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**Towards An Explanation And
Prediction Of Residential
Movement:**

An examination of the concept of sectoral movement, Adams' restricted image causal hypothesis, and the initial development of a predictive statistical model of restricted lateral movement.

A thesis presented for the
Degree of Doctor of Philosophy

in Geography

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Abstract

Adams (1969) argues that movers possess a restricted sectoral image of the city based upon their home sector. This image operates to restrict a household's movement to its home sector. This research examines that particular causal hypothesis in terms of its theoretical basis and tests its explanatory role for patterns of movement of mover households to ownership property in Hamilton, New Zealand. On both counts Adams' causal hypothesis is strongly criticized, as is the usage of the sectoral form in the measurement of restricted lateral movement. Instead a corridor form of measurement is proposed and used.

From a study of variables related to the personal characteristics of the mover and the relocation decision process it is argued that mover households who move within their home corridor do so because they hold locational attachments to their home area. Locational attachments are seen to develop as a function of the mover household's age and/or previous ownership of property in that area. Non-corridor movers lack locational attachments due to their youth and/or first time ownership. For Hamilton a statistical model based upon locational attachments, personal characteristics, and relocation decision process variables is developed, which attempts to explain corridor and non-corridor movement.

PART I

PATTERNS OF INTRA-URBAN RESIDENTIAL MOBILITY

Chapter 1. The Research Problem

Residential mobility research within urban geography has developed through decades of research from a basic interest in urban morphology, through a period of studying the general characteristics of mobility patterns, into a study of the behavioural processes. The importance of this later approach was emphasized by Wolpert's (1965, p.160) argument that the "understanding and prediction of migration streams require determining the constants in migration behavior". However, the role of predicting where a person will move has not been a focus of urban geography, in that the study of intra-urban mobility behaviour has centred upon establishing the regularities of movement in terms of 'who moves', 'why they move', and 'where they move' (Simmons, 1968). But with the accumulation of knowledge upon these topics, it would appear that urban geographers can now extend their interests to predicting where a person will move to. It is this extension of existing theory into the area of prediction which forms one of the primary objects of this research.

Interest in the topic of where a move will terminate centres upon the study of directions and distances of movement, or more precisely the geometry of movement. Here the distinction is made between studies which examine the lateral component of movement, in terms of lateral movement around the city, and the radial component of movement, in terms of the radial distance of a move from the Central Business District (CBD). To quote Simmons (1968, p.640):

"The best factor for predicting the location of a new residence is the location of the former home. All the evidence indicates that most moves are short, within

familiar territory, and reflect both satisfaction with the neighbourhood and location with respect to the urban structure".

That is, that a mover's relocation occurs within the sector of the city in which its initial residence is located (i.e. the home sector), but at a greater distance from the CBD (Hoyt, 1939).

Reasons for radial movement are derived from Burgess' (1924) concentric zone concept, Hoyt's (1939) sector filtering concept, and the family-cycle model (Abu-Lughood and Foley, 1960; Johnston, 1969a, 1969b). Under Burgess' schema radial movement outwards into different ecological zones is the result of the process of invasion and succession, whereas Hoyt suggests a constant filtering outwards as neighbourhoods become older and less desirable. The family cycle model suggests that with developing family status a mover moves outwards through the city, often jumping over stable areas and with the possibility of moving back to inner city rental areas during the post-child phase. Each of these three reasons relates to different types of movement, with the family cycle model probably the most general explanation. Invasion and succession is related to movement patterns of ethnic minorities living in the inner city faced with forced or self-imposed ethnic segregation, while filtering for the purpose of simply bettering ones neighbourhood or dwelling is mainly limited to high status movers.

In 1969 Adams published a seminal paper in which he argues that the cause of sectoral movement (i.e. lateral movement) is that mover's possess a restricted sectoral image of the city based upon their home sector. This image is proposed to limit the mover's use of formal and informal information sources, and as a consequence controls their search and selection of a new

residence. As a result a mover is unable to move outside its home sector, which means that housing demand is sector specific. If the desired vacancy does not exist within the home sector, the mover has only the choice of either, changing its search criteria to match that of the vacancy set within the home sector, or not to move (also see Adams and Saunders, 1969).

Central to Adams' arguments is his claim that the restricted sectoral mental construct is based upon the person's knowledge, and not urban structural form, for he states that sectors, rings, neighbourhoods, or nuclei are "objective images (which) become subjective images only in the minds of city planners, urban geographers and similar types" (pp. 305-306). The restricted sectoral image is derived by means of a person's regular movement pattern within the urban area, which in form is essentially radial, based upon the home residence and the downtown centre. Extension of the sectoral image beyond the home residence results from the use of suburban facilities such as large shopping malls. Movement outside the home sector is seen to be unnecessary and infrequent, so that for the areas outside the home sector a person's knowledge is limited or non-existent.

Adams' restricted image hypothesis is presented diagrammatically in figure 1:1.^{*1} The migrant while living at their initial residence will develop a wedge-shaped image of the city based upon the downtown centre, extending to the urban periphery, and covering parts of the home sector (the shaded area). So as to conform with Adams' notion of 'a narrow sector', the width of the home sector is expected to be of an angle between 25 - 45 degrees either side of the initial residence. Therefore, each

*1 The source of all figures and plates presented in this dissertation is the author.

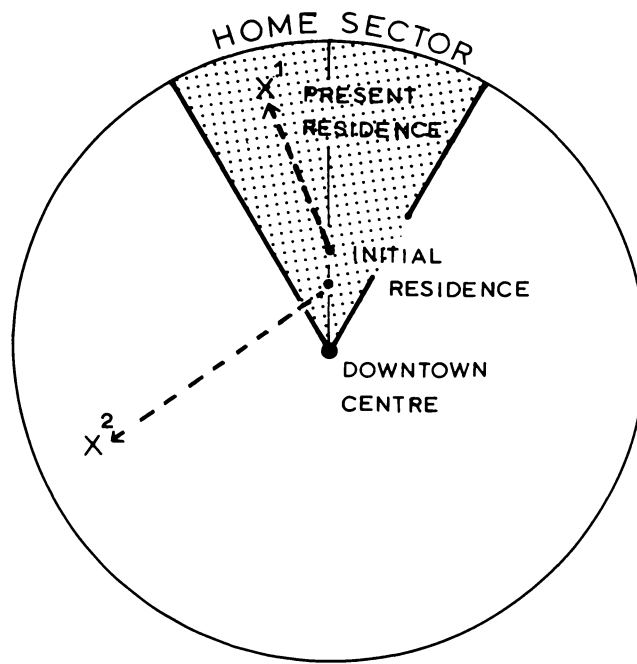


Figure 1:1

SECTORAL MOVEMENT

individual has their own unique home sector, which in terms of form does not match the physical or socio-economic structure of the city. In effect the limits of the home sector are an arbitrary measure, outside which the mover is not expected to search for or select a dwelling, due to their lack or limited knowledge of ⁺that section of the city. The result is sectoral movement as shown by move X^1 , whereas if the movement were against the hypothesized trend (i.e. outside of the home sector) as shown by move X^2 it is termed non-sectoral movement.

Adams, in his empirical research on Minneapolis, argues that sectoral migration biases would confirm his hypothesis of sectorally constrained mental images. But despite his resulting claims, he fails to test:

- (i) The notion that a mover's knowledge forms a restricted sectoral image based upon the home origin.
- (ii) That the restricted sectoral image restricts the mover's spatial search of the vacancy set and selection of a dwelling to the home sector.

Furthermore, since Adams' research sectoral movement as a major regularity in intra-urban mobility has been questioned by researcher's contradictory findings. In support of sectoral search space and/or movement are studies by Adams (1969, movement), Donaldson (1973, search space and movement), Whitelaw and Gregson (1972, search space), and Clark (1972, movement). Those findings are counted by the research of Whitelaw and Robinson (1972, movement), Clark (1971, movement), and Brown and Holmes (1971, search space). However, amongst this latter group, support is given for the general concept of strong sectoral movement. Brown and Holmes cite urban structure in terms of a lack of a pattern of homogeneous socio-economic areas in either

a concentric or sectoral fashion as the possible reason for the non-existence of a strong sectoral pattern of search space within Cedar Rapids, which they view as a function of the city's size (110,000). Likewise Clark (1971) in his study of movement through Christchurch (275,000) presents a similar argument as an explanation for not finding clear support for patterns of sectoral movement, in that he emphasized that urban structure modifies behaviour and that behaviour is converted into structure. As a result Clark's 1972 research is limited to the northwest area of the city which contains a well structured high status sector, hence sectoral movement (Johnston, 1969b). In addition Whitelaw and Robinson have suggested that an alternative orientation node for the mover may be its work location, which in a large city may not be the downtown centre, although the results of their study are inconclusive.

At the time when this study was established (March, 1971) the basic research objectives were centred upon three questions and a hypothesis raised by the initial studies of Adams, and Brown and Holmes:^{*2}

- (i) Does a pattern of sectorally biased movement exist within a small city?
- (ii) Does a person's image of the city take the form of a restricted sectoral image?
- (iii) Does an individual's restricted sectoral image actually control the decisions on spatial search and relocation?
- (iv) That sectoral movement is the result of the mover's possessing strong feelings of association with the

^{*2} Those two studies were the only ones known at the very beginning of this research.

origin home area, whereas non-sectoral movers are characterised by their lack of, or weak feelings of association.

Subsequent research upon these topics, however, caused the original approach to be modified. To present these developments this chapter is divided into two sections, the first of which is a study of the theoretical basis to Adams' hypothesis. The second section, sets out to establish upon a sound basis the evidence given in the literature supporting:

- (i) Sectoral search space and movement.
- (ii) Restricted sectoral image.

Finally, the research problem is formalized and the chapter format of this dissertation presented.

Section A Theoretical Basis of Adams' Restricted Image Hypothesis

Adams' only test of the mental image construct is a study of 36 college students, with whom he simply assessed the number of street names within the State College of Pennsylvania, that they could recall. In that the population studied was unrelated to his research into patterns of movement, and that he did not examine the spatial form of those students' images, appears to have been of little concern. Instead Adams bases the evidence for supporting his hypothesis upon the claim that:

'Changes in residence can be measured to see if their pattern of range and orientation is consistent with a wedge - shaped image or some other form' (p.307).

In each of his three migration samples (1890-95, 1920-25, 1945-51) Adams established a statistically significant bias in the direction of movement, and concluded that "there is ample basis for the argument that intra-urban movements of city residents depend on limited mental maps or mental images of the city" (p.322). Based purely upon the study of directions of movement and no measurement of the mover's mental image, such a conclusion is clearly one of deduction and supposition and not a direct test of his hypothesis. To conduct a test of his hypothesis it would have been necessary for him to have examined five hypotheses:

1. That sectoral movement is a major regularity in the directional characteristics of intra-urban mobility.
2. That non-sectoral movement is rare, and then a function of random movement.
3. That the movers possessed a restricted sectoral mental image based upon their initial residence.
4. That the mover's search space and movement is restricted to their home sector.

5. That the cause of that restricted search space and movement is their restricted image.

Yet it is not possible to discard the theory behind Adams' hypothesis simply upon the grounds that he did not directly provide any proof of the relationship between the restricted image construct and the demonstrated directional bias. The basic concept represents a possible explanatory reason for sectoral movement, particularly as other studies have presented evidence of residents holding localized images of their city (e.g. Lynch, 1960, for the inner city; Lee, 1968, and Orleans, 1967, for the suburbs). A localized image, however, cannot be directly equated with a restricted image in that the former does not set a quantitative limit upon the degree of knowledge that a person must have to know an area, whereas the latter does. For example, a person may know all of the city very well yet know the local area much better, giving him a localized but not a restricted image. However, rather than accept Adams' conceptualisation of the restricted image hypothesis a reformulated hypothesis was favoured following the examination of a number of major criticisms with the theoretical arguments behind his hypothesis. The topics covered within this study are, first, non-sectoral movement, and secondly, the existence and role of a restricted sectoral image.

A:1 Sectoral and Non-sectoral Movement

The first major criticism concerns his discarding of the notion that people may move non-sectorally, for he suggests that such movement is rare and that it is the result of random movement. It could be argued, however, that non-sectoral movement is a major non-random regularity in intra-urban mobility, resulting from movement between different sectors of the city's

socio-economic structure, or due to preferences held for areas outside the home sector. Therefore, if Adams had included the non-sectoral movement population within his hypothesis, he would have had to establish why, if all persons have restricted images, some are able to move outside the home sector, or conversely, why some persons did not possess restricted sectoral images. As a result Adams' hypothesis is an incomplete conceptualisation of the reality it is attempting to explain.

A:2 Existence and Role of a Restricted Sectoral Image

"If daily and weekly travel patterns of urban residents are mainly radial with respect to downtown, a typical resident's mental image of the city normally should assume the shape of a wedge pointed at the central business district. When a change of residence is contemplated, the search for a new home will be confined by the mental map" (p. 307).

An analysis of that statement will reveal that Adams' restricted image hypothesis claims:

- (i) That the restricted sectoral image is derived from radial daily and weekly travel patterns between the home and the downtown centre.
- (ii) That it is the restricted image which confines the mover's search space and not any other variables.

To study the theoretical bases of those two hypotheses three topics are examined:

- a. That daily and weekly travel patterns are mainly radial with respect to the downtown centre.
- b. That daily and weekly travel patterns result in a restricted wedge shaped urban image centred on the

downtown - initial residence axis.

- c. That the restricted sectoral image confines the migrants search space.

Finally, these criticisms are brought together with the reformulation of the restricted image hypothesis.

- a. That daily and weekly travel patterns are mainly radial with respect to the downtown centre.

The validity of this premise appears to depend upon two factors, the first of which is the size, form and period of development of the urban area. New world anglo-american small (less than 100,000) and medium (100,000 - 500,000) sized cities tend to be single-centred, and therefore in them the household head's journey to work will be mainly radial with respect to the downtown centre. However, in large cities (greater than 500,000) a multi-nuclei form (Harris and Ullman, 1945) orients some of that travel pattern away from the CBD (Whitelaw and Robinson, 1972). Secondly, the assumption that the movement decision is based upon the head of household's mental image is questioned, in that it refers to the image of only one member of the household, and then only to the image of that member's primary travel activity. Berry and Horton (1970), reporting on the Chicago Area Transportation Study, state that only 40 percent of all 'person travel' is work orientated, with personal business trips accounting for 20 percent, social recreational trips 20 percent, and all other trips making up 16 percent (e.g. shopping, school, serve passenger, eat meal, etc).

Compared to the journey to work the spatial form of these other types of trips are dissimilar (Wheeler and Stutz, 1971). Only social interaction with neighbours, as opposed to that with friends or relatives, has been found to be highly sensitive

to distance from the home (Stutz, 1973). Furthermore, some recreational trips are simply exploratory drives through different areas of the city, although with time recreational travel in general tends to settle down to a habitual stereotype behaviour pattern (Mercer, 1971). In addition there is an important section of the population which have mobile occupations, such as; drivers of taxis, buses, trucks; persons employed in building and construction, emergency services, repairs and inspection, salesmen, etc. For these people the daily and weekly travel patterns may involve all of the city at different points in time. Therefore, it is highly unlikely that movers in an anglo-american city of the 1970s with access to a car will have an image of the city restricted to their home sector, although expectedly they would have a heightened knowledge of their home area and regular travel routes.*³

- b. That daily and weekly travel patterns result in a restricted wedge shaped urban image centred on the downtown-initial residence axis.

In part this topic has already been answered by the criticism of the theoretical basis of radial travel patterns. But two key questions here are:

- (i) Is it the urban image related to, the daily and weekly travel patterns of the head of household's journey to work which is of concern within the residential location decision?

*³ In that two of Adams' three study periods occur prior to general household access to the automobile and the decentralization of employment his theory on radial movement and lack of movement across the city appear more applicable. But this defence is pure speculation as no information exists on intra-city travel patterns at that time. Most importantly, he does not set up his hypothesis as being limited to a historical period.

- (ii) Do people in fact possess a restricted wedge shaped urban image centred on the downtown - initial residence axis?

The topic of the first question has not been examined within the literature. But at this point the question is raised of why can't the basis of that image be the more localized household journeys to schools, shopping centres and friends? Another aspect of criticism is that mental images are not simply the result of a resident's urban location at one point in time, for some movers have previously lived outside of their present origin home sector, and hold images of other sectors (Horton and Reynolds, 1971a).

In answer to the second question, evidence supporting a localized familiarity mental image has been found by Horton and Reynolds (1971a) and Donaldson and Johnston (1973). However, as stated previously, a localized image cannot be directly equated with a restricted image. Therefore, these images may indicate only a localized heightened familiarity, and not as Adams hypothesized, a lack of knowledge which results in movers not being able to consider vacancies outside of the home sector.

- c. That the restricted sectoral image confines the migrants search space.

On a theoretical basis the role of Adams' restricted image hypothesis can be directly questioned. Here the principal criticisms are made of his;

1. Restrictions on use of formal information sources.
2. Method of development of a causal hypothesis.
3. Failure to acknowledge other possible explanations.

1. Restrictions on use of formal information sources.

In terms of supply of information about vacancies formal information sources are seen to be very important; Rossi (1955) established that 63 percent of movers used newspapers, and 50 percent real estate agents. For the use of informal information sources his figures are; 57 percent of movers walked or drove around, 31 percent used personal contacts, and 31 percent received their information from windfalls.^{*4} Herbert (1973) achieved similar results. Furthermore, Brown and Moore (1970) view formal information sources as a means by which movers extend their awareness space beyond the limits of direct activity space. However, despite the importance of the role of formal information sources Adams did not research this topic, instead he assumed that the use of formal information is limited to vacancies within the home sector, because "leads can be checked out easily, information sources are considered trustworthy and the mental map can be put into effective use" (p. 312). Here the only controlling factor of the mover's use of formal information sources related to knowledge is that of trust, for the argument upon accessibility of vacancies is an additional and alien hypothesis. But there is no available evidence to suggest that movers limit their trust of information to that which refers to suitable vacancies within their home sector.

