and Number of Internal Trips by Deflection Angle Grouping Corresponding to Orientation, with Trips of Less than One Mile in Length Assigned to Their Respective Angle Grouping 116

TABLE Page

36. Travel Ratios for Households by Distance of Residence from City Center for Trip Purpose and Orientation 118

37. Travel Ratios for Households by Income for Trip Purpose and Orientation 122

38. Travel Ratios for Households by Occupation of Head of Household for Trip Purpose and Orientation 126

39. Travel Ratios for Households by Stage in Family Life Cycle of Household for Trip Purpose and Orientation 130

40. Travel Ratios for Households by Distance of Residence from City Center for Travel Mode and Orientation 132

41. Travel Ratios for Households by Income for Travel Mode and Orientation 134

42. Travel Ratios for Households by Occupation of Head of Household for Travel Mode and Orientation 138

43. Travel Ratios for Households by Stage in Family Life Cycle of Household for Travel Mode and Orientation 142

44. Travel Ratios for Households by Income for Distance of Residence from City Center and Orientation 144

45. Travel Ratios for Households by Occupation of Head of Household for Distance of Residence from City Center and Orientation 150

TABLE Page

46. Travel Ratios for Households by Stage in Family Life Cycle of Household for Distance of Residence from City Center and Orientation 156

47. Travel Ratios for Households by Occupation of Head of Household for Income and Orientation 159

48. Travel Ratios for Households by Stage in Family Life Cycle of Household for Income and Orientation 167

49. Travel Ratios for Households by Stage in Family Life Cycle of Household for Occupation of Head of Household and Orientation 171

50. Distribution of Trips for Households by Distance of Residence from City Center for Trip Purpose 176

51. Distribution of Trips for Households by Income for Trip Purpose 178

52. Distribution of Trips for Households by Occupation of Head of Household for Trip Purpose 180

53. Distribution of Trips for Households by Stage in Family Life Cycle of Household for Trip Purpose 184

54. Distribution of Trips for Households by Distance of Residence from City Center for Travel Mode 186

55. Distribution of Trips for Households by Income for Travel Mode 188

TABLE Page

56. Distribution of Trips for Households by Occupation of Head of Household for Travel Mode 190

57. Distribution of Trips for Households by Stage in Family Life Cycle of Household for Travel Mode 194

58. Distribution of Trips for Households by Income for Distance of Residence from City Center 196

59. Distribution of Trips for Households by Occupation of Head of Household for Distance of Residence from City Center 198

60. Distribution of Trips for Households by Stage in Family Life Cycle of Household for Distance of Residence from City Center 202

61. Distribution of Trips for Households by Occupation of Head of Household for Income 204

62. Distribution of Trips for Households by Stage in Family Life Cycle of Household for Income 206

63. Distribution of Trips for Households by Stage in Family Life Cycle of Household for Occupation of Head of Household 208

64. Number of Internal Trips by Distance of Residence from City Center for Income, Occupation of Head of Household, Stage in Family Life Cycle of Household, Trip Purpose, Travel Mode, and Orientation 210

LIST OF FIGURES

FIGURE		Page
1.	The Detroit Study Area	13
2.	Diagram of Method of Determining Orientation	16

CHAPTER I

INTRODUCTION

The Problem

The problem set forth in this research grows out of an interest in the relationship of residential to nonresidential functions in the urban community. The organization of the community has been described in the past as being focused on the central core (2, 18). Several writers have talked of the core as the genesis of the community, as the locus of the coordinating and control functions, and as the attractor of the bulk of the "daytime" population of the community. Hawley has said that

> Whereas under conditions of compact village settlement the center is simply the nuclear point in an organization of land uses, it becomes, in addition (as urbanization takes place), the point of integration of the diverse functions of a more or less widely distributed population. Instead of individuals moving out each day from a centralized residence area to exploit the varied uses of lands round about, they converge upon the center from scattered outlying settlements to exchange the fruits of their many specialized activities. [16, p. 240.]

It is generally known, in the setting of large urban centers in the United States, that suburban areas are growing faster than central cities, that suburban housing is newer and more attractive for residential purposes than that in central cities, and that the urban or metropolitan community is undergoing rapid changes which will call for revision of earlier conceptions of urban life,

urban-rural relationships, and intermetropolitan linkages. Recent studies have documented the growth of the "ring" in standard metropolitan areas[1] in comparison to their respective central cities (1, 15).

Although there are differences among cities of different size and with different regional location, the present trend is toward a greater rate of population growth in the ring, as against the central city, and a greater rate of growth in the rural parts of the standard metropolitan areas as against the urban sections. While some of the larger northern and northeastern cities have attained later stages in this process of development, the national picture is one of the decline of central cities as the sites of future population growth.

Manufacturing and service activity show mixed patterns concerning the ring-central city growth differences. While consistent shifts of manufacturing to suburban areas were not apparent in 1950 (21), there is evidence in northern cities such as Detroit that there is a trend toward the deconcentration of manufacturing along with the development of new establishments in the ring area (31). Service activity, on the other hand, shows a general shift following population (7).

The growth of outlying areas within standard metropolitan areas has been attributed to increasing industrialization and urbanization in turn profoundly affected by improvements in technologies relating to transportation, communication, agriculture, and

---

[1] "Ring" is a term applied to that part of a standard metropolitan area that is not included in the central city about which the standard metropolitan area is organized. See Volume I of 1950 Census of Population for a definition of standard metropolitan area.

sanitation. Technological innovation has permitted a considerable increase in the geographic extent of the functional community and has contributed to the dispersal of population and redistribution of industrial and commerical units.[1] Improvements in transportation have played no small part in these changes. Of great importance in this respect has been the introduction of the motor truck and automobile.

In tracing the correlates of local transport development in urban areas, Ogburn (28) suggests that population distribution tends to be determined by transportation facilities. The shift from walking, as a major mode of travel, to the streetcar in the late 1880's brought about a dispersal of the population from city core areas along the radial transit lines. Where distance from home to work had been of prime consideration, distance to the transit lines which connected residential and work areas came to be of more concern. Still, the scatter of population about the urban area did not reach a high order until the automobile and autobus came to replace the fixed transit lines.

Along with increased population dispersal came shopping subcenters which could attract considerable trade in spite of limited variety of goods because of their greater accessibility to some part of the community population. At the same time, economies of scale--i.e., of increased size of establishment operation--had forced some industrial establishments to peripheral locations where rents and congestion costs were lower (17, 37). Thus, accompanying the population's outward movement, commercial and industrial nodes or subcenters were growing to compete for some of the

---

[1] For an elaboration on this historical development of the urban community along with research implications, see Schnore (34).

previously highly centralized activity of the urban community. As McKenzie has pointed out concerning community growth, ". . . there is not merely a multiplication of houses and roads but a process of differentiation and segregation takes place as well" (26, p. 73).

It has been suggested by some writers that under conditions of the expanding urban community the development of lateral dependence among outlying segments of the community is likely to take place. If it is assumed that continued urban growth is associated with increasingly lengthy and arduous travel to the inner core of the community, then the development of alternative solutions to daily population requirements is likely to occur.

Schnore has pointed out the differences in the character of population and land uses among subcommunities peripheral to the central city (33, 35). In distinguishing among "satellites," or work-place areas, and "suburbs," or residential areas, he has suggested that dependence patterns among satellites and suburbs are likely to develop, in congruence with the "least distance" hypothesis suggested by Zipf (39), Quinn (29), Carroll (5), and others. This hypothesis states that the distances traveled by the population in a community will tend to be minimized, limited only by conditions of geographic barriers, suitability of residential sites, and length of residence in the community necessary for such adjustment to take place.

Following this line of reasoning, it appears plausible that centripetal movement, or movement toward community core areas, would tend to decline as populations at greater and greater distances from the city center are considered. This contention forms a basis for a set of hypotheses to be investigated in this research.

The order of functions which occur in the core of metropolitan areas can be said to differ markedly from community functions as a whole.

> Differences in the distribution pattern of various types of service units are quite conspicuous. . . . It may be stated as a general rule that the more specialized the function of a unit the greater is the tendency to occupy a central location. . . . special financial, legal, and professional services of all sorts concentrate in the so-called "downtown" area of the community center. [16, p. 277.]

Residential activity can be set aside as an insignificant part of core area activity. As stated earlier, coordinating and control functions, the powerful mediating and administrative functions, tend toward central location. Vernon (38) has discussed the degree of standardization of input and output of economic activities. He notes that unstandardized functions, those with highly variable quantity, quality, and class of input and output, tend to be associated with centralized locations.

It is a well-known thesis in ecological theory that functions in a community tend to distribute themselves in space about the ecological center of the community by their ability to compete for locations at the ecological center, to the degree that other locational determinants are not operative. Although attempts toward building functions on top of one another at the center have been undertaken in the form of the skyscraper, not all functions desiring central locations can occupy the same position in space. Thus, those less willing and able to gain the point of so-called maximum accessibility distribute themselves as they can about this point. While functions at the ecological center are likely to be of considerable significance for the community life, the clustering

effect in surrounding central locations may well extend for blocks or miles from the most central point.

The attraction of, and community orientation towards, central areas, then, is not merely a matter of functions congregated at the center itself, but of the proliferation of activities clustering towards the center, resulting from the process of concentration, as a product of an interweaving of lines of dependence in an almost unfathomable labyrinth.

It is taken as an assumption in this analysis that positions characterized by a high degree of skill, usually associated with high status and relatively high economic power, tend to be associated with the centralized functions as described in the preceding paragraph (9). The degree to which individuals classified as high in socioeconomic rank tend to cluster in these centralized unstandardized functions is believed to be considerable.[1] Therefore, it can be inferred that the higher socioeconomic group will tend more toward central locations in their daily activity than the general population.

There is a known tendency for these higher socioeconomic groups to locate their residences at greater distances from the core than the general population. If this is so, it may be that distance of residence from center will override the proposed socioeconomic differences as to central attractiveness. Thus, it will be necessary to control the factor of residence-to-center distance in the analysis of these differences.

Implicit in the foregoing is the assumption that occupational role and residential location will tend to determine the degree of

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[1] Vernon's discussion of unstandardized inputs includes labor inputs, thereby supplying some foundation for this assumption.

centrality of travel not only for "work" travel, but for travel as a whole. To the degree that socioeconomic level is related to consumption requirements of the individual--i.e., the quality, quantity, and diversity of these requirements--it is likely that not only employment activity but the variety and range of goods and services concentrated in the central areas will be more attractive to the higher socioeconomic groups (7, 8).

Further, as has been suggested by other writers, the occupational role of the head of the household, family income, and so forth are taken as applicable to the entire household for measurement purposes in determining travel behavior.

It is in the context of the household that another variable is introduced. The character of a household as to its size, its composition, and its "age" has been considered in the framework of the family life cycle (6, 12, 20, 24, 25).

> It is well known that changes occur in people's attitudes and behavior as they grow older, but many of these changes may be associated less with the biological process of aging than with the influence of age upon the individual's family memberships. Thus, the critical dates in the life of an individual may not be his birthday so much as the days when a change occurs in his family status, for example, when he marries, or when his first child is born. [22]

Family life cycle has been shown to be effective in ordering life style and the position of the household in the community along a different, but important, dimension from that of socioeconomic level. To the degree that the household activity pattern is altered by changes in life cycle stage, expectations of its effect upon centripetal attraction can be set forth. Households made up of young single persons, or young married persons without children, are likely to enjoy considerable freedom as to travel activity. Those

households with young married persons and children are probably encumbered in two ways as to travel activity. First, they have not yet reached their peak income and yet their expenses are high, which may tend to reduce the length and frequency of extensive travel as a matter of reducing cost. Second, the presence of children may be a travel deterrent. Thus, daily shopping, recreation and other activities are likely to be localized in neighborhoods rather than concentrated in the central business district.

The older married have relatively high incomes and are unlikely to be hindered by the presence of young children. These should be more able to travel freely. Older single persons--the never-married and the widowed--are probably older on the average than their married counterparts, are feeling the effects of declining income and the restricting advances of age, and thus are more likely to localize their travel.[1]

If it is true that degree of centripetal attraction is inversely related to distance of residence from the core area, the decreasing density of activites correlated with increasing distance to city center leads to a further deduction. The length of trips, in this research the distance between residence and destinations, is likely to increase as the degree of centripetal attraction lessens in the outer areas. In particular, lateral and centrifugal trips would be expected to increase in length as residence-center distance increases, as a product of increasing dispersion and decreasing density of functional activity.

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[1] As a general reference on the subject of family life cycle, see Clark (6). In particular reference to this last point, see the Lansing and Morgan article in this work.

As suggested in discussing expected socioeconomic differences, households at the higher socioeconomic levels are expected to tend toward a greater dependence on central areas than are the households at lower levels. Moreover, it would seem likely that the differentials in degree of centripetal attraction would become increasingly marked as residence-to-center distance increases. If there are "cut-off" points in the residence-to-center distance continuum after which the substitution of deconcentrated functions in place of the core functions occurs, it is probable that the lower socioeconomic households would substitute earlier, at a point nearer to the center, than the households in the higher levels. Hence, the gradient describing the decline of degree of centripetal attraction would be sharper for the lower group.

Generalizations as to what has happened to residence-non-residence linkages as a result of technological change are not testable in the scope of this research. In the first place, these arrangements among functions in the community have not been described with sufficient clarity in the literature on the urban community as to enable such an analysis (17). But more importantly, the empirical work to be presented here considers only one large metropolitan area at a particular moment in time. Moreover, peculiar characteristics of rate of growth, population composition, size of labor force, and economic base differ from those of other urban areas.

Therefore, the use of this research has two aspects. One purpose is to test some primitive hypotheses about relationships among selected social structural variables and measures of the travel arrangements of households. Secondly, the descriptive material should be of interest to others studying the dynamic patterns of movement and contact among elements in the community

because there is no adequate description of residence-to-non-residence ties. Other pattern features of interest would include the communication systems and goods-movement systems in the community among social and economic units (27).

Hypothetical Analysis

The following hypotheses regarding the relationship of travel to social and locational features of households are set forth and analyzed in this research on the basis of the assumptions and derivations stated in the preceding paragraphs.

Simple hypotheses

1. The greater the distance of residence from the community center, the lower will be the degree of centripetal orientation, or relative frequency of centripetal travel.

2. Inasmuch as the higher socioeconomic groups tend to locate their residences in peripheral areas, the higher the socioeconomic level of the household, the lower will be the degree of centripetal orientation.

3. Households with older unmarried heads and with a married head with children are expected to display a lower degree of centripetal orientation than households with married heads without children and young unmarried.

Holding distance of residence from city center constant

4. The higher the socioeconomic level, the higher will be the degree of centripetal orientation.

5. Households with older unmarried heads and with a married head and children are expected to display a lower degree

of centripetal orientation than households with married heads without children and young unmarried.

Relationships among distance of residence to city center and travel orientation and distance to destination

6. The greater the distance from residence to city center, the greater will be the average distance from residence to destination.

7. The greater the distance of residence from city center, the greater will be the size of the socioeconomic differentials in degree of centripetal orientation.

CHAPTER II

DESCRIPTION OF DATA AND METHOD

In the spring of 1954, the Detroit Metropolitan Area Traffic Study carried out a survey of four thousand households selected by probability methods in the Detroit area to gather information about the travel patterns of persons in the area. The data analyzed in this research are from the interview schedules completed in that survey.

The Detroit traffic study area from which the study sample was drawn included the greater part of the Detroit standard metropolitan area, leaving out sections to the north and west (Figure 1). The study area included about 91 percent of the population of the standard metropolitan area in 1950. The survey was intended to yield vehicular trip information representative of travel in a 24-hour period on a weekday in the spring of 1954. Information was obtained by interviewing one or more responsible adults in the sample household.

Since major interest is directed toward the tendency of movement toward the core areas, households located within one mile of the Detroit City Hall were excluded. Also, trips to places beyond the areas adjacent to the study area were excluded on the grounds that these movements did not represent regular routine intracommunity activity.[1]

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[1] See Methodological Appendix for further elaboration on the source of data.

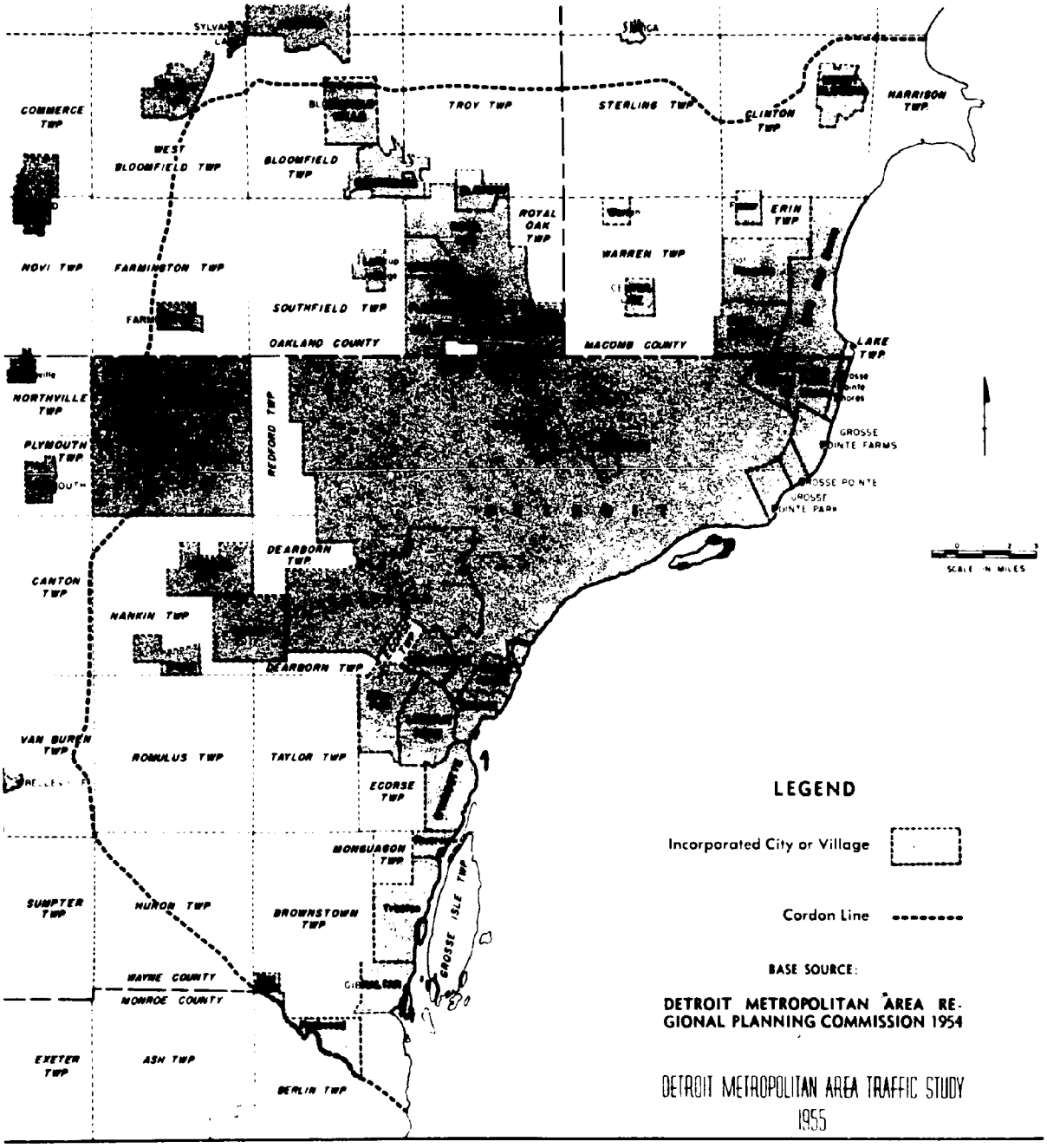


Figure 1. The Detroit Study Area

Unit of Analysis

The household, which was the sampling unit in the survey, is also the unit of analysis in this study. Households are regarded as elements of the community that can be located in the social structure by the use of locational, socioeconomic, and family development measures. Travel pattern differences that result from such characterization of households can be said to reflect in part the social structure of the community in its spatial aspect.

Incidental to their daily routine functioning, households have periodic contacts with a variety of functional sites. Moreover, households vary in the patterns of contacts they maintain. The variation is a matter not only of frequency but of distance, or degree of penetration into the community, and direction. For purposes of this analysis, the structural features will be taken as independent variables and the travel frequencies and patterns as the dependent. The factor of core-to-residence distance will be used, in addition, as a control upon the relationship of the other independent variables to travel arrangements.

Travel Definitions

It may be useful to set forth a few definitions of terms at this point. Travel patterns of households are expressed in terms of the frequency, distance traveled, and direction or orientation of vehicular trips. A trip is a movement of a member of a sample household to a place other than his residence at which some activity takes place having basic significance for that individual. The travel pattern of a household is the locus of points in the community to which trips are made by the members of the household

during a representative 24-hour period with respect to the locations of residence and the city center. The number of trips made by a household is defined as trip frequency. Trip distance denotes the airline mileage between residence and destination for any trip or trips.

The direction of a trip is determined by the locations of household residence (R), trip destination (D), and the city center (C), relative to one another. The angle formed by the line CRD is defined as the deflection angle. The size of this angle is the number of degrees which the line RD must be rotated in order to coincide with the line RC. (See Figure 2.)

The deflection angle varies from 0° to 180°. When the deflection angle is between 0° and 45°, it is termed centripetal in the sense that the trip is directed from place of residence toward the city center. Angles between 45° and 134° are termed lateral. Here the trip runs somewhat perpendicular to the residence-center line. Finally, angles between 135° and 180° are centrifugal since the travel from residence is away from the city center.[1] Centripetal, lateral, and centrifugal sets of angles are referred to as orientations. Thus, degree of centripetal orientation of the travel of any set of households is the relative concentration of trips into deflection angles of less than 45°.

The ratio of the number of centripetal trips to the total number of trips of any group of households is called the centripetal travel ratio, or CTR. This ratio is an expression of the

---

[1] Trips with destinations less than one mile from place of residence were classified as lateral. Lateral and local travel were combined in the interests of the primary purpose of the research, which was determination of the degree to which noncentripetally located units might substitute for more central units.

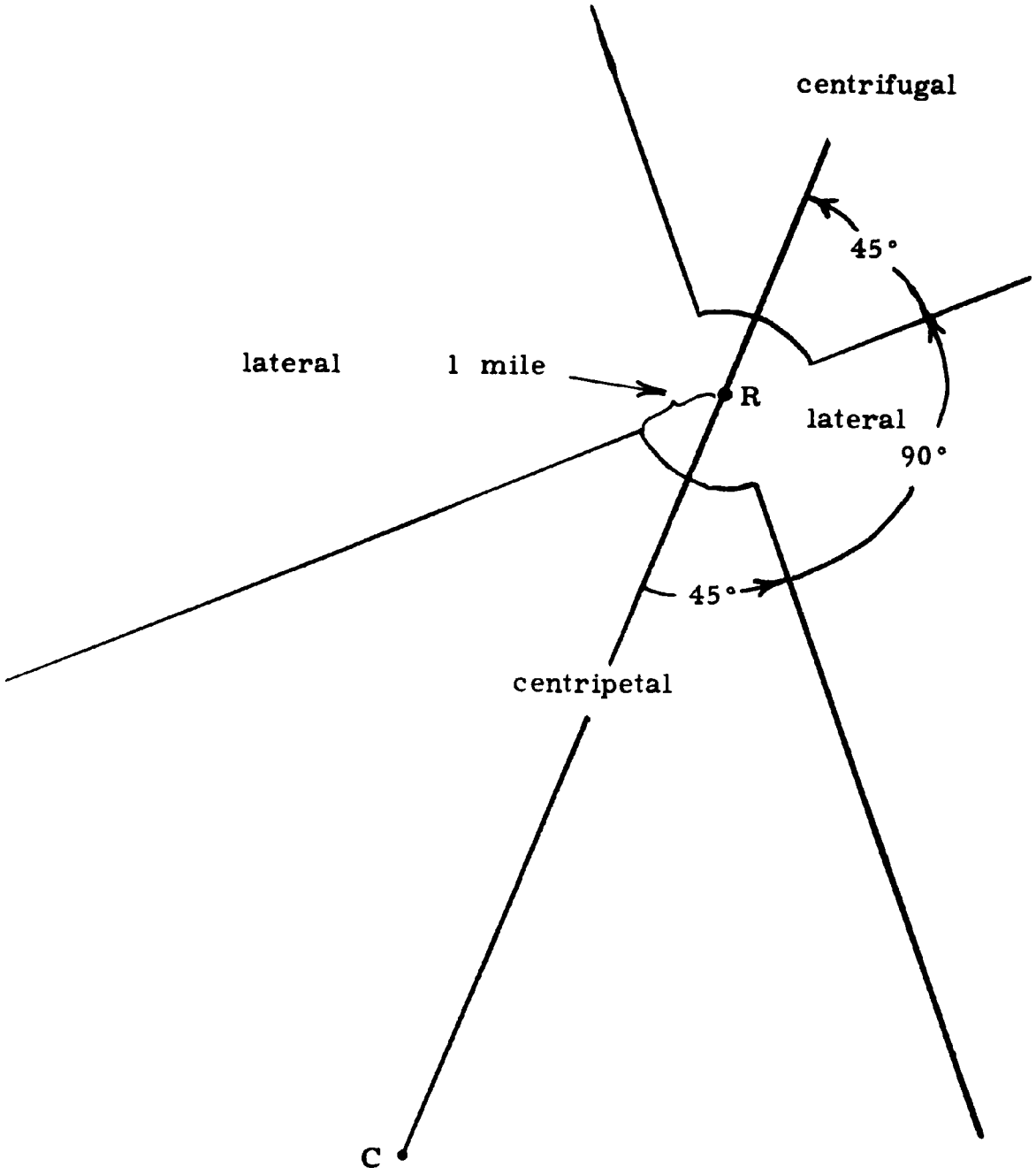


Figure 2. Diagram of Method of Determining Orientation. Point R is household residence and point C is city center. For each household, the study area is divided into centripetal, lateral, and centrifugal areas. Then each trip destination reported by that household is located in one of the orientations. Note that local trips are denoted lateral.

degree of centripetal orientation: the higher the ratio, the greater the degree of centripetal orientation. The ratio of the number of lateral trips to the total is the lateral travel ratio, while the centrifugal travel ratio is the number of centrifugal trips divided by the total. The values of each of these three ratios appear for all independent variables and control variables used in this research in Appendix B.