2. Method of development of a causal hypothesis.

In that Adams claimed the restricted image as the cause of sectoral movement a second source of criticism arises from the finding that not only do people in general hold a localized

^{*4} Each mover could have more than one source of information.

knowledge image, they also hold localized preference (Horton and Reynolds, 1971b) and desirability images (Johnston, 1971a, 1972a). These preferences and desirability images may be the result of the knowledge image, but it could also be that the movers have sufficient knowledge of areas outside the home sector to consider suitable vacancies in them but prefer to move within their home sector. Therefore, in developing his theory these findings demonstrate that Adams failed to take into account other variables which may explain sectoral movement. To have tested for the causal factor of sectoral movement it was necessary that Adams adopt the scientific procedure of causal analysis design. This to follow Blalock's (1964) argument, involves:

- (i) A finite set of explicitly defined variables.
- (ii) Certain assumptions about how these variables are interpreted causally.
- (iii) Assumptions to the effect that outside variables while operating do not have confounding influences that disturb the causal patterns amongst the variables explicitly being considered.

Such an approach would not have been particularly difficult to organise if Brown and Moore's (1970), or Rossi's (1955) residential mobility decision process model had been operationalized.*⁵

3. Failure to acknowledge other possible explanations.

The above criticisms of Adams' causal statements leads to the most important criticism of his work, which is that he fails to acknowledge any other possible reason for sectoral movement.

*⁵ Brown and Moore's (1970) residential mobility decision process model was first available in a 1968 Ohio State departmental publication and is cited as a reference by Adams.

This may in part relate to how poorly this complex area of urban geographic research has been structured, but a search of the literature will reveal that Simmons (1968) suggested two other explanatory reasons, although neither has been empirically researched. Presented here as hypotheses, these are:

Locational Attachments Hypothesis.

That a household deliberately selects a nearby location in order to maintain spatial familiarity, social contact, institutional links, or access with the origin area (p. 641).

Urban Structure Hypothesis.

That the housing market of a city is sub-divided into sectoral divisions in terms of socio-economic and ethnic stratification, and that the vast majority of movers do not change their income or ethnic environment (p. 642). Therefore, a mover's freedom of movement around the city is restricted by the sectoral structure of the city.

The basis of the first hypothesis appears to have been derived from the work of Caplow (1949) who suggests that the origins of that explanation go back to the first study of residential mobility in the United States (Herzfeld, E.G., 1905: 'Family Monographs'), and the second hypothesis is derived from Hoyt's (1939) theory of residential structure and structural change. Both researchers incidentally studied the same city as Adams; Minneapolis.*6

By examining the relationship between, the restricted image,

*6 Adams himself references all three articles (Simmons, Caplow, and Hoyt).

locational attachments, and urban structure hypotheses, it was established that the principal explanations of sectoral movement can be structured as:

- (i) City form.
- (ii) Random movement and internal city structure.
- (iii) Sector specific housing demand.

(i) City form.

Defined as the city's shape as opposed to its internal structure, the form of the city can explain sectoral movement, in that a mover is unable to shift outside of its home sector. For the vast majority of cities such an explanation is very limited, in that they do have a distribution of housing which would allow for movement outside of the very narrow limits of the home sector.

(ii) Random movement and internal city structure.

Sectoral movement may not be the result of purposeful movement, but rather random movement within the limits of a vacancy sub-set which is spatially clustered. Here the internal structure of the city in terms of the spatial distribution of the vacancy sub-set is the only variable which determines the destination of the mover, where the probability that an individual mover will move within its home sector is a function of the proportional distribution of the city's vacancy sub-set within its home sector. For example, table 1:1a displays that under a random movement design 34 percent of the movers will move within their home sector, given that particular spatial distribution of the vacancy sub-set and purchasing demand. However, if the relationship between the distribution of supply and demand is weaker a lower degree of sectoral movement results (table 1:1b). The greatest

**Table 1:1 Random Sectoral Movement Within the Limits of the
Vacancy Sub-set**

Home Sectors *1	A Proportion of Vacancy Sub-set	B Percentage of Movers in Vacancy Sub-set	C Expected Proportion of Random Movers	D Percentage of Sectorally Constrained Movers (B x C)
a. Example 1				
Sector 1	.5	50	.5	25
Sector 2	.2	10	.2	2
Sector 3	.1	10	.1	1
Sector 4	.2	30	.2	6
		<u>100</u>		<u>34</u>
b. Example 2				
Sector 1	.5	10	.5	5
Sector 2	.2	30	.2	6
Sector 3	.1	50	.1	5
Sector 4	.2	10	.2	2
		<u>100</u>		<u>18</u>

*1 In that each individual has his own unique home sector, the home sector and a physical sector of the city are here viewed as synonymous so as to display the role of random sectoral movement within the limits of the vacancy sub-set.

degree of random movement within the vacancy sub-set occurs when all of the purchasing power is in the sector with the greatest proportion of vacancies, the least when all the purchasing power is in the sector with the fewest vacancies.

(iii) Sector specific housing demand (Non-random movement).

People may deliberately limit their search and selection for a vacancy to their home sector. Termed sector specific housing demand or non-random sectoral movement, the degree of sectoral movement is dependent upon the proportion of movers who want to move within their home sector. Where the distribution of demand is less than supply all movers can move within their home sector (table 1:2a), but when demand exceeds supply (table 1:2b) only that proportion which meets the level of supply can do so. The remainder have three choices, either they can change their housing demands to meet a realizable vacancy sub-set within their home sector, or they can decide not to move, or they can move outside of their home sector.

Two reasons are put forward as the explanation for sectoral specific housing demand:

- a. Restricted image hypothesis.
- b. Locational attachments hypothesis.

The difference between these two hypotheses is that under the restricted image hypothesis sectoral movement is the result of negative constraints upon free movement around the city, whereas under the locational attachments hypothesis movement within the home sector results from positive attachments.

Finally in this study of the role of the restricted image hypothesis only one study has attempted to relate a person's familiarity to their pattern of search and movement. Donaldson

Table 1:2 Non-Random Sectoral Movement and the Vacancy Sub-set

	A	B	C	D
	Proportion of Vacancy Sub-set	Percentage of Movers in Vacancy Sub-set	Proportion of movers who aspired to sectoral movement	Percentage of Sectorally Constrained Movers *2 (B x C)
Home *1 Sectors				
a. <u>Example 1</u>				
Sector 1	.5	50	.6	30
Sector 2	.2	10	.6	6
Sector 3	.1	10	.6	6
Sector 4	.2	30	.6	18
		<u>100</u>		<u>60</u>
b. <u>Example 2</u>				
Sector 1	.5	10	.6	6
Sector 2	.2	30	.6	18
Sector 3	.1	50	.6	10
Sector 4	.2	10	.6	6
		<u>100</u>		<u>40</u>

*1 In that each individual has his own unique home sector, the home sector and physical sector of the city are viewed as synonymous so as to display the role of the distribution of the vacancy sub-set upon non-random sectoral movement.

*2 As demand for dwellings can only be met by the level of supply of dwellings the maximum percentage of sectorally constrained moves is dependent upon the proportion of the vacancy sub-set within that sector. In example 2, sector 3, sixty percent of movers wanted to move within their home sector but the available vacancy sub-set allowed only twenty percent to do so.

(1973) set out to examine three sequential hypotheses which he claimed would provide a test of Adams' model. These were:

- (i) That an average resident possesses a wedge shaped mental map of his city, which is largely based upon his kinetic field, and is coincident with his home sector of the city.
- (ii) That an average resident's search for a new home will be conducted primarily within the limits of the resident's mental map, and therefore will be sectorally constrained.
- (iii) As an average resident primarily considers housing vacancies occurring within his home sector his final choice will probably be located in that sector, implying that intra-urban migration patterns will possess sectoral bias" (p. 15).

From a questionnaire study of 174 persons who moved to ownership property within the northwest sector of Christchurch, Donaldson concludes that Adams' hypothesis is correct. People moving within the northwest sector did so because their freedom to move anywhere else within the city was restricted by their mental image of the city. However, the research fails to provide a test of Adams' hypothesis, in that:

- (i) It did not establish that an individual's familiarity image is restricted to the home sector.
- (ii) It did not examine the central claim to Adams' hypothesis, that the cause of the restricted search space and movement is the restricted image.

In effect all Donaldson achieves in testing Adams' hypothesis is to improve upon Horton and Reynolds' (1971a) findings on the existence of a localized aggregate familiarity image, by

establishing that the possession of localized aggregate familiarity image is associated with sectoral search space and the selection of a destination within the northwest sector of Christchurch.*7 To have tested for the causal factor of sectoral movement it was necessary that Donaldson like Adams adopt the scientific procedure of causal analysis design.

A:3 Section 1 Concluding Remarks

As a result of the foregoing criticisms and developments, support for Adams' causal hypothesis of sectoral movement and its conceptualisation is found wanting. The restricted image hypothesis is seen to be nothing more than just one possible explanatory hypothesis of sectoral movement, which has not been tested. Furthermore, it is proposed that Adams' restricted image hypothesis be reformulated so as to make it more realistic, which means that it takes into account the existence of non-sectoral movement and alternative explanations. The reformulated restricted image hypothesis is:

That movers possessing a restricted image of the city based upon their home origin, will have their search for and selection of a dwelling restricted to the home sector, unless;

- (i) The home sector does not contain a suitable vacancy.
- (ii) The image's role is overridden by locational attachments.

*7 The northwest sector of Christchurch contains the main high status sector of the city and is the same area as studied by Clark (1972). Clark claims that sectoral movement within that sector is a function of the area's structure.

Of the two conditions for the restricted image to control movement, the first argues that a mover holding a restricted image could be forced to move outside of its home sector to meet its housing demands. The second, places positive reasons for moving within the home sector above the negative reason of the restricted image.

Section B The Research Front

This section is divided into three topics; first, a critique upon the research designs and methods of analysis used by other researchers in this field, secondly, the research problem reformulated, and thirdly, the chapter format of this dissertation presented. Taken together these topics are viewed as providing a detailed statement upon the position of the research field at the time of developing this research (1971-73).

B:1 A Critical Assessment of the Research Design and Methods of Analysis Used in the Study of Sectoral Search Space, Movement, and Images

Because of the size and complexity of this topic only the conclusions of this study are presented here; the actual criticisms are given in Appendix 1. To obtain a detailed understanding of these criticisms this appendix should be treated as an extension of this chapter and not simply an appendage.

From the study of the research design and methods of analysis used to examine sectoral search space and movement by Adams (1969), Brown and Holmes (1971), Clark (1971, 1972), Whitelaw and Gregson (1972), Whitelaw and Robinson (1972), and Donaldson (1973) their research results were all found faulty, to the degree that in no case can their research be used with any confidence in direct support for or against Adams' restricted image hypothesis.

However, Donaldson's study did present valid findings in terms of;

- (i) that movers within the northwest sector did restrict their search space to that area, and
- (ii) that the majority of intra-urban movers selling their property within the northwest sector did move within that sector.

Furthermore, from a re-interpretation of the other studies, using

their diagrams, evidence of sectorally biased search space and movement can be found. But despite tests against random movement, all the studies failed to establish that the movement was non-random, as the patterns could easily be explained by random movement within the vacancy sub-set.

Upon the topic of restricted images, a study of the research design and methods of analysis used within the research of Donaldson (1973), Donaldson and Johnston (1973), and Johnston (1971a, 1972a) established that their findings could not be used with any confidence as direct evidence for or against Adams' restricted image hypothesis. No study has examined the concept of individual's possessing a restricted image. Furthermore, their studies of localized images can be criticized upon the grounds;

- (i) that they did not, with the partial exception of Johnston (1972a), examine the individual's image,
- (ii) their definitions of awareness space images are erroneous, and
- (iii) their selections of study populations do not provide a test of Adams' hypothesis.

Finally, Horton and Reynolds' (1971a, 1971b) research cannot be directly equated with the topic, in that it also fails to meet the above requirements, which is the result of it having different although related objectives.

As a result of these findings a set of ground rules can be established for conducting meaningful research upon the topic of the restricted image hypothesis. Sub-divided into the study of, sectoral search space and movement, and the restricted sectoral image, these rules which may be subject to amendment apply to the study of any aspect of the topic:

Sectoral Search Space and Movement.

- (i) That only one method can be used to measure sectoral search space and movement, and that is the 'direct sectoral analysis system': the angle formed between the two axes connecting the orientation node with the reference and related nodes (see Appendix 1, discussion of Brown and Holmes' research).

However, in assuming the orientation node as the focus of the angle, alternatives exist in terms of the choice of node. A further problem involves the decision upon the width of the home sector.

- (ii) That to determine if the search space or movement is the result of random or non-random behaviour it is necessary that the distribution of the vacancy set be examined, in that tests using uniform angles as random directions of movement simply establish if the patterns are sectorally biased, with no indication of the cause. The inclusion of the distribution of the vacancy set should be at the level of vacancy sub-sets, as the internal structure of the city could explain sectoral movement.
- (iii) To produce meaningful measurements for a comparative basis, the population studied should also be sub-divided by the tenure of mover's origin and destination, and the personal characteristics of movers.
- (iv) The research design must involve a representative sample of intra-urban movers. For studies based upon a sub-division of the city this must include movers into, within, and out of the study area.
- (v) In selecting the Transmap algorithm to align all origins upon the common axis based upon the orientation node, the

'rotate only' option must be used (see Appendix 1).

Restricted Sectoral Image.

- (i) A restricted image must be examined and not just a localized image. This involves the establishment of a quantitative limit as the threshold of awareness space, below which the image is restricted.
- (ii) The image of the individual examined must be based upon actual knowledge of the city and not perceived desirability, preferences, etc. The knowledge contained within the image must include both information derived from direct and indirect activity space.
- (iii) The images must be examined at the level of the individual. If this is achieved through grouping images that are similar, the number of groups must be large, so as to maximise the homogeneity within the groups.
- (iv) The study of images must be based upon a population of movers, and as with the study of search space and movement it must include a representative sample of intra-urban movers. Again if the study is based upon a sub-division of the city it must include movers into, within, and outside of the study area.

B:2 Research Problem Reformulated

As a result of the foregoing developments in isolating the research problem, this research with its basic objective to establish the explanation of restricted lateral movement, centres upon examining three research theses:

1. That residential mobility within Hamilton is laterally restricted.
2. That the primary reason for restricted lateral movement is sectorally specific housing demands rather than random movement within a vacancy sub-set.
3. Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis.

B:3 Chapter Format

Research Thesis 1

Prior to the study to determine the existence of restricted lateral movement an introduction to the study area is presented (Chapter 2), in which four topics related to the study of restricted lateral movement are examined. These are;

- (i) The source of data used.
- (ii) Hamilton as a research laboratory.
- (iii) Economic typology of the suburbs of Hamilton.
- (iv) General patterns of intra-urban mobility.

Then in Chapter 3 the first research thesis is examined. However, in doing so any sectoral bias which may be established does not necessarily indicate non-random sectoral movement, for under the system of analysis used that pattern may be the result of the urban area's shape or random movement within the limits of a vacancy sub-set.

Research Thesis 2

As both random movement within the vacancy sub-set and non-random movement will be present within Hamilton's patterns of

intra-urban mobility, the test of the second research thesis is based upon establishing to what degree sectoral movement is the result of sector specific decisions. Under the concept of random movement movers will hold no pre-move aspirations or preferences towards moving within their home sector, in that the reason for sectoral movement is the relationship between the mover's origin and vacancy sub-set. The study of this research thesis is conducted in conjunction with the third research thesis and involves the use of Brown and Moore's (1970) two phase decision process model of residential mobility. Within that framework concern centres primarily upon the topics of a mover's aspiration and preference sets (Chapter 6), although the whole topic of the explanation for restricted lateral movement has to be covered before the conclusions upon this thesis can be obtained (Chapters 5 to 9).

Research Thesis 3

The restricted image and locational attachments hypotheses are central to examining the third thesis. Initially the basic arguments behind the locational attachments hypothesis are examined in depth and the source of the data used to study the residential mobility decision process is introduced (Chapter 4). Then each element of that decision process is studied (Chapters 5 to 9), with the topic of the restricted image examined under the concept of awareness space (Chapter 7). Locational attachments are examined separately in Chapter 9, and like the study of the second research thesis no conclusions upon this third thesis can be made before the end of that chapter.

Finally, Chapter 10 forms the summary and conclusions to this research, in which a statement is made upon future develop-

ments of this research approach, and the general usage of this approach to assess the quality of the current human urban environment, and for monitoring changes in that environment.

Chapter 2. An Introduction to the Study Area and the General
Characteristics of Intra-Urban Residential Mobility

Sited on the Waikato River the Hamilton Urban Area had a population at the 1971 Census of 80,780 people (figure 2:1). Developing from two small military outposts of the 1860s Hamilton's growth has been recent and extremely rapid. In 1911 Hamilton (3,542) was fourteenth in the urban hierarchy, eighth (20,096) in 1936, and fifth (40,646) in 1956. Only Auckland (649,746), Wellington - Hutt (307,629) and Christchurch (275,968) were substantially larger (1971), for Hamilton is rapidly overtaking Dunedin (111,059). Below Hamilton the nearest rivals in terms of size are in the range of 40,000 to 57,000, which makes Hamilton a middle sized city by New Zealand standards, although on a world scale a small city.

Lying under the economic shadow of Auckland, approximately 130 kilometers north, and located in the middle of a very high density dairy farming region Hamilton is in terms of economic functions primarily a commercial and service centre. It ranks first amongst New Zealand's urban areas in terms of the proportion of its residence work force in commerce, second in services, fifth in population, and only eighth in manufacturing (Goodall, 1972). As Goodall states, "Hamilton's role is a specialised one providing retail, administrative, educational and transport facilities for a population of some 225,000 people living in the Central North Island".

As a result of its rapid growth Hamilton's population has a very youthful age structure and a social survey conducted in 1961 (Vanderberg, et. al., 1965) estimates that of all residents only 16 percent were born in Hamilton, the rest were primarily from other areas within New Zealand. Hamilton is also characterised

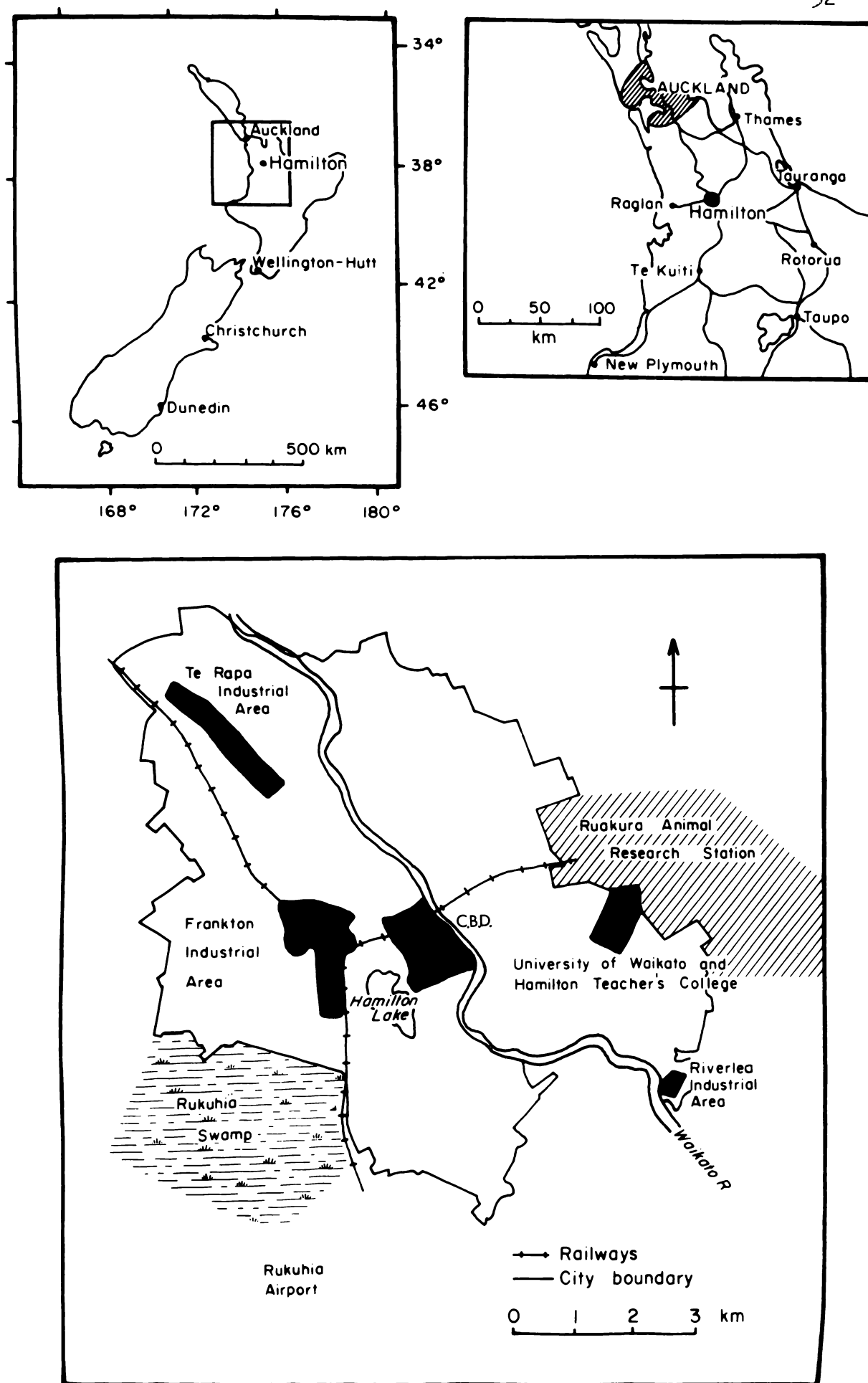


Figure 2:1 Hamilton, The Study Area.

by a high proportion of temporary residents, and research has suggested that it forms a major node within a national pattern of movement north ^{to} ~~of~~ Auckland (Poulsen and Johnston, 1973).

To a large extent the city itself has had its physical growth dictated by the barriers of the river, the Rukuhia swamp, plus the availability of hilly ridges (elevation approximately 50 metres above the swamp) which have proved highly desirable and sought after residential sites. Present growth is centred upon the north-west - southeast axis of the river, with future development limited to the north of the city by the western, southern, and eastern restrictions of the Rukuhia swamp, the Rukuhia airport, the rich farmland south of Riverlea, and the Ruakura Animal Research Station (figure 2:1). At the time of this research the city's shape approximated a circular form, with the city's households almost equally divided between the east and west banks. The westside is, however, distinctly different from the eastside in that it has the CBD and both of the major industrial areas: Frankton and Te Rapa. East of the river there is only one small industrial area at Riverlea, and although it has the research and educational establishments of Ruakura Animal Research Station, University of Waikato, and Hamilton Teacher's College, the eastside is primarily a residential area. Future growth plans, however, involving the development of parallel lines of residential cells along the axis of the river to the north of the city will soon change the city from its circular form into a linear form (Hamilton Area Study Report, May 1972).

This chapter is divided into four topics, the objectives of which are to:

1. Present the sources of data used in the study of restricted lateral movement.
2. Present Hamilton as the laboratory within which the examination of the three research theses were conducted.
3. Develop a typological classification of the areas or suburbs within Hamilton as a base for interpreting the different rates of restricted lateral movement between areas, and as a means of assessing the role of economic status.
4. Provide a background to the study of restricted lateral mobility within Hamilton by presenting four general characteristics of the mobility patterns. Although these analyses are strictly outside the direct objectives of this research they also serve as a basis for comparison with future studies of restricted lateral movement within Hamilton.

1. Data Sources Used To Study Patterns of Mobility

Ideally the best source of data to establish the total pattern of intra-urban residential mobility would have been an address register, but the lack of such records in New Zealand resulted in the decision to use the best available continuous register, the electricity distribution authorities' power reconnection records. Usually when the reconnection request is made the electricity authority obtains the previous address of the customer, which along with the new address permits a move to be traced. This is, however, not a complete set of data as it only records the establishment of a household and not actual movements.

Often a move takes place from one dwelling to another without the move being recorded or without a new household being established. For example, in rented dwellings a flat may change several occupants without the person who initially established the flat moving out. In the case of marriage where the wife moves to her husband's dwelling no move will be recorded, or if both move to the new dwelling only one person's move will be recorded.

Unfortunately, the two reticulation authorities within Hamilton did not both operate a connection card system; the Central Waikato Power Board did, but the Hamilton City Council did not. What they both did was to record the person's new address when taking the final meter reading. This was so that the account and any payment bond could be posted out. Fortunately, distinctions appear to have been made between the occupation of a new residence and addresses care of somebody-else. But like the reconnection cards, the final reading records have limitations:

- (i) If a person does not know what his new address will be it cannot be recorded, and normally this person will pay his account at the office.
- (ii) Only the movement of the person whose name the account is under is recorded.
- (iii) Movement to another address does not always mean that a new household is established, for the person may be moving to an existing household.

The data collected from the two electricity distribution authorities covered all their recorded intra-urban moves for the 1971 period.

Because the tenure of the origin and destination are seen as important variables in the propensity of movers to move within their home sector (Simmons, 1968), additional data were collected upon the sales of dwellings, the building of dwellings (the

approximate date finished) and moves from State Houses, over the period 1971.*¹ Data on the dwelling sales was obtained from the records of the land sales register of the New Zealand Government Valuation Department's Hamilton Office, new dwellings completed from the rating records of the building inspection division of the Hamilton City Council, and moves from State Houses from the State Advances Corporation's Hamilton Office. From those three sources of information chronological and alphabetical street listings were prepared of dwellings sold, built, and State Houses vacated. To establish the tenure of the mover's origin and destination these lists were then compared with the lists of intra-urban movement addresses. Those addresses not matched by these lists were viewed as movement from or to a rental non-state dwelling (Rental (NS)). The tenure categories obtained from this pairing are given in table 2:1.

In adopting the use of this pairing technique for establishing the tenure types of moves a number of problems arise. First, there is no complete correlation between the sale of property or the purchase of that property by the person who moves in or out. In a number of cases the property sold is leased to the old or new occupier by an absentee landowner. Therefore, the old or new occupier is a tenant and not the owner. Also within the rental (NS) group there are a number of persons who moved into a residence owned by the occupier of that dwelling, such as the move

*1 State Houses are dwellings built by Government and let at low rentals to families on low incomes. Until recently these dwellings, which are limited in number, were built in State Housing sub-divisions, with the result that this vacancy set is spatially clustered. Also they are not directly part of the competitive housing market, in that they are controlled and let by the State Advances Corporation. As such they form a separate part of the rental housing market.

Table 2:1Intra-urban Movement Housing Tenure Categories

	Number of Observations
<u>Four Major Tenure Groups:</u>	
1. Ownership to Rental	185
2. Ownership to Ownership	155
3. Rental to Ownership	472
4. Rental to Rental	905
<u>Eleven Lower Level Tenure Groups:</u> *1	
1. Ownership Existing to Ownership Existing *2	130
2. Ownership Existing to Ownership New	25
3. Ownership Existing to Rental Non-State	185
4. Rental Non-State to Rental Non-State	772
5. Rental Non-State to State	70
6. Rental Non-State to Ownership Existing	266
7. Rental Non-State to Ownership New	164
8. State to Ownership Existing	26
9. State to Ownership New	16
10. State to Rental Non- State	22
11. State to State	41

*1 Ownership Existing to State moves did not exist because of State Housing regulations.

*2 Ownership Existing dwellings are old housing stock sold or purchased by the mover.

by the bride at marriage, and moves back to parental homes by young persons. In some cases the final reading records were found to have duplication of entries and incomplete addresses, which meant that those records had to be vetted. Therefore, classifications by this approach are not completely accurate, but this data set is seen to be considerably better than just taking the total population of movers as one population. Finally, the task of pairing is extremely tedious and time consuming, involving the collation of three additional chronological and alphabetical listings, and for computer analysis the coding of grid co-ordinates, tenure subscripts, and the code for the area or suburb. The grid system used was one of a 200 metre grid pattern (i.e. 40,000 metres in area) centred on the downtown node - the Central Post Office.

2. Hamilton as a Research Laboratory

An important question within the study of restricted lateral movement is what effect do the characteristics of the city have upon the resulting study? This leads on to the principal question of any nomothetic research, which is how applicable are the findings of this study to any other urban area, or for the same area at some later period of time? Unfortunately the only complete answer for the first part of the second question is to repeat this study within different urban areas, although the results are expected to have general currency. For Hamilton, however, the results will most probably continue to apply for some time. So as to enable the findings of this study to be interrelated with those of future research, the characteristics of the study area are presented. To do so four topics are covered:

- (i) City's form.
- (ii) City's size.

(iii) City's internal structure.

(iv) Existence of major barriers to movement.

(i) City Form.

The near circularity of Hamilton centred on the CBD removes from consideration the possibility of the city's shape as the explanation for any sectoral bias that might be observed. The CBD, however, is not the only major structural node within the city, for as previously stated Hamilton does have two relatively major non-central industrial areas, Frankton and Te Rapa, plus a major suburban educational - research agglomeration (the University of Waikato, Hamilton Teachers' College, and Ruakura Animal Research Station). But the power of these nodes to detract from the CBD's role as the locus of a mover's mental image of the city is not supported (Chapter 8, Sketch Map Study).

(ii) City Size.

Although in no way proven, it still might be argued that within a small city of eighty thousand a mover is unlikely to possess a restricted sectoral image, in that it is highly probable that they know the whole city very well. Therefore, it could be argued that this study of the restricted image concept within a small city is inappropriate. However, the topic is more complex than just the relationship between a restricted image and sectoral movement, for there are other aspects related to a city's size which may also affect the study of this topic. For example;

- a. Increasing size probably results in a higher degree of homogeneity within an area's socio-economic status and housing market. In assuming that movers tend to remain within their own socio-economic environment the more

differentiated the internal structure of the city the greater the probability of a higher degree of sectoral movement.

- b. Increasing size may result in a multi-nuclei city structure which possibly creates for residents a number of different and probably localized orientation nodes. As a result the internal structure of the city may destroy any relationship between a restricted sectoral image and sectoral movement based upon the CBD.
- c. With increasing size the sources of formal information, principally the real estate agents tend to be area specific, so that their areal specialisation may reinforce the local perception of the available vacancy set, or even direct the mover's search space.
- d. Large cities tend to have within them local government divisions which like the multi-nuclei city structure may be a barrier to movement.

Therefore, for a large city there exist other aspects besides the restricted image which may result in restricted lateral movement. This implies that there is no simple solution to the problem of whether it is better to examine this topic within a large or small city. But there is an advantage in conducting this study within a small city, in that if no image constraints are found, then the dominant pattern of movement should be random within the limits of the vacancy sub-set. However if not, then it has been established that the regularity is independent of the role of the image. It could therefore be argued, that if locational attachments were the explanation for restricted lateral movement within a small city then that explanation also applies to a large city. The role of the restricted image in a large city would, therefore,

simply reinforce the degree of restricted lateral movement by the addition of movers with restricted images who did not hold locational attachments with their home area.

Within the context of those arguments Hamilton is a single centred city, with real estate agents primarily centrally located and with no known area specialisation, and no metropolitan political divisions.

(iii) City's Internal Structure.

Sub-dividing the city into six physical corridors (figure 2:2)^{*2} and examining the internal structure of the city's vacancy sets, it was found that Corridors 2, 3 and 6 contain the greatest proportion of the existing dwellings vacancy set, whereas the distribution of new dwellings and sections appears to be more evenly spread (figures 2:3, 2:4a). Viewed by the mean price structure of the vacancy sets there is for all three vacancy sets high prices within areas of the northern corridors, Corridor 1 and 4, plus Hamilton Lake and Riverlea, and low prices in the areas within Corridors 2 and 3 (figures 2:5, 2:6).^{*3} T-tests between the prices of existing dwellings sold within the six corridors established that only Corridor 3 and 6 are similar (table 2:2), although the mean scores do suggest a three-way split between, the northern corridors (1 and 4) with high values, the southern corridors (3 and 6) with middle values, and the central corridors (2 and 5) with low values. For the cost of new dwellings built

*2 The sub-division of the city into six physical corridors is based upon a study of intra-urban mobility interconnectivity between the 26 areas, presented in the next chapter.

*3 The price groups used were based upon a study of the total profile of selling prices. However, the actual prices paid for dwellings seem in 1974 ludicrous due to rampant inflation.

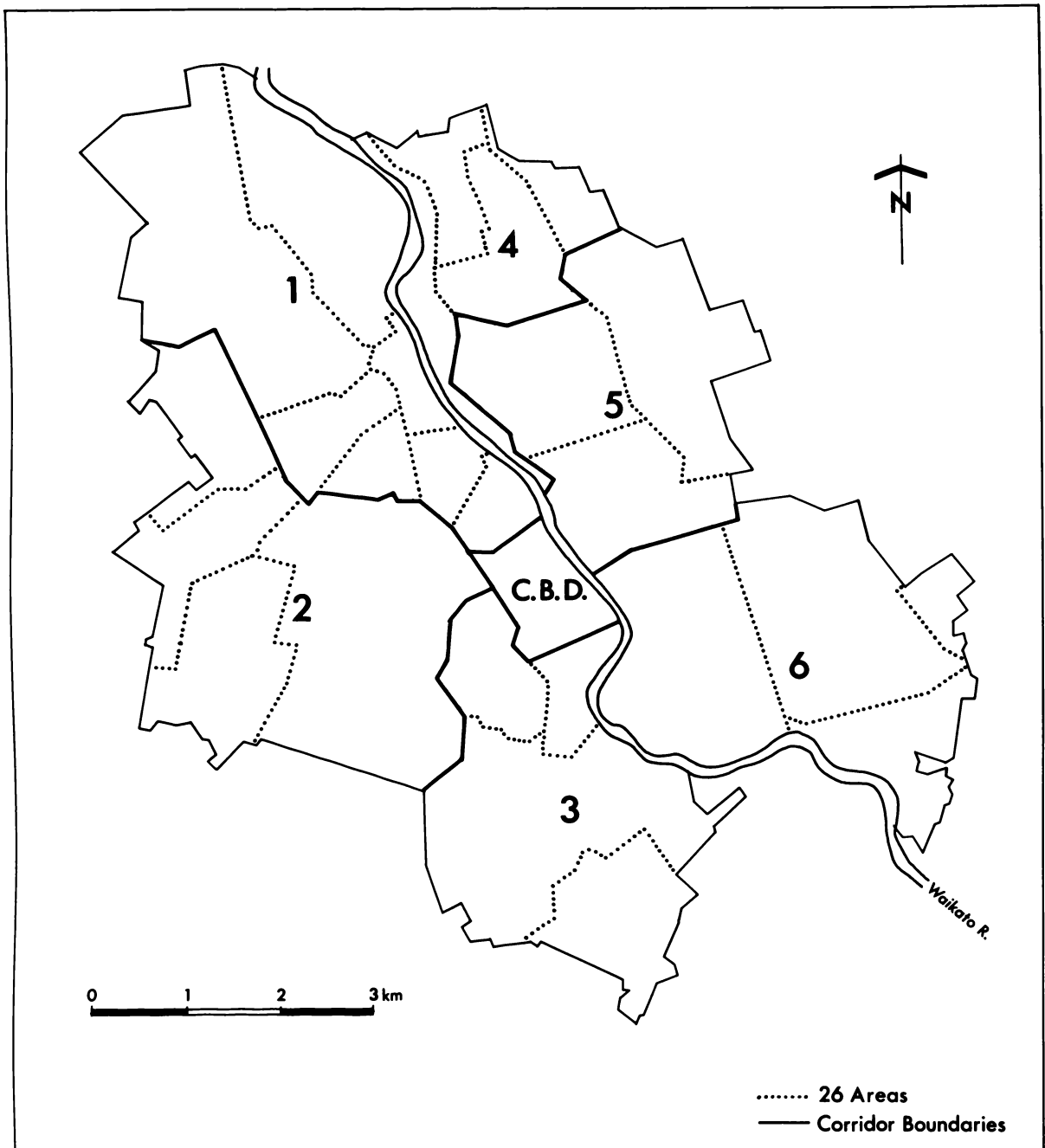


Figure 2:2 Grouping Of Areas Into Six Physical Corridors.