The Independent Variables

Distance of residence from city center

The accessibility of the city center, or core, to place of residence is expected to have direct bearing on the amount of travel toward the core. The degree of accessibility is inversely proportional to the "friction of space" that may be said to exist between place of residence and city center. This "friction" is said to be a function of the time-cost distance from point to point, but no tested mathematical statement of this function has been set forth. Distance in miles between these points is used as an approximation of this friction and is hypothesized to have an inverse relationship with degree of centripetal orientation, following the reasoning in Chapter I.

In the analysis of relative frequency of centripetal travel, residences are combined into single mile zones near the central areas, two mile zones between seven and thirteen miles, and the group beyond thirteen miles is taken together as a single group. While these groupings are arbitrary, the modified grouping in Chapter IV results from adjusting mileage zones to include roughly the same number of cases in the interest of a proposed analysis

of variance. These groupings are 1.0 to 5.9 miles, 6.0 to 8.9 miles, 9.0 to 11.9 miles, and 12.0 or more miles.

Socioeconomic level

Median or average income of the area of residence and the occupation of the head of the household are used to characterize the socioeconomic level of the household. These two variables are used because income and occupation are, along with education, measures of the status and economic power of individuals in Western society. They measure the degree to which individuals tend toward one style of life as against another as has been shown in studies of fertility, political predisposition and behavior, consumer behavior, and in many other respects. They also suggest the degree to which the individual is involved in community activities and they locate in some measure his place in the structure of the community. These variables were available, while education level was not, in the traffic study data.

It would have been advantageous to use income of families rather than census tract median income. The tract income has serious shortcomings in three respects. First, there is considerable variation in family incomes within census tracts. The notion that census tracts are homogeneous is approximately true at best, and that to an unknown degree. Secondly, the traffic study included an area for analysis somewhat larger than the Detroit tracted area. As a result, for some households no assignment to an income category was possible. Therefore, the income analysis in the research considers only those households in the tracted area.

An additional limitation of the income variable arose as a result of the coding and IBM card-punching of income on the part

of the original traffic study. All census tracts for which median income was reported in 1950 were ranked by size of the median. The tracts were then sorted into ten groups of equal number and each group assigned a distinctive code. This procedure yielded the irregular income intervals that will be seen in the analysis tables. It is unfortunate that the income deciles were based upon numbers of tracts rather than population within the tracts. Uniform population sizes within the deciles would have at least yielded statistical benefits.

Occupation, on the other hand, was reported for each person aged five years or older in the surveyed households. The occupation of the head of the household was used to the exclusion of the employments of other persons in the household, for it is more likely to be related to the household style of life and its activities than would be the occupations of other household members.

Family life cycle

Family formation, growth, and dissolution yield important changes in the activities of individuals in households. Of interest here is the manner of articulation of the household with the community. It is felt that travel patterns of the household will be affected by life-cycle stage as well as by socioeconomic factors.

Households were grouped into categories on the basis of the age and marital status of the head of the household and the presence of children under the age of fifteen years. The groupings were as follows:

Head unmarried under age forty-five

Head married under age forty-five with no children

Head married under age forty-five with children[1]

Head married aged forty-five or more

Head unmarried aged forty-five or more.

Dependent Variables

Distance traveled and frequency of travel are of main concern within orientation categories. The degree of centripetal orientation of the travel of any set of households is measured by the proportion of the total travel of the households distributed towards the more central areas. Specifically, the degree of centripetal orientation is measured by the centripetal travel ratio, as previously defined, and by distance traveled in a centripetal direction as compared with distance traveled in noncentripetal directions.

Mediating Variables of Trip Purpose and Travel Mode

In origin and destination studies sponsored by the United States Bureau of Public Roads, two kinds of information are utilized in the analysis of travel relative to the functions or activities at the origins or termini of trips. One set of data utilized is that of land use.

Arising from studies executed by tax assessors, planning boards, or by origin-and-destination teams themselves, the land in an urban community is classified in small units, perhaps by

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[1] This category includes households with children under fifteen both related and unrelated to the head. The schedule reporting did not always distinguish membership of children in the primary family.

city block, as to the predominant use to which the land is put. This classification follows the categories of residential, commercial, industrial, and public, with some subdivisions within each. Trips to an area may then be classified by the predominant land use of the area.

Another set of data is obtained in household interviews where for every trip reported the respondent is asked to assign a purpose or a reason for travel to any point. These responses are broken into work, personal business, social recreation, shopping, and school. With these data, trips may be classified by the types of requirements that generated the travel rather than the types of activities that are located at the trip end.

For the purposes of this analysis, trip purpose was used to classify travel in order to control for differences in requirement arrangements for household groups. Since travel to a predominantly "commercial-retail" area of land may mean working, eating, buying goods or services, or calling on a dentist, trip purpose appeared more suitable for present purposes.[1]

Travel mode, which refers to the means of conveyance in travel, has two major categories: auto driver or passenger, and public transit. In the discussion in Chapter I of the growth of urban areas in recent years, the effect of the automobile on travel patterns was mentioned. It is suggested that the means of transportation available and utilized by a household may partially

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[1] "Trip Purpose," while the better of the two choices, is not without drawbacks. Mitchell and Rapkin have discussed the limitations to a "purpose analysis," arguing that it is a nonunidimensional variable and nonselective among two or more possible choices (27).

determine travel orientation. Distance traveled as well as direction were expected to differ by mode of travel.

It is known that the number of automobiles owned per family is positively related to trip frequency, as are distance from city center and income (13). Assuming that ownership of automobiles means more travel and, of travel undertaken, more travel by automobile, mode of travel represents an attribute closely related to the set of variables already assembled, and should be included in the analysis.

Summary

The data from a 1954 survey of the Detroit area are to be utilized in the analysis. The effect of household location, socio-economic level, and family life-cycle stage upon the degree to which household travel tends to be oriented toward the community center are of main concern.

Travel features, the independent, and the control variables have been described and defined. While there are defects in these data, especially with respect to income, they are on the whole amenable to the proposed analysis. First, the results of the analysis of the relative frequency of centripetal travel will be presented. This will be followed by analysis of trip length differences by orientation.

CHAPTER III

ANALYSIS OF DIFFERENTIALS IN CENTRALITY OF TRAVEL ORIENTATION

In this chapter, an analysis of the centripetal travel ratios (CTR's) of households is undertaken. The degree of centripetal orientation over all trips as measured by the CTR is .40. A CTR equal to .40 implies that four out of ten trips made by members of households in the Detroit study area are in a centripetal direction. The expected value of the CTR if trips were random with respect to direction, although not formulated in mathematical terms, would be roughly less than .25.

The Effect of Distance from City Center upon Orientation

When travel of households is grouped by the distance of residence from the city center (abbreviated as distance RC) as in Table 1, CTR is directly related to distance. This represents a contradiction of Hypothesis 1. The relationship, while not a perfectly linear one, clearly indicates that the more peripheral households are markedly more centripetal in orientation than the more central households.[1] In distance RC zones one to four

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[1] In anticipation of an objection at this point, it is necessary to point out that the problem of geometric bias in the measure of degree of centripetal orientation is taken up in the first section of Chapter IV.

TABLE 1

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRIP PURPOSE
(A dash [--] indicates a ratio based on less than five cases.)

Trip Purpose	Distance of Residence from City Center (miles)				
	Total	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9
Total	.399	.268	.267	.274	.367
Work	.519	.193	.255	.307	.411
Personal business .	.416	.357[a]	.328	.408	.452
Social recreation .	.332	.692[a]	.281	.164	.252
Eat meal	279	--	.182[a]	.176[a]	.067[a]
Shopping:					
Department store	.600	.800[a]	.833[a]	.647[a]	.500
Groceries-drugs	.228	.500[a]	.167	.043	.300
Other	.345	--	.292	.094	.308
School	.273	.000[a]	.143	.412[a]	.273
Number of trips . .	10,746	157	524	672	746

[a]Base of ratio less than twenty cases.

TABLE 1 (Continued)

Distance of Residence from City Center (miles)						No. of Trips
5.0-5.9	6.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0 or More	
.346	.350	.414	.423	.470	.461	10,746
.419	.504	.612	.640	.682	.661	3,943
.444	.308	.443	.437	.414	.443	772
.262	.270	.308	.332	.417	.417	3,072
.250	.226	.205	.300	.375	.400	409
.611[a]	.462	.492	.487	.743	.791	270
.119	.105	.208	.236	.246	.306	948
.219	.270	.348	.333	.372	.440	606
.536	.180	.310	.321	.239	.230	726
754	940	1,905	1,833	1,290	1,925	

miles, the proportion is stable at .27, rising to .35-.37 in the zones from four to seven miles, .41-.42 in the seven to eleven-mile area, and to .46-.47 in the eleven or greater mile areas. In Table 2 the ratio can be seen to vary about an ascending line with increasing distance up to the fifteen mile zone at .57 where it falls and rises erratically to the rim of the study area.

Distance from residence to city center and trip purpose

While the CTR of all travel is .40, the work trips are more centripetal at a CTR value of .52 (Table 1). Work trips are not the most centripetally oriented of all the purpose grouping, but of the high relative frequency groups this is true. Work travel demonstrates a similar relationship among CTR's and distance RC but with a greater range in CTR's than that of all trips and a more regular increase in centripetal orientation as distance increases, from .19 in the most central location of residence to .68 in the eleven to thirteen mile zones.

Balanced against work travel is that for the purpose of social and recreational activity which is below the over-all average at .33. Although CTR's increase with distance RC, the pattern is not as regular as that of work travel, the rise occurring after the three mile distance zone is reached. Nor do the values attain as high levels as work travel, ranging from .16 to .41.

Work and social-recreation travel constitute 37 and 29 percent of all trips, respectively, and are by far the most important purpose categories considered. It is of interest to note that, as distance RC increases, the percent of trips with work purpose decreases while the percent for social-recreation purpose increases (Table 50), such that in the outer areas social and recreation travel attain greater importance than that of work

TABLE 2

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER

Distance of Residence from City Center (miles)	Centripetal Travel Ratios for Households
1.0-1.9	.267
2.0-2.9	.267
3.0-3.9	.272
4.0-4.9	.366
5.0-5.9	.346
6.0-6.9	.350
7.0-7.9	.390
8.0-8.9	.439
9.0-9.9	.432
10.0-10.9	.411
11.0-11.9	.440
12.0-12.9	.520
13.0-13.9	.539
14.0-14.9	.565
15.0-15.9	.498
16.0-16.9	.366
17.0-17.9	.310
18.0-18.9	.487
19.0-19.9	.492
20.0-20.9	.068
21.0-21.9	.200[a]
22.0-22.9	.750[a]

[a]Base of ratio less than twenty cases.

travel. This relationship will be discussed later in the context of family life cycle.

Travel for personal business purposes is slightly higher than average in centripetal orientation. The values of CTR's fluctuate over distance from city center, rising and falling within a range from .31 to .45 with a minor increase of the ratio as distance increases.

Travel for department store shopping, while representing only 2.5 percent of daily travel, is the purpose with the highest degree of centripetal orientation. The total CTR for this purpose is .60, which arises out of something akin to a U-curve over distance. Values are high near the central area, falling in the middle distance zones and rising sharply in the outer areas.[1]

The purpose categories of "eat meal," "shopping for groceries-drugs," "shopping--other," and "school" constitute about one-quarter of all travel. These purpose categories are below average in centripetal orientation and display a slight relationship between distance RC and CTR. Of these, the purpose group "eat meal" shows the most pronounced relationship between CTR and distance, from about .18 in the second and third distance rings to .40 in the peripheral area. However, this increase in CTR is neither regular nor even consistent until the seven mile zone is reached, where a steady increase begins.

There is, then, a wide range in the degree of centripetal orientation of trips of various purposes and marked difference in the effect of residence to center distance upon tendency toward central travel among purposes. Work and social-recreation

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[1] This curve may be generated by the presence of shopping subcenters in the middle areas. See Jonassen (19) and Sharpe (36).

purposes which contain the bulk of travel both demonstrate strong relationships of CTR to distance RC, while work trips on the whole are more centripetal and social-recreation travel less so than the average over-all trips.

Residence-to-center distance and travel mode

Except for a slight downward dip of the ratio in the five mile distance zone, auto drivers display a similar direct correlation of CTR and distance of residence from the city center (Table 3). Beginning at .24 in the first three distance classes, the ratio rises to about .30 for the next three, to .42 for the following two, and, finally, to .51 in the last two distance classes. It appears that the relationship between degree of central orientation of travel and the distance variable is more pronounced for auto drivers than for all modes. Auto passengers again display a positive relationship between orientation and distance, but the ratio is somewhat less stable in increase and attenuated in range when compared to the auto drivers.

With some variation, mass transit travel shows a rapid increase in ratio with increasing distance up to the nine to eleven mile distance zone after which it falls sharply. In every mile zone up to this point, mass transit is more highly centripetal than the auto-drivers mode.

Taxi, truck-passenger, and walk-to-work modes are represented by relatively few trips. In many cases the cell sizes are not adequate for analysis, but, to the degree that an interpretation may be made, their pattern is peculiar. Just as these are not "common" travel modes, their CTR's show up as unusual. Taxi movement, for example, may be more expensive than that for other modes; thus it is likely to be used only for short distances or

TABLE 3

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRAVEL MODE
(A dash [--] indicates a ratio based on less than five cases.)

Travel Mode	Distance of Residence from City Center (miles)				
	Total	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9
Total	.399	.268	.267	.274	.367
Auto driver	.410	.244	.244	.242	.316
Auto passenger . . .	.343	.391	.122	.196	.306
Public transportation passenger . .	.516	.271	.436	.416	.580
Taxi passenger . . .	.455	.600[a]	.143[a]	.333[a]	.400[a]
Truck passenger . .	.389	--	--	--	--
Walk (to work only)	.040	.056[a]	.000	.036	.050
Number of trips . .	10,746	157	524	672	746

[a]Base of ratio less than twenty cases.

TABLE 3 (Continued)

Distance of Residence from City Center (miles)						No. of Trips
5.0-5.9	6.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0 or More	
.346	.350	.414	.423	.470	.461	10,746
.298	.338	.417	.428	.511	.507	5,415
.292	.276	.340	.365	.401	.417	3,363
.595	.546	.638	.653	.476	.395	1,686
--	--	--	--	--	.714[a]	44
--	--	.286[a]	.286[a]	--	.333[a]	36
.034	.000[a]	.067[a]	.000[a]	.143[a]	.091[a]	202
754	940	1,905	1,833	1,290	1,925	

infrequent trips. Walking trips, confined to work travel only, are very short in distance and are likely strikingly noncentripetal in orientation, because all trips under one mile in length are arbitrarily lateral. Little further comment will be made on taxi and truck passengers and on walking trips, but they will be included in analysis and descriptive tables for the reader's inspection.

Differentials in Orientation by Income

With the exception of the second decile group in which a minor downward fluctuation is apparent, the relationship of the income variable to degree of centripetal orientation is positive (Table 4). Starting with the lowest two deciles in which about .30 trips are centripetal, the proportion advances to .34 and to .36, remaining stable over a set of about four deciles, and then moves progressively higher over the highest four deciles.

Income and distance of residence from city center

When income is controlled for distance of residence from city center (distance RC), the relationship of income to degree of centripetal orientation breaks down. The absence of the upper income groups from the central areas and the absence of the lower income groups from the outer areas appear to account for the main part of the over-all relationship of income to CTR. Within the three highest income deciles there is a correlation of CTR with distance, but even at the inner locations CTR remains relatively high for these deciles compared with the other income groups. Thus income appears to be more important than distance from center among these higher income groupings in determination of CTR.

TABLE 4

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR DISTANCE OF RESIDENCE FROM CITY CENTER
(A dash [--] indicates a ratio based on less than five cases.)

Distance of Residence from City Center (miles)	Income[a] (in dollars)					
	0-2699	2700-3066	3073-3338	3355-3476	3480-3652	3656-3850
1.0-1.9	.256	.290	.231[b]	--	--	--
2.0-2.9	.292	.269	.240	.177	.476	--
3.0-3.9	.340	.233	.335	.252	.204	.206
4.0-4.9	.478	.312	.173	.353	.400	.349
5.0-5.9	--	.268	.310	.394	.319	.317
6.0-6.9	--	.235[b]	.404	.220	.310	.517
7.0-8.9	--	.303	.282	--	.375	.477
9.0-10.9	--	.565	--	--	.313	.308
11.0-12.9	--	--	--	.478	.460	.569
13.0 or more	--	.571	.600	.533	.505	.352
Total	.305	.292	.343	.363	.363	.365
No. of trips	302	599	731	736	787	1,040

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit tracted area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

[b]Base of ratio less than twenty cases.

TABLE 4 (Continued)

Income[a] (in dollars)						No. of Trips
3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	Total	
--	--	--	--	--	.268	157
--	--	--	--	--	.267	524
--	--	.538	--	--	.274	672
.481	.400[b]	.485	--	--	.367	746
.348	.363	.000[b]	.500	--	.346	754
.311	.297	.405	.377	--	.350	940
.298	.386	.478	.462	--	.414	1,905
.352	.456	.426	.480	--	.423	1,833
.454	.460	.478	.428	--	.470	1,290
.473	.598	.415	.523	.425	.461	1,925
.407	.414	.451	.464	.425	.399	
1,513	1,521	1,635	1,355	527		10,746

Income and trip purpose

When classes of trips are examined separately, further patterns appear. Work trips show a definite systematic relationship of income with CTR. Comparing the CTR's for work with the pattern over-all purposes (Table 5), not only is an orderly progression present, but the range of ratios is much greater. The gradient of the ratio over income difference is not linear, but is monotonic.

Trips for personal business and social-recreation purposes show gross differences in the same direction: the higher the income within purpose, the more likely centripetal travel. Trips for the purpose of eating in commercial establishments show definite increase in centrality of orientation with income. Restaurant dining, however, is not an important purpose for travel in this community.

Department store shopping shows an inversion of the predominant trend. The ratios of centripetal movement are very high for all income groups, but decline somewhat as income increases, and then increase for the last two income deciles. Perhaps the most striking feature of department store travel is the consistently high level of centripetal orientation. The average for all department store trips is .60 and the range is from .38 to .67 (excluding ratios with small bases). Department stores are clustered in central areas in Detroit but for some years have had counterparts in subcenters distributed about the urban area.[1] The partial inversion in this type of travel activity may be a function of the presence of shopping centers

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[1]However, Detroit is somewhat dominated in department store activity by one firm which had at the time of the survey a primary location in the central business district and a store branch as the core of a new shopping center opened in the suburbs just after this survey got under way. Shortly after the survey, a second suburb branch opened.

TABLE 5

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR TRIP PURPOSE

(A dash [--] indicates a ratio based on less than five cases.)

Trip Purpose	Total	Income[a] (dollars) 0-2699	2700-3066	3073-3338	3355-3476	3480-3652
Total .	.399	.305	.292	.343	.363	.363
Work . . .	.519	.249	.278	.383	.428	.435
Personal business .	.416	.359	.466	.348	.393	.431
Social recreation . . .	.332	.679	.221	.348	.284	.299
Eat meal . . .	.279	--	.111[b]	.095	.174	.200
Shopping:						
Dept. store .	.600	.857[b]	.667[b]	.647[b]	.667	.633
Groc.-drugs .	.228	.091[b]	.286	.291	.271	.095
Other .	.345	.222[b]	.467[b]	.250	.290	.355
School . .	.273	.143[b]	.292	.216	.231	.375[b]
No. trips.	10,746	302	599	731	736	787

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

[b]Base of ratio less than twenty cases.

TABLE 5 (Continued)

Income[a] (dollars)						No. of Trips
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	Not Reported	
.365	.407	.414	.451	.464	.425	10,746
.528	.547	.616	.638	.712	.636	3,943
.294	.482	.447	.415	.465	.520	772
.249	.351	.287	.356	.397	.429	3,072
.217	.281	.303	.295	.388	.360	409
.625	.575	.382	.565	.618	1.000[b]	270
.242	.210	.225	.270	.149	.345	948
.256	.505	.321	.434	.261	.310	606
.333	.189	.434	.291	.306	.117	726
1,040	1,513	1,521	1,635	1,355	527	

with department stores on all important radials in the outer parts of the central city area (about five to ten miles from the city center; Table 1 would seem to confirm this guess).

As might be expected, income shows little relationship to CTR in primarily local residence-tied activity such as grocery and drug shopping and "other" shopping which includes shopping not specifically in department stores or for groceries or drugs. Trips to school, almost exclusively trips by persons aged five to eighteen years to local grade and high schools, also fit into the category of local travel in which little centripetal orientation pattern is apparent.

Income and mode of travel

When travel is segregated by mode, the difference between the degree of centripetal orientation of automobile drivers and passengers, and mass transit passengers is quite striking (Table 6). It has been suggested by others that the well-established radial network of arterial streets tends to make radial travel easier than lateral travel. Since mass transit conveyances are generally fixed in routing, it appears to be most efficient in shifting passengers between complementary clusters of functions; e.g., from residence to workplace. Getting to the "downtown" area is relatively easy by mass transit by way of radials through residential clusters. Lateral travel, however, even for a very short distance can be much more difficult than a "downtown" trip several times the distance away.

The importance of the motor car as stressed by Ogburn (28) is in its ability to travel overland, as long as the ground surface is sufficient to support the weight of the vehicle and is not broken. The auto is, then, relatively free of the orientation of the major arterial channels. In cities that matured before the motor car, the

TABLE 6

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR TRAVEL MODE

(A dash [--] indicates a ratio based on less than five cases.)

Travel Mode	Total	Income[a] (dollars) 0-2699	2700-3066	3073-3338	3355-3476	3480-3652
Total .	.399	.305	.292	.343	.363	.363
Auto driver . .	.410	.282	.285	.333	.373	.350
Auto passenger	.343	.302	.234	.279	.322	.325
Public transportation passenger	.516	.375	.386	.494	.471	.531
Taxi passenger . .	.455	--	.333[b]	--	.000[b]	--
Truck passenger	.389	--	--	--	--	--
Walk (to work only) . . .	.040	.000	.033	.040	.069	.032
No. trips.	10,746	302	599	731	736	787

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 6 (Continued)

Income[a] (dollars)						No. of Trips
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	
.365	.407	.414	.451	.464	.425	10,746
.350	.433	.414	.444	.485	.508	5,415
.324	.371	.365	.372	.344	.390	3,363
.536	.433	.616	.692	.752	.235	1,686
--	--	.200[b]	.833[b]	--	1.000[b]	44
.273[b]	--	--	.444[b]	--	--	36
.000[b]	.000[b]	.077[b]	.118[b]	--	--	202
1,040	1,513	1,521	1,635	1,355	527	

[b]Base of ratio less than twenty cases.

cluster patterns of residence, workplace, and shopping center were such that mass transit could retain an important, if not dominant, position in local transport many years after the automobile came to be an item of mass consumption. Detroit and Los Angeles, whose major growth has come since the era of the street railway and the elevated, have a considerably more dispersed settlement of all functions. Mass transit is not well suited to this type of community development (23).

As would be expected from the foregoing, mass transit is significantly more centripetal in orientation than is auto travel, whether by drivers or passengers, for all except one income decile in which the CTR's are equal. While both mass transit and auto travel show definite increases in centrality of orientation as income increases, the middle ranges show some fluctuations and inversions. The relationship of income to CTR is present in any case, but appears stronger for mass transit than either auto driver or auto passenger modes, which may be a product of the scarcity of lateral transit lines in the more peripheral areas where the higher socioeconomic groups tend to reside.

Differentials in Orientation by Occupation of the Head of the Household

Occupation of the head of the household was taken as a second socioeconomic variable upon which to classify trips. Using the Bureau of the Census ordering of eleven major occupation groups, occupation of head is directly related to the centripetal travel ratio (Table 7). The relationship is neither regular nor

TABLE 7

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER

(A dash [--] indicates a ratio based on less than five cases.)

Distance of Residence from City Center (miles)	Occupation of Head of Household					
	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred	Sales Workers
1.0-1.9	.167[a]	.393	.167[a]	.250	.320	--
2.0-2.9	.271	.173	--	.275	.188	.208
3.0-3.9	.218	.250	--	.260	.242	.478
4.0-4.9	.571	.632	--	.299	.376	.487
5.0-5.9	.216	.400	--	.287	.331	.370
6.0-6.9	.375	.361	--	.326	.416	.409
7.0-8.9	.298	.435	--	.469	.397	.394
9.0-10.9	.250	.520	--	.367	.418	.464
11.0-12.9	.526[a]	.387	--	.527	.428	.423
13.0 or more . .	.412	.416	.750[a]	.534	.433	.468
Total	.323	.407	.455	.383	.394	.426
No. of trips . . .	402	592	22	2,109	2,509	671

[a]Base of ratio less than twenty cases.

TABLE 7 (Continued)

Occupation of Head of Household							
Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	Total	No. of Trips
.357[a]	.125[a]	--	.000[a]	.250[a]	--	.268	157
.345	.477	--	.111[a]	.349	--	.267	524
.312	.302	--	.368	.244	--	.274	672
.367	.234	--	.370	.375	--	.367	746
.431	.366	--	.423	.403	--	.346	754
.397	.275	--	.268	.383	--	.350	940
.504	.341	--	.436	.496	--	.414	1,905
.479	.435	--	.427	.389	--	.423	1,833
.500	.494	--	.467	.510	--	.470	1,290
.530	.432	--	.536	.295	--	.461	1,925
.456	.390	--	.431	.380	.750[a]	.399	
759	1,740	0	1,129	805	8		10,746

linear: the "blue-collar" workers on the whole are less oriented toward the city center than "white-collar" workers.[1]

The range in ratios over all occupations is relatively small: .32 for laborers and farm workers to .46 for clerical and kindred workers. The expected relationship of occupation level inversely related to CTR is slightly reversed and the expectation of the relationship of occupation to CTR after control for distance of residence from city center is not borne out with any regularity.

Occupation of head and distance of residence from city center

There is some indication that the white-collar people, as a group, tend toward more centripetal movement than the blue-collar workers even after distance of residence from city center is controlled (Table 8). However, if the population located less than nine miles from the city center is examined, the blue-collar households in four out of the seven distance classes show greater CTR's than do the white-collar households. Beyond this nine mile line, the white-collar CTR's are higher. This pattern effectively contradicts the hypothesized pattern of differentials at least in the more central residential areas.

Occupation of head and trip purpose

When trips to work are classified by the occupation of the head of the household of the tripmaker, a different pattern is apparent (Table 9). In every case, the white-collar occupation groups

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[1] "Blue-collar" worker is understood to mean the categories of laborers and farm workers through craftsmen, foremen, and kindred workers, while the "white-collar" group embraces the remaining categories such as sales people, clerical, and professional.

TABLE 8

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD (BLUE-COLLAR, WHITE-COLLAR) FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Distance of Residence from City Center (miles)	Blue-Collar		White-Collar	
	Centripetal Travel Ratio	Number of Trips	Centripetal Travel Ratio	Number of Trips
1.0-1.9	.287	115	.200	30
2.0-2.9	.233	374	.349	106
3.0-3.9	.249	402	.340	188
4.0-4.9	.375	451	.350	206
5.0-5.9	.315	464	.395	223
6.0-6.9	.374	457	.310	368
7.0-8.9	.420	878	.395	882
9.0-10.9	.402	834	.444	927
11.0-12.9	.461	595	.473	643
13.0 or more .	.463	1,064	.486	726
Total	.386	5,634	.418	4,299

TABLE 9

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRIP PURPOSE
(A dash [--] indicates a ratio based on less than five cases.)

Trip Purpose	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Total	.399	.323	.407	.455	.383	.394
Work	.519	.381	.504	.333[a]	.471	.508
Personal business	.416	.367	.649	--	.367	.401
Social-recreation	.332	.260	.280	.667[a]	.313	.335
Eat meal	.279	.182[a]	.444[a]	--	.195	.224
Shopping:						
Dept. store .	.600	--	.611[a]	--	.765	.560
Groc.-drugs .	.228	.147	.283	--	.211	.275
Other	.345	.211[a]	.333	--	.465	.323
School	.273	.222[a]	.217	--	.217	.299
No. of trips . . .	10,746	402	592	22	2,109	2,509

[a]Base of ratio less than twenty cases.

TABLE 9 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
.426	.456	.390	--	.431	.380	.750[a]	10,746
.577	.548	.566	--	.640	.519	--	3,943
.556	.563	.378	--	.403	.378	--	772
.383	.388	.351	--	.340	.289	--	3,072
.291	.222[a]	.284	--	.448	.160	--	409
.500[a]	.615	.475	--	.667	.643	--	270
.250	.234	.186	--	.189	.240	--	948
.222	.429	.341	--	.347	.333	--	606
.327	.317	.248	--	.304	.214	--	726
671	759	1,740	0	1,129	805	8	

demonstrate greater centrality of orientation than do the blue-collar groups. There is variability in CTR's among each of these groups which is not supported by the occupational orderings, but the differences between white-collar and blue-collar groups are distinct, except for shopping trips (Table 10).

Again, in the case of social-recreation travel, which is the second most important source of travel in terms of frequency (work trips are first), the white-collar group ranks higher in every category than the blue-collar, with the exception of the numerically unimportant private household workers. In the other trip-purpose categories the results are mixed. Even so, the tendency toward centripetal movement, with one occupational exception, tends to be greater for white-collar than for blue-collar groups when trips for personal business purposes are examined.

Occupation of head and travel mode

When the trips of household members are classed by occupation of their household heads and by travel mode, the tendency for public transportation to display higher centripetal values than the auto modes appears to hold for every occupational group (Table 11). With respect to mass transit, there is a group difference favoring the white collar group as to centrality of orientation, but this relationship does not hold for each occupational category (Table 12). A similar set of relationships holds for the auto modes, but is less distinct.

Differentials in Orientation by Stage in Family Life Cycle

It had been expected that the households with a young (under age forty-five) unmarried head would show the highest degree of

TABLE 10

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD (BLUE-COLLAR, WHITE-COLLAR) FOR TRIP PURPOSE

Trip Purpose	Blue-Collar		White-Collar	
	Centripetal Travel Ratio	Number of Trips	Centripetal Travel Ratio	Number of Trips
Work	.479	2,273	.583	1,404
Personal business	.409	391	.433	307
Social-recreation . . .	.317	1,528	.358	1,296
Eat meal	.226	137	.320	247
Shopping:				
Dept. store .	.626	131	.546	97
Groceries-drugs	.243	498	.205	375
Other	.355	324	.333	243
School	.267	352	.282	330
Total	.386	5,634	.418	4,299

TABLE 11

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRAVEL MODE
(A dash [--] indicates a ratio based on less than five cases.)

Travel Mode	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Total	.399	.323	.407	.455	.383	.394
Auto driver . . .	.410	.347	.426	--	.395	.407
Auto passenger	.343	.235	.347	.833[a]	.335	.356
Public transportation passenger	.516	.423	.542	.364[a]	.476	.462
Taxi passenger	.455	--	--	--	--	.200[a]
Truck passenger	.389	--	--	--	.625[a]	.300[a]
Walk (to work only)	.040	.067[a]	.000	--	.038	.030
No. of trips . . .	10,746	402	592	22	2,109	2,509

[a]Base of ratio less than twenty cases.

TABLE 11 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
.426	.456	.390	--	.431	.380	.750[a]	10,746
.426	.444	.403	--	.459	.352	--	5,416
.354	.413	.322	--	.356	.309	--	3,363
.627	.621	.559	--	.528	.584	--	1,686
--	.500[a]	.667[a]	--	.628[a]	.286[a]	--	44
-	--	.231[a]	--	--	--	--	36
.000[a]	.000[a]	.048	--	.083[a]	.091	--	202
671	759	1,740	0	1,129	805	8	

TABLE 12

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD (BLUE-COLLAR, WHITE-COLLAR) FOR TRAVEL MODE

Travel Mode	Blue-Collar		White-Collar	
	Centripetal Travel Ratio	Number of Trips	Centripetal Travel Ratio	Number of Trips
Auto driver . .	.401	2,728	.429	2,338
Auto passenger . . .	.341	1,744	.352	1,361
Public transportation passenger . . .	.472	1,000	.578	509
Taxi passenger . . .	.167	12	.640	25
Truck passenger . . .	.455	22	.286	14
Walk (to work only) . . .	.031	128	.038	52
Total	.386	5,634	.418	4,299

centripetal orientation. Then the young married without children would have a lower, but relatively high centripetal travel ratio, declining for the married with children and rising for the older married (head aged forty-five or older). The older single persons were expected to show a decline in centripetal movement.

In Table 13, the "household total" row shows that these contentions are borne out on the whole with one exception: Households whose heads are under age forty-five and who are unmarried demonstrate a consistently lessened tendency toward centripetal travel than do all groups except the older unmarried. Young married without children and older married do demonstrate greater centripetal orientation than do either the young married with children or the older unmarried.

Family life cycle and distance of residence from city center

When distance of residence from city center is controlled, the over-all pattern, as previously described, prevails (Table 13). The effect of increasing distance on the ratios is to increase them within each life cycle stage so that the relationship among stages is preserved. If the three married stages are considered (young, without and with children, and older married), only one exception occurs in the relationship among ratios described above--for the households located between three and four miles from the city center the older married have a slightly higher, but roughly the same, ratio as do the younger married with children. Considering all life stages, the three to four mile group shows reversals for both the young unmarried and the older unmarried, which present ratios higher than expected. Other exceptions to the pattern are the young unmarried in the four to five, five to six, and thirteen or more mile groups, while among the older

TABLE 13

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER

(A dash [--] indicates a ratio based on less than five cases.)

Distance of Residence from City Center (miles)	Stage in Family Life Cycle of Household							No. of Trips
	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	Total	
1.0-1.9	.200	.429[a]	.192	.345	.177	--	.268	157
2.0-2.9	.237	.253	.206	.333	.265	--	.267	524
3.0-3.9	.434	.351	.242	.238	.260	--	.274	672
4.0-4.9	.405	.396	.299	.408	.338	--	.367	746
5.0-5.9	.432	.280	.272	.359	.571	--	.346	754
6.0-6.9	.254	.395	.318	.367	.347	--	.350	940
7.0-8.9	.360	.395	.364	.459	.432	--	.414	1,905
9.0-10.9	.429	.504	.397	.441	.395	--	.423	1,833
11.0-12.9	.355	.519	.457	.487	.531	--	.470	1,290
13.0 or more	.523	.488	.432	.511	.351	--	.461	1,925
Total . . .	.379	.413	.380	.423	.369	.500[a]	.399	
No. of trips . . .	441	976	4,427	4,109	777	16		10,746

[a] Base of ratio less than twenty cases.

unmarried the exceptions occur in the five to six and eleven to twelve mile rings.

Family life cycle and trip purpose

When purpose of travel is held constant, a reversal of the predicted relationship between the young married with and without children appears (Table 14). This reversal extends in many cases to the relationship between young married with children and the older married. The young married with children display, for most purposes of travel, higher centripetal travel ratios than do their preceding or following groups. Upon closer examination of this apparent contradiction of the previous section on family life cycle and distance from residence to city center, the following appears to be true. The young married without children distribute trips over purpose in a markedly different fashion than young couples with children. Travel to work makes up 45 percent of the travel of those without children, while those with children generate only 29 percent of their trips in this purpose category (Table 53).

On the other hand, the frequency of social recreation travel is relatively greater for those with children (33 percent) than those without (24 percent). Since work trips over all life-cycle stages are much more centripetal in orientation than are social recreation trips, it can be concluded that the concentration of the travel of the young couples without children in work purposes, and those with children in social recreation purposes, underlies the difference between the over-all direction of difference and that among the specific purpose groups.

An interpretation of the difference in distribution of trips into the work and social recreation categories can be made on the basis of the greater prevalence of wives working among childless couples.

TABLE 14

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRIP PURPOSE
(A dash [--] indicates a ratio based on less than five cases.)

Trip Purpose	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Total .	.399	.379	.413	.380	.423	.369	.500[a]	10,746
Work . . .	.519	.418	.478	.532	.553	.438	.500[a]	3,943
Personal business .	.416	.400	.417	.413	.445	.250	--	772
Social-recreation	.332	.356	.343	.351	.306	.310	--	3,072
Eat meal . . .	.279	.350	.220	.296	.303	.135	--	409
Shopping:								
Dept. store .	.600	.714[a]	.556[a]	.554	.614	.692	--	270
Groc.-drugs .	.228	.056[a]	.222	.218	.259	.167	--	948
Other .	.345	.455	.485	.319	.336	.217	--	606
School . .	.273	.111[a]	.458	.192	.357	.565	--	726
No. of trips . . .	10,746	441	976	4,427	4,109	777	16	

[a]Base of ratio less than twenty cases.

In March of 1956, 31 percent of married women with husbands present living in urban areas in the United States were in the labor force. At the same time, only 24 percent of these women who had children under the age of 17 were labor-force participants (3). Also, women with children tend to work part-time rather than full-time, and in some cases will work only two or three days out of the week. Beyond this immediate explanation it is apparent that, although young married without children evidence higher CTR's than do the couples with children, the underlying differences in distribution of trips over purpose bear heavily on the total CTR differences. The familial requirements of these two family groups generate differences in degree of contact among the several broad categories of community functions. When trip purpose is controlled, the families with children display a greater degree of centripetal orientation than do those families without.

Within purpose, the reason that CTR's are higher for couples with than without children may be partially due to the tendency for families with younger children to locate in the more outlying areas than those without children, since families in the outer areas tend to generate higher CTR's than those in inner areas. Table 60 shows that, while 60 percent of all trips of couples with children are made from residences located nine or more miles from the city center, only 40 percent of the trips by married persons without children originate from households located in this more peripheral area.

In summary, it may be said that the stages in family life cycle not only affect travel distributions in the sense of restricting or extending the frequency and length of journeys, but also tend to create conditions which change the emphasis as to the <u>type</u> of

activities engaged in, which themselves in their location patterns appear to generate travel pattern differences.

Family life cycle and travel mode

The pattern of centripetal travel ratios over life cycle when travel mode is controlled is similar to the over-all pattern for all modes except for automobile drivers (Table 15). Couples with children show a minor but significant increase in CTR in trips in which the tripmaker is an auto driver than do those without children. The young unmarried persons have a higher CTR as automobile drivers than households in any other stage, but resume the lower CTR's for the other two major modes of travel. The older married couples conform in every case in showing a lower CTR than the preceding stage in family life cycle.

Conclusions--the Hypothetical Outcome

The first hypothesis (Hypothesis 1), which states the inverse relationship between centripetal orientation and distance between residence and city center, was not borne out. On the contrary, the null hypothesis is accepted and a converse proposition is set forth that, as distance of residence from the city center increases, so does centripetal attraction; i.e., the likelihood of inward movement.

Since the location of households in terms of distance from the core is positively related to socioeconomic level, the proposition that socioeconomic level is inversely related to degree of centripetal orientation falls as a result of the outcome of the hypothetical failure described in the paragraph above. Again, a direct relationship between the independent and dependent variables occurs.

Hypothesis 4 states that when distance is controlled the direct relation between socioeconomic level and degree of centripetal

TABLE 15

CENTRIPETAL TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRAVEL MODE
(A dash [--] indicates a ratio based on less than five cases.)

Travel Mode	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Total .	.399	.379	.413	.380	.423	.369	.500[a]	10,746
Auto driver . .	.410	.429	.404	.421	.410	.334	.444[a]	5,416
Auto passenger	.343	.301	.373	.322	.371	.340	--	3,363
Public transportation passenger	.516	.420	.530	.415	.585	.557	.600[a]	1,686
Taxi passenger	.455	--	--	.200[a]	.500	.286[a]	--	44
Truck passenger	.389	--	--	.357	--	--	--	36
Walk (to work only) . . .	.040	.040	.083[a]	.049	.038	.022	--	202
Trips . .	10,746	441	976	4,427	4,109	777	16	

[a]Base of ratio less than twenty cases.

orientation should appear. The fact that it is partially apparent does not clarify this relationship since the populations in the different socioeconomic groupings tend to be segregated on the distance-from-center variable: the lower-income and blue-collar workers tend more toward central location of residence while the higher-income and white-collar workers tend toward peripheral residential sites. The question as to whether distance or socioeconomic level takes precedence in establishing the tendency for inward movement has no clear answer here. Yet there is evidence that over and above the effect of distance, the higher socioeconomic levels show greater centrality in orientation than the lower. The following chapter will have more to say on this point.

The family life cycle hypothesis (Hypothesis 3) was confirmed on the whole except for the expected high relative frequency of centripetal travel for the households with young unmarried heads. Even when distance of residence from the city center is controlled, this expected pattern prevails: the households with young married heads and with children, and households with older unmarried heads show less centripetal orientation than do the other stages of household development.

A striking reversal occurs in the reported differences in centripetal orientation between households with young heads with children and those without children when trip purpose is controlled. Within purpose classes, the households with children show a higher degree of centripetal orientation than do those without. It was suggested that the higher centrality among the households with children was due to these households' tending toward more peripheral location than those without.

In spite of the differences favoring those households with children within purpose, the over-all difference runs higher for those

without. This is true because of the considerable concentration of total travel of the households without children in the "work" purpose category. Travel in this category tends to show a greater degree of centrality of orientation than does "social-recreation," in which the bulk of the trips of families with children is concentrated.

Hypothesis 7, which states that the socioeconomic differentials in centrality of orientation increase as residence to center distance increases, as one might expect from the foregoing, is not borne out.

The results of the analysis set forth in this chapter were on the whole unexpected. Although differentials in centripetal travel orientation were definitely in evidence, the direction of the relationships in many cases was the converse of that hypothesized. The distance of place of residence from the city center (City Hall) comes through in all cases as a strong direct determinant of travel orientation. Since it is generally known that distance of residence from city center is positively related to socioeconomic level in most cities (with some exceptions, such as Flint, Michigan), it is not surprising that occupation of head of the household and median income of census tract of residence are correlated with travel orientation in a similar manner.

The hypothesized relationship of family life cycle with travel orientation was supported, on the whole. Even when distance of residence to city center was controlled, a regular pattern of orientation appeared over the stages of family life cycle. However, when the relationship of family life cycle is controlled by trip purpose, an inversion in the relationship appears. This will be taken up in more detail later.

CHAPTER IV

AN ANALYSIS OF TRAVEL BY TRAVEL ORIENTATION

Of particular interest in the preceding presentation was the overwhelming effect of distance of residence from the city center in determining travel orientation. Consider the hypotheses set forth in Chapter I. It was expected that the higher the socio-economic level the lower the degree of centripetal orientation. Households at the higher income levels tend to peripheral location. Households established in the peripheral areas were expected to show less centripetal travel as a result of intervening "friction of space." The reasoning, elaborated in Chapter I, took the lines of arguing that, with increasing size within the context of present communication and transportation facilities, the deconcentration of non-residential functions would tend to take place. This deconcentration was expected to permit the substitution by the peripheral householders of juxtaposed functions which had previously been available only in the more central areas. Although these dispersed functions might offer less variety and concentration than those in the core, they would be more attractive as a result of increased friction of space between these outlying areas and the core concentrations. As was apparent in the analysis of the centripetal travel ratios for socio-economic measures with and without control for distance of residence from city center, the assumption of the substitutability of alternative accessible sites for the greater diversity and concentration of functions in the more central areas was not substantiated--rather the

converse appears to be true. Even so, this is not to say that some degree of reorientation has not occurred.

However, a few questions arise from the preceding analysis. First, the measure of centripetal orientation, CTR, is constructed by dividing the number of centripetal trips by the total travel frequency. Since "centripetal" is defined as destination-location within a 90° angle with its vertex at place of residence, oriented toward city center and bisected by a line between residence and city center, it is a matter of simple geometry that as distance of residence, R, from the city center, C, increases, the proportion of the area under examination (the Detroit community) falling into that sector increases. At the extreme periphery nearly the entire area is encompassed in the centripetal class. As a result, the CTR may display an artifactual increase which results from increasing R-to-C distance.

A second question which arises, again as a criticism of the measures used, is that the centripetal travel ratio as an expression of centripetal orientation is merely a function of travel frequency and that the consideration of distance traveled as an additional aspect might develop a different set of results. Suppose that lateral and centrifugal trips were of increasing length as R-to-C distance increased, while the length of centripetal trips did not increase correspondingly. If this were true, some differences in interpretation might be called for. Centripetal trips might be more frequent as residence-to-center distance increases, but of relatively short length Opposed to this, noncentripetal trips may become more lengthy and directed to subcenter concentrations. In reviewing distance and frequency of travel of orientation, it may be that they are inversely related to one another, a finding which would cast serious doubt on the results of the relative frequency analysis. This

alternative hypothesis would seem to deserve some examination. Certainly distance combined with frequency should be scrutinized where evaluation of the relationship of accessibility of nonresidential sites to amount of actual contact is undertaken.

An Analysis of Centripetal Travel

The distribution of centripetal trips by deflection angle

Treating the problems raised in order, the first question concerning the geometric bias in the measure of degree of centripetal orientation leads to the analysis of the characteristics of centripetal trips. In Table 16, centripetal trips are segregated into five subsets by angle of deflection.[1]

The smallest deflection angle category is sharply distinguishable with twice the percentage of trips of any of the other categories. About 43 percent of all centripetal trips fall into the 0°-9° category. This percentage drops to 21 in the second and declines in a somewhat regular manner over the remaining angle groups.

When distance of residence from city center is added, there is a tendency for the proportion of travel within the 0°-9° group to be greatest for the near-to-center residences and to decline as distance increases. The values range from 49 percent for the most central households to 39-40 percent for the most peripheral. Within each distance class, however, the 0°-9° angle class remains numerically the most important with a marked drop to the 10°-19° class, followed by a decline over the remaining angle groups. All distance classes, then, are similar in the distribution of centripetal trips over these angle classes.

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[1] See Chapter II for definition of angle of deflection.

TABLE 16

DISTRIBUTION OF CENTRIPETAL TRIPS BY DEFLECTION ANGLE FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Deflection Angle	Distance of Residence from City Center (miles)									
	1.0-5.9		6.0-8.9		9.0-11.9		12 or More		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
0-9° . . .	441	48.9	503	44.9	438	38.5	448	39.7	1830	42.7
10-19° . .	161	17.9	220	19.7	248	21.9	247	21.9	876	20.5
20-29° . .	125	13.9	195	17.5	211	18.6	196	17.4	727	16.9
30-39° . .	131	14.5	128	11.4	173	15.2	180	16.0	612	14.3
40-45° . .	43	4.8	72	6.5	65	5.8	56	5.0	236	5.6
Total . . .	901	100.0	1118	100.0	1135	100.0	1127	100.0	4281	100.0

It may be assumed at this point that the centripetal travel is more concentrated toward the core when originating from households closer to it. On the other hand, this range in values over distance in the 0°-9° group is not large. If the 0°-9° and 10°-19° groups are considered together, the range is from 60 to 67 percent, which further indicates the tendency over all distance groups to concentrate the greater part of their centripetal travel into the smallest angle groups.

Moreover, about 17 percent of all travel in the community is to destinations within ten degrees of a residence-city center line. Of trips originating from residences located in the one to six mile distance group, 15 percent were in this angle group; those from between six and nine miles, 18 percent; from between nine and twelve, 17 percent; and twelve or more miles, just over 19 percent. To the extent any variation is apparent, it is toward slightly heavier concentration of trips in lower angle groups from residences located at greater distances from the core.

Pursuing this matter further, the socioeconomic factor of occupation of head of the household, in the white-collar and blue-collar dichotomy, was introduced to examine the skewness of the deflection angle of centripetal trips toward small values (Table 17). The white-collar households sent 44.2 percent of their centripetal trips toward the city center under ten degrees of deflection, while 39.7 percent of the blue-collar centripetal travel was in this category. Again, as in the case of the residence-center distance comparison, the majority of centripetal travel is concentrated in the small angles of deflection.

White-collar households sent 64 percent of their centripetal travel into the two smallest angle groups (0°-9° and 10°-19°), and for the blue-collar group this proportion is 61 percent. While this

TABLE 17

DISTRIBUTION OF CENTRIPETAL TRIPS BY DEFLECTION ANGLE FOR OCCUPATION OF HEAD OF HOUSEHOLD AND DISTANCE OF RESIDENCE FROM CITY CENTER

Deflection Angle	Distance of Residence from City Center (miles)									
	1.0-5.9		6.0-8.9		9.0-11.9		12 or More		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Blue-Collar Occupation										
0-9° . . .	236	44.0	208	38.5	200	39.5	221	37.1	865	39.7
10-19° . .	104	19.4	105	19.5	111	21.9	145	24.4	465	21.4
20-29° . .	84	15.7	107	19.8	100	19.8	100	16.8	391	18.0
30-39° . .	77	14.4	80	14.8	70	13.8	94	15.8	321	14.7
40-45° . .	35	6.5	40	7.4	25	5.0	35	5.9	135	6.2
Total . . .	536	100.0	540	100.0	506	100.0	595	100.0	2177	100.0
White-Collar Occupation										
0-9° . . .	147	55.1	224	48.5	225	38.1	198	41.4	794	44.2
10-19° . .	44	16.4	96	20.8	125	21.2	93	19.4	358	19.9
20-29° . .	33	12.4	76	16.4	107	18.1	91	19.0	307	17.1
30-39° . .	37	13.9	41	8.9	93	15.8	77	16.0	248	13.8
40-45° . .	6	2.2	25	5.4	40	6.8	20	4.2	91	5.0
Total . . .	267	100.0	462	100.0	590	100.0	479	100.0	1798	100.0
Not in Labor Force										
0-9° . . .	58	59.2	71	61.2	13	33.3	29	54.7	171	55.9
10-19° . .	13	13.3	19	16.4	12	30.8	9	17.0	53	17.3
20-29° . .	8	8.2	12	10.4	4	10.3	5	9.4	29	9.5
30-39° . .	17	17.3	7	6.0	10	25.6	9	17.0	43	14.0
40-45° . .	2	2.0	7	6.0	0	0.0	1	1.9	10	3.3
Total . . .	98	100.0	116	100.0	39	100.0	53	100.0	306	100.0

difference is in the expected direction with the higher socioeconomic level households showing more centrally oriented centripetal travel, the blue-collar to white-collar differences are not great. However, it is important to note that this difference favors the white-collar group in spite of the more decentralized residential pattern of this group. Thus, while distance of residence from center may influence degree of centripetal orientation as an artifact of the CTR measure, this effect does not appear excessive.