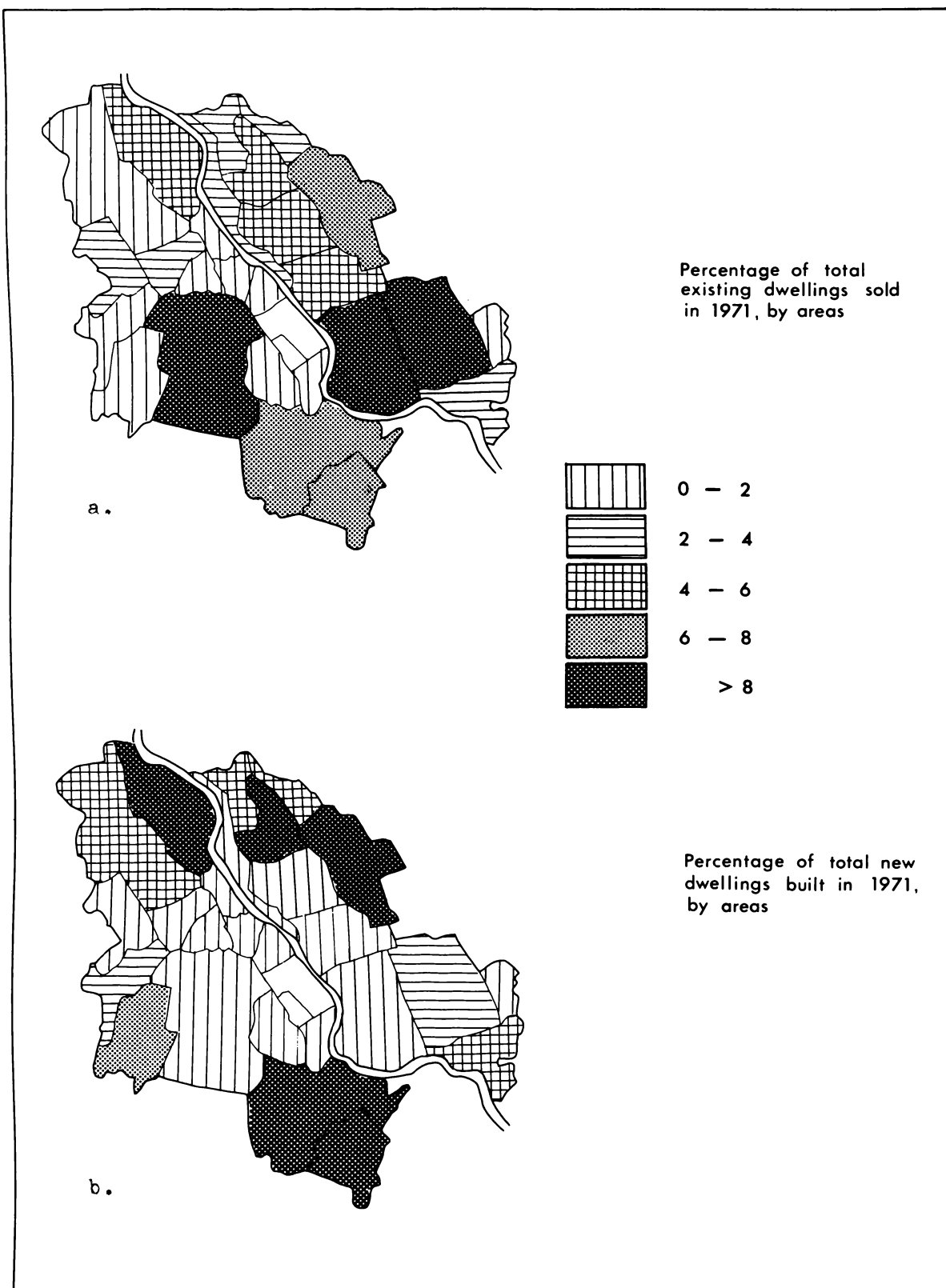
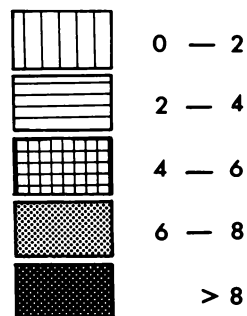
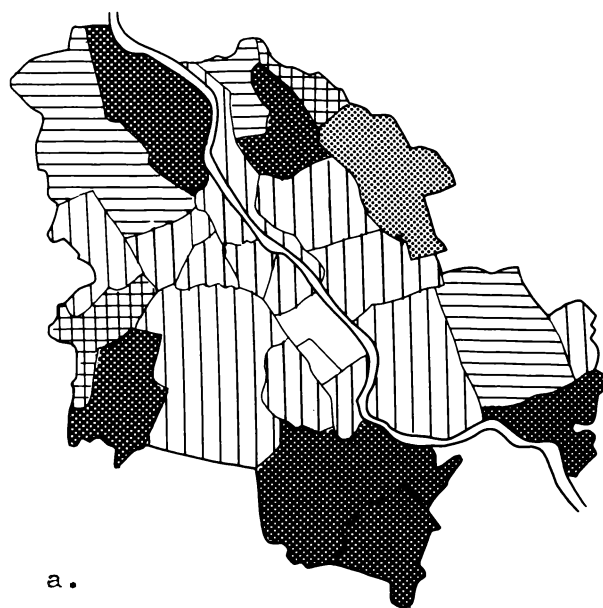
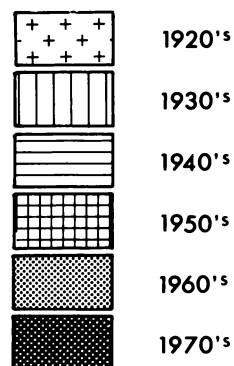
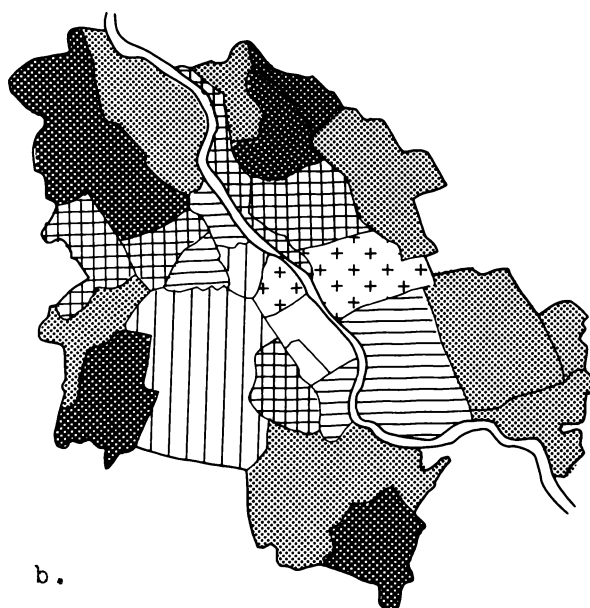


Figure 2:3 Distribution Of Existing Dwellings Sold And New Dwellings Built, 1971.



Percentage of total
sections sold in 1971,
by areas



Mean age structure of
the total housing vacancy
set, 1971

Figure 2:4 Distribution Of Sections Sold, And The Mean Age Of The Total Housing Vacancy Set, 1971.

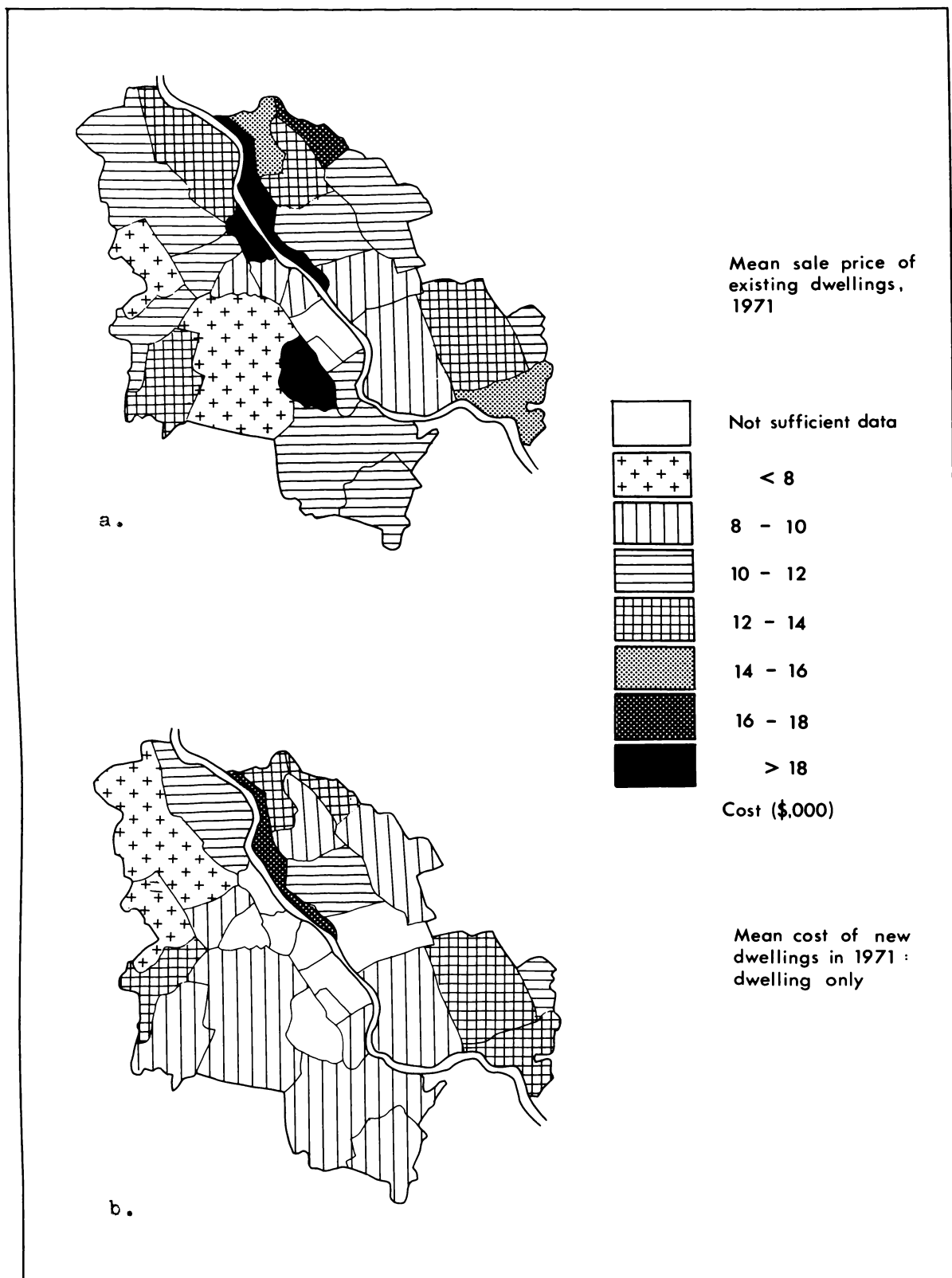


Figure 2:5 Distribution Of Prices Paid For Existing And New Dwellings, 1971.

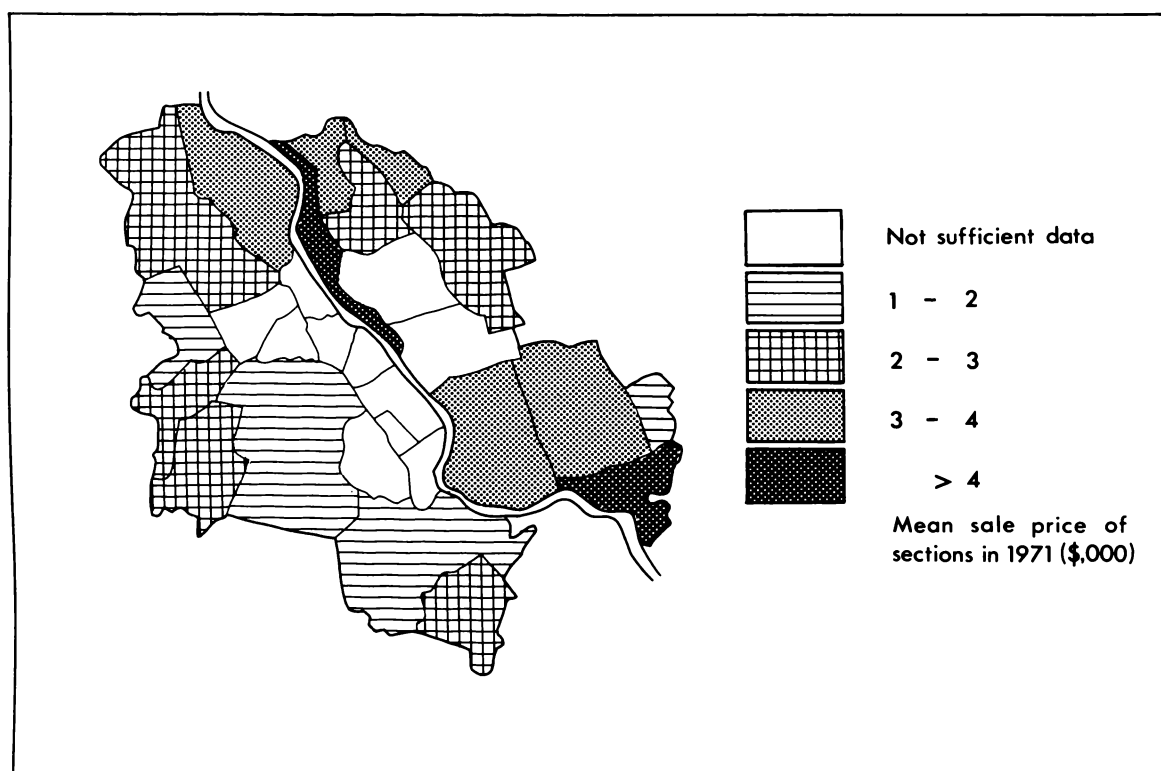


Figure 2:6 Distribution Of Prices Paid For Sections, 1971.

and sections sold, Corridors 1, 4 and 6 form a high cost group and Corridors 2, 3 and 5 a low cost group (table 2:3). Statistically only Corridor 1 for new dwellings and Corridor 4 for sections differ significantly from this dichotomous grouping (table 2:4). In comparison the age structure of the vacancy set (figure 2:4b) appears to be more evenly distributed, forming a pattern which suggests a general concentric zonal structure, with an inner core of pre 1950 dwellings and a broken peripheral zone of dwellings built in the 1960s - 1970s. However, the mean values by corridor aggregations established that the age structure of the vacancy set is unevenly distributed: Corridors 2, 5, and 6 form an older grouping with the more recent dwellings in Corridors 1, 3 and 4 (table 2:5), although statistically only Corridors 2 and 6 are related.

To provide a measure of the degree of clustering within the internal structure of the vacancy sub-sets, the distribution of these over the six corridors was compared with the distribution of the total vacancy set, and the differences between the two distributions calculated. Table 2:6 presents the results for the distribution of existing dwellings, which suggests that existing dwellings under eight thousand dollars cluster in Corridor 2 and that dwellings in the range over twelve thousand dollars cluster in Corridor 4. The least clustering occurs in the eight to twelve thousand group, which has the greatest proportion of dwellings. New dwellings under eight thousand dollars cluster in Corridor 3 and again dwellings over twelve thousand dollars cluster in Corridor 4 (table 2:7). But for both existing and new dwellings the degree of total clustering in any of the vacancy sub-sets is not so extreme as to suggest that a person's freedom of spatial choice is highly constrained.

Table 2:2Comparative Tests of Prices of Dwellings Sold, 1971

Corridors	Mean Price (\$,000)	t-values					
		1	2	3	4	5	6
1	12.718	---	8.303 *	1.973 *	6.232 *	4.561 *	2.192 *
2	8.168		----	6.748 *	16.453 *	5.740 *	9.067 *
3	11.461			----	8.222 *	2.504 *	0.149
4	16.806				----	12.743 *	10.201 *
5	10.269					----	3.568 *
6	11.532						----

* Significantly different at the .05 level.
t-tests (unsigned).

Table 2:3Comparative Tests of Prices of New Dwellings Built, 1971

Corridors	Mean Price (\$,000)	t-values					
		1	2	3	4	5	6
1	10.290	---	0.860	2.876 *	2.220 *	3.053 *	2.804 *
2	9.853		----	1.461	5.473 *	1.595	3.245 *
3	9.197			----	5.429 *	0.180	4.633 *
4	11.298				----	5.636 *	1.366
5	9.145					----	4.733 *
6	12.264						----

* Significantly different at the .05 level.
t-tests (unsigned).

Table 2:4Comparative Tests of Prices of Sections Sold, 1971

Corridors	Mean Price (\$,000)	t-values					
		1	2	3	4	5	6
1	3.267	---	4.851*	5.329*	0.349	4.477*	1.284
2	2.195		----	0.220	4.699*	0.397	7.784*
3	2.164			----	5.222*	0.268	8.867*
4	3.177				----	4.294*	1.756*
5	2.113					----	6.575*
6	3.565						----

* Significantly different at the .05 level.
t-tests (unsigned).

Table 2:5Comparative Tests of Vacancy Set House Ages - Sold and Built, 1971

Corridors	Mean Age Group (decades)	t-values					
		1	2	3	4	5	6
1	5.652	---	3.880*	2.800*	5.057*	6.035*	3.774*
2	5.004		----	6.405*	8.377*	1.969*	0.814
3	6.016			----	2.321*	8.634*	6.992*
4	6.269				----	10.669*	9.610*
5	4.626					----	3.048*
6	5.135						----

* Significantly different at the .05 level.
t-tests (unsigned).

Table 2:6Degree of Clustering of Existing Dwellings Sold, 1971

Percentage of vacancies above or below the distribution of the total vacancies									
Vacancy Sub-sets (\$,000)	Corridors	1	2	3	4	5	6	Total + (Degree of cluster- ing)	Percentage of total vacancy set
< 8		-7.71	20.43	-3.92	-5.86	-1.88	-1.06	20.43	23.20
8 - 12		-1.00	-5.09	8.64	-1.55	0.60	-1.60	9.24	41.10
12 - 16		-1.31	-7.90	0.19	15.30	-9.25	2.96	18.46	18.84
16 - 20		-4.96	-10.87	-4.70	26.08	-11.75	6.20	32.28	10.10
> 20		0.05	-12.99	-3.06	38.60	-16.01	-6.59	38.65	6.76
Distribution of total vacancies		17.67	14.26	15.72	6.96	21.07	24.31		

Table 2:7Degree of Clustering of New Dwellings Built, 1971

Vacancy Sub-sets (\$,000)	Percentage of vacancies above or below the distribution of the total vacancies							Total + (Degree of cluster- ing)	Percentage of total vacancy set
	Corridors	1	2	3	4	5	6		
< 8		5.54	-1.76	18.80	3.15	-7.97	-17.76	27.49	26.54
8 - 12		2.74	-0.26	8.48	9.06	-1.83	-18.19	20.28	54.19
12 - 16		3.06	-5.72	0.13	28.40	-14.97	-10.90	31.59	12.95
> 16		-0.17	-4.26	-10.72	25.53	-18.57	8.19	33.72	6.32
Distribution of total vacancies		17.67	14.26	15.72	6.96	21.07	24.31		

(iv) Major Barriers to Movement.

A further limiting factor may be the role of the river as a barrier to movement. Up until the mid-1960s only two road and one rail bridge spanned the river, and although two more road bridges have since been added, the river is still a major barrier to peak hour traffic, as witnessed by the daily peak hours traffic jams. Furthermore, the river has had its effect upon the directions of principal roading patterns within the city, which may by its effect upon travel patterns influence the directions of a person's residential mobility. The roading pattern on the eastside of the river runs parallel to the river rather than focusing upon the CBD, which is the case on the westside.

3. Typological Structure of Areas

For the purpose of this research the individual areas of Hamilton were grouped into areas with similar characteristics, which are termed typology groupings. By doing so the aim was to move from the uniqueness of each area and develop this study within the framework of more generalised theory. But in attempting to characterise the areas of Hamilton, three major problems were confronted. First in 1971 there was no clearly defined and universally acceptable set of sub-divisions of Hamilton. The Department of Statistics 1971 Census sub-divisions were new and clearly not a set locally recognised by name or by area, and the only other sources of suburban names were the NZMS 17 map series (1968, 4th edition), and the names of intra-city bus destinations, post offices, and schools. Unfortunately the map series was out of date, in that it lacked the names of new suburban areas, and like the other three sources did not give the

boundaries of the areas. Secondly, there was a lack of data by which to establish the characteristics of the areas, in that there was no census data at the area level before 1974. The third problem relates to classifying of a number of areas, in that the growth rate of Hamilton's housing, housing policies, and the size of the city had limited the homogeneity of housing within areas, to the extent that in a number of high status areas large low status sub-divisions had been established. This made the establishment of a meaningful differentiation between areas difficult.

To overcome the first problem, and to satisfy a later need within this research of the areas studied being those perceived by the population of Hamilton (Chapters 6 and 7), a number of persons were asked to sub-divide Hamilton up into as many sub-divisions as possible and name them. From these maps, sketched upon a street outline of Hamilton, the most common sub-divisions were obtained as well as the names by which they were known. These divisions were used in the actual interview study, although one area, Ruakura, had to be discarded before the analysis as a number of movers did not regard it as a residential area; rather it was associated with the animal research station. In total the city was sub-divided into 26 perceived suburbs or areas (the CBD was excluded), with the final boundaries established during the fieldwork (figure 2:7).

A second concern was to select a series of variables to determine the characteristics of the areas, and as must be stressed that the classification of areas is dependent upon the variables used in this study. Ideally a data set of social, economic, and demographic variables were required to establish a typology based on the now expected three dimensions of urban structure: socio-economic status, family status, and ethnic status. But

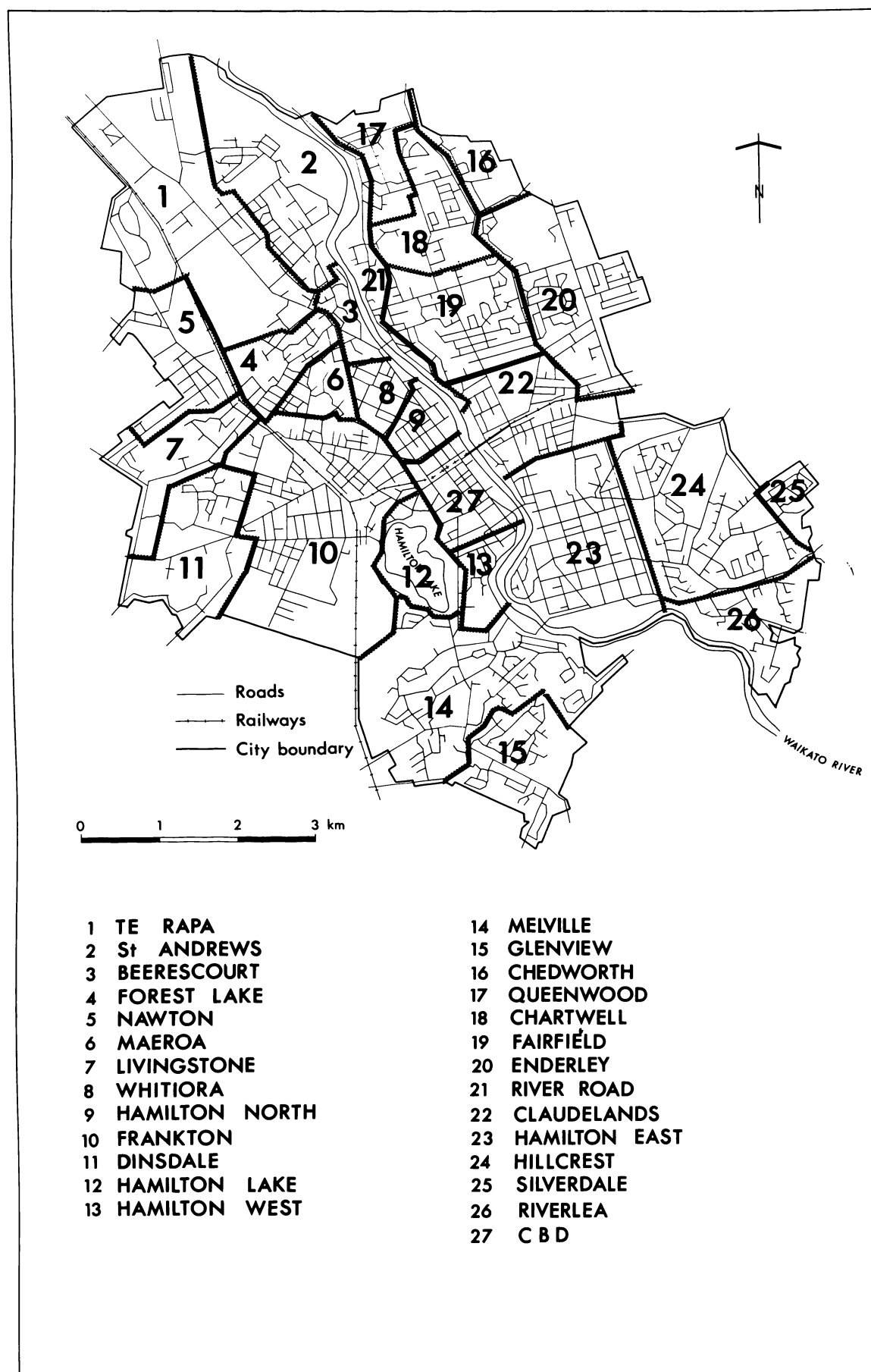


Figure 2:7 The Areas Of Hamilton.

unfortunately no data upon social, demographic, and ethnic variables were available, as the 1971 Census had not been compiled, so alternatives had to be sought. The result was the usage of seven variables obtained from secondary data sources.*4

- (i) Selling price of residential dwellings sold in 1971.
- (ii) Age period of residential dwellings sold in 1971.
- (iii) Number of residential dwellings sold in 1971.
- (iv) Number of residential dwellings built in 1971.
- (v) Number of residential sections sold in 1971.
- (vi) Number of State Houses vacated in 1971.
- (vii) Number of rental movers in 1971.

The selling price variable was sub-divided into five groups, and the age of dwelling into three groups, giving a total of thirteen variables. To make the areas comparable for the purposes of analysis it was necessary to standardize the area units, which for the first eight variables involves ratios of the total number of existing residential dwellings sold in each area, and for the remaining five, ratios of the number of dwellings in each area.

In analysing these data the research design required the grouping of the areas into independent typology groups. To do this three statistical algorithms were used. First, the data was factor analysed to obtain the common underlying dimensions, with R^2 used in the diagonal of the inter-correlation matrix. The factor dimensions were then orthogonally rotated via a varimax system to ease interpretation. Standardized 'z' factor scores from the orthogonally rotated factor matrix were obtained and used

*4 The data used was that collected for establishing the tenure groups of intra-urban movement. But as the variables were collected at the level of individual dwellings it had to be aggregated to the level of the 26 areas.

as the input for a grouping algorithm HGROUP, based on Ward's (1963) hierarchical grouping procedure (Veldman, 1967). The decision as to which group level in the hierarchy to accept was based upon the selection of the major jump in the error term (within group sums of squares), with the grouping structure tested for its independence by discriminant analysis.

From the factor analysis three factors were obtained (table 2:8) with 80.4 percent of the variance between areas explained. The first factor explained 48 percent, the second 21 percent, and the third 11 percent. Only for two variables was the proportion of variance explained less than 60 percent; these were the ratio of existing dwellings sold (48 percent) and the ratio of State Housing movers (27 percent). The interpretation of these factors was that:

Factor 1, with a high negative loading on the 1940s - 50s age category, and high positive loadings on the 1960s - 70s age category, the ratio of new dwellings built and the ratio of sections sold, was interpreted as a development factor; which is probably akin to a family status factor.

Factor 2, with high negative loadings upon the two lowest cost variables and the ratio of State Housing, and positive loadings upon the high cost variables and ratio of existing dwellings sold, was interpreted as an economic factor; which is probably akin to a socio-economic status factor.

Factor 3, with high positive loadings upon the oldest age group and the ratio of rental moves, and high negative loadings on two high cost variables, 1960s - 70s age category, ratio of new dwellings

Table 2:8**Hamilton City Areas Typology, Orthogonal Factor Matrix (Varimax)****(Loadings greater than .4)**

Factors	1	2	3	Communalities
Variables				
<u>A. Ratios of Dwellings Sold:</u>				
Price groups of dwellings sold. (\$,000)				
1. < 8		-.420		68.52
2. 8 - 12		-.851		76.17
3. 12 - 16			-.688	64.49
4. 16 - 20		.749	-.400	77.07
5. > 20		.885		80.52
Age period of dwellings sold.				
6. Pre 1940s			.898	91.86
7. 1940s - 1950s	-.915			84.65
8. 1960s - 1970s	.748		-.626	95.29
<u>B. Ratios of Total Dwellings:</u>				
9. Existing Dwellings Sold		.592		47.88
10. New Dwellings Built	.790		-.407	79.06
11. Sections Sold	.789		-.423	80.82
12. State Housing Vacancies		-.400		26.70
13. Rental Moves			.781	62.14

built and the ratio of sections sold, was interpreted as a rental-tenure factor; which is probably akin to a second family status dimension. The hierarchical profile grouping analysis (HGROUP) of the factor scores established a major break in the error term at six groups. However, one area was grouped on its own but with areas of similar type under five groups, so the five group level was accepted. The discriminant analysis upon the groupings established no misclassification. To interpret the groupings, the signs of the factor scores were adjusted so that they were comparable and then plotted (figure 2:8) and each grouping was named according to its profile. To demonstrate the method of naming the groups, groups 1, 2 and 4 stand out in figure 2:8a as clearly having independence of form upon factors 1 and 2. Taking group 1, this has high positive scores on factor 2 (economic level) but a negative centroid on factor 1 (development level), however, the inclusion of factor 3 (rental-tenure) in figures 2:8b and 2:8c does not improve the interpretation of this group. Therefore, it was interpreted as a high status old age housing group. The actual allocation of typology names for all areas is represented in figure 2:9, where it can be seen that a high and medium status dichotomy sub-divided into areas of new and old housing has been established, plus a group of rental areas.

From mapping the groups members (figure 2:9) it was established that despite its small size Hamilton's urban structure is characterised by a high status sector spanning both sides of the river north from the CBD. A major status area is also located around Hamilton Lake (Lake Rotoroa), and new developments of expensive dwellings are in the peripheral areas of Riverlea, Glenview and Dinsdale. The division between the 'medium status

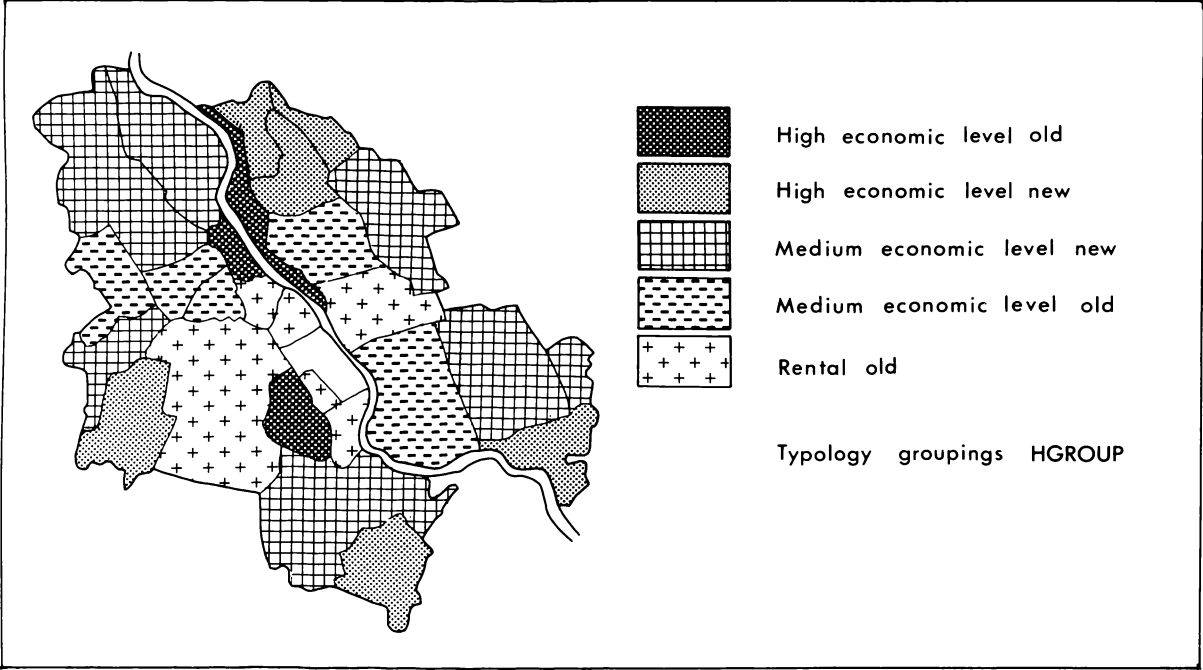


Figure 2:9 Area Typology Classifications.

new' and the 'medium status old' is as expected, with the new area characterised by group housing developments of the 1960s - 1970s.*⁵ Likewise, the inner city 'rental areas' stand out from the 'medium status old' areas, in that the latter tend to be of a more recent period of development and with a higher degree of residential ownership. However, this analysis also indicates the problems of the homogeneity of areas, where the high cost dwellings of Hillcrest's ridge and St Andrew's river terraces have been swamped by the relatively large number of low cost housing on less desirable flat lands. Hence, both areas were grouped at the level of medium status.