After distance from residence to city center is controlled, the the white-collar to blue-collar comparison shows, in three out of four distance categories, a higher proportion of white-collar centripetal trips in the smallest angle group than blue-collar trips. However, the tendency toward a regular reduction in the proportions for both classes as residence-center distance increases is evident: from 55 percent to between 38 and 41 percent for white-collar households, and from 44 percent to 37 percent for the blue-collar households.

Distance of residence from destination of centripetal trips by deflection angle

In Table 18, mean distance from residence to destination of centripetal trips is presented for households grouped by distance of residence from city center. In the last line it is apparent that, as distance of residence from the city center increases, so does distance to destination, from 3.7 miles for the most central location of residence to 8.0 miles for the most peripheral. It may be further noted, in the last column of the table, that as the deflection angle for centripetal trips increases mean distance to destination decreases, except for a rise in the 40°-45° group. On the whole, mean distance

TABLE 18

NUMBER, AND MEAN DISTANCE ($\bar{X}$), FROM RESIDENCE TO DESTINATION (IN MILES) OF CENTRIPETAL TRIPS BY DEFLECTION ANGLE FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Deflection Angle	Distance of Residence from City Center (miles)									
	1.0-5.9		6.0-8.9		9.0-11.9		12 or More		Total	
	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$
0-9° . . .	441	3.5	503	5.9	438	7.2	448	9.6	1830	6.6
10-19° . .	161	3.2	220	4.9	248	5.8	247	7.6	876	5.6
20-29° . .	125	4.0	195	4.9	211	5.3	196	7.0	727	5.4
30-39° . .	131	4.1	128	5.0	173	5.2	180	6.0	612	5.1
40-45° . .	43	5.5	72	5.4	65	5..2	56	6.6	236	5.6
Total . . .	901	3.7	1118	5.4	1135	6.1	1127	8.0	4281	5.9

to destination appears greater for the highly centripetal trips from households at the greatest distances from the core area.

Comparing the increases in residence to center with residence to destination distances of these centripetal trips, it is of interest to note that the mean travel length does not increase as fast as mean distance of residence from center. That is to say, the greater the distance from residence to the city center, the greater the difference between residence-center and residence-destination distance. For example, assuming mean distance of residence to center to be the midpoint of the distance classes, for the most central households, residence-to-center distance is 3.5 miles while the distance of residence to destination is 3.7. For the households located between nine and twelve miles from the center, the residence-to-center distance would be 10.5 miles while the average trip length is 6.1. It may be inferred from these differences that increasing the degree of centripetal orientation as measured by trip length does not yield an equal increase in travel to the central business district. Expressed in another manner, the probability of travel to the city center appears to decrease with increasing distance between residence and city center in spite of increases in measures of degree of centripetal orientation. Table 19 presents the percentage of centripetal trips reaching the central business district by distance of residence from city center. It may be noted that this percentage declines with increasing residence-to-center distance. Thus it is suggested that the relative amount of inwardness of travel is not necessarily related to the relative amount of travel to the central business district.

When centripetal travel of the residence-to-center groups is cross-tabulated by angle of deflection, mean distance between residence and destination correlates positively with distance between residence and city center within every lateral deflection class, with a

TABLE 19

PERCENT OF CENTRIPETAL TRIPS HAVING DESTINATIONS IN THE CENTRAL BUSINESS DISTRICT BY DISTANCE FROM CITY CENTER

Distance of Residence from City Center (miles)	Centripetal Trips	
	Total	Percent Destined to the Central Business District
Total	4,285	15.5
1.0 to 5.9	901	31.1
6.0 to 8.9	1,118	16.6
9.0 to 11.9	1,135	10.5
12.0 or more	1,131	7.1

partial inversion in the 40°-45° class in the middle distance of residence-to-city-center groups. Of particular interest is the range of residence-to-destination distances over residence-to-center classes within angle class. The range is greatest for the smallest angle class and becomes progressively smaller as angle increases. Thus it appears that the greater the degree of centripetal orientation the stronger the relationship between residence-to-destination and residence-to-city-center distance. There is some indication, however, that this relationship breaks down in the 40°-45° deflection class. This relationship of the two distance variables by orientation will be taken up further in the next section.

Table 20 presents household travel classified, in addition, by the white-collar or blue-collar classification of the occupation of the heads. For every residence-to-center distance class and for every deflection grouping of centripetal trips, the mean distance of residence to destination for white-collar household travel is greater than for the blue-collar grouping. The cross tabulation of residence-to-center distance by deflection angle for the centripetal trips of each occupation class yields a similar over-all picture. There are, however, several exceptions: the first (most central) and the last distance groups with deflection of 20°-29°; the second and third distance groups in the 30°-39° class; and the third distance group in the 40°-45° class. In the smallest angle groups, however, white-collar households generate centripetal trips of consistently greater length than the blue-collar households.

This analysis of travel frequency and travel distance of centripetal trips further demonstrates the effect of distance of residence to center and that of socioeconomic level upon degree of centripetal orientation. Not only do populations of higher socioeconomic level and with residences in the more peripheral areas tend to express a

TABLE 20

NUMBER, AND MEAN DISTANCE ($\bar{X}$), FROM RESIDENCE TO DESTINATION (IN MILES) OF CENTRIPETAL TRIPS BY DEFLECTION ANGLE FOR OCCUPATION OF HEAD OF HOUSEHOLD AND DISTANCE OF RESIDENCE FROM CITY CENTER

Deflection Angle	Distance of Residence from City Center (miles)									
	1.0-5.9		6.0-8.9		9.0-11.9		12 or More		Total	
	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$
Blue-Collar Occupation										
0-9° . . .	236	3.5	208	5.5	200	6.6	221	8.9	865	6.1
10-19° . .	104	3.2	105	4.6	111	5.6	145	7.4	465	5.4
20-29° . .	84	4.0	107	4.8	100	4.4	100	7.4	391	5.2
30-39° . .	77	3.9	80	5.3	70	5.6	94	5.8	321	5.2
40-45° . .	35	5.5	40	5.1	25	5.9	35	5.8	135	5.6
Total . . .	536	3.7	540	5.1	506	5.8	595	7.6	2177	5.6
White-Collar Occupation										
0-9° . . .	147	3.6	224	6.2	225	7.7	198	10.6	794	7.3
10-19° . .	44	3.2	96	5.2	125	6.2	93	7.8	358	6.0
20-29° . .	33	3.3	76	5.0	107	6.1	91	6.9	307	5.8
30-39° . .	37	4.6	41	4.4	93	5.1	77	6.4	248	5.3
40-45° . .	6	6.0	25	6.1	40	4.7	20	8.2	91	5.9
Total . . .	267	3.7	462	5.6	590	6.5	479	8.6	1798	6.4
Not in Labor Force										
0-9° . . .	58	3.5	71	6.0	13	8.1	29	9.1	171	5.8
10-19° . .	13	3.0	19	4.8	12	3.4	9	7.8	53	4.6
20-29° . .	8	6.0	12	5.6	4	6.2	5	2.6	29	5.3
30-39° . .	17	4.0	7	4.8	10	2.6	9	4.2	43	3.9
40-45° . .	2	2.8	7	4.2	0	--	1	--	10	3.7
Total . . .	98	3.7	116	5.6	39	5.1	53	7.3	306	5.2

greater proportion of their daily activity in more central areas, but the depth of penetration appears to locate the mean destination within a relatively narrow range proximate to the city center. On the other hand, the increasingly lengthy penetration of travel of the more peripheral household does not appear to lead to more frequent contact with functions in the central business district. Instead, the probability of contact with the center appears to decrease.

Distance of Travel by Orientation: a Comparison of Centripetal and Noncentripetal Travel

Analysis of the relative frequency and average distance of centripetal trips tends to affirm the validity of the centripetal travel ratio as a means of expressing degree of centripetal orientation of households. Not only are the more central areas of the community of disproportionate importance as sites of destinations, but their attractive effect is quite evenly spread throughout the community population.

Table 21 presents travel grouped into broad orientation classes. Marked differences in average distance among the orientation classes are apparent. Centripetal trips are greatest in length at 5.9 miles, followed by centrifugal at 3.9 miles and lateral at 2.4 miles. These constitute 41, 11, and 48 percent, respectively, of the total internal trips in the community.[1]

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[1] The tables in this section contain 295 fewer trips than reported earlier. These trips were to points outside the study area, which prevented direct computation of distance to destination and angle of deflection. Travel outside the area was classified as centrifugal.

TABLE 21

PERCENTAGE DISTRIBUTION AND MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY ORIENTATION

Orientation	Mean Distance from Residence to Destination (miles)	Percent
Lateral	2.4	47.6
Centripetal	5.9	41.0
Centrifugal	3.9	11.4
Over-all orientation	4.0	100.0

Comparison controlling for distance of residence from city center

In Table 22, in which average distance to destination by orientation is controlled for distance of residence from city center, a striking relationship of residence-destination to residence-center distance, appears. While mean residence-to-destination distance of centripetal trips increases regularly with residence-center distance, both lateral and centrifugal residence-destination distances decrease with equal regularity. Distance to destination of centripetal trips increases from 3.7 miles in the first distance from center zone up to 8.0 for the last. For centrifugal trips, the mileage values decrease from 4.4 to 2.8, while lateral trips decrease from 2.8 miles at a maximum to 2.0 miles in the peripheral areas.

Classification of travel by orientation produces marked differences in mean distance of residence to destination. Cross classification of travel by orientation and distance of residence from center yields a further segregation of values which indicate the importance of distance between residence and city center upon travel distance within orientation groupings.

The result of these findings is to justify further the use of the centripetal travel ratio as a measure of degree of centripetal orientation. Since distance to destination increases with distance to center for centripetal trips, while distance to destination of lateral and centrifugal trips decreases, there is apparently a correlation between the centripetal travel ratio and length of centripetal trips, and an inverse relationship between CTR and length of lateral and centrifugal trips.

Of considerable importance are the findings that show centripetal trips not only longer on the average than centrifugal or lateral, but increasing in length as distance from residence to city center

TABLE 22

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Lateral	2.8	2.5	2.1	2.0
Centripetal	3.7	5.4	6.1	8.0
Centrifugal	4.4	4.0	3.4	2.8
Over-all orientation	3.3	3.8	4.0	5.1

increases while those of the other orientations decrease. The travel area for households appears to narrow or concentrate as they locate at the more peripheral points of the community. Trips are focused increasingly on central areas.

As pointed out in the discussion of centripetal travel distances earlier in this chapter, although average distance between residence and destination of centripetal trips increases with distance of residence from the city center, the probability of travel to the city center or the central business district appears to decrease as residence-to-center distance increases. Thus, degree of centripetal orientation does not lead directly to an estimate of the relative frequency of trips with city-center destination. Rather, centrality of orientation and the proportion of travel to the central business district may be inversely related.

Comparison controlling for income and distance of residence from city center

When trip distance is examined within each orientation class over income (Table 23), the relation of distance to destination and income level resembles that of distance to destination and distance to city center. Centripetal trips increase from 4.9 miles in length for the low-income group to 6.3 miles for the high-income group, while centrifugal trips decline from 4.2 to 3.3 miles and lateral trips from 2.5 to 2.3 miles for these income categories.

When distance of residence from the city center is added, in Table 24, roughly the same relationship of distance to destination within orientation to distance to center for each income group is found. However, within distance-from-center categories, there is not a neat increase in distance to destination over income classes for centripetal, nor a decrease for noncentripetal travel. Even so,

TABLE 23

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY INCOME FOR ORIENTATION

Orientation	Income[a]			
	Low	Medium	High	Not Reported
Lateral	2.5	2.3	2.3	1.7
Centripetal	4.9	5.9	6.3	10.2
Centrifugal	4.2	3.8	3.3	4.1
Over-all orientation	3.6	4.0	4.3	5.8

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 24

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR INCOME AND ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Low Income[a]				
Lateral	2.7	2.1	2.8	2.0
Centripetal	3.6	5.4	6.1	6.9
Centrifugal	4.4	3.8	3.6	2.9
Medium Income				
Lateral	3.1	2.6	1.9	2.1
Centripetal	4.4	5.1	5.8	7.1
Centrifugal	5.2	4.3	3.4	2.2
High Income				
Lateral	3.8	2.5	2.0	2.1
Centripetal	4.1	5.6	6.3	8.8
Centrifugal	3.0	3.8	3.2	2.4
Income Not Reported				
Lateral	--	--	--	1.7
Centripetal	--	--	--	10.2
Centrifugal	--	--	--	4.1

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

centripetal trips are longer in every case for the high-income group than for those with low incomes.

Comparison controlling for occupation of head and distance of residence from city center

As in the case of distance to center or of income, lateral trips are longer for blue-collar than for white-collar households, while centripetal trips are longer for white-collar workers than for manual workers (Table 25). Centrifugal trips represent a reversal of this pattern, with white-collar households making the longer trips. The longest centrifugal and lateral travel distances and the shortest centripetal travel distance is found among those households whose heads are not in the labor force.

When distance to city center is added, in Table 26, it appears that this reversal is a result of more lengthy centrifugal trips by white-collar households in the more central residential areas, from 1.0 to 9.0 miles from the core. The pattern previously described of increasing length of centripetal and decreasing length of non-centripetal trips as distance from city center increases is true, but for one exception, within both white-collar and blue-collar households.

Distance to destination of centripetal trips is greater for white-collar than for blue-collar households; but distance to destination of centrifugal and lateral trips is not consistently shorter for the white-collar households.

The "not in the labor force" group demonstrates irregular patterning of travel distance within every orientation over distance. These households appear to concentrate in the central areas more so than even the blue-collar households. As a result, when mean distance to destination by orientation is viewed for this group,

TABLE 25

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR ORIENTATION

Orientation	Occupation of Head of Household			
	Blue-Collar	White-Collar	Not in Labor Force	Not Ascertained
Lateral	2.5	2.1	2.9	--
Centripetal	5.6	6.4	5.2	7.8
Centrifugal	3.8	3.9	4.5	--
Over-all orientation	3.9	4.2	4.0	6.6

TABLE 26

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR OCCUPATION OF HEAD OF HOUSEHOLD AND ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Blue-Collar Occupation				
Lateral	2.9	2.7	2.1	1.9
Centripetal	3.7	5.1	5.8	7.6
Centrifugal	4.2	4.0	3.6	2.4
White-Collar Occupation				
Lateral	2.5	2.1	2.2	1.7
Centripetal	3.7	5.6	6.5	8.6
Centrifugal	5.3	4.1	3.1	2.3
Not in Labor Force				
Lateral	2.6	3.3	2.4	3.3
Centripetal	3.7	5.6	5.1	7.2
Centrifugal	4.1	3.6	--	8.2
Not Known				
Lateral	--	--	--	--
Centripetal	--	--	--	7.8
Centrifugal	--	--	--	--

the low centripetal and high lateral and centrifugal values found are not surprising.

Comparison controlling for family life-cycle groupings and distance of residence from city center

In this presentation, the young and older unmarried are combined, as are those households with young and older married heads without children, and, last, the young married heads with children are not combined. In effect, the household stages with unmarried heads, those with married heads but without children, and those with married heads with children constitute three groups with similar orientation characteristics, from the analysis in Chapter III.

Table 27 shows that the centripetal travel of households with unmarried heads is the shortest in length, with the households having married heads without children next, and those of households having married heads with children being the most lengthy. Lateral and centrifugal travel lengths decrease over this order of households. This result would be surprising in the light of the analysis of degree of centripetal orientation results were it not that the trip-purpose control showed up the tendency for households with children to be more centripetal in orientation within purpose than the other family life-cycle stages.

Ordering these family life-cycle stages as described above, centripetal trips increase from 5.3 to 6.1 miles in length over life-cycle groupings, while centrifugal and lateral trips decrease from 4.4 to 3.7 miles and from 2.6 to 2.1 miles, respectively.

In Table 28, the households with head married with and without children follow closely the described pattern of distance to destination within orientation over distance to city center. Even though distance to destination of centripetal trips increases over distance to center for the trips of households with unmarried heads,

TABLE 27

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR ORIENTATION

Orientation	Stage in Family Life Cycle of Household			
	Head Unmarried	Head Married without Children	Head Married with Children	Not Ascertained
Lateral	2.6	2.5	2.1	2.3
Centripetal	5.3	5.9	6.1	8.0
Centrifugal	4.4	3.9	3.7	--
Over-all orientation	3.8	4.1	3.9	5.4

TABLE 28

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD AND ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Head Unmarried				
Lateral	2.4	3.0	2.9	2.0
Centripetal	3.6	5.6	5.7	8.5
Centrifugal	4.4	4.4	6.0	2.5
Head Married without Children				
Lateral	3.0	2.5	2.2	2.1
Centripetal	3.8	5.3	6.3	8.4
Centrifugal	4.1	4.2	3.4	2.5
Head Married with Children				
Lateral	2.5	2.2	2.0	1.9
Centripetal	3.5	5.4	6.0	7.6
Centrifugal	4.9	3.5	3.0	2.9
Not Ascertained				
Lateral	--	--	--	--
Centripetal	--	--	--	7.8
Centrifugal	--	--	--	--

lateral and centrifugal travel distances vary in an irregular manner over distance.

Comparing the length of centripetal trips over life-cycle groups within distance-from-center classes, it is apparent that the households with children tend toward shorter centripetal trips than the other life-cycle groups, but the clustering of the group with children in the outer areas results in a larger mean centripetal distance when distance to center is not considered.

These results viewed with the results presented in Chapter III lead to the conclusion that the married families with children demonstrate a lower over-all degree of centripetal orientation because of the way they differ from other households in their purposes for travel, yet they display longer centripetal travel to destinations and shorter to noncentripetal destinations because of the tendency for these households to cluster in perpheral areas in the community.

Comparison controlling for the mediating variables of travel purpose and travel mode with distance of residence from city center

In Table 29, trip purposes are clustered roughly by their degree of centripetal orientation as measured in Chapter III. In order of degree of centripetal orientation from high to low, the mean distance to destination of the trip-purpose groups are: work, 5.3 miles; personal business and department store shopping, 4.0 miles; social-recreation, eat meal, and shopping--other, 3.6 miles; and shopping--groceries--drugs and school purposes, 1.9 miles.

Within each orientation over the purpose groups, the reduction in length of trips from the high of work travel to the low of shopping--groceries--drugs and school, is maintained, with the exception of centrifugal trip distance in the social-recreation group

TABLE 29

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY TRIP PURPOSE FOR ORIENTATION

Orientation	Trip Purpose			
	Work	Personal Business and Shop in Department Store	Social-Recreation, Eat Meal, and Shop Other	Shop Groceries and Drugs, and School
Lateral	3.6	2.5	2.2	1.1
Centripetal	6.7	5.6	5.5	3.8
Centrifugal	4.5	3.5	3.9	2.8
Over-all orientation	5.3	4.0	3.6	1.9

which rises above the preceding personal business category. Thus it appears more evident that distance to destination is a direct function of degree of central orientation of household travel as measured by the CTR.

Within each purpose group, centripetal travel is longer, on the average, than centrifugal, which in turn is longer than lateral travel.[1] When trip length by purpose group within orientation is controlled for distance of residence to center (Table 30), the rise in distance to destination of centripetal trips with increasing distance to city center is apparent. It is remarkable that this is true on the whole for the local travel purposes of shopping--groceries--drugs and school, the deviations occurring in the nine to eleven mile ring. However, the expected reduction in distance to destination of lateral and centrifugal travel as residence recedes from the core is only roughly evident.

The work purpose and social-recreation purpose groups which are much more frequently reported as purposes of travel more nearly conform to the distance to destination within orientation pattern. The only outstanding exception in these two purpose groups is that of lateral work travel, which presents no clear pattern except that of an erratic rise in distance to destination in outer areas.

Mean trip length by mode (Table 31) is greatest for auto drivers at 4.3 miles, followed by mass transit at 4.2 miles, and then by auto passengers at 3.6 miles. Other modes, which combine taxi and truck passengers with walk-to-work trips, representing a

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[1] Since trips less than one mile in length are classed with lateral trips, the magnitude of these differences must be viewed with care. However, see Table 35 in the Appendix.

TABLE 30

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRIP PURPOSE AND ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Work				
Lateral	3.2	4.0	3.8	4.1
Centripetal	3.9	5.9	7.2	10.1
Centrifugal	4.9	4.3	3.6	2.9
Personal Business and Shop in Department Store				
Lateral	2.8	2.4	2.2	2.4
Centripetal	3.3	5.7	6.5	7.7
Centrifugal	4.1	3.9	2.6	2.7
Social-Recreation, Eat Meal, and Shop Other				
Lateral	2.6	2.3	2.0	1.9
Centripetal	3.8	4.8	5.5	6.9
Centrifugal	4.2	4.3	3.9	2.4
Shop Groceries and Drugs, and School				
Lateral	1.1	1.0	1.2	1.2
Centripetal	2.9	3.8	3.2	4.9
Centrifugal	3.2	2.4	2.0	3.4

TABLE 31

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY TRAVEL MODE FOR ORIENTATION

Orientation	Travel Mode			
	Auto Drivers	Auto Passengers	Public Transportation Passengers	Other
Lateral	2.5	2.3	2.8	0.7
Centripetal	6.3	5.5	5.4	5.3
Centrifugal	4.1	3.8	3.2	1.9
Over-all orientation	4.3	3.6	4.2	1.4

residual category constituting not quite 3 percent of total travel, are exceedingly short at 1.4 miles from residence to destination. For every mode, centripetal travel is more lengthy than centrifugal, and these are greater in length than lateral. Further, the relationship of length of trip within orientation over mode follows the pattern set forth above; i.e., auto drivers make the most lengthy trips and "other" modes the least. The one deviant from this pattern is in lateral movement, in which case mass transit takes the lead over auto drivers.

Over the three major modes of travel, the increase of centripetal trip distance and the decrease of centrifugal and lateral distance accompany increasing residence-to-center distance without exception (Table 32). The "other" mode category shows somewhat the same pattern, but the peculiar and selective nature of these modes precludes a simple explanation. For example, the enormous increase in mean length of centripetal trips in the twelve or more mile distance-from-center category may be largely due to short-distance taxi travel in the central business district by the higher-income suburban population who work in the central areas.

Conclusions

As to the geometric bias, in the sense of large differences in community area taken into the "centripetal" categories as distance of residence to center varies, the outcome of this analysis in this chapter was favorable. The larger part of all centripetal travel, 60 percent or more, was found to be destined to points with deflection angles of under 20 degrees. A significant decline in the proportion of travel to this 40-degree sector took place as distance to center increased, but the maximum and minimum values were

TABLE 32

MEAN DISTANCE FROM RESIDENCE TO DESTINATION OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRAVEL MODE AND ORIENTATION

Orientation	Distance of Residence from City Center (miles)			
	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Auto Drivers				
Lateral	2.9	2.6	2.2	2.1
Centripetal	4.0	5.4	6.4	8.3
Centrifugal	5.0	4.2	3.4	2.3
Auto Passengers				
Lateral	3.0	2.2	2.1	1.9
Centripetal	3.7	5.1	5.2	7.1
Centrifugal	4.3	4.0	3.7	2.6
Public Transportation Passengers				
Lateral	3.2	3.2	2.0	1.8
Centripetal	3.4	5.7	7.0	9.2
Centrifugal	3.5	3.3	2.8	2.3
Other				
Lateral	1.0	0.5	1.1	0.8
Centripetal	2.6	4.6	2.8	12.5
Centrifugal	2.3	--	--	--

67 percent and 60 percent, respectively. Centripetal travel broken by occupation of the head of the household yielded a higher concentration in the more central deflection angle categories of white-collar than blue-collar households. Both groups showed a decline in this central-angle concentration as distance from center increased, however.

For all centripetal trips, it was found that the greater the distance of residence from the center the longer the average trip. More important, as deflection angle increased, mean distance to destination declined except for the largest centripetal-angle group. When angle and distance to center were taken together, as distance from the center increased so did distance to destination, for every deflection angle category except again for the largest angle class. Although this increase in distance to destination was found in four out of five angle classes over distance, the range in values was greater for the smaller deflection angles than the larger. These findings again emphasize the highly central concentration of centripetal trips. On the other hand, travel length did not increase as fast as residence-to-center distance. This appeared to indicate that even though centrality of orientation may increase as residence-to-center distance increases, the likelihood of travel to the city center decreases.

For centripetal trips of the occupation-of-head classes (white-collar and blue-collar) classified by distance to center and by deflection angle, white-collar households had longer mean distance to destination in every case than did blue-collar households. Taken together in a cross tabulation, the over-all difference in distance to destination prevailed with several exceptions. In the smallest angle groups, the white-collar to blue-collar differences were sustained.

The findings on the whole bear out the effectiveness of the centripetal travel ratio in displaying degree of centripetal orientation. The nature of the concentration of frequency and distance to destination indicate that the centripetal travel of populations of higher socioeconomic level and with peripheral location, those groups with the higher centripetal travel ratios, generate relatively more inward-bound traffic than do their opposites by these measures. A greater proportion of their activities show a greater penetration to the central areas of the community.

When all travel was grouped into the three broad orientation classes of centripetal, centrifugal, and lateral, their average distance-to-destination values were 5.9, 3.9, and 2.4 miles, respectively, further illustrating the decline in area penetration of lateral travel as against radial, and of centrifugal travel as against centripetal. This set of relationships contrasted with lateral travel as the most frequent, centripetal next, and centrifugal the least frequent.

Mean distance to destination was reported by orientation and by distance of residence to the city center. This led to the provocative result that, as distance of residence from center increased, the mean length of centripetal trips also increased, while at the same time both lateral and centrifugal trips decreased in length. Since CTR correlated directly with distance from center, it appeared that there was a direct correlation of CTR with centripetal travel distance and an inverse correlation of CTR with lateral and centrifugal travel distance. These results suggest a severe constriction in travel distribution for the households with residence more distant from the center. Travel becomes concentrated in the centripetal sectors and increase in length in this sector, while other travel reduces in frequency and length.

Income bore a similar relationship to distance to destination within orientation as did distance to city center. However, this relationship did not systematically hold up after distance from center was controlled, except that the high-income group displayed more lengthy centripetal trips than did the low-income households in every case.

The white-collar and blue-collar classification of the occupation of head of households yielded longer lateral trips for blue-collar than for white-collar groups, and longer centripetal travel for white-collar than for the manual-worker households. Centrifugal travel, however, turned out to be more lengthy for white-collar workers. Within each occupation group the previously described relationship between distance to destination and distance to center within orientation generally held up.

An analysis of family life-cycle groupings showed travel length as greatest for the married with children, less for the married without children, and least for the unmarried. This result partially conflicted with that of the CTR analysis in Chapter III, except that the trip-purpose control in that section indicated the married with children had higher CTR's within purpose than the married without children, suggesting that a difference in trip distribution over purpose accounted for the smaller over-all CTR's. Further, the tendency for families with children to locate away from the core appeared to explain the longer over-all travel. Even so, it is clear that the measure of centripetal orientation by trip frequency is not indicative of travel length by orientation in these family life-cycle groupings as in the case of the other variables considered.

The analysis of trips by distance to center for family life-cycle groups and orientation showed again the previously described direct relationship of distance to center and distance to destination

for centripetal travel, and the inverse relationship for the other two orientations for married groups. The unmarried showed the centripetal pattern of increase, but lateral and centrifugal were not systematic in length.

While classification of travel by purpose did not show up the relationship of trip length to residence-center distance by orientation as clearly as in other tables, the mode of travel analysis reflected this relationship without exception in the predominant travel modes.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Under the present conditions of expansion, the metropolitan community is expected to take on new forms and new arrangements among its elements. One aspect of this morphological shifting is the residence-to-nonresidence linkages. Previous thought on this subject suggested that the primary orientation of the population was toward the core areas of the urban community in their extraresidential activity. Recently this notion has been challenged. It has been argued that intracommunity movements are to an increasing extent lateral rather than centripetal.

If the growth of the metropolitan community has led to marked deconcentration of functions which had previously occupied central locations such as to affect the orientation of these residence-to-nonresidence linkages, it would appear that the travel of the peripheral households would be less city-center oriented than that of the more central households. Also, it was argued that functions which were tending to seek outer locations would be more selective of travel for lower socioeconomic households, households with children, and households consisting of unmarried elderly persons.

The hypotheses appearing at the end of Chapter I were based upon these assumptions. Contrary to expectations, the degree of centripetal orientation was found to be directly related to distance of

residence from city center, and directly related to socioeconomic level. The hypothesis which sets forth greater centripetal concentration for travel of households with young unmarried and married heads without children than for the young married with children and the older unmarried was borne out, on the whole. The exception to this finding was that the households with young unmarried heads tended to display a relatively low degree of centripetal orientation.

When the socioeconomic measures were controlled for distance of residence from city center in their relationship to degree of centripetal attraction, it appeared that distance between residence and center accounted for the greater part of the relationship of socioeconomic level to centrality of orientation. However, some residual effect appeared which could be attributed to income and to the occupation of the head of the household. The observed relationship of family life-cycle stage to relative frequency of centripetal travel persisted even after distance was controlled.

The analysis of distance from residence to destination tended to conform with the results of the relative centripetal frequency analysis. The households more distant from the city center and those of higher socioeconomic level were found to travel farther in their centripetal trips--i.e., had a higher degree of centripetal orientation--than those households with more central residence and lower on the socioeconomic scale. Of considerable interest in this analysis were the findings that length of noncentripetal trips tended to be inversely related to length of centripetal trips.

While differences in mode of travel produced some differences in degree of centripetal orientation, these differences did not on the whole modify the preceding findings. Differences by trip purpose, on the other hand, turned out to be quite important.

As previously noted, the family life-cycle stage hypotheses were confirmed. When travel purpose was controlled, however, it was found that the households with young married heads and with children generated high rather than low centrality of orientation within purpose categories. This finding contradicts the relationship of centripetal travel ratios to family life-cycle stages.

This apparent contradiction results from differences among the family life-cycle stages in the proportion of trips made for work as against social-recreation purposes. The married with children tended to make relatively fewer work trips and more social-recreation trips than those in the other life-cycle stages. Work trips tend to be considerably more centripetal in orientation than social-recreation trips, so the gross comparison of ratios among life-cycle stages revealed the married with children as relatively less centripetally oriented.

The difference in the relative importance of work travel as against social-recreation travel also appears to affect the relationships between the centripetal travel ratio and distance to center, income, and occupation. The effect is to reduce the sizes of the differences between ratios: the more peripheral residents, people in the higher socioeconomic level, and the married with children tended to make relatively more social-recreation trips which in turn reduced the total degree of centripetal orientation for each of these groups.

Hypothesis 6 was constructed mainly on the assumption that lateral trips would increase in length in the outlying areas. The finding that trip length increases in outer areas, however, is due solely to increasing length of centripetal trips. Both lateral and centrifugal trips were found to decrease in length as residence-to-center distance increases.

It was expected that socioeconomic differentials in degree of centripetal orientation would become more marked as residence-to-center distance increases. This was not substantiated by the data. It is possible that further analysis of travel by purpose by socio-economic level might produce such a finding. Certainly the omission from the analysis of centripetal travel orientation, by purpose, by residence-to-center distance, for socioeconomic levels, presents a limitation in this research that should be avoided in further work on this subject.

Conclusions

The following things are apparent from this study. The distance from a household's place of residence to the center of the community is a critical determinant of average travel length. The centripetal travel ratio for households is highly correlated with trip distance and with trip distance within orientation of travel, and so tends to reflect the relative importance of core areas to households in terms not only of relative frequency, but also of penetration into the community.

It is not presumed that it is possible to comment directly upon the trends toward development of lateral residence-to-non-residence linkages in this analysis. These data permit little more than description of the linkages in terms of frequency, distance traveled, and orientation or direction as affected by the social structure of the community.

Nonetheless, this material presents a view of the dynamic or functional aspect of the community structure. Just as the distribution of population characteristics or of economic features in the space of the community show regularities in a static analysis, the

dynamics which make a viable system of the many scattered parts of the community demonstrate definite patterning. Doubtlessly this would be true of the flow of communications and goods as well as of people.

What can be said about travel patterns in this community? It may have been noted earlier that the emphasis on travel orientation has been on the degree of centripetal orientation, although noncentripetal travel accounts for about 60 percent of all travel. At first glance, the magnitude of this figure implies that the emphasis placed upon the inward and outward daily movement of the population by many writers was overly emphasized. Travel to noncentripetal destinations accounts for the majority of daily movement. In spite of this, the findings that degree of centripetal orientation increases as residence-to-center distance increases and as socioeconomic level increases, suggest that the greater part of this lateral movement is on the part of the population residing in the more central areas. The orientation hypotheses, on the other hand, suggested that the growth in noncentripetal travel would take place in the outer areas of the community, a supposition belied by these data. It is, of course, quite possible that lateral and centrifugal travel are playing a more important part in community travel today than previously. But that cannot be inferred by comparing these data with theoretical speculation of students of the community.

Moreover, the distance of residence to center, socioeconomic, and family life-cycle groups which display the greatest degree of centripetal orientation also tend to be the groups which distribute their travel most heavily in the less centripetal purpose categories. In other words, analysis of degree of centripetal orientation by purpose tends to show more sharply defined gradients in centripetal travel ratios over differences in income, and the other independent

variables. Thus, the analysis without purpose controls somewhat underestimates the differentials.

The sources of difference in degree of centripetal orientation appear to be twofold. It may be hypothesized that family development in the sense of an increase in dependents tends to generate more travel of a nonwork nature. Social-recreation travel increases considerably at the expense of work trips in relative frequency in the more developed families, for example. At the same time, socioeconomic level is also correlated with increasing nonwork travel and its effect should be isolated from that of family development. This difference in distribution of travel among purposes tends to reduce the differences in degree of centripetal orientation of the high socioeconomic, more distant residence to center, and the more developed families from their opposites. This source of difference might be said to be located in household structure and requirement differences.

A second, and probably the most important, source of difference in degree of centripetal orientation appears to be largely a matter of distance of residence from city center, and to some degree of socioeconomic level of the household. The greater the distance and the higher the socioeconomic level, the more frequent is centripetal travel. In contrast to the first source noted, this source of difference might be said to arise from the impingement of the community structure upon the household.

The finding that every income and occupation-of-head group demonstrates greater centrality of orientation in outer as against inner areas of residential location suggests an increasing inward dependence of households as distance from center increases. The amount of deconcentration of functions does not appear sufficient to have shifted the orientations of residents in outer distance zones.

In addition, the degree of penetration into the community of the centripetal travel of these peripheral groups precludes a mere centripetal bias resulting from radial street patterning: the average length of centripetal travel is markedly higher than noncentripetal in these outer locations.

The decline of the ratio of centripetal trip length to distance of residence from the center as residence-to-center distance increases, however, suggests that the central business district of the community is not the recipient of this increasingly center-oriented travel. Taken with the longer and more frequent noncentripetal travel of the more centralized residences, it may be inferred that core clustering of functions are concentrated over an area several miles in radius about the center and that the density and diversity of these functions do in fact decline in a somewhat regular manner with increasing distance from the city center.

Especially noteworthy is the strength of the central orientation of the residents of the large city studied here. Despite the scattering of functions over the city which has been in process for two or three decades, a pronounced inward orientation persists. To be sure, the focus of that orientation is larger and more diffuse for the residents of each succeeding distance zone. Still the collective life of the city is obviously turned inward. Indeed it would be surprising were this not the case, for a city is presumably an organization having unit character.

The dispersion of functions adjunct to those in the core as peripheral appendages can and do provide an intermedium in the linkages between residences and centralized functions. If, in the process of further community development, continued functional disperson takes place, the decline in frequency of contact between residential and centralized nonresidential activities may well be

concomitant with increases in interaction among centralized and noncentralized nonresidential functions. Thus, in any case, the integrity of the community is preserved. The inward orientation of the community merely takes on a different form.

The finding that degree of centripetal orientation shows minor, but irregular, increases over socioeconomic differences even after distance from center is controlled shows that there is probably some greater dependence of the higher socioeconomic groups upon the inner areas more frequently than the lower. Little further elaboration on this point can be undertaken until further analysis of the components of travel is made. Factors important for consideration are the detail on travel features as to purpose, land use at destination, and the relationship of these movements to the family structure and the community structure.

There are several alternative developments that might be undertaken to further elaborate and modify the findings of this research. First of all, this research was severely limited in scope by the crudeness of data collected on household characteristics. A well-formulated schedule of questions dealing with the type of household, its duration, and its experience in the urban community would be of value. Other questions needed would be aimed at estimating disposable income, detailed occupation, the activity pattern of the household as to membership and participation in extrafamilial activities, shopping habits, and attitudes toward sources of goods and services utilized by the household.

Travel data might well include walking trips. Combining vehicular and walking modes would aid in estimating the intensity of activity at points of destination, thus enabling the researcher to discriminate between single-stop destinations and activity centers in which several stops might occur. Taken together, these suggestions

may provide a research instrument which would make it possible to weigh the effect of location of the household residence, socio-economic level, and household structure and requirements upon travel orientation in combination and factor by factor. Information on the use of the telephone or the mails to accomplish that which some persons do in face-to-face contact for shopping and personal business reasons would be useful. There may well be considerable differences among groups in the population in the use of communication facilities in substitution for personal contact.

A comparative analysis of communities might be undertaken using origin and destination study data already available. However, it is this writer's opinion that this may be somewhat premature until more experimental analysis within individual communities is undertaken. A more refined questionnaire used in an efficient sampling frame might well provide a more sound basis for a subsequent comparative analysis.

APPENDIXES

APPENDIX A

DATA AND METHOD

APPENDIX A

DATA AND METHOD

Source of Data

The data analyzed in this paper were taken from a survey of households in the Detroit area in the spring of 1954 by the Detroit Metropolitan Area Traffic Study. This survey was the second of two traffic surveys conducted by the study in 1953-54. It is necessary to review briefly the original survey as a background to the second, or "Continuing Survey."

Producing information on some 240,000 trips, the original survey covered roughly 40,000 households in order to obtain estimates of movement between small areas in the Detroit community. Two parallel surveys gathered information on truck and taxi movement and on movements crossing the study area cordon line or boundary.

The systematic sample for the original study had been drawn by the Bureau of the Census especially for the purpose. A variable sampling fraction was used in the selection of households to insure adequate traffic estimates in lightly populated areas where new growth was expected at future dates. At the same time, the cost of unnecessary precision in the already built-up densely populated areas was avoided. The sample was designed to represent the vehicular travel of household members in each area of the community over a 24-hour weekday period in the fall of 1953. The survey

was conducted over a period of ninety-five weekdays. A "responsible" person or persons in each household was asked to report all vehicular movements of persons in their household from 4:00 a.m. of the previous day until 4:00 a.m. of the day of the interview. Walking trips to work were included.

The continuing survey followed the same procedures in the spring of 1954. However, a subselection of the original sample was taken to yield a uniform 0.4 percent sample of the Detroit area households. About 24,000 trips were reported by roughly 4,000 households.

Procedures

The survey procedures are treated elsewhere in considerable detail (4). The data collected in the survey had been coded and punched into two sets of IBM cards by the study staff. One set of cards contained information about each household in the sample: residential location, size of household, number of trips by household members and so forth. The other set of cards contained information about each trip made by each person in each of the sample households. The trip card included information on the age, sex, race, occupation, and industry of the tripmaker. It also contained information as to the location of residence, trip origin, trip destination, purpose of trip, and travel mode. Every residence, trip origin, and trip destination was coded as to location in a one-tenth mile coordinate grid system mapped onto the Detroit area.

As a first step in this research, the interviews which were on hand in the office were collated with the household IBM cards. Then trip cards were matched against the household cards until the counts checked out. The 4,000 interviews were partially recoded

to construct one card for each person in each sample household. These contained reviewed occupational information, relationship of the person to the head of the household, marital status, and whether or not trips were made by this person. These person cards were matched with household and trip cards until all differences were eliminated.

The Wayne State University Computation Laboratory prepared a program for an IBM 650 computer which utilized the household, trip, and person cards in generating a working deck of trip cards. Using the coordinate information on residence and destination, the distance from residence to destination and from residence to city center (a constant) were computed for each nonhome-bound internal (within the study area) trip. Further, the coordinates were used to compute the deflection angle for each trip, an angle described by the lines from residence to center and residence to destination, oriented toward the center. The angles were then summarized into the orientation categories of centripetal, lateral, and centrifugal. The set of cards for each household was reviewed by the machine in order to determine stage in family life cycle. The output of one work card for every trip card in every sample household was accomplished.

Certain exclusions and exceptions to the continuing survey sample were undertaken. All households located within a one-mile radius of the city center were dropped. All trips of the remaining households to places well outside the Detroit area were eliminated, as were all nonhome-bound travel and travel for "change mode" and "serve passenger" purposes. No computation of distance to destination or angle of deflection was made for travel to areas adjacent to the study area to which the coordinate system did not extend. All trips of less than one mile from residence to destination were

arbitrarily defined as "lateral." In other words, lateral and local travel were combined.

Nonsampling Bias

In Chapter IV, the problem of artifactual increase in degree of centripetal orientation as residence-to-center distance increased was discussed and partially resolved. The survey questions and procedures used in origin-and-destination studies can be seriously questioned both in terms of consistency and reliability. The lack of clear definitions for travel concepts as well as household and person characteristics present added limitations. The effect of these features in biasing the survey results are for the most part uninvestigated.

It is known, however, that only some 80 percent of the vehicular trips actually undertaken were reported in the survey. This estimate was made by comparing survey reporting with traffic ground counts; i.e., vehicular counts made at "screenlines" in the area. It would appear that this loss arises from having only one respondent reporting on all travel in many households and from forgotten short nonroutine trips and trips intentionally not reported.

The problem of the completion rate for interview schedules is another matter, however, as can be seen in Table 33. It has been reported to the author that the considerable experience obtained by the workers in the first survey was used to good advantage in the continuing survey. Also, a good deal more time and care went into the handling of the interviews from the second, comparatively small, survey.

Another problem arose as a result of the previously mentioned decision to classify trips of less than one mile with "lateral"

TABLE 33

SUMMARY REPORT ON HOME INTERVIEWS: DETROIT METROPOLITAN AREA TRAFFIC STUDY, CONTINUING SURVEY, 1954

Item		Percent
Total addresses (N = 3,870)		100.0
Interview completed		92.7
Incomplete, but no possible trip		4.5
Vacant	3.7	
Demolished	0.4	
Other	0.4	
Unable to complete but trips possible		2.8
No person at home after repeated calls	1.4	
Refusals	0.5	
Travel date past due	0.9	
Other	0.0	

trips. While it is felt that this procedure was warranted in the interests of comparing centripetal travel with noncentripetal, the analysis of distance to destination by orientation tends to overestimate the length of centripetal and centrifugal trips and to underestimate that of lateral. While this limitation was not expected to materially affect the results of the distance comparisons, the true airline distance values by direction (not strictly orientation) are not reported.

Table 34 presents frequency of travel for less than one and one or more miles from residence to destination. Inspection of this table shows that there is not a marked difference in the percentage of trips less than one mile in length by distance of residence to city center. As far as the relative frequency measure of degree of centripetal orientation is concerned, it may be inferred that the combining of lateral and local travel had no serious effect on the results.

The results upon distance to destination of assignment of local trips to their respective angle groups are contained in Table 35. It may be noted that a decrease in the length of centripetal and centrifugal trips and an increase in the length of lateral trips occurs, comparing this table to Table 21 in the text. But the relationships discussed in Chapter IV appear unaffected by this modification.

It is likely that the most significant sources of nonsampling error are associated with (1) inadequate and unreliable reporting of trips by the householders, and (2) inadequacies of the present concepts of trip and trip purpose.

TABLE 34

DISTRIBUTION OF TRIPS BY DISTANCE FROM RESIDENCE TO DESTINATION FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Distance of Residence from City Center (miles)	Distance from Residence to Destination				Total Number
	Less than One Mile		One Mile or Greater		
	No.	Pct.	No.	Pct.	
1	39	24.8	118	75.2	157
2	110	21.0	414	79.0	524
3	168	25.0	504	75.0	672
4	148	19.9	597	80.1	745
5	171	22.7	583	77.3	754
6	199	21.2	741	78.8	940
7	242	24.4	749	75.6	991
8	224	24.5	690	75.5	914
9	245	24.5	754	75.5	999
10	226	27.1	608	72.9	834
11	196	24.0	621	76.0	817
12	95	20.1	378	79.9	473
13	47	14.7	272	85.3	319
14	66	19.2	278	80.8	344
15	74	22.4	257	77.6	331
16	61	20.7	234	79.3	295
17	91	31.1	202	68.9	293
18	23	14.0	141	86.0	164
19	38	27.9	98	72.1	136
20	22	75.9	7	24.1	29
21	2	40.0	3	60.0	5
22	0	00.0	8	100.0	8
Total	2,487	23.1	8,257	76.9	10,744

TABLE 35

MEAN (X) DISTANCE FROM RESIDENCE TO DESTINATION AND NUMBER OF INTERNAL TRIPS BY DEFLECTION ANGLE GROUPING CORRESPONDING TO ORIENTATION, WITH TRIPS OF LESS THAN ONE MILE IN LENGTH ASSIGNED TO THEIR RESPECTIVE ANGLE GROUPING

Deflection Angle Grouping in Degrees (and Corresponding Orientation)	Distance of Residence from City Center (miles)									
	1.0-5.9		6.0-8.9		9.0-11.9		12 or More		Total	
	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.	$\bar{X}$	No.
45°-134° (lateral) . . .	3.5	1,093	3.2	984	2.8	890	2.5	681	3.1	3,648
0°-44° (centripetal)	3.2	1,066	4.8	1,282	5.3	1,341	7.3	1,256	5.2	4,945
135°-180° (centrifugal)	3.5	632	3.0	462	2.4	310	2.0	289	2.9	1,693
Total for all angle groups	3.4	2,791	3.9	2,728	4.1	2,541	5.1	2,226	4.1	10,286
Angle not ascertained[a]	0.0	26	0.0	56	0.0	53	0.0	33	0.0	168
Total over all trips . .	3.3	2,817	3.8	2,784	4.0	2,594	5.1	2,259	4.0	10,454

[a]These 168 trips were destined to places within one-tenth mile of place of residence. In these cases the coordinates of residence and destination were the same. Thus, distance to destination was zero and no angle was computed.

APPENDIX B

TRAVEL ORIENTATION RATIO TABLES

TABLE 36

TRAVEL RATIOS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRIP PURPOSE AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Distance of Residence from City Center (miles)			
	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9
Work				
Lateral	.569	.502	.557	.460
Centripetal	.193	.255	.307	.411
Centrifugal	.238	.243	.136	.129
Personal Business				
Lateral	.357[a]	.582	.423	.452
Centripetal	.357[a]	.328	.408	.452
Centrifugal	.286[a]	.090	.169	.096
Social-Recreation				
Lateral	.077[a]	.490	.645	.422
Centripetal	.692[a]	.281	.164	.252
Centrifugal	.231[a]	.229	.191	.326
Eat Meal				
Lateral	--	.636[a]	.824[a]	.933[a]
Centripetal	--	.182[a]	.176[a]	.067[a]
Centrifugal	--	.182[a]	.000[a]	.000[a]

[a]Base of ratio less than twenty cases.

TABLE 36 (Continued)

Distance of Residence from City Center (miles)						Total
5.0-5.9	6.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0 or More	
			Work			
.450	.423	.277	.280	.224	.203	.358
.419	.504	.612	.640	.682	.661	.519
.131	.073	.111	.080	.094	.136	.123
			Personal Business			
.400	.538	.475	.397	.494	.400	.453
.444	.308	.443	.437	.414	.443	.416
.156	.154	.082	.166	.092	.157	.131
			Social-Recreation			
.460	.476	.517	.528	.473	.376	.474
.262	.270	.308	.332	.417	.417	.332
.278	.254	.175	.140	.110	.207	.194
			Eat Meal			
.714	.581	.659	.667	.607	.471	.633
.250	.226	.205	.300	.375	.400	.279
.036	.194	.136	.033	.018	.129	.088

TABLE 36 (Continued)

Orientation	Distance of Residence from City Center (miles)			
	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9
Shopping: Department Store				
Lateral	.200[a]	.000[a]	.294[a]	.273
Centripetal	.800[a]	.833[a]	.647[a]	.500
Centrifugal	.000[a]	.167[a]	.059[a]	.227
Shopping: Groceries-Drugs				
Lateral	.500[a]	.667	.851	.500
Centripetal	.500[a]	.167	.043	.300
Centrifugal	.000[a]	.166	.106	.200
Shopping: Other				
Lateral	--	.375	.719	.577
Centripetal	--	.292	.094	.308
Centrifugal	--	.333	.187	.115
School				
Lateral	.833[a]	.762	.412[a]	.636
Centripetal	.000[a]	.143	.412[a]	.273
Centrifugal	.167[a]	.095	.176[a]	.091
Total				
Lateral	.503	.519	.582	.467
Centripetal	.268	.267	.274	.367
Centrifugal	.229	.214	.144	.166

[a]Base of ratio less than twenty cases.

TABLE 36 (Continued)

Distance of Residence from City Center (miles)						Total
5.0-5.9	6.0-6.9	7.0-8.9	9.0-10.0	11.0-12.9	13.0 or More	
			Shopping: Department Store			
.278[a]	.385	.407	.487	.257	.163	.318
.611[a]	.462	.492	.487	.743	.791	.600
.111[a]	.153	.101	.026	.000	.046	.082
			Shopping: Groceries-Drugs			
.667	.807	.699	.704	.688	.622	.685
.119	.105	.208	.236	.246	.306	.228
.214	.088	.093	.060	.066	.072	.087
			Shopping: Other			
.531	.351	.565	.621	.535	.435	.521
.219	.270	.348	.333	.372	.440	.345
.250	.379	.087	.046	.093	.125	.134
			School			
.393	.720	.606	.580	.628	.628	.613
.536	.180	.310	.321	.239	.230	.273
.071	.100	.084	.099	.133	.142	.114
			Total			
.469	.488	.461	.478	.437	.390	.463
.346	.350	.414	.423	.470	.461	.399
.185	.162	.125	.099	.093	.149	.138

TABLE 37

TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR TRIP PURPOSE AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Income[a] (in dollars)				
	0-2699	2700-3066	3073-3338	3355-3476	3480-3652
		Work			
Lateral	.524	.593	.453	.431	.446
Centripetal	.249	.278	.383	.428	.435
Centrifugal	.227	.129	.164	.141	.119
		Personal Business			
Lateral	.513	.396	.551	.429	.446
Centripetal	.359	.466	.348	.393	.431
Centrifugal	.128	.138	.101	.178	.123
		Social-Recreation			
Lateral	.143	.566	.484	.528	.450
Centripetal	.679	.221	.348	.284	.299
Centrifugal	.178	.213	.168	.188	.251
		Eat Meal			
Lateral	--	.667[b]	.905	.826	.743
Centripetal	--	.111[b]	.095	.174	.200
Centrifugal	--	.222[b]	.000	.000	.057

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 37 (Continued)

Income[a] (in dollars)						Total
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	
			Work			
.334	.310	.292	.275	.209	.233	.358
.528	.547	.616	.638	.712	.636	.519
.138	.143	.092	.087	.079	.131	.123
			Personal Business			
.494	.325	.398	.559	.437	.360	.453
.294	.482	.447	.415	.465	.520	.416
.212	.193	.155	.026	.098	.120	.131
			Social-Recreation			
.532	.454	.507	.440	.466	.399	.474
.249	.351	.287	.356	.397	.429	.332
.219	.195	.206	.204	.137	.172	.194
			Eat Meal			
.696	.649	.545	.656	.525	.480	.633
.217	.281	.303	.295	.388	.360	.279
.087	.070	.152	.049	.087	.160	.088

[b]Base of ratio less than twenty cases.