4. General Characteristics of Mobility

As an introduction to the study of intra-urban movement within Hamilton four aspects of intra-urban mobility are presented.

- (i) Volumes, ratios and net change of intra-urban movement.
- (ii) Intra-urban movement by tenure groups.
- (iii) Intra-urban movement across the river.
- (iv) Dispersion of intra-urban movement.

(i) Volumes, Ratios and Net Change of Intra-urban Movement.

a. Volumes of Movement.

For volumes of movement out of the 26 areas a Kruskal-Wallis

*⁵ Group housing is mass produced new low cost housing sited in new sub-divisions, and normally constructed by a group of building companies for the lower - middle income housing market. Some of these houses are built prior to being sold, while others are built as a result of building ties after the section is purchased.

ANOVA established a significant difference between the typology groups ($9.84 > 9.49$ at .05, 4 d.f.). The form of this difference in terms of the mean volumes of out-movement (table 2:9) suggests that the lower ranked more central areas have the largest volumes. Figure 2:10a displays this pattern, where three inner city areas have more than ten percent of the total volume of out-movement: Hamilton East (13.1 percent), Frankton (11.4 percent) and Claudelands (11.2 percent). A similar analysis of movement into the areas established no significant differences between groups ($5.10 < 9.49$ at .05; 4 d.f.), which indicates a greater degree of variance in volumes of movement within groups than between groups. As a result it is concluded that compared with out-movement, the volumes of in-movement are more evenly distributed between areas (figure 2:10b).

b. Ratios of Change.

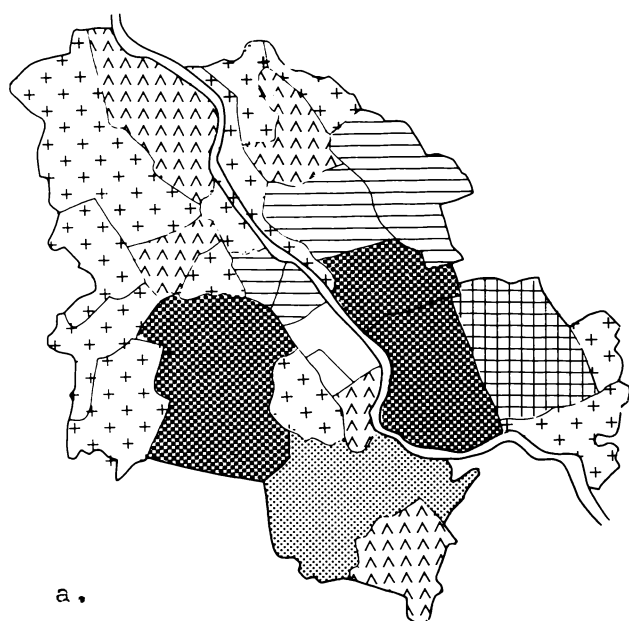
Volumes of movement, however, do not take into account the size of the area studied which leads to problems in comparing the volumes of movement between different areas, whereas the ratios of movement do. From the analysis of out-movement ratios, a significant difference between groups was established ($14.17 > 9.49$, at .05; 4 d.f.) and the mean values of the groups displayed a pattern of increased rates of out-movement with lower typology levels (table 2:10). In that this latter group of areas are centrally located higher rates of out-movement were found in the inner city (figure 2:11a). As expected rates of in-movement were low in the inner city, with the marked exception of Hamilton Lake (figure 2:11b), and although the analysis of variance between groups established a significant difference ($10.83 > 9.49$ at .05; 4 d.f.), the mean values do not give a clear pattern of the

Table 2:9Percentage Volume of Total Intra-urban Movement by Typology Groups

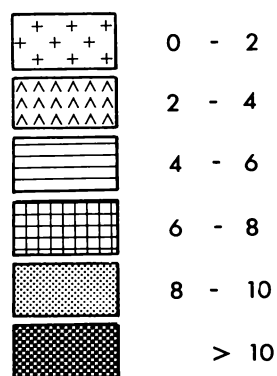
Typology Groups	Mean Percentage Volume from Origin Areas	Mean Percentage Volume to Destination Areas
1. High Economic Level Old	0.95	0.90
2. High Economic Level New	1.48	2.88
3. Medium Economic Level New	4.01	4.74
4. Medium Economic Level Old	4.60	4.72
5. Rental Old	6.10	3.95

Table 2:10Percentage Rates of Total Intra-urban Movement by Typology Groups

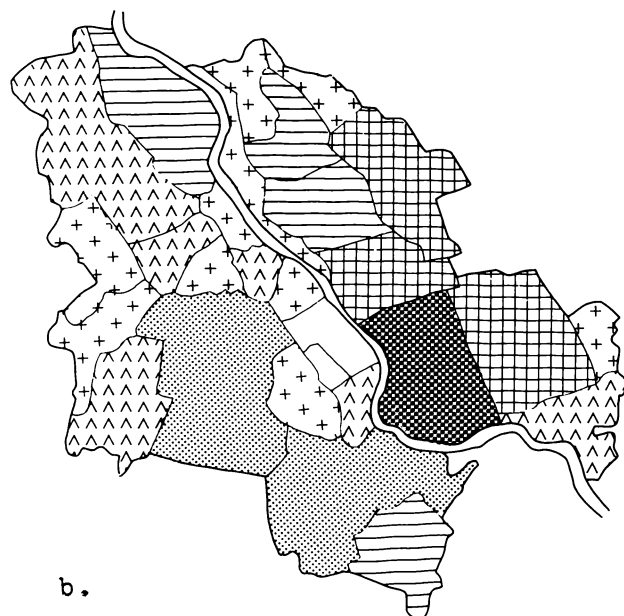
Typology Groups	Mean Percentage Rate from Origin Areas	Mean Percentage Rate to Destination Areas
1. High Economic Level Old	3.90	5.65
2. High Economic Level New	5.50	10.75
3. Medium Economic Level New	7.11	8.75
4. Medium Economic Level Old	7.38	7.06
5. Rental Old	16.08	9.34



a.
OUT - MOVEMENT

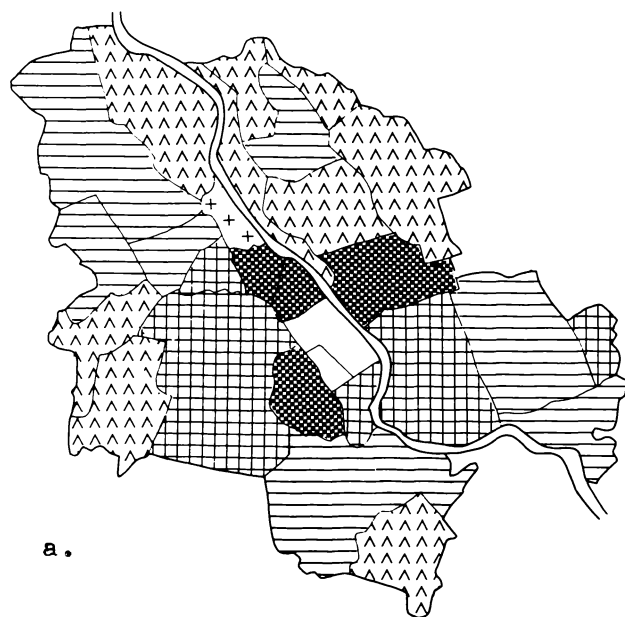


Percentage of the total
intra-urban movement

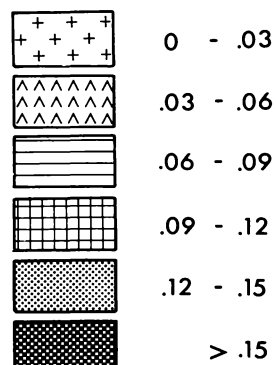


b.
IN - MOVEMENT

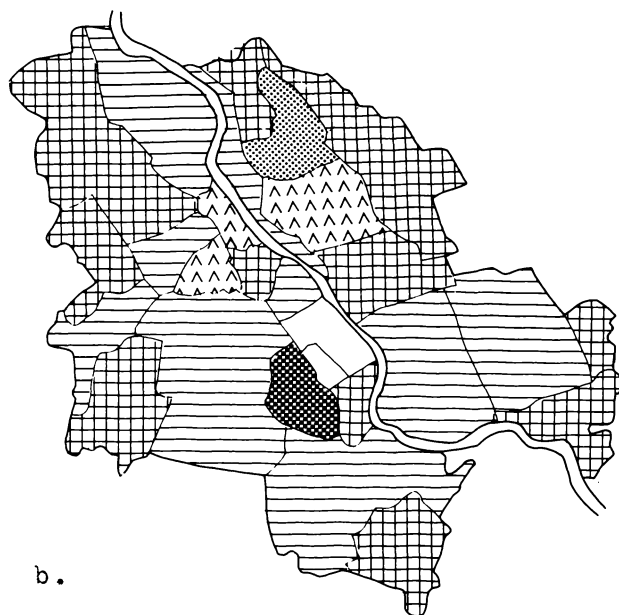
Figure 2:10 Distribution Of Volume Of Total Intra-Urban Residential Movement, 1971.



OUT MOVEMENT



Ratio of movement based
on the number of house-
holds per area



IN MOVEMENT

Figure 2:11 Distribution Of Ratios Of Total Intra-Urban
Residential Movement, 1971.

differences between typology groups.

c. Net Change.

Net change from intra-urban mobility is dominated by movement out of central rental areas and into peripheral areas of high and medium status new housing (table 2:11). The high and medium status areas of old housing, which tend to be located between the inner city rental and peripheral new housing areas, are characterised by little change in terms of redistribution. This, therefore, suggests, first, that the general pattern of movement is movement from the inner city areas into the peripheral new housing areas, and secondly, that the inner city rental areas act as a 'port of entry' for movers into the intra-urban mobility system, in that intra-urban mobility results in a net loss in the inner city areas which must be filled by some population. Although part of the loss would be absorbed by changes of property from residential land use, the majority of inner city properties left vacant would most probably be occupied by movers from outside of the city, or young adults who have moved from their parental homes within the city for the purpose of 'flatting'.^{*6}

(ii) Intra-urban Movement by Tenure Groups.

With no data upon the base populations of each tenure type, no assessment of the ratio of each tenure groups intra-urban migration was possible, therefore, tenure groups were viewed in terms of their proportion of the total intra-urban movement. In doing so it was established that the movers from rental (NS)

^{*6} Flatting for a large number of young adults is a stage in the life-cycle between leaving their parental home and marriage, involving sharing a rental property with other young adults.

Table 2:11Percentage Total Net Change by Typology Groups

Typology Groups	Percentage Total Intra-urban Movement		Percentage Total Net Change (A - B)	Percentage of Total Net Gain or Loss
	In (A)	Out (B)		
1. High Economic Level Old	2.45	1.75	0.70	4.76
2. High Economic Level New	17.24	9.20	8.04	54.76
3. Medium Economic Level New	33.49	27.55	5.94	40.48
4. Medium Economic Level Old	22.54	23.35	-0.81	-5.56
5. Rental Old	24.29	38.15	-13.86	-94.44
			<u>-13.86</u> 14.67	

property accounted for 74 percent of all moves, ownership origins 20 percent and State Housing origins 6 percent (table 2:12). By destinations, rental (NS) property received 57 percent of all moves, ownership existing 25 percent, ownership new 12 percent, and State Housing 7 percent (table 2:13). Viewed by movement between and within tenure groups the major characteristic was that rental (NS) properties were the destinations for the bulk of movers from rental (NS) property, and ownership property (table 2:12). Likewise, movers from rental (NS) properties were the source of the bulk of movement into all types of destinations (table 2:13). Therefore, the principal characteristic of movement by tenure groups is the dominance of rental (NS) movers, rental (NS) origins, and rental (NS) destinations.

(iii) Intra-urban Movement Across the River.

The Waikato River has within this chapter been put forward as a potential barrier to the spatial freedom of movement within the city. To examine the importance of it as such, the method adopted was to take the population of movers who shifted to new residences outside of their home origins physical corridor, and compare the proportion in that population which moved upon their home side of the river with those who moved across the river. Ideally, if the river was a major barrier then it was expected that the bulk of these movers would remain upon their home side of the river. The results of this analysis, however, established that 54 percent of those movers crossed the river, with a slight directional bias in that 58 percent of movers whose origins were upon the westside moved across the river compared to 50 percent for movers whose origins were upon the eastside. Viewed by corridor aggregations (table 2:14) the figures for each corridor

Table 2:12

Residential Mobility within Hamilton: Out-movement by Tenure
Group

Tenure Group

Origin/Destination	Number	Percentage of Total Intra- urban moves	Percentage of Origin Tenure Groups Intra- urban moves
Ownership Existing/ Ownership Existing	130	7.6	38.2
Ownership New	25	1.5	7.4
Rental (NS)	185	<u>10.7</u> (19.8)	<u>54.4</u>
Rental (NS)/ Ownership Existing	266	15.5	20.9
Ownership New	164	9.6	12.9
Rental (NS)	772	44.9	60.7
State	70	<u>4.1</u> (74.1)	<u>5.5</u>
State/ Ownership Existing	26	1.5	24.8
Ownership New	16	0.9	15.2
Rental (NS)	22	1.3	21.0
State	41	<u>2.4</u> (6.1)	<u>39.0</u>
	<u>1717</u>		

Table 2:13

Residential Mobility within Hamilton: In-movement by Tenure
Group

Tenure Group

Destination/Origin	Number	Percentage of Total Intra- urban moves	Percentage of destination Tenure Groups Intra-urban moves
Ownership Existing/ Ownership Existing	130	7.6	30.8
Rental (NS)	266	15.5	63.0
State	26	<u>1.5</u> (24.6)	<u>6.2</u>
Ownership New/ Ownership Existing	25	1.5	12.2
Rental (NS)	164	9.6	80.0
State	16	<u>0.9</u> (12.0)	<u>7.8</u>
Rental/ Ownership Existing	185	10.7	18.9
Rental (NS)	772	44.9	78.9
State	22	<u>1.3</u> (56.9)	<u>2.2</u>
State/ Rental (NS)	70	4.1	63.1
State	41	<u>2.4</u> (6.5)	<u>36.9</u>
	<u>1717</u>		

followed the same pattern. Therefore, there is no support for the river as a major barrier to movement, although it would appear that there is a slightly greater degree of movement from the westside across the river than from the eastside.

(iv) Dispersion of Intra-urban Movement.

The pattern of dispersion for the total population by area typology is displayed in figure 2:12. Here the standard ellipse technique is used as a cartographic device to display lateral and radial dispersion of destination or origin areas from the mean centre of each origin or destination area. The orientation of the ellipse is the alignment of the mean centre of the area and the CBD orientation node.*7 That diagram suggests that for movement out of the origin areas, the least dispersion of destinations is for the 'high economic level old' and the 'rental old' groups, and that the greatest dispersion is exhibited by the two groupings of movement from new housing areas: 'high economic level new' and 'medium economic level new'. Examined by destination areas a similar pattern was found for the dispersion of origin areas between the five groups. However, the problem with that analysis is that a direct comparison between typology groupings is inaccurate, for as described in the criticisms of Brown and Holmes' (1971) measurement of dispersion (Appendix 1), the maximum distance of possible movement from an area is a function of the distance of the reference node from the orientation node. In otherwords an areas distance from the CBD orientation node would be expected to be positively related to the degree of dispersion.

*7 This usage of the standard ellipse technique is different from that of Brown and Holmes' (1971).

Table 2:14

Proportion of Movers who shifted to
Destinations Outside Their Origin
Physical Corridor who Crossed the
River

Mover's Origin	Proportion Who Moved Across the River
Corridor 1	.572
Corridor 2	.536
Corridor 3	.637
Corridor 4	.393
Corridor 5	.513
Corridor 6	.513

DISPERSION OF MOVEMENT
FROM ORIGIN AREAS

DISPERSION OF MOVEMENT
INTO DESTINATION AREAS

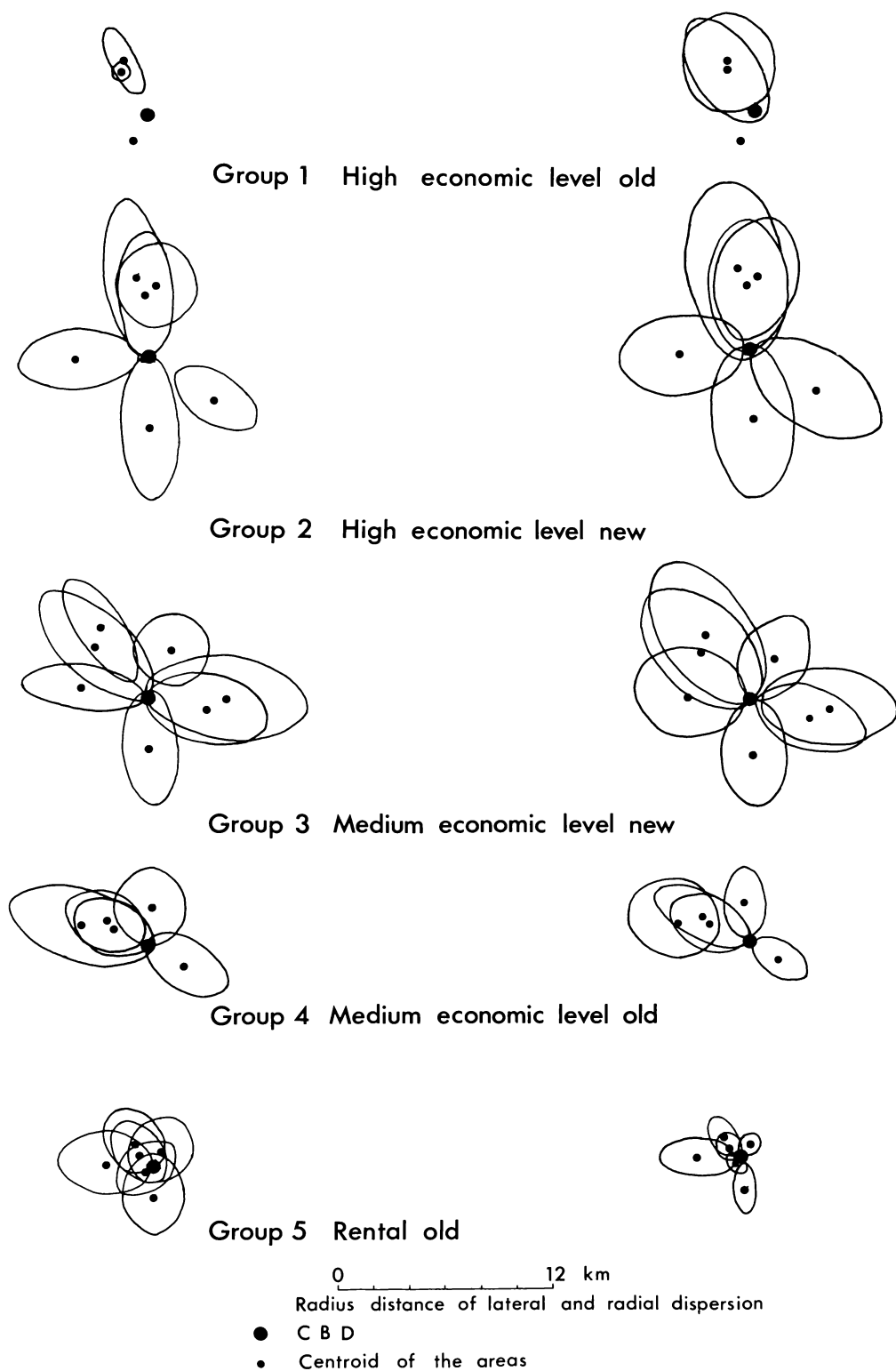


Figure 2:12

Dispersion Of Total Residential
Movement By Typology Groups.

To overcome that problem a system of analysis was developed by which the expected pattern of radial and lateral dispersion is obtained, under the assumption that the destinations of movement are uniformly distributed around the central orientation node. In this calculation the radial distance of the observed destinations from the orientation node were used as the basis for dispersing those destinations uniformly about the city. By establishing a ratio between observed and expected dispersion a basis for comparison between areas is obtained. A ratio of 1 indicates that the observed and expected distribution are similar although not the same, a ratio of less than 1 indicates a degree of clustering and a ratio greater than 1 indicates dispersal beyond that expected (e.g. all destinations or origins on the opposite side of the city) (Appendix 2).

The results from this analysis of 'relative dispersion' established that the ratios of out-movement for each area are close to that of the expected distribution, which indicates a lack of clustering, although not extreme dispersal (table 2:15). Developing this analysis further by testing for the difference between typology groupings, a Kruskal-Wallis ANOVA established that there are significant differences between groups upon all three measures (lateral, and radial dispersion and standard distance). The mean rankings for all three variable indicates that there is a positive relationship between clustering and typology level, therefore, the higher the economic - tenure status of the mover's origin area the less dispersed is their selection of a destination.

A comparison within typology groups between the dispersion of out-movement, displays that for the first three groups the dispersion of out-movement from the areas is less than in-movement, whereas for the last two groups the reverse is the case (figure

Table 2:15

Ratios of Relative Dispersion for Total Intra-Urban Movement from
Origin Areas

Typology Groups	Lateral Dispersion	Radial Dispersion	Standard Distance
<u>1. High Economic Level Old</u>			
Beerescourt *1	.333	.168	.224
Hamilton Lake			
River Road	.493	.634	.609
Mean Rank	1.50	2.50	1.50
<u>2. High Economic Level New</u>			
Dinsdale	.988	.802	.836
Glenview	.844	.996	.972
Chedworth	.934	.546	.645
Queenwood	.849	.927	.916
Chartwell	.786	.930	.902
Riverlea	.749	.603	.630
Mean Rank	8.83	11.16	10.00
<u>3. Medium Economic Level New</u>			
Te Rapa	.883	.921	.914
St Andrews	.630	.713	.700
Livingstone	.691	.894	.860
Melville	.895	.964	.950
Enderley	1.118	.699	.839
Hillcrest	1.049	.878	.915
Silverdale	1.159	.957	.995
Mean Rank	13.85	12.28	12.57
<u>4. Medium Economic Level Old</u>			
Forest Lake	.992	.732	.795
Norton	1.097	.945	.971
Maeroa	.989	.795	.853
Fairfield	.980	.809	.881
Hamilton East	.954	1.107	1.060
Mean Rank	16.60	13.20	13.40
<u>5. Rental Old</u>			
Whitiora	1.014	.957	.976
Frankton	1.092	.880	.938
Hamilton West	1.038	1.088	1.072
Claudlands	1.319	.969	1.133
Hamilton North	.865	1.142	1.031
Central City*2	1.086	1.465	1.292
Mean Rank	19.16	21.16	22.16
Kruskal-Wallis ANOVA Chi-square	11.28	10.90	13.98

Significance value > 9.49 at .05, 4 d.f.

*1 Excluded because a large rental population swamps the typology classification.

*2 Moves from within the CBD.

2:12). This suggests that movers living in the outer areas (i.e. groups 1, 2, and 3) are more likely to move shorter distances than movers moving into those areas, whereas for the inner areas (groups 4 and 5) movers from those areas are more likely to move a greater distance than movers moving into those areas.

(v) Summary.

As an introduction of the mobility patterns within Hamilton the foregoing analyses have established that the greatest volumes and highest rates of out-movement are from the inner city areas. This is the result of rental movers dominating the patterns of movement in terms of volume, and also as the source and destination of moves to and from other tenure groups. Net change is characterised by out-movement from the inner city rental areas and in-movement in the peripheral new housing areas. The high and medium status areas of old housing, which lie between the rental and new housing areas, underwent no major change. Although the river would appear to be potentially a major barrier to the spatial freedom of intra-urban movement, no evidence was found to suggest that it is. Finally, a study of the dispersion of movement established that the higher a mover's origin area's typology status the less dispersed are the mover's destinations.

Chapter 3. Restricted Lateral Movement

Reference to figure 3:1 will show that residential movement within Hamilton is clearly complex, which destroys any pre-conceived notion that sectoral movement is a universal pattern. At first glance that diagram would appear to suggest a random pattern of movement, however, this may be a false impression resulting from the relatively long distance cross-city moves visually distracting from the shorter sectorally constrained moves. To test for the existence of restricted lateral movement within the patterns of residential mobility this chapter examines the first of the three research theses:

'That residential mobility within Hamilton is laterally restricted.'

To do so the chapter is divided up into; a study of sectoral movement, and then because of criticisms relating to the effect of the sectoral construct upon the measurement of lateral movement the patterns are examined independent of any geometric constraints. Finally the topic of movement outside of the home sector is studied for the purpose of aiding the explanation of restricted lateral movement.

Section A Residential Mobility Within the Home Sector

This section upon sectoral movement is divided into two topics, first, the system of sectoral measurement used, and secondly, the results of the analysis of sectoral movement.

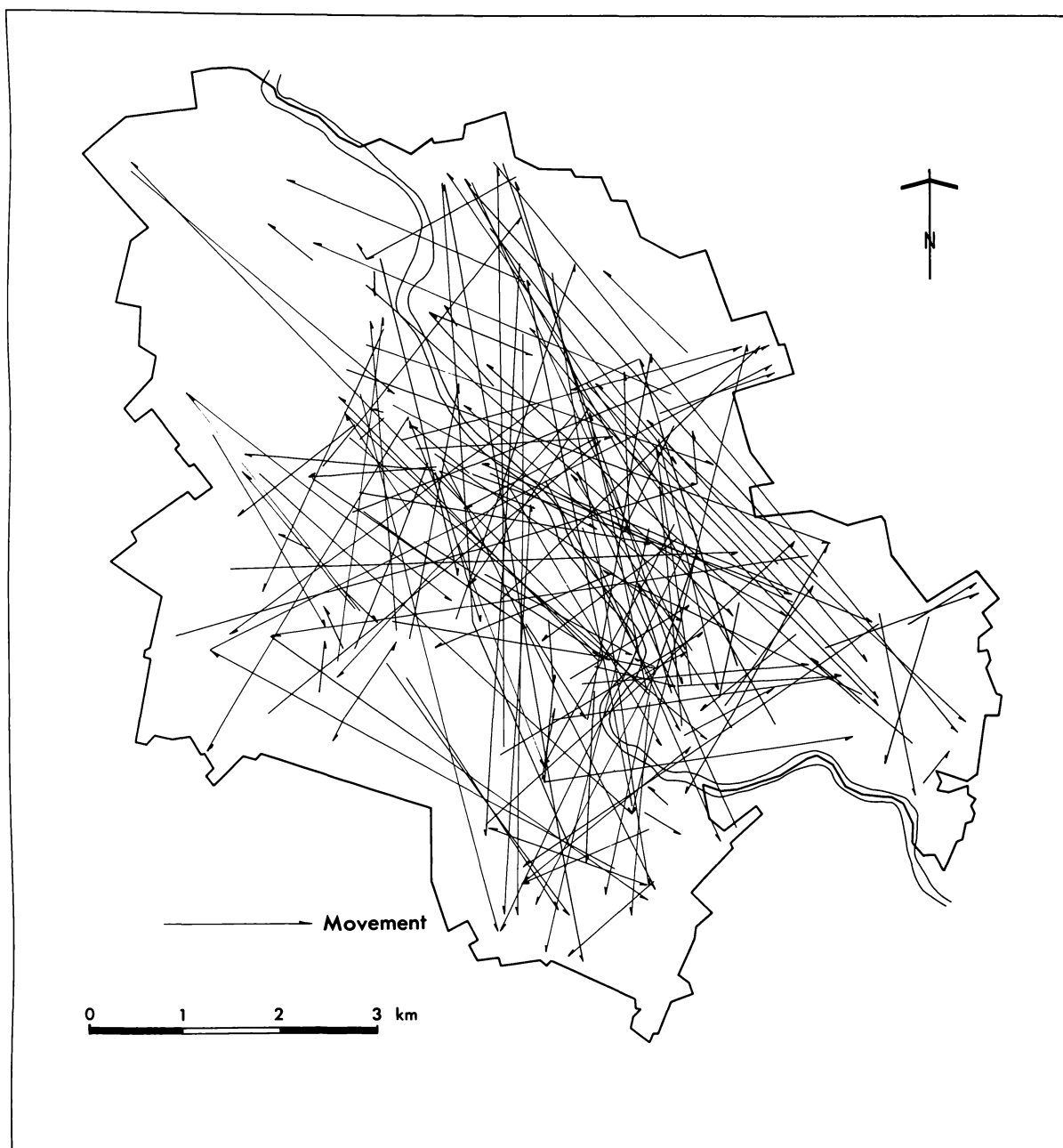


Figure 3:1 Total Residential Movement Within Hamilton, July 1971.

A:1 System of Sectoral Measurement

The method of analysis used within this study is that of 'direct sectoral measurement'. This involves measuring the angle between two axes which link the origin and the destination vacancy with the downtown centre. The width of the home sector is set at 35 degrees, which in the distribution of angles of the total pattern of movement is the major break between sectorally biased movement and that which approximated random movement.*1 To facilitate the measurement of sectoral movement all initial residences (i.e. reference node) were rotated to the common axis, which is based upon the downtown centre (i.e. orientation node), with the destinations (i.e. related node) rotated the same angle so that they retain their relative spatial position to their reference node using the 'Rotate Only' option of the algorithm Transmap (see Appendix 1, discussion on Brown and Holmes' research). So as to determine the degree of sectoral movement within the limit of the home sector the actual distribution of moves was compared with a random distribution of moves represented by a uniform distribution of angles of movement. The method for testing sectoral movement involves the use of a Kolmogorov - Smirnov one sample test, the selection of which was because it meets the requirements of the research and limitations of the data in that the test:

- (i) Takes into account the number of observations in each category.

*1 As stated in Chapter 1 the width of the home sector is arbitrary but must be somewhere between 25 and 45 degrees to approximate a narrow sector. Initially, Chi-square tests and modifications of the Kolmogorov - Smirnov test were tried for the purpose of establishing different sector widths for each tenure group and area. However, these methods of analysis failed to achieve meaningful results.

- (ii) is not affected by the existence of zeroes in a number of categories.

- (iii) That the categories of angles are sequential.

However, as random movement assumes an isotropic surface and an invariant distribution of supply and demand around the orientation node, the finding of a sectoral bias does not prove that this pattern of movement was non-random, for it may be the result of random movement within the vacancy sub-set.*2

The use of the Kolmogorov - Smirnov statistical test involves a series of three separate tests:

- (i) As with Adams' usage of this technique, the distribution of moves over all angles is tested to see if the distribution is biased.
- (ii) Sectorally biased movement is determined by establishing at the outer limit of the home sector if the Kolmogorov - Smirnov value is significantly different from the expected. If the significance level had not been achieved the population is viewed as not sectorally biased.
- (iii) The possibility of non-sectorally biased movement, (i.e. biased movement outside of the home sector) is tested by conducting the same test upon all moves outside the home sector, where the expected frequency of moves remained the same as for tests 1 and 2. However, the existence of this bias is extremely unlikely as any other general bias will be at different angles to each mover's origin.

*2 Note that the role of the city's shape as the cause of sectoral movement has been discounted in Chapter 2.

To illustrate this system of analysis figure 3:2 presents a series of four examples, in which all distributions were found to be biased (test 1). In testing for sectoral movement (test 2) the home sector limit was set at 35 degrees, and all but example 2 were found to have sectorally biased movement. Tests for non-sectoral bias (test 3) established that pattern only for example 2. Finally, in comparing movers each tenure sub-division's and area's proportion of sectoral movement concern centred upon the different number of observations within each population, therefore, a two sample proportions test is used. As stated by Blalock (1960, p. 176) 'a difference between two proportions can be treated as a special case of a difference between two means'. The advantages of the test are that it:

- (i) Is based upon a dichotomised variable.
- (ii) Includes the number of observations within the analysis.

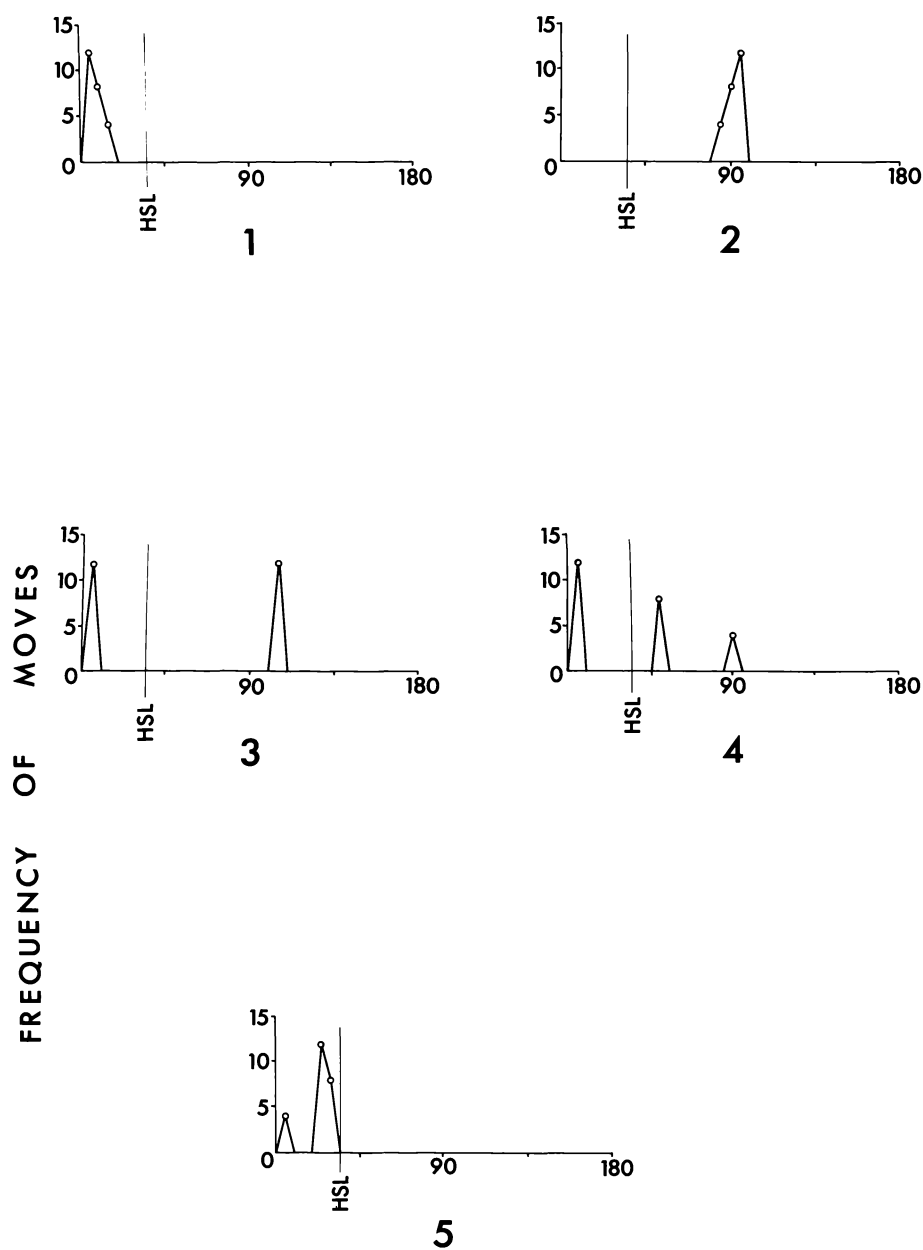
A:2 Results of the Analysis of Sectoral Movement

The distribution of angles of movement within Hamilton for the total population, the four major and eleven lower level tenure groups are presented in figures 3:3, 3:4. Discussion of those patterns of movement is divided up into three topics using those three divisions. Finally, the topic of the spatial patterns of sectoral in-movement and out-movement for each of the 26 areas is discussed.

a. Degree of Movement within the Home Sector.