TABLE 37 (Continued)

Orientation	Income[a] (in dollars)				
	0-2699	2700-3066	3073-3338	3355-3476	3480-3652
	Shopping: Department Store				
Lateral	.000[b]	.000[b]	.353[b]	.333	.267
Centripetal	.857[b]	.667[b]	.647[b]	.667	.633
Centrifugal	.143[b]	.333[b]	.000[b]	.000	.100
	Shopping: Groceries-Drugs				
Lateral	.909[b]	.628	.636	.625	.730
Centripetal	.091[b]	.286	.291	.271	.095
Centrifugal	.000[b]	.086	.073	.104	.175
	Shopping: Other				
Lateral	.333[b]	.333[b]	.750	.452	.419
Centripetal	.222[b]	.467[b]	.250	.290	.355
Centrifugal	.445[b]	.200[b]	.000	.258	.226
	School				
Lateral	.571[b]	.583	.745	.654	.563[b]
Centripetal	.143[b]	.292	.216	.231	.375[b]
Centrifugal	.286[b]	.125	.039	.115	.062[b]
	Total				
Lateral	.480	.558	.530	.488	.478
Centripetal	.305	.292	.343	.363	.363
Centrifugal	.215	.150	.127	.149	.159

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 37 (Continued)

Income[a] (in dollars)						
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	Total
		Shopping: Department Store				
.292	.425	.412	.326	.353	.000[b]	.318
.625	.575	.382	.565	.618	1.000[b]	.600
.083	.000	.206	.109	.029	.000[b]	.082
		Shopping: Groceries-Drugs				
.684	.707	.683	.650	.769	.586	.685
.242	.210	.225	.270	.149	.345	.228
.074	.083	.092	.080	.082	.069	.087
		Shopping: Other				
.561	.394	.593	.494	.614	.548	.521
.256	.505	.321	.434	.261	.310	.345
.183	.101	.086	.072	.125	.142	.134
		School				
.565	.623	.475	.650	.595	.714	.613
.333	.189	.434	.291	.306	.117	.273
.102	.188	.091	.059	.099	.169	.114
		Total				
.475	.443	.448	.436	.433	.433	.463
.365	.407	.414	.451	.464	.425	.399
.160	.150	.138	.113	.103	.142	.138

[b]Base of ratio less than twenty cases.

TABLE 38

TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRIP PURPOSE AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Occupation of Head of Household				
	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Work					
Lateral	.468	.391	.467[a]	.405	.351
Centripetal	.381	.505	.333[a]	.471	.508
Centrifugal	.151	.104	.200[a]	.124	.141
Personal Business					
Lateral	.433	.243	--	.490	.424
Centripetal	.367	.649	--	.367	.401
Centrifugal	.200	.108	--	.143	.175
Social-Recreation					
Lateral	.571	.462	.167[a]	.440	.449
Centripetal	.260	.280	.667[a]	.313	.335
Centrifugal	.169	.258	.166[a]	.247	.216
Eat Meal					
Lateral	.818[a]	.556[a]	--	.756	.750
Centripetal	.182[a]	.444[a]	--	.195	.224
Centrifugal	.000[a]	.000[a]	--	.049	.026

[a]Base of ratio less than twenty cases.

TABLE 38 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	Total
				Work			
.269	.337	.322	--	.261	.393	--	.358
.577	.548	.566	--	.640	.519	--	.519
.154	.115	.112	--	.099	.088	--	.123
				Personal Business			
.305	.375	.500	--	.522	.527	--	.453
.556	.563	.378	--	.403	.378	--	.416
.139	.062	.122	--	.075	.095	--	.131
				Social-Recreation			
.432	.476	.489	--	.543	.504	--	.474
.383	.388	.351	--	.340	.289	--	.332
.185	.136	.160	--	.117	.207	--	.194
				Eat Meal			
.582	.611[a]	.621	--	.397	.760	--	.633
.291	.222[a]	.284	--	.448	.160	--	.279
.127	.167[a]	.095	--	.155	.080	--	.088

TABLE 38 (Continued)

Orientation	Occupation of Head of Household				
	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Shopping: Department Store					
Lateral	--	.278[a]	--	.235	.360
Centripetal	--	.611[a]	--	.765	.560
Centrifugal	--	.111[a]	--	.000	.080
Shopping: Groceries-Drugs					
Lateral	.794	.652	--	.724	.648
Centripetal	.147	.283	--	.211	.275
Centrifugal	.059	.065	--	.065	.077
Shopping: Other					
Lateral	.421[a]	.546	--	.500	.532
Centripetal	.211[a]	.333	--	.465	.323
Centrifugal	.368[a]	.121	--	.035	.145
School					
Lateral	.667[a]	.652	--	.670	.569
Centripetal	.222[a]	.217	--	.217	.299
Centrifugal	.111[a]	.131	--	.113	.132
Total					
Lateral	.522	.443	.363	.471	.454
Centripetal	.323	.407	.455	.383	.394
Centrifugal	.155	.150	.182	.146	.152

[a]Base of ratio less than twenty cases.

TABLE 38 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	Total
			Shopping: Department Store				
.375[a]	.347	.400	--	.267	.238	--	.318
.500[a]	.615	.475	--	.667	.643	--	.600
.125[a]	.038	.125	--	.066	.119	--	.082
			Shopping: Groceries-Drugs				
.700	.625	.700	--	.721	.627	--	.685
.250	.234	.186	--	.189	.240	--	.228
.050	.141	.114	--	.090	.133	--	.087
			Shopping: Other				
.533	.486	.534	--	.507	.564	--	.521
.222	.429	.341	--	.347	.333	--	.345
.245	.085	.125	--	.146	.103	--	.134
			School				
.530	.585	.683	--	.582	.595	--	.613
.327	.317	.248	--	.304	.214	--	.273
.143	.098	.069	--	.114	.191	--	.114
			Total				
.419	.428	.486	--	.460	.483	.125[a]	.463
.426	.456	.390	--	.431	.380	.750[a]	.399
.155	.116	.124	--	.109	.137	.125[a]	.138

TABLE 39

TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRIP PURPOSE AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Stage in Family Life Cycle of Household						
	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	Total
Work							
Lateral	.458	.383	.321	.339	.475	.300[a]	.358
Centripetal	.418	.478	.532	.553	.438	.500[a]	.519
Centrifugal	.124	.139	.147	.108	.087	.200[a]	.123
Personal Business							
Lateral	.566	.440	.428	.458	.545	--	.453
Centripetal	.400	.417	.413	.445	.250	--	.416
Centrifugal	.034	.143	.159	.097	.205	--	.131
Social-Recreation							
Lateral	.426	.457	.465	.483	.538	--	.474
Centripetal	.356	.343	.351	.306	.310	--	.332
Centrifugal	.218	.200	.184	.211	.152	--	.194
Eat Meal							
Lateral	.600	.610	.660	.612	.649	--	.633
Centripetal	.350	.220	.296	.303	.135	--	.279
Centrifugal	.050	.170	.044	.085	.216	--	.088

[a] Base of ratio less than twenty cases.

TABLE 39 (Continued)

Orientation	Stage in Family Life Cycle of Household: Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	Total
Shopping: Department Store							
Lateral	.286[a]	.222[a]	.348	.339	.192	--	.318
Centripetal	.714[a]	.556[a]	.554	.614	.692	--	.600
Centrifugal	.000[a]	.222[a]	.098	.047	.116	--	.082
Shopping: Groceries-Drugs							
Lateral	.944[a]	.694	.703	.642	.708	--	.685
Centripetal	.056[a]	.222	.218	.259	.167	--	.228
Centrifugal	.000[a]	.084	.079	.099	.125	--	.087
Shopping: Other							
Lateral	.318	.397	.572	.512	.565	--	.521
Centripetal	.455	.485	.319	.336	.217	--	.345
Centrifugal	.227	.118	.109	.152	.218	--	.134
School							
Lateral	.778[a]	.375	.684	.555	.217	--	.613
Centripetal	.111[a]	.458	.192	.357	.565	--	.273
Centrifugal	.111[a]	.167	.124	.088	.218	--	.114
Total							
Lateral	.487	.435	.476	.445	.503	.375[a]	.463
Centripetal	.379	.413	.380	.423	.369	.500[a]	.399
Centrifugal	.134	.152	.144	.132	.128	.125[a]	.138

[a]Base of ratio less than twenty cases.

TABLE 40

TRAVEL RATIOS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRAVEL MODE AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Distance of Residence from City Center (miles)			
	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9
Auto Driver				
Lateral	.415	.502	.609	.488
Centripetal	.244	.244	.242	.316
Centrifugal	.341	.254	.149	.196
Auto Passenger				
Lateral	.348	.634	.649	.476
Centripetal	.391	.122	.196	.306
Centrifugal	.261	.244	.155	.218
Public Transportation Passenger				
Lateral	.500	.390	.433	.314
Centripetal	.271	.436	.416	.580
Centrifugal	.229	.174	.151	.106
Taxi Passenger				
Lateral	.400[a]	.857[a]	.667[a]	.600[a]
Centripetal	.600[a]	.143[a]	.333[a]	.400[a]
Centrifugal	.000[a]	.000[a]	.000[a]	.000[a]
Truck Passenger				
Lateral	--	--	--	--
Centripetal	--	--	--	--
Centrifugal	--	--	--	--
Walk (to work only)				
Lateral	.944[a]	.952	.964	.950
Centripetal	.056[a]	.000	.036	.050
Centrifugal	.000[a]	.048	.000	.000
Total				
Lateral	.503	.519	.582	.467
Centripetal	.268	.267	.274	.367
Centrifugal	.229	.214	.144	.166

[a] Base of ratio less than twenty cases.

TABLE 40 (Continued)

Distance of Residence from City Center (miles)						Total
5.0-5.9	6.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0 or More	
			Auto Driver			
.497	.508	.452	.480	.410	.365	.456
.298	.338	.417	.428	.511	.507	.410
.205	.154	.131	.092	.079	.128	.134
			Auto Passenger			
.488	.490	.520	.522	.509	.398	.496
.292	.276	.340	.365	.401	.417	.343
.220	.234	.140	.113	.090	.185	.161
			Public Transportation Passenger			
.297	.385	.308	.249	.347	.459	.361
.595	.546	.638	.653	.476	.395	.516
.108	.069	.054	.098	.177	.146	.123
			Taxi Passenger			
--	--	--	--	--	.286[a]	.545
--	--	--	--	--	.714[a]	.455
--	--	--	--	--	.000[a]	.000
			Truck Passenger			
--	--	.714[a]	.714[a]	--	.500[a]	.528
--	--	.286[a]	.286[a]	--	.333[a]	.389
--	--	.000[a]	.000[a]	--	.167[a]	.083
			Walk (to work only)			
.897	1.000[a]	.733[a]	.938[a]	.857[a]	.818[a]	.920
.034	.000[a]	.067[a]	.000[a]	.143[a]	.091[a]	.040
.069	.000[a]	.200[a]	.062[a]	--	.091[a]	.040
			Total			
.469	.488	.461	.478	.437	.390	.463
.346	.350	.414	.423	.470	.461	.399
.185	.162	.125	.099	.093	.149	.138

TABLE 41

TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR TRAVEL MODE AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Income[a] (in dollars)				
	0-2699	2700-3066	3073-3338	3355-3476	3480-3652
Auto Driver					
Lateral	.427	.562	.536	.465	.487
Centripetal	.282	.285	.333	.373	.350
Centrifugal	.291	.153	.131	.162	.163
Auto Passenger					
Lateral	.472	.582	.588	.521	.463
Centripetal	.302	.234	.279	.322	.325
Centrifugal	.226	.184	.133	.157	.212
Public Transportation Passenger					
Lateral	.433	.467	.375	.391	.379
Centripetal	.375	.386	.494	.471	.531
Centrifugal	.192	.147	.131	.138	.090

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 41 (Continued)

Income[a] (in dollars)						
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	Total
			Auto Driver			
.501	.419	.452	.446	.429	.365	.456
.350	.433	.414	.444	.485	.508	.410
.149	.148	.134	.110	.086	.127	.134
			Auto Passenger			
.491	.474	.467	.482	.518	.465	.496
.324	.371	.365	.372	.344	.390	.343
.185	.155	.168	.146	.138	.145	.161
			Public Transportation Passenger			
.307	.418	.308	.256	.168	.565	.361
.536	.433	.616	.692	.752	.235	.516
.157	.149	.076	.052	.080	.200	.123

TABLE 41 (Continued)

Orientation	Income[a] (in dollars)				
	0-2699	2700-3066	3073-3338	3355-3476	3480-3652
Taxi Passenger					
Lateral	--	.667[b]	--	1.000[b]	--
Centripetal	--	.333[b]	--	.000[b]	--
Centrifugal	--	.000[b]	--	.000[b]	--
Truck Passenger					
Lateral	--	--	--	--	--
Centripetal	--	--	--	--	--
Centrifugal	--	--	--	--	--
Walk (to work only)					
Lateral	1.000	.934	.920	.931	.936
Centripetal	.000	.033	.040	.069	.032
Centrifugal	.000	.033	.040	.000	.032
Total					
Lateral	.480	.558	.530	.488	.478
Centripetal	.305	.292	.343	.363	.363
Centrifugal	.215	.150	.127	.149	.159

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 41 (Continued)

Income[a] (in dollars)						Total
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	
			Taxi Passenger			
--	--	.800[b]	.167[b]	--	.000[b]	.545
--	--	.200[b]	.833[b]	--	1.000[b]	.455
--	--	.000[b]	.000[b]	--	.000[b]	.000
			Truck Passenger			
.727[b]	--	--	.445[b]	--	--	.528
.273[b]	--	--	.444[b]	--	--	.389
.000[b]	--	--	.111[b]	--	--	.083
			Walk (to work only)			
.889[b]	.895[b]	.846[b]	.823[b]	--	--	.920
.000[b]	.000[b]	.077[b]	.118[b]	--	--	.040
.111[b]	.105[b]	.077[b]	.059[b]	--	--	.040
			Total			
.475	.443	.448	.436	.433	.433	.463
.365	.407	.414	.451	.464	.425	.399
.160	.150	.138	.113	.103	.142	.138

[b]Base of ratio less than twenty cases.

TABLE 42

TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRAVEL MODE AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Occupation of Head of Household				
	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Auto Driver					
Lateral	.506	.419	--	.472	.447
Centripetal	.347	.426	--	.395	.407
Centrifugal	.147	.155	--	.133	.146
Auto Passenger					
Lateral	.565	.465	.167[a]	.474	.464
Centripetal	.235	.347	.833[a]	.335	.356
Centrifugal	.200	.188	.000[a]	.191	.180
Public Transportation Passenger					
Lateral	.443	.347	.364[a]	.401	.405
Centripetal	.423	.542	.364[a]	.476	.462
Centrifugal	.134	.111	.272[a]	.123	.133

[a]Base of ratio less than twenty cases.

TABLE 42 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	Total
				Auto Driver			
.424	.435	.475	--	.435	.495	--	.456
.426	.444	.403	--	.459	.352	--	.410
.150	.121	.122	--	.106	.153	--	.134
				Auto Passenger			
.474	.472	.546	--	.519	.546	--	.496
.354	.413	.322	--	.356	.309	--	.343
.172	.115	.132	--	.125	.145	--	.161
				Public Transportation Passenger			
.213	.258	.317	--	.389	.318	--	.361
.627	.621	.559	--	.528	.584	--	.516
.160	.121	.124	--	.083	.098	--	.123

TABLE 42 (Continued)

Orientation	Occupation of Head of Household				
	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Taxi Passenger					
Lateral	--	--	--	--	.800[a]
Centripetal	--	--	--	--	.200[a]
Centrifugal	--	--	--	--	.000[a]
Truck Passenger					
Lateral	--	--	--	.250[a]	.600[a]
Centripetal	--	--	--	.625[a]	.300[a]
Centrifugal	--	--	--	.125[a]	.100[a]
Walk (to work only)					
Lateral	.866[a]	.960	--	.924	.970
Centripetal	.067[a]	.000	--	.038	.030
Centrifugal	.067[a]	.040	--	.038	.000
Total					
Lateral	.522	.443	.363	.471	.454
Centripetal	.323	.407	.455	.383	.394
Centrifugal	.155	.150	.182	.146	.152

[a]Base of ratio less than twenty cases.

TABLE 42 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	Total
				Taxi Passenger			
--	.500[a]	.333[a]	--	.375[a]	.714[a]	--	.545
--	.500[a]	.667[a]	--	.625[a]	.286[a]	--	.455
--	.000[a]	.000[a]	--	.000[a]	.000[a]	--	.000
				Truck Passenger			
--	--	.692[a]	--	--	--	--	.528
--	--	.231[a]	--	--	--	--	.389
--	--	.077[a]	--	--	--	--	.083
				Walk (to work only)			
1.000[a]	1.000[a]	.952	--	.834[a]	.773	--	.920
.000[a]	.000[a]	.048	--	.083[a]	.091	--	.040
.000[a]	.000[a]	.000	--	.083[a]	.136	--	.040
				Total			
.419	.428	.486	--	.460	.483	.125[a]	.463
.426	.456	.390	--	.431	.380	.750[a]	.399
.155	.116	.124	--	.109	.137	.125[a]	.138

TABLE 43

TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRAVEL MODE AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Stage in Family Life Cycle of Household						Total
	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Auto Driver							
Lateral	.412	.447	.440	.467	.524	.556[a]	.456
Centripetal	.429	.404	.421	.410	.334	.444[a]	.410
Centrifugal	.159	.149	.139	.123	.142	.000[a]	.134
Auto Passenger							
Lateral	.563	.444	.525	.458	.517	--	.496
Centripetal	.301	.373	.322	.371	.340	--	.343
Centrifugal	.136	.183	.153	.171	.143	--	.161
Public Transportation Passenger							
Lateral	.454	.349	.433	.310	.328	.200[a]	.361
Centripetal	.420	.530	.415	.585	.557	.600[a]	.516
Centrifugal	.126	.121	.152	.105	.115	.200[a]	.123

[a] Base of ratio less than twenty cases.

TABLE 43 (Continued)

Orientation	Stage in Family Life Cycle of Household: Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	Total
Taxi Passenger							
Lateral	--	--	.800[a]	.500	.714[a]	--	.545
Centripetal	--	--	.200[a]	.500	.286[a]	--	.455
Centrifugal	--	--	.000[a]	.000	.000[a]	--	.000
Truck Passenger							
Lateral	--	--	.607	--	--	--	.528
Centripetal	--	--	.357	--	--	--	.389
Centrifugal	--	--	.036	--	--	--	.083
Walk (to work only)							
Lateral	.960	.917	.902	.898	.956	--	.920
Centripetal	.040	.083	.049	.038	.022	--	.040
Centrifugal	.000	.000	.049	.064	.022	--	.040
Total							
Lateral	.487	.435	.476	.445	.503	.375[a]	.463
Centripetal	.379	.413	.380	.423	.369	.500[a]	.399
Centrifugal	.134	.152	.144	.132	.128	.125[a]	.138

[a]Base of ratio less than twenty cases.

TABLE 44

TRAVEL RATIOS FOR HOUSEHOLDS BY INCOME FOR DISTANCE OF RESIDENCE FROM CITY CENTER AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Total	Income[a] (in dollars) 0-2699	2700-3066	3073-3338	3355-3476	3480-3652
			Total			
Lateral	.463	.480	.558	.530	.488	.478
Centripetal	.399	.305	.292	.343	.363	.363
Centrifugal	.138	.215	.150	.127	.149	.159
			1.0-1.9 Miles			
Lateral	.503	.512	.500	.462[b]	--	--
Centripetal	.268	.256	.290	.231[b]	--	--
Centrifugal	.229	.232	.210	.307[b]	--	--
			2.0-2.9 Miles			
Lateral	.519	.458	.544	.558	.532	.476
Centripetal	.267	.292	.269	.240	.177	.476
Centrifugal	.214	.250	.187	.202	.291	.048
			3.0-3.9 Miles			
Lateral	.582	.509	.620	.541	.566	.645
Centripetal	.274	.340	.233	.335	.252	.204
Centrifugal	.144	.151	.147	.124	.182	.151

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 44 (Continued)

Income[a] (in dollars)						No. of Trips
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	
			Total			
.475	.443	.448	.436	.433	.433	4,975
.365	.407	.414	.451	.464	.425	4,288
.160	.150	.138	.113	.103	.142	1,483
			1.0-1.9 Miles			
--	--	--	--	--	--	79
--	--	--	--	--	--	42
--	--	--	--	--	--	36
			2.0-2.9 Miles			
--	--	--	--	--	--	272
--	--	--	--	--	--	140
--	--	--	--	--	--	112
			3.0-3.9 Miles			
.627	--	--	.462	--	--	391
.206	--	--	.538	--	--	184
.167	--	--	.000	--	--	97

[b]Base of ratio less than twenty cases.

TABLE 44 (Continued)

Orientation	Income[a] (in dollars)					
	Total	0-2699	2700-3066	3073-3338	3355-3476	3480-3652
			4.0-4.9 Miles			
Lateral	.467	.435	.575	.750	.491	.431
Centripetal	.367	.478	.312	.173	.353	.400
Centrifugal	.166	.087	.113	.077	.156	.169
			5.0-5.9 Miles			
Lateral	.469	--	.488	.487	.457	.469
Centripetal	.346	--	.268	.310	.394	.319
Centrifugal	.185	--	.244	.203	.149	.212
			6.0-6.9 Miles			
Lateral	.488	--	.706[b]	.532	.610	.500
Centripetal	.350	--	.235[b]	.404	.220	.310
Centrifugal	.162	--	.059[b]	.064	.170	.190
			7.0-8.9 Miles			
Lateral	.461	--	.697	.671	--	.500
Centripetal	.414	--	.303	.282	--	.375
Centrifugal	.125	--	.000	.047	--	.125
			9.0-10.9 Miles			
Lateral	.478	--	.348	--	--	.565
Centripetal	.423	--	.565	--	--	.313
Centrifugal	.099	--	.087	--	--	.122

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to

TABLE 44 (Continued)

Income[a] (in dollars)						
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	No. of Trips
			4.0-4.9 Miles			
.432	.321	.600[b]	.303	--	--	348
.349	.481	.400[b]	.485	--	--	274
.219	.198	.000[b]	.212	--	--	124
			5.0-5.9 Miles			
.512	.303	.514	.600[b]	.458	--	354
.317	.348	.363	.000[b]	.500	--	261
.171	.349	.118	.400[b]	.042	--	139
			6.0-6.9 Miles			
.333	.542	.411	.500	.474	--	459
.517	.311	.297	.405	.377	--	329
.150	.147	.292	.095	.149	--	152
			7.0-8.9 Miles			
.349	.597	.455	.397	.427	--	879
.477	.298	.386	.478	.462	--	789
.174	.105	.159	.125	.111	--	237
			9.0-10.9 Miles			
.579	.528	.447	.492	.426	--	877
.308	.352	.456	.426	.480	--	775
.113	.120	.097	.082	.094	--	181

1950, the trips made by household members living in those tracts are not classified by income.

[b]Base of ratio less than twenty cases.

TABLE 44 (Continued)

Orientation	Total	Income[a] (in dollars) 0-2699	2700-3066	3073-3338	3355-3476	3480-3652
		11.0-12.9 Miles				
Lateral	.437	--	--	--	.500	.370
Centripetal	.470	--	--	--	.478	.460
Centrifugal	.093	--	--	--	.022	.170
		13.0 or More Miles				
Lateral	.390	--	.429	.300	.333	.363
Centripetal	.461	--	.571	.600	.533	.505
Centrifugal	.149	--	.000	.100	.134	.132
Number of trips		302	599	731	736	787

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 44 (Continued)

Income[a] (in dollars)						
3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	No. of Trips
			11.0-12.9 Miles			
.353	.424	.466	.449	.472	--	564
.569	.454	.460	.478	.428	--	606
.078	.122	.074	.073	.100	--	120
			13.0 or More Miles			
.452	.361	.329	.384	.394	.433	750
.352	.473	.598	.415	.523	.425	887
.196	.166	.073	.201	.083	.142	288
1,040	1,513	1,521	1,635	1,355	527	10,746

TABLE 45

TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
			Total			
Lateral	.463	.522	.443	.363	.471	.454
Centripetal	.399	.323	.407	.455	.383	.394
Centrifugal	.138	.155	.150	.182	.146	.152
			1.0-1.9 Miles			
Lateral	.503	.500[a]	.571	.666[a]	.409	.440
Centripetal	.268	.167[a]	.393	.167[a]	.250	.320
Centrifugal	.229	.333[a]	.036	.167[a]	.341	.240
			2.0-2.9 Miles			
Lateral	.519	.542	.635	--	.530	.482
Centripetal	.267	.271	.173	--	.275	.188
Centrifugal	.214	.187	.192	--	.195	.330

[a]Base of ratio less than twenty cases.

TABLE 45 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
				Total			
.419	.428	.486	--	.460	.483	.125[a]	4,975
.426	.456	.390	--	.431	.380	.750[a]	4,288
.155	.116	.124	--	.109	.137	.125[a]	1,483
				1.0-1.9 Miles			
--	.571[a]	.875[a]	--	.333[a]	.500[a]	--	79
--	.357[a]	.125[a]	--	.000[a]	.250[a]	--	42
--	.072[a]	.000[a]	--	.667[a]	.250[a]	--	36
				2.0-2.9 Miles			
.500	.517	.409	--	.667[a]	.512	--	272
.208	.345	.477	--	.111[a]	.349	--	140
.292	.138	.114	--	.222[a]	.139	--	112

TABLE 45 (Continued)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
		3.0-3.9 Miles				
Lateral	.582	.582	.583	--	.617	.626
Centripetal	.274	.218	.250	--	.260	.242
Centrifugal	.144	.200	.167	--	.123	.132
		4.0-4.9 Miles				
Lateral	.467	.400	.316	--	.538	.389
Centripetal	.367	.571	.632	--	.299	.376
Centrifugal	.166	.029	.052	--	.163	.235
		5.0-5.9 Miles				
Lateral	.469	.549	.400	--	.521	.528
Centripetal	.346	.216	.400	--	.287	.331
Centrifugal	.185	.235	.200	--	.192	.141
		6.0-6.9 Miles				
Lateral	.488	.500	.333	--	.583	.416
Centripetal	.350	.375	.361	--	.326	.416
Centrifugal	.162	.125	.306	--	.091	.168

TABLE 45 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
			3.0-3.9 Miles				
.391	.438	.539	--	.606	.622	--	391
.478	.312	.302	--	.368	.244	--	184
.131	.250	.159	--	.026	.134	--	97
			4.0-4.9 Miles				
.359	.449	.563	--	.500	.489	--	348
.487	.367	.234	--	.370	.375	--	274
.154	.184	.203	--	.130	.136	--	124
			5.0-5.9 Miles				
.408	.510	.398	--	.481	.328	--	354
.370	.431	.366	--	.423	.403	--	261
.222	.059	.236	--	.096	.269	--	139
			6.0-6.9 Miles				
.364	.460	.597	--	.473	.469	--	459
.409	.397	.275	--	.268	.383	--	329
.227	.143	.128	--	.259	.148	--	152

TABLE 45 (Continued)

Orientation	Total	Occupation of Head of Household: Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
		7.0-8.9 Miles				
Lateral	.461	.638	.417	--	.434	.455
Centripetal	.414	.298	.435	--	.469	.397
Centrifugal	.125	.064	.148	--	.097	.148
		9.0-10.9 Miles				
Lateral	.478	.688	.333	--	.511	.490
Centripetal	.423	.250	.520	--	.367	.418
Centrifugal	.099	.062	.147	--	.122	.092
		11.0-12.9 Miles				
Lateral	.437	.316[a]	.387	--	.374	.472
Centripetal	.470	.526[a]	.387	--	.527	.428
Centrifugal	.093	.158[a]	.226	--	.099	.100
		13.0 or More Miles				
Lateral	.390	.412	.505	.250[a]	.268	.395
Centripetal	.461	.412	.416	.750[a]	.534	.433
Centrifugal	.149	.176	.079	.000[a]	.198	.172
Number of trips		402	592	22	2,109	2,509

[a]Base of ratio less than twenty cases.

TABLE 45 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
			7.0-8.9 Miles				
.423	.398	.559	--	.420	.380	--	879
.394	.504	.341	--	.436	.496	--	789
.183	.098	.100	--	.144	.124	--	237
			9.0-10.9 Miles				
.464	.431	.448	--	.490	.569	--	877
.464	.479	.435	--	.427	.389	--	775
.072	.090	.117	--	.083	.042	--	181
			11.0-12.9 Miles				
.423	.423	.437	--	.477	.429	--	564
.423	.500	.494	--	.467	.510	--	606
.154	.077	.069	--	.056	.061	--	120
			13.0 or More Miles				
.372	.366	.414	--	.391	.561	--	750
.468	.530	.432	--	.536	.295	--	887
.160	.104	.154	--	.073	.144	--	288
671	759	1,740	0	1,129	805	8	10,746

TABLE 46

TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Total								
Lateral	.463	.487	.435	.476	.445	.503	.375[a]	4,975
Centripetal	.399	.379	.413	.380	.423	.369	.500[a]	4,288
Centrifugal	.138	.134	.152	.144	.132	.128	.125[a]	1,483
1.0-1.9 Miles								
Lateral	.503	.600	.357[a]	.539	.431	.588	--	79
Centripetal	.268	.200	.429[a]	.192	.345	.177	--	42
Centrifugal	.229	.200	.214[a]	.269	.224	.235	--	36
2.0-2.9 Miles								
Lateral	.519	.526	.453	.535	.495	.653	--	272
Centripetal	.267	.237	.253	.206	.333	.265	--	140
Centrifugal	.214	.237	.294	.259	.172	.082	--	112
3.0-3.9 Miles								
Lateral	.582	.472	.532	.577	.608	.635	--	391
Centripetal	.274	.434	.351	.242	.238	.260	--	184
Centrifugal	.144	.094	.117	.181	.154	.105	--	97

[a]Base of ratio less than twenty cases.

TABLE 46 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
			4.0-4.9 Miles					
Lateral	.467	.476	.439	.495	.439	.532	--	348
Centripetal	.367	.405	.396	.299	.408	.338	--	274
Centrifugal	.166	.119	.165	.206	.153	.130	--	124
			5.0-5.9 Miles					
Lateral	.469	.454	.587	.457	.485	.302	--	354
Centripetal	.346	.432	.280	.272	.359	.571	--	261
Centrifugal	.185	.114	.133	.271	.156	.127	--	139
			6.0-6.9 Miles					
Lateral	.488	.569	.404	.518	.482	.495	--	459
Centripetal	.350	.254	.395	.318	.367	.347	--	329
Centrifugal	.162	.177	.201	.164	.151	.158	--	152
			7.0-8.9 Miles					
Lateral	.461	.460	.434	.517	.418	.466	--	879
Centripetal	.414	.360	.395	.364	.459	.432	--	789
Centrifugal	.125	.180	.171	.119	.123	.102	--	237
			9.0-10.9 Miles					
Lateral	.478	.476	.395	.499	.468	.506	--	877
Centripetal	.423	.429	.504	.397	.441	.395	--	775
Centrifugal	.099	.095	.101	.104	.091	.099	--	181

TABLE 46 (Continued)

Orientation	Stage in Family Life Cycle of Household							
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	No. of Trips
				11.0-12.9 Miles				
Lateral	.437	.516	.442	.457	.394	.375	--	564
Centripetal	.470	.355	.519	.457	.487	.531	--	606
Centrifugal	.093	.129	.039	.086	.119	.094	--	120
				13.0 or More Miles				
Lateral	.390	.415	.363	.403	.360	.468	--	750
Centripetal	.461	.523	.488	.432	.511	.351	--	887
Centrifugal	.149	.062	.149	.165	.129	.181	--	288
Number of trips		441	976	4,427	4,109	777	16	10,746

TABLE 47

TRAVEL RATIOS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR INCOME AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Total						
Lateral	.463	.522	.443	.363	.471	.454
Centripetal	.399	.323	.407	.455	.383	.394
Centrifugal	.138	.155	.150	.182	.146	.152
Income[a] 0-2699 Dollars						
Lateral	.480	.419	.537	.625[b]	.500	.327
Centripetal	.305	.323	.352	.125[b]	.250	.327
Centrifugal	.215	.258	.111	.250[b]	.250	.346
Income 2700-3066 Dollars						
Lateral	.558	.653	.493	--	.573	.538
Centripetal	.292	.264	.324	--	.292	.302
Centrifugal	.150	.083	.183	--	.135	.160

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 47 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
				Total			
.419	.428	.486	--	.460	.483	.125[b]	4,975
.426	.456	.390	--	.431	.380	.750[b]	4,288
.155	.116	.124	--	.109	.137	.125[b]	1,483
				Income[a] 0-2699 Dollars			
--	.636[b]	.428	--	--	.594	--	145
--	.273[b]	.524	--	--	.281	--	92
--	.091[b]	.048	--	--	.125	--	65
				Income 2700-3066 Dollars			
.286[b]	.571	.600	--	.583	.439	--	334
.429[b]	.286	.220	--	.250	.366	--	175
.285[b]	.143	.180	--	.167	.195	--	90

[b]Base of ratio less than twenty cases.

TABLE 47 (Continued)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Income 3073-3338 Dollars						
Lateral	.530	.470	.625	--	.505	.500
Centripetal	.343	.324	.219	--	.376	.383
Centrifugal	.127	.206	.156	--	.119	.117
Income 3355-3476 Dollars						
Lateral	.488	.333	.471	--	.592	.460
Centripetal	.363	.356	.441	--	.305	.360
Centrifugal	.149	.311	.088	--	.103	.180
Income 3480-3652 Dollars						
Lateral	.478	.439	.375	--	.490	.450
Centripetal	.363	.415	.484	--	.340	.402
Centrifugal	.159	.146	.141	--	.170	.148
Income 3656-3850 Dollars						
Lateral	.475	.465	.553	--	.480	.466
Centripetal	.365	.209	.368	--	.404	.332
Centrifugal	.160	.326	.079	--	.116	.202

[b]Base of ratio less than twenty cases.

TABLE 47 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
			Income 3073-3338 Dollars				
.667[b]	.574	.584	--	.574	.483	--	387
.333[b]	.361	.265	--	.383	.293	--	251
.000[b]	.065	.151	--	.043	.224	--	93
			Income 3355-3476 Dollars				
.366	.259	.603	--	.510	.554	--	359
.415	.534	.269	--	.367	.400	--	267
.219	.207	.128	--	.123	.046	--	110
			Income 3480-3652 Dollars				
.428	.460	.482	--	.666	.511	--	376
.343	.400	.301	--	.275	.330	--	286
.229	.140	.217	--	.059	.159	--	125
			Income 3656-3850 Dollars				
.625	.411	.504	--	.378	.486	--	494
.167	.425	.382	--	.489	.360	--	380
.208	.164	.114	--	.133	.154	--	166

TABLE 47 (Continued)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
Income 3852-4046 Dollars						
Lateral	.443	.610	.464	--	.372	.428
Centripetal	.407	.317	.369	--	.428	.418
Centrifugal	.150	.073	.167	--	.200	.154
Income 4047-4319 Dollars						
Lateral	.448	.692	.375	.143[b]	.496	.461
Centripetal	.414	.288	.427	.714[b]	.370	.390
Centrifugal	.138	.020	.198	.143[b]	.134	.149
Income 4321-4731 Dollars						
Lateral	.436	.308[b]	.397	--	.410	.446
Centripetal	.451	.692[b]	.379	--	.439	.452
Centrifugal	.113	.000[b]	.224	--	.151	.102
Income 4735 Dollars and Over						
Lateral	.433	.714[b]	.286	--	.374	.428
Centripetal	.464	.286[b]	.633	--	.525	.467
Centrifugal	.103	.000[b]	.081	--	.101	.105

[b]Base of ratio less than twenty cases.

TABLE 47 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
			Income 3852-4046 Dollars				
.438	.443	.480	--	.451	.563	--	670
.404	.443	.371	--	.438	.338	--	616
.158	.114	.149	--	.111	.099	--	227
			Income 4047-4319 Dollars				
.433	.407	.424	--	.389	.460	--	681
.439	.483	.407	--	.470	.461	--	629
.128	.110	.169	--	.141	.079	--	211
			Income 4321-4731 Dollars				
.381	.482	.450	--	.483	.367	--	712
.500	.455	.464	--	.412	.483	--	738
.119	.063	.086	--	.105	.150	--	185
			Income 4735 Dollars and Over				
.422	.298	.501	--	.442	.441	--	587
.432	.596	.423	--	.449	.442	--	629
.146	.106	.076	--	.109	.117	--	139

TABLE 47 (Continued)

Orientation	Occupation of Head of Household					
	Total	Laborers and Farm Workers	Service Workers	Private Household Workers	Operatives and Kindred	Craftsmen, Foremen, and Kindred
	No Data Available					
Lateral	.433	.478	.417[b]	--	.329	.475
Centripetal	.425	.391	.583[b]	--	.513	.370
Centrifugal	.142	.131	.000[b]	--	.158	.155
Number of trips		402	592	22	2,109	2,509

[b]Base of ratio less than twenty cases.

TABLE 47 (Continued)

Occupation of Head of Household							
Sales Workers	Clerical and Kindred Workers	Managers, Officials, and Proprietors	Farmers and Farm Managers	Professional, Technical, and Kindred	Not in the Labor Force	Occupations Unknown or Not Elsewhere Classified	No. of Trips
				No Data Available			
.369	.445[b]	.456	--	.316	.585	--	228
.447	.444[b]	.400	--	.614	.244	--	224
.184	.111[b]	.144	--	.070	.171	--	75
671	759	1,740	0	1,129	805	8	10,746

TABLE 48

TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR INCOME AND ORIENTATION
(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
				Total				
Lateral	.463	.487	.435	.476	.445	.503	.375[a]	4,975
Centripetal	.399	.379	.413	.380	.423	.369	.500[a]	4,288
Centrifugal	.138	.134	.152	.144	.132	.128	.125[a]	1,483
				Income[b] 0-2699 Dollars				
Lateral	.480	.557	.295	.404	.500	.600	--	145
Centripetal	.305	.246	.409	.255	.327	.275	--	92
Centrifugal	.215	.197	.296	.341	.173	.125	--	65
				Income 2700-3066 Dollars				
Lateral	.558	.581	.636	.567	.505	.595	--	334
Centripetal	.292	.326	.312	.267	.321	.230	--	175
Centrifugal	.150	.093	.052	.166	.174	.175	--	90

[a]Base of ratio less than twenty cases.

[b]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 48 (Continued)

Orientation	Stage in Family Life Cycle of Household: Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	No. of Trips
Income 3073-3338 Dollars								
Lateral	.530	.511	.424	.564	.543	.510	--	387
Centripetal	.343	.395	.404	.305	.338	.396	--	251
Centrifugal	.127	.094	.172	.131	.119	.094	--	93
Income 3355-3476 Dollars								
Lateral	.488	.500	.482	.502	.460	.515	--	359
Centripetal	.363	.321	.365	.330	.394	.438	--	267
Centrifugal	.149	.179	.153	.168	.146	.047	--	110
Income 3480-3652 Dollars								
Lateral	.478	.638	.447	.465	.434	.567	--	376
Centripetal	.363	.224	.362	.385	.392	.309	--	286
Centrifugal	.159	.138	.191	.150	.174	.124	--	125
Income 3656-3850 Dollars								
Lateral	.475	.464	.391	.510	.473	.419	--	494
Centripetal	.365	.429	.437	.328	.369	.441	--	380
Centrifugal	.160	.107	.172	.162	.158	.140	--	166

TABLE 48 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Income 3852-4046 Dollars								
Lateral	.443	.350	.421	.449	.434	.538	.800[a]	670
Centripetal	.407	.500	.436	.374	.449	.354	.200[a]	616
Centrifugal	.150	.150	.143	.177	.117	.108	.000[a]	227
Income 4047-4319 Dollars								
Lateral	.448	.310	.348	.448	.471	.535	--	681
Centripetal	.414	.452	.379	.445	.392	.310	--	629
Centrifugal	.138	.238	.273	.107	.137	.155	--	211
Income 4321-4731 Dollars								
Lateral	.436	.500	.496	.441	.403	.478	--	712
Centripetal	.451	.500	.454	.430	.489	.375	--	738
Centrifugal	.113	.000	.050	.129	.108	.147	--	185
Income 4735 Dollars and Over								
Lateral	.433	.334[a]	.407	.493	.403	.407	--	587
Centripetal	.464	.444[a]	.568	.404	.485	.519	--	629
Centrifugal	.103	.222[a]	.025	.103	.112	.074	--	139

[a]Base of ratio less than twenty cases.

TABLE 48 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
			No Data Available					
Lateral	.433	.500	.389[a]	.488	.364	.313[a]	--	228
Centripetal	.425	.500	.389[a]	.358	.525	.312[a]	--	224
Centrifugal	.142	.000	.222[a]	.154	.111	.375[a]	--	75
Number of trips		441	976	4,427	4,109	777	16	10,746

[a]Base of ratio less than twenty cases.

TABLE 49

TRAVEL RATIOS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR OCCUPATION OF HEAD OF HOUSEHOLD AND ORIENTATION

(A dash [--] indicates a ratio based on less than five cases.)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Total								
Lateral	.463	.487	.435	.476	.445	.503	.375[a]	4,975
Centripetal	.399	.379	.413	.380	.423	.369	.500[a]	4,288
Centrifugal	.138	.134	.152	.144	.132	.128	.125[a]	1,483
Laborers and Farm Workers								
Lateral	.522	.583[a]	.430	.571	.500	.684[a]	--	210
Centripetal	.323	.333[a]	.354	.273	.348	.316[a]	--	130
Centrifugal	.155	.084[a]	.216	.156	.152	.000[a]	--	62
Service Workers								
Lateral	.443	.542	.412	.468	.394	.468	--	262
Centripetal	.407	.229	.471	.374	.464	.426	--	241
Centrifugal	.150	.229	.117	.158	.142	.106	--	89
Private Household Workers								
Lateral	.363	--	--	.000[a]	--	.428[a]	--	8
Centripetal	.455	--	--	.833[a]	--	.286[a]	--	10
Centrifugal	.182	--	--	.167[a]	--	.286[a]	--	4

[a]Base of ratio less than twenty cases.

TABLE 49 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Operatives and Kindred Workers								
Lateral	.471	.397	.504	.473	.451	.605	--	993
Centripetal	.383	.359	.363	.353	.443	.272	--	808
Centrifugal	.146	.244	.133	.174	.106	.123	--	308
Craftsmen, Foremen, and Kindred Workers								
Lateral	.454	.476	.340	.488	.430	.727	.800[a]	1,139
Centripetal	.394	.405	.509	.361	.413	.182	.200[a]	988
Centrifugal	.152	.119	.151	.151	.157	.091	.000[a]	382
Sales Workers								
Lateral	.419	.389	.343	.441	.423	.346	--	281
Centripetal	.426	.472	.493	.395	.448	.385	--	286
Centrifugal	.155	.139	.164	.164	.129	.269	--	104
Clerical and Kindred Workers								
Lateral	.428	.486	.420	.401	.432	.476	--	325
Centripetal	.456	.444	.319	.510	.427	.463	--	346
Centrifugal	.116	.070	.261	.089	.141	.061	--	88

[a]Base of ratio less than twenty cases.

TABLE 49 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Managers, Officials, and Proprietors								
Lateral	.486	.387	.540	.483	.480	.560	--	846
Centripetal	.390	.516	.260	.401	.403	.267	--	679
Centrifugal	.124	.097	.200	.116	.117	.173	--	215
Farmers and Farm Managers								
Lateral	--	--	--	--	--	--	--	0
Centripetal	--	--	--	--	--	--	--	0
Centrifugal	--	--	--	--	--	--	--	0
Professional, Technical, and Kindred Workers								
Lateral	.460	.421	.439	.483	.418	.559	--	519
Centripetal	.431	.500	.460	.402	.492	.250	--	487
Centrifugal	.109	.079	.101	.115	.090	.191	--	123
Not in the Labor Force								
Lateral	.483	.646	.487	.559	.449	.459	--	389
Centripetal	.380	.268	.462	.254	.375	.424	--	306
Centrifugal	.137	.086	.051	.187	.176	.117	--	110

TABLE 49 (Continued)

Orientation	Stage in Family Life Cycle of Household							No. of Trips
	Total	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	
Occupations Unknown or Not Elsewhere Classified								
Lateral	.125[a]	--	--	--	--	--	.167[a]	1
Centripetal	.750[a]	--	--	--	--	--	.833[a]	6
Centrifugal	.125[a]	--	--	--	--	--	.000[a]	1
Number of trips		441	976	4,427	4,109	777	16	10,746

APPENDIX C

TRAVEL FREQUENCY TABLES

TABLE 50

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRIP PURPOSE

Distance of Residence from City Center (miles)	Trip Purpose							
	Work		Personal Business		Social-Recreation		Eat Meal	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
1.0-1.9 . . .	109	69.4	14	8.9	13	8.3	3	1.9
2.0-2.9 . . .	275	52.4	67	12.8	96	18.3	11	2.1
3.0-3.9 . . .	361	53.7	71	10.5	110	16.4	17	2.5
4.0-4.9 . . .	411	55.0	73	9.8	147	19.7	15	2.0
5.0-5.9 . . .	313	41.5	45	5.9	248	32.9	28	3.7
6.0-6.9 . . .	357	37.9	52	5.6	330	35.1	31	3.3
7.0-8.9 . . .	654	34.3	122	6.4	565	29.6	88	4.7
9.0-10.9 . .	553	30.1	126	6.9	587	32.0	90	4.9
11.0-12.9 . .	403	31.2	87	6.7	372	28.9	56	4.3
13.0 or more	507	26.3	115	6.0	604	31.3	70	3.7
Total	3,943	36.6	772	7.2	3,072	28.6	409	3.8

TABLE 50 (Continued)

Trip Purpose									
Shopping, Dept. Store		Shopping, Gro.-Drugs		Shopping, Other		School		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
5	3.2	6	3.8	1	0.6	6	3.9	157	100.0
6	1.2	24	4.6	24	4.5	21	4.1	524	100.0
17	2.6	47	7.0	32	4.7	17	2.6	672	100.0
22	3.0	30	4.0	26	3.5	22	3.0	746	100.0
18	2.4	42	5.6	32	4.2	28	3.8	754	100.0
26	2.7	57	6.1	37	3.9	50	5.4	940	100.0
59	3.1	183	9.6	92	4.8	142	7.5	1,905	100.0
39	2.2	199	10.8	108	5.9	131	7.2	1,833	100.0
35	2.7	138	10.7	86	6.7	113	8.8	1,290	100.0
43	2.2	222	11.5	168	8.8	196	10.2	1,925	100.0
270	2.5	948	8.9	606	5.6	726	6.8	10,746	100.0

TABLE 51

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY INCOME FOR TRIP PURPOSE

Income[a] (dollars)	Trip Purpose							
	Work		Personal Business		Social-Recreation		Eat Meal	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
0-2699 . . .	185	61.2	39	12.9	28	9.3	0	-
2700-3066 .	327	54.5	58	9.7	113	18.9	18	3.0
3073-3338 .	298	40.7	69	9.5	184	25.1	21	2.9
3355-3476 .	334	45.3	56	7.6	197	26.8	23	3.1
3480-3652 .	336	42.6	65	8.3	211	26.8	35	4.5
3656-3850 .	369	35.4	85	8.2	293	28.2	23	2.2
3852-4046 .	490	32.3	83	5.5	465	30.8	57	3.7
4047-4319 .	497	32.6	103	6.8	499	32.8	66	4.3
4321-4731 .	561	34.3	118	7.2	486	29.7	61	3.7
4735 and over	417	30.7	71	5.3	433	31.9	80	5.9
No data available . .	129	24.4	25	4.8	163	30.9	25	4.7
Total	3,943	36.6	772	7.2	3,072	28.6	409	3.8

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to

TABLE 51 (Continued)

Trip Purpose									
Shopping, Dept. Store		Shopping, Gro.-Drugs		Shopping, Other		School		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
7	2.3	11	3.7	18	5.9	14	4.7	302	100.0
9	1.5	35	5.8	15	2.5	24	4.1	599	100.0
17	2.3	55	7.5	36	5.0	51	7.0	731	100.0
21	2.9	48	6.5	31	4.2	26	3.6	736	100.0
30	3.8	63	8.0	31	3.9	16	2.1	787	100.0
24	2.3	95	9.1	82	7.9	69	6.7	1,040	100.0
40	2.7	157	10.3	99	6.6	122	8.1	1,513	100.0
34	2.3	142	9.3	81	5.3	99	6.6	1,521	100.0
46	2.8	163	10.0	83	5.1	117	7.2	1,635	100.0
34	2.5	121	9.0	88	6.5	111	8.2	1,355	100.0
8	1.6	58	11.0	42	7.9	77	14.7	527	100.0
270	2.5	948	8.9	606	5.6	726	6.8	10,746	100.0

1950, the trips made by household members living in those tracts are not classified by income.

TABLE 52

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRIP PURPOSE

Occupation of Head of Household	Trip Purpose							
	Work		Personal Business		Social-Recreation		Eat Meal	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Laborers and farm workers . .	218	54.2	30	7.4	77	19.2	11	2.7
Service workers . .	240	40.5	37	6.2	186	31.5	9	1.5
Private household workers . .	15	68.1	0	-	6	27.3	0	-
Operatives and kindred workers . .	926	43.9	147	6.9	575	27.3	41	1.9
Craftsmen, foremen, and kindred . . .	874	34.8	177	7.0	684	27.3	76	3.0
Sales workers . .	227	33.8	36	5.3	183	27.3	55	8.2
Clerical and kindred workers . .	321	42.2	48	6.4	206	27.1	18	2.4

TABLE 52 (Continued)

Trip Purpose									
Shopping, Dept. Store		Shopping, Gro.-Drugs		Shopping, Other		School		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
4	1.0	34	8.5	19	4.7	9	2.3	402	100.0
18	3.0	46	7.8	33	5.6	23	3.9	592	100.0
0	-	0	-	0	-	1	4.6	22	100.0
34	1.6	185	8.8	86	4.1	115	5.5	2,109	100.0
75	3.0	233	9.3	186	7.4	204	8.2	2,509	100.0
16	2.4	60	8.9	45	6.7	49	7.4	671	100.0
26	3.4	64	8.4	35	4.6	41	5.5	759	100.0

TABLE 52 (Continued)

Occupation of Head of Household	Trip Purpose							
	Work		Personal Business		Social Recreation		Eat Meal	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Managers, officials, and proprietors . .	500	28.7	156	9.0	539	30.9	116	6.7
Farmers and farm managers .	0	-	0	-	0	-	0	-
Professional, technical, and kindred . . .	356	31.5	67	5.9	368	32.6	58	5.1
Not in the labor force	262	32.5	74	9.2	246	30.5	25	3.2
Occupation not known or not elsewhere classified .	4	50.0	0	-	2	25.0	0	-
Total	3,943	36.6	772	7.2	3,072	28.6	409	3.8

TABLE 52 (Continued)

Trip Purpose									
Shopping, Dept. Store		Shopping, Gro.-Drugs		Shopping, Other		School		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
40	2.3	140	8.0	88	5.1	161	9.3	1,740	100.0
0	-	0	-	0	-	0	-	0	-
15	1.4	111	9.8	75	6.7	79	7.0	1,129	100.0
42	5.2	75	9.3	39	4.8	42	5.3	805	100.0
0	0	0	-	-	-	2	25.0	8	100.0
270	2.5	948	8.9	606	5.6	726	6.8	10,746	100.0

TABLE 53

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRIP PURPOSE

Stage in Family Life Cycle of Household	Trip Purpose							
	Work		Personal Business		Social-Recreation		Eat Meal	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Head unmarried, aged 15-44	225	51.0	30	6.8	101	22.9	20	4.5
Head married, aged 15-44, without children . .	439	44.9	84	8.6	230	23.6	41	4.2
Head married, aged 15-44, with children . .	1,274	28.7	315	7.1	1,461	33.0	159	3.6
Head married, aged 45 or more . .	1,616	39.3	299	7.3	1,080	26.2	152	3.7
Head unmarried, aged 45 or more . .	379	48.7	44	5.7	197	25.3	37	4.8
Not known	10	62.5	0	-	3	18.7	0	-
Total	3,943	36.6	772	7.2	3,072	28.6	409	3.8

TABLE 53 (Continued)

Trip Purpose									
Shopping, Dept. Store		Shopping, Gro.-Drugs		Shopping, Other		School		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
7	1.6	18	4.1	22	5.0	18	4.1	441	100.0
18	1.8	72	7.4	68	7.0	24	2.5	976	100.0
92	2.1	454	10.3	276	6.2	396	9.0	4,427	100.0
127	3.1	355	8.7	217	5.2	263	6.5	4,109	100.0
26	3.4	48	6.1	23	3.0	23	3.0	777	100.0
0	-	1	6.3	0	-	2	12.5	16	100.0
270	2.5	948	8.9	606	5.6	726	6.8	10,746	100.0

TABLE 54

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR TRAVEL MODE

Distance of Residence from City Center (miles)	Travel Mode					
	Auto Driver		Auto Passenger		Public Transportation Passenger	
	No.	Pct.	No.	Pct.	No.	Pct.
1.0-1.9	41	26.1	23	14.6	70	44.6
2.0-2.9	201	38.3	123	23.5	172	32.8
3.0-3.9	302	44.9	148	22.0	185	27.5
4.0-4.9	342	45.8	170	22.8	188	25.2
5.0-5.9	362	48.0	209	27.7	148	19.6
6.0-6.9	435	46.2	312	33.2	174	18.5
7.0-8.9	997	52.3	658	34.5	224	11.8
9.0-10.9	1,015	55.3	611	33.4	173	9.4
11.0-12.9	712	55.1	421	32.7	147	11.4
13.0 or more	1,008	52.3	688	35.8	205	10.6
Total	5,415	50.3	3.363	31.3	1,686	15.7

TABLE 54 (Continued)

Travel Mode							
Taxi Passenger		Truck Passenger		Walk (to work only)		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
5	3.2	0	-	18	11.5	157	100.0
7	1.3	0	-	21	4.1	524	100.0
6	0.9	3	0.5	28	4.2	672	100.0
5	0.7	1	0.1	40	5.4	746	100.0
4	0.5	2	0.3	29	3.9	754	100.0
2	0.2	0	-	17	1.9	940	100.0
4	0.2	7	0.4	15	0.8	1,905	100.0
4	0.2	14	0.8	16	0.9	1,833	100.0
0	-	3	0.2	7	0.6	1,290	100.0
7	0.4	6	0.3	11	0.6	1,925	100.0
44	0.4	36	0.4	202	1.9	10,746	100.0

TABLE 55

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY INCOME FOR TRAVEL MODE

Income[a] (dollars)	Travel Mode					
	Auto Driver		Auto Passenger		Public Transportation Passenger	
	No.	Pct.	No.	Pct.	No.	Pct.
0-2699	103	34.1	53	17.5	120	39.7
2700-3066	235	39.2	141	23.5	184	30.7
3073-3338	306	41.8	233	31.9	160	21.9
3355-3476	351	47.6	211	28.7	138	18.8
3480-3652	374	47.5	231	29.3	145	18.4
3656-3850	537	51.6	330	31.7	153	14.7
3852-4046	802	53.0	496	32.7	194	12.9
4047-4319	812	53.3	529	34.8	159	10.5
4321-4731	879	53.7	513	31.4	211	12.9
4735 and over .	756	55.7	454	33.5	137	10.2
No data available	260	49.3	172	32.6	85	16.2
Total	5,415	50.3	3,363	31.3	1,686	15.7

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to

TABLE 55 (Continued)

Travel Mode							
Taxi Passenger		Truck Passenger		Walk (to work only)		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
4	1.4	0	-	22	7.3	302	100.0
9	1.5	0	-	30	5.1	599	100.0
4	0.5	3	0.4	25	3.5	731	100.0
5	0.6	2	0.3	29	4.0	736	100.0
4	0.6	2	0.2	31	4.0	787	100.0
0	-	11	1.1	9	0.9	1,040	100.0
0	-	2	0.1	19	1.3	1,513	100.0
5	0.3	3	0.2	13	0.9	1,521	100.0
6	0.4	9	0.5	17	1.1	1,635	100.0
2	0.1	3	0.2	3	0.3	1,355	100.0
5	0.9	1	0.2	4	0.8	527	100.0
44	0.4	36	0.4	202	1.9	10,746	100.0

1950, the trips made by household members living in those tracts are not classified by income.

TABLE 56

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR TRAVEL MODE

Occupation of Head of Household	Travel Mode					
	Auto Driver		Auto Passenger		Public Transportation Passenger	
	No.	Pct.	No.	Pct.	No.	Pct.
Laborers and farm workers	170	42.2	115	28.6	97	24.2
Service workers	277	46.7	170	28.8	118	19.9
Private household workers	3	13.6	6	27.3	11	50.0
Operatives and kindred	997	47.2	656	31.1	391	18.6
Craftsmen, foremen, and kindred	1,281	51.0	797	31.8	383	15.2
Sales workers	394	58.7	192	28.6	75	11.2
Clerical and kindred workers	363	47.8	252	33.2	124	16.3

TABLE 56 (Continued)

Travel Mode							
Taxi Passenger		Truck Passenger		Walk (to work only)		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
1	0.2	4	1.0	15	3.8	402	100.0
2	0.3	0	-	25	4.3	592	100.0
0	-	0	-	2	9.1	22	100.0
4	0.2	8	0.3	53	2.6	2,109	100.0
5	0.2	10	0.4	33	1.4	2,509	100.0
3	0.4	0	-	7	1.1	671	100.0
8	1.1	0	-	12	1.6	759	100.0

TABLE 56 (Continued)

Occupation of Head of Household	Travel Mode					
	Auto Driver		Auto Passenger		Public Transportation Passenger	
	No.	Pct.	No.	Pct.	No.	Pct.
Managers, officials, and proprietors	932	53.5	566	32.5	202	11.7
Farmers and farm managers	0	-	0	-	0	-
Professional, technical, and kindred workers	649	57.4	351	31.1	108	9.6
Not in the labor force ...	347	43.1	256	31.8	173	21.4
Occupation unknown or not elsewhere classified	2	25.0	2	25.0	4	50.0
Total	5,415	50.3	3,363	31.3	1,686	15.7

TABLE 56 (Continued)

Travel Mode							
Taxi Passenger		Truck Passenger		Walk (to work only)		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
6	0.3	13	0.7	21	1.3	1,740	100.0
0	-	0	-	0	-	0	-
8	0.7	1	0.1	12	1.1	1,129	100.0
7	0.9	0	-	22	2.8	805	100.0
0	-	0	-	0	-	8	100.0
44	0.4	36	0.4	202	1.9	10,746	100.0

TABLE 57

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR TRAVEL MODE

Stage in Family Life Cycle of Household	Travel Mode					
	Auto Driver		Auto Passenger		Public Transportation Passenger	
	No.	Pct.	No.	Pct.	No.	Pct.
Head unmarried, aged 15-44 . . .	189	42.8	103	23.4	119	26.9
Head married, aged 15-44 without children	544	55.7	268	27.4	149	15.3
Head married, aged 15-44 with children . .	2,231	50.3	1,630	36.9	492	11.1
Head married, aged 45 or more	2,104	51.2	1,157	28.1	738	18.0
Head unmarried, aged 45 or more	338	43.5	203	26.1	183	23.5
Not known	9	56.2	2	12.5	5	31.3
Total	5,415	50.3	3,363	31.3	1,686	15.7

TABLE 57 (Continued)

Travel Mode							
Taxi Passenger		Truck Passenger		Walk (to work only)		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
4	1.0	1	0.2	25	5.7	441	100.0
0	-	3	0.3	12	1.3	976	100.0
5	0.1	28	0.6	41	1.0	4,427	100.0
28	0.7	4	0.1	78	1.9	4,109	100.0
7	0.9	0	-	46	6.0	777	100.0
0	-	0	-	0	-	16	100.0
44	0.4	36	0.4	202	1.9	10,746	100.0

TABLE 58

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY INCOME FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Income[a] (dollars)	Distance of Residence from City Center (miles)									
	1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0-5.9	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
0-2699 . .	82	27.1	144	47.7	53	17.5	23	7.7	0	-
2700-3066	62	10.3	193	32.2	129	21.6	80	13.3	41	6.9
3073-3388	13	1.7	104	14.3	170	23.2	52	7.1	113	15.5
3355-3476	0	-	62	8.4	99	13.4	173	23.5	175	23.8
3480 3652	0	-	21	2.6	93	11.8	130	16.6	113	14.3
3656-3850	0	-	0	-	102	9.8	169	16.2	82	7.9
3852-4046	0	-	0	-	0	-	81	5.3	66	4.4
4047-4319	0	-	0	-	0	-	5	0.3	135	8.9
4321-4731	0	-	0	-	26	1.5	33	2.1	5	0.3
4735 and over	0	-	0	-	0	-	0	-	24	1.7
No data available .	0	-	0	-	0	-	0	-	0	-
Total . . .	157	1.4	524	4.9	672	6.2	746	7.0	754	7.0

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to

TABLE 58 (Continued)

Distance of Residence from City Center (miles)												
6.0-6.9		7.0-8.9		9.0-10.9		11.0-12.9		13.0 or more		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
0	-	0	-	0	-	0	-	0	-	302	100.0
17	2.8	33	5.5	23	3.8	0	-	21	3.6	599	100.0
94	12.8	85	11.7	0	-	0	-	100	13.7	731	100.0
41	5.6	4	0.5	0	-	92	12.5	90	12.3	736	100.0
84	10.7	40	5.1	115	14.6	100	12.7	91	11.6	787	100.0
60	5.8	86	8.2	240	23.1	102	9.8	199	19.2	1,040	100.0
177	11.7	228	15.0	142	9.4	337	22.3	482	31.9	1,513	100.0
185	12.1	497	32.7	454	29.8	163	10.8	82	5.4	1,521	100.0
168	10.2	506	31.0	317	19.4	356	21.7	224	13.8	1,635	100.0
114	8.4	426	31.5	542	40.0	140	10.3	109	8.1	1,355	100.0
0	-	0	-	0	-	0	-	527	100.0	527	100.0
940	8.7	1,905	17.8	1,833	17.0	1,290	12.0	1,925	18.0	10,746	100.0

1950, the trips made by household members living in those tracts are not classified by income.

TABLE 59

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Occupation of Head of Household	Distance of Residence from City Center (miles)									
	1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0-5.9	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Laborers and farm workers . .	12	2.9	59	14.7	55	13.7	35	8.7	51	12.7
Service workers . .	28	4.7	52	8.8	36	6.0	38	6.5	80	13.5
Private household workers . .	6	27.2	2	9.1	1	4.6	0	-	3	13.6
Operatives and kindred workers . .	44	2.0	149	7.1	219	10.4	221	10.5	188	8.9
Craftsmen, foremen, and kindred workers . .	25	0.9	112	4.5	91	3.6	157	6.3	142	5.7
Sales workers . .	2	0.2	24	3.6	23	3.5	39	5.8	27	4.0
Clerical and kindred workers . .	14	1.8	29	3.8	64	8.4	49	6.5	51	6.7

TABLE 59 (Continued)

Distance of Residence from City Center (miles)											Total	
6.0-6.9		7.0-8.9		9.0-10.9		11.0-12.9		13.0 or More				
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.		No.	Pct.
24	6.0	47	11.6	32	8.0	19	4.7	68	17.0		402	100.0
36	6.1	115	19.4	75	12.7	31	5.2	101	17.1		592	100.0
1	4.5	0	-	0	-	1	4.6	8	36.4		22	100.0
175	8.3	290	13.7	313	14.9	182	8.6	328	15.6		2,109	100.0
221	8.8	426	16.9	414	16.5	362	14.5	559	22.3		2,509	100.0
44	6.5	142	21.2	153	22.8	123	18.3	94	14.1		671	100.0
63	8.3	133	17.5	144	19.0	78	10.3	134	17.7		759	100.0

TABLE 59 (Continued)

Occupation of Head of Household	Distance of Residence from City Center (miles)									
	1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0-5.9	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Managers, officials, and proprietors . .	8	0.4	44	2.5	63	3.7	64	3.6	93	5.4
Farmers and farm managers .	0	-	0	-	0	-	0	-	0	-
Professional technical and kindred . .	6	0.5	9	0.8	38	3.3	54	4.8	52	4.6
Not in the labor force . . .	12	1.4	43	5.4	82	10.2	88	10.9	67	8.3
Occupation unknown or not elsewhere classified	0	-	1	12.5	0	-	1	12.5	0	-
Total . . .	157	1.4	524	4.9	672	6.2	746	7.0	754	7.0

TABLE 59 (Continued)

Distance of Residence from City Center (miles)												
6.0-6.9		7.0-8.9		9.0-10.9		11.0-12.9		13.0 or More		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
149	8.5	419	24.1	375	21.6	247	14.2	278	16.0	1,740	100.0
0	-	0	-	0	-	0	-	0	-	0	-
112	10.0	188	16.6	255	22.6	195	17.3	220	19.5	1,129	100.0
115	14.3	145	18.0	72	9.0	49	6.1	132	16.4	805	100.0
0	-	0	-	0	-	3	37.5	3	37.5	8	100.0
940	8.7	1,905	17.8	1,833	17.0	1,290	12.0	1,925	18.0	10,746	100.0

TABLE 60

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR DISTANCE OF RESIDENCE FROM CITY CENTER

Stage in Family Life Cycle of Household	Distance of Residence from City Center (miles)									
	1.0-1.9		2.0-2.9		3.0-3.9		4.0-4.9		5.0-5.9	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Head unmarried, aged 15-44 . . .	25	5.6	38	8.6	53	12.1	42	9.5	44	10.0
Head married, aged 15-44, without children . .	14	1.4	75	7.7	94	9.6	91	9.3	75	7.7
Head married, aged 15-44, with children . .	26	0.5	170	3.9	194	4.4	214	4.8	232	5.2
Head married, aged 45 or more . .	58	1.4	192	4.6	227	5.6	321	7.8	340	8.2
Head unmarried, aged 45 or more .	34	4.3	49	6.3	104	13.4	77	9.9	63	8.1
Not known . . .	0	-	0	-	0	-	1	6.2	0	-
Total . . .	157	1.4	524	4.9	672	6.2	746	7.0	754	7.0

TABLE 60 (Continued)

Distance of Residence from City Center (miles)												
6.0-6.9		7.0-8.9		9.0-10.9		11.0-12.9		13.0 or More		Total	
No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
51	11.5	50	11.4	42	9.5	31	7.0	65	14.8	441	100.0
114	11.7	129	13.2	139	14.2	77	7.9	168	17.3	976	100.0
220	5.0	712	16.1	858	19.4	803	18.1	998	22.6	4,427	100.0
458	11.2	863	21.0	710	17.3	343	8.3	597	14.6	4,409	100.0
95	12.3	148	19.0	81	10.4	32	4.2	94	12.1	777	100.0
2	12.5	3	18.8	3	18.7	4	25.0	3	18.8	16	100.0
940	8.7	1,905	17.8	1,833	17.0	1,290	12.0	1,925	18.0	10,746	100.0

TABLE 61

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY OCCUPATION OF HEAD OF HOUSEHOLD FOR INCOME

Occupation of Head of Household	Income[a] (in dollars)			
	0-2699	2700-3066	3073-3338	3355-3476
Laborers and farm workers . . .	31	72	34	45
Service workers	54	71	32	34
Private household workers	8	1	0	3
Operatives and kindred	84	192	226	174
Craftsmen, foremen, and kindred	52	106	154	189
Sales workers	4	7	6	41
Clerical and kindred workers . .	11	35	61	58
Managers, officials, and proprietors	21	50	113	78
Farmers and farm managers . . .	0	0	0	0
Professional, technical, and kindred	4	24	47	49
Not in the labor force	32	41	58	65
Occupation unknown or not elsewhere classified	1	0	0	0
Total	302	599	731	736

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 61 (Continued)

Income[a] (in dollars)							
3480-3652	3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	Total
41	43	41	52	13	7	23	402
64	38	84	96	58	49	12	592
0	1	0	7	2	0	0	22
206	250	269	262	271	99	76	2,109
169	298	486	362	332	180	181	2,509
35	24	57	148	126	185	38	671
50	73	140	118	110	94	9	759
83	131	221	248	336	369	90	1,740
0	0	0	0	0	0	0	0
51	45	144	149	267	292	57	1,129
88	136	71	76	120	77	41	805
0	1	0	3	0	3	0	8
787	1,040	1,513	1,521	1,635	1,355	527	10,746

TABLE 62

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR INCOME

Stage in Family Life Cycle of Household	Income[a] (in dollars)			
	0-2699	2700-3066	3073-3338	3355-3476
Head unmarried, aged 15-44 . . .	61	43	43	28
Head married, aged 15-44, without children	44	77	99	85
Head married, aged 15-44, with children	47	187	243	333
Head married, aged 45 or more	110	218	293	226
Head unmarried, aged 45 or more	40	74	53	64
Not known	0	0	0	0
Total	302	599	731	736

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 62 (Continued)

Income[a] (in dollars)							
3480-3652	3656-3850	3852-4046	4047-4319	4321-4731	4735 and Over	No Data Available	Total
58	28	60	42	44	18	16	441
94	87	140	132	119	81	18	976
273	412	764	674	732	483	279	4,427
265	417	479	612	603	688	198	4,109
97	93	65	58	136	81	16	777
0	3	5	3	1	4	0	16
787	1,040	1,513	1,521	1,635	1,355	527	10,746

TABLE 63

DISTRIBUTION OF TRIPS FOR HOUSEHOLDS BY STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD FOR OCCUPATION OF HEAD OF HOUSEHOLD

Occupation of Head of Household	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married Aged 45 or More	Head Unmarried Aged 45 or More	Not Known	Total
Laborers and farm workers	12	65	128	178	19	0	402
Service workers	48	51	235	211	47	0	592
Private household workers	2	0	6	0	14	0	22
Operatives and kindred	78	234	967	749	81	0	2,109
Craftsmen, foremen, and kindred	42	212	1,197	1,031	22	5	2,509
Sales workers	36	67	297	241	26	2	671
Clerical and kindred workers	72	69	294	241	82	1	759

TABLE 63 (Continued)

Occupation of Head of Household	Head Unmarried, Aged 15-44	Head Married, Aged 15-44, without Children	Head Married, Aged 15-44, with Children	Head Married, Aged 45 or More	Head Unmarried, Aged 45 or More	Not Known	Total
Managers, officials, and proprietors	31	100	714	819	75	1	1,740
Farmers and farm managers	0	0	0	0	0	0	0
Professional, technical, and kindred workers	38	139	528	356	68	0	1,129
Not in the labor force	82	39	59	283	342	0	805
Occupation unknown or not elsewhere classified	0	0	0	0	1	7	8
Total	441	976	4,427	4,109	777	16	10,746

TABLE 64

NUMBER OF INTERNAL TRIPS BY DISTANCE OF RESIDENCE FROM CITY CENTER FOR INCOME, OCCUPATION OF HEAD OF HOUSEHOLD, STAGE IN FAMILY LIFE CYCLE OF HOUSEHOLD, TRIP PURPOSE, TRAVEL MODE, AND ORIENTATION

Category and Orientation	Over-all Orientation	Distance of Residence from City Center (miles)				
		Total	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Over-all orientation	10,451	10,451	2,815	2,784	2,594	2,258
		Total				
Total						
Lateral		4,972	1,443	1,338	1,255	936
Centripetal . .	10,451	4,285	901	1,118	1,135	1,131
Centrifugal . .		1,194	471	328	204	191
		Income[a]				
Low						
Lateral		2,094	1,288	283	262	261
Centripetal . .	4,081	1,450	746	198	192	314
Centrifugal . .		537	410	52	39	36
Medium						
Lateral		1,351	119	534	439	259
Centripetal . .	2,964	1,245	113	370	375	387
Centrifugal . .		368	52	161	85	70
High						
Lateral		1,299	36	521	554	188
Centripetal . .	2,917	1,366	42	550	568	206
Centrifugal . .		252	9	115	80	48

[a]Place of residence of each tripmaker is classified by the 1950 median income of census tract in which it was located. Since many tracts were added to the Detroit Tracted Area subsequent to 1950, the trips made by household members living in those tracts are not classified by income.

TABLE 64 (Continued)

Category and Orientation	Overall Orientation	Distance of Residence from City Center (miles)				
		Total	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Not reported						
Lateral		228	0	0	0	228
Centripetal . .	489	224	0	0	0	224
Centrifugal . .		37	0	0	0	37
Occupation of Head of Household						
Blue-collar						
Lateral		2,611	938	616	575	482
Centripetal . .	5,475	2,177	536	540	506	595
Centrifugal . .		687	314	155	102	116
White-collar						
Lateral		1,971	361	613	630	367
Centripetal . .	4,184	1,798	267	462	590	479
Centrifugal . .		415	111	143	98	63
Not in labor force						
Lateral		389	144	109	50	86
Centripetal . .	786	305	98	116	39	52
Centrifugal . .		92	46	30	4	12
Not known						
Lateral		1	0	0	0	1
Centripetal . .	6	5	0	0	0	5
Centrifugal . .		0	0	0	0	0
Stage in Family Life Cycle of Household[b]						
Head married						
Lateral		605	277	168	81	79
Centripetal . .	1,187	453	181	128	68	76
Centrifugal . .		129	67	38	14	10

[b]Three cases were lost in computation.

TABLE 64 (Continued)

Category and Orientation	Overall Orientation	Distance of Residence from City Center (miles)				
		Total	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Head married, without children						
Lateral		2,253	737	684	496	336
Centripetal . .	4,950	2,142	506	660	510	466
Centrifugal . .		555	227	188	86	54
Head married, with children						
Lateral		2,109	429	483	677	520
Centripetal . .	4,300	1,682	214	329	555	584
Centrifugal . .		509	177	102	103	127
Not ascertained						
Lateral		5	0	4	0	1
Centripetal . .	11	6	0	1	0	5
Centrifugal . .		0	0	0	0	0
		Trip Purpose[b]				
Work						
Lateral		1,409	730	332	218	129
Centripetal . .	3,813	2,042	502	580	517	443
Centrifugal . .		362	218	74	44	26
Personal business and shop dept. store						
Lateral		436	142	120	102	72
Centripetal . .	1,029	483	151	111	110	111
Centrifugal . .		110	45	27	19	19
Social-recreation, eat meal, and shop other						
Lateral		2,033	416	591	609	417
Centripetal . .	3,936	1,344	194	330	372	448
Centrifugal . .		559	174	188	101	96

[b]Three cases were lost in computation.

TABLE 64 (Continued)

Category and Orientation	Overall Orientation	Distance of Residence from City Center (miles)				
		Total	1.0-5.9	6.0-8.9	9.0-11.9	12 or More
Shop groceries-drugs, and school						
Lateral		1,094	155	296	325	318
Centripetal . .	1,670	414	54	97	134	129
Centrifugal . .		162	34	39	39	50
		Travel Mode[b]				
Auto drivers						
Lateral		2,467	649	672	675	471
Centripetal . .	5,257	2,217	348	563	651	655
Centrifugal . .		573	232	165	102	74
Auto passengers						
Lateral		1,667	364	496	467	340
Centripetal . .	3,239	1,154	166	310	314	364
Centrifugal . .		418	126	139	67	86
Public transportation passengers						
Lateral		610	285	136	78	111
Centripetal . .	1,670	870	368	238	162	102
Centrifugal . .		190	108	21	33	28
Other						
Lateral		229	145	35	34	15
Centripetal . .	282	42	19	7	6	10
Centrifugal . .		11	5	3	1	2

[b]Three cases were lost in computation.

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