1. Total Population.

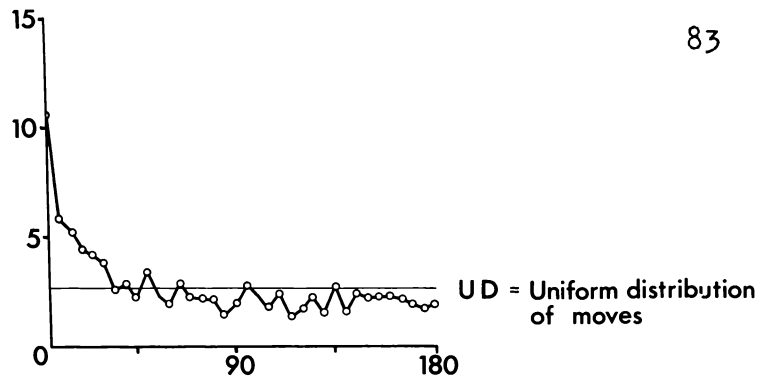
For the total pattern of intra-urban movement 38 percent of movers' destinations were within their home sector, compared with



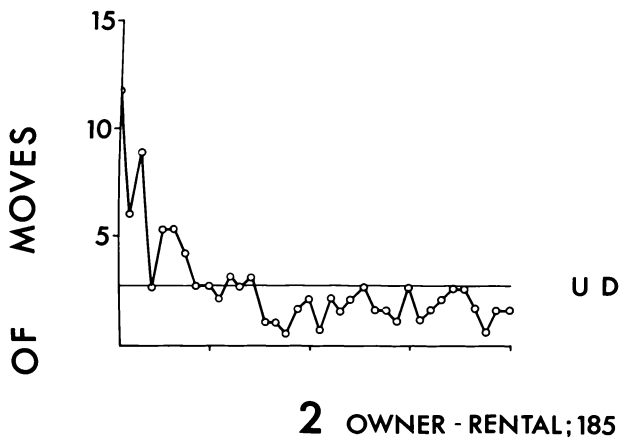
GROUPED ANGLES OF MOVEMENT

HSL = Home sector limit

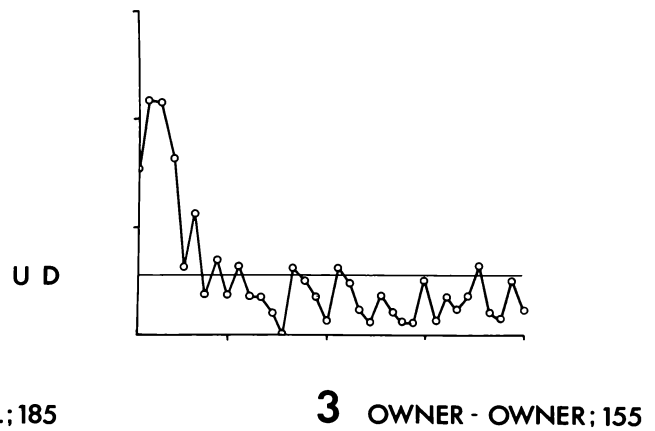
Figure 3:2 System Of Testing For Sectoral And Non-Sectoral Biased Movement.



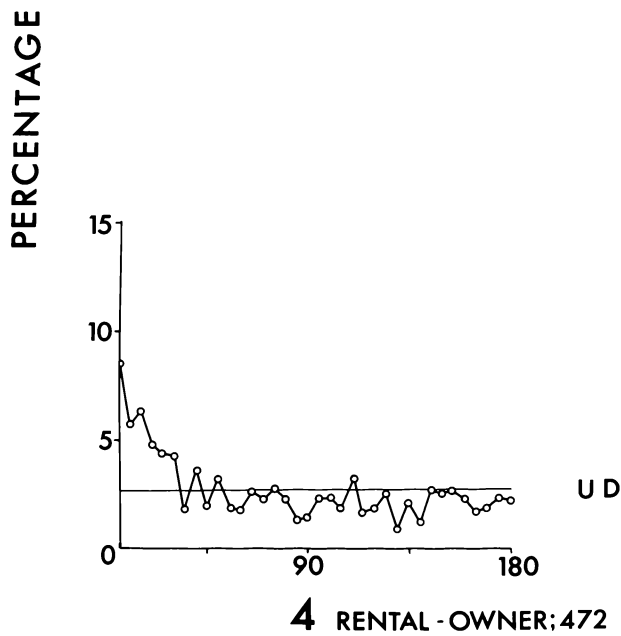
1 TOTAL ; 1717 ; NUMBER OF MOVES



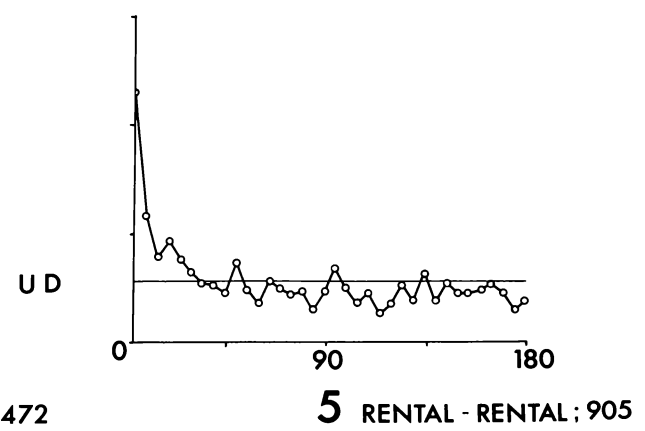
2 OWNER - RENTAL ; 185



3 OWNER - OWNER ; 155



4 RENTAL - OWNER ; 472



5 RENTAL - RENTAL ; 905

UNSIGNED ANGLE OF MOVEMENT

Figure 3:3 Angles Of Movement From Home Origin, For The Total Population And The Four Major Tenure Groups.

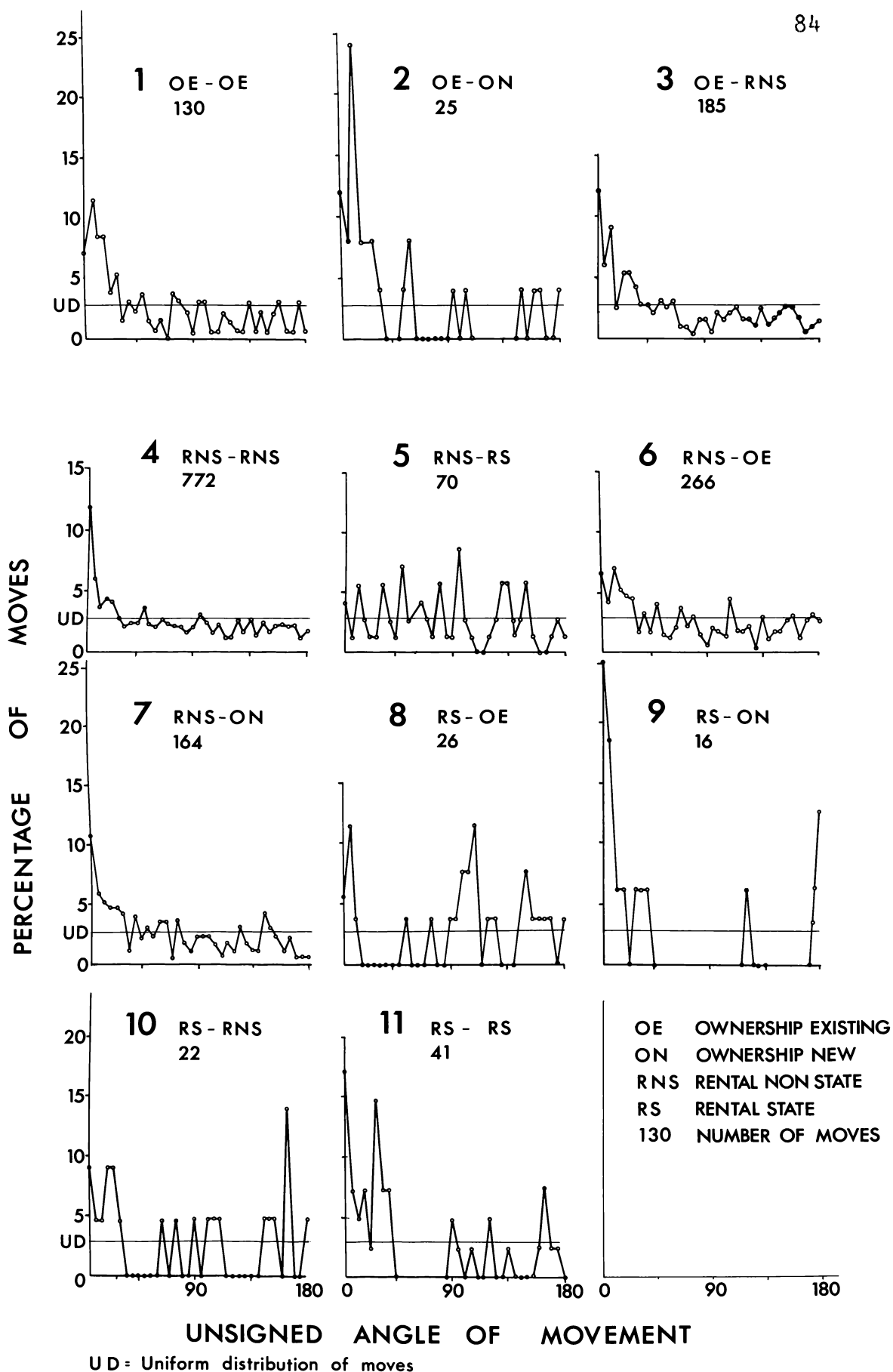


Figure 3:4 Angles Of Movement From Home Origin, For The Eleven Lower Level Tenure Groups.

19 percent under a uniform distribution of moves. This difference between the observed and the expected patterns established a significant sectoral bias at the .05 significance level (table 3:1). However, the test for non-sectoral bias failed to establish that pattern, nor was it found for any tenure sub-division or area.

2. Four Major Tenure Groups.

All four groups' patterns of movement were sectorally biased (table 3:1). However, the degree of sectoral movement varied between movers from ownership and rental property, in that owners had a much higher propensity to move within their home sector. This pattern is clearly shown in the statistical tests between the tenure groups, where 'Ownership to Rental' and 'Ownership to Ownership' movers are significantly different than 'Rental to Rental' movers, and 'Ownership to Ownership' is significantly different than 'Rental to Ownership', but similar between groups with the same type of origin (table 3:2). A further pattern appears to be the narrow distribution of 'Rental to Rental' angles of movement within their home sector compared with the greater dispersion for 'Ownership to Ownership' movement (figure 3:3). This pattern suggests that members of the rental population are not only less likely to move within their home sector but if they do their movement will be very close to their initial residence in terms of lateral dispersion.

3. Eleven Lower Level Tenure Groups

Three tenure sets were found not to have sectorally biased patterns of movement, and all three involved State Housing (table 3:3). These were:

- (i) 'Rental (NS) to State'.

Table 3:1Percentage of Moves Within Home Sector: Four Major Tenure Groups

	Number	Percentage of Moves Within Home Sector
Total Population	1717	37.8
<u>Tenure Groups</u>		
Ownership to Rental	185	42.2
Ownership to Ownership	155	49.7
Rental to Ownership	472	35.6
Rental to Rental	905	35.1

All Sectorally Biased at .05 Level.
Kolmogorov-Smirnov One Sample Test (Test 2).

Table 3:2Comparative Tests Upon Proportions of Sectoral Movement Between
Four Major Tenure Groups

Z Values, Unsigned				
Tenure Groups	Ownership to Rental	Ownership to Ownership	Rental to Ownership	Rental to Rental
Ownership to Rental	----	1.381	1.575	1.829*
Ownership to Ownership		----	3.119*	3.459*
Rental to Ownership			----	0.179
Rental to Rental				----

* Significantly Different at .05 level.
Two Sample Proportions Test.

Table 3:3**Percentage of Moves Within Home Sector : Eleven Lower Level Tenure Groups**

Tenure Groups	Number	Percentage of Moves Within Home Sector
Origin/Destination		
Ownership Existing/		
Ownership Existing	130	46.1
Ownership New	25	63.9
Rental (NS)	185	42.2
Rental (NS)/		
Ownership Existing	266	34.5
Ownership New	164	37.8
Rental (NS)	772	35.1
State	70	----
State/		
Ownership Existing	26	----
Ownership New	16	68.7
Rental (NS)	22	----
State	41	60.9

---- No Sectoral Bias at .05 level.
 Kilmogorov-Smirnov One Sample Test (Test 2).

(ii) 'State to Ownership Existing'.

(iii) 'State to Rental (NS)'.

The explanation for these patterns is that State Houses are limited to a restricted area, therefore, the choice of where to move is not strictly a free one. However, the 'State to Ownership New' and 'State to State' housing moves have extremely high rates of sectoral movement. This is attributed to the location of new State Housing blocks within the new low cost group housing suburbs, and that movement within the State Housing vacancy set is restricted by the spatial structure of State Housing blocks. Very high proportions of sectoral movement were also found for movement from ownership property, with movement to new dwellings higher than that to existing dwellings. But comparatively low proportions of sectoral out-movement were established for rental (NS) property. Finally statistical tests between the tenure groups of origins and destinations repeat the results at the higher level of aggregation, in that movers from ownership property have a greater degree of sectoral out-movement than rental movers (table 3:4), whereas tests based upon destination groups established no underlying pattern (table 3:5).

b. Spatial Pattern of Sectoral Movement.

1. Movement from Origin Areas.

The northern two corridors of the city (corridors 1 and 4) contain areas with very high proportions of sectorally constrained movement (figure 3:5a), which may be explained by that being the high class sector of the city. To examine the role of economic status upon sectoral movement a Kruskal - Wallis ANOVA was conducted upon the typology grouping of areas. For the analysis,

Table 3:4

Comparative Tests Upon Proportions of Sectoral Movement Between
Eight Lower Level Tenure Groups, Presented by Tenure of Origin
Groupings

Tenure Groups	Z Values, Unsigned							
	OE/ OE	OE/ ON	OE/ RNS	RNS/ OE	RNS/ ON	RNS/ RNS	ST/ ON	ST/ ST
OE/OE	----	1.630	0.140*	2.407*	2.226*	1.433	1.707*	1.652*
OE/ON		----	1.755*	2.953*	2.908*	2.469*	0.316	0.243
OE/RNS			----	2.575*	2.259*	1.417	1.798*	1.809*
RNS/OE				----	0.691	0.176	2.760*	3.243*
RNS/ON					----	0.655	2.402*	2.676*
RNS/RNS						----	2.774*	3.346*
ST/ON							----	0.548
ST/ST								

* Significantly Different at .05 level.
Two Sample Proportions Test.

Table 3:5

Comparative Tests Upon Proportions of Sectoral Movement Between
Eight Lower Level Tenure Groups, Presented by Tenure of Destination
Groupings

Z Values, Unsigned								
Tenure Groups	OE/ OE	RNS/ OE	OE/ ON	RNS/ ON	ST/ ON	OE/ RNS	RNS/ RNS	ST/ ST
OE/OE	----	2.226*	1.630	1.433	1.707*	0.140	2.407*	1.651
RNS/OE		----	2.908*	0.691	2.760*	2.259*	0.176	3.243*
OE/ON			----	2.469*	0.316	1.754*	2.953*	0.243
RNS/ON				----	2.402*	1.417	0.655	2.676*
ST/ON					----	1.798*	2.774*	0.548
OE/RNS						----	2.575*	1.809*
RNS/RNS							----	3.346*
ST/ST								----

* Significantly Different at .05 level.
Two Sample Proportions Test

based upon the 19 areas which had sectoral biased movement^{*3}, a significant difference was established ($9.82 > 9.49$ at the .05 level, 4 d.f.) in which the mean rankings of groups displayed a positive relationship between the typology level and sectoral movement (table 3:6). A second pattern related to that finding is the increase in sectoral movement as distance from the downtown centre increases (figure 3:5a). The reason for this will be developed later, but in summary it appears to relate to the limitations on lateral movement resulting from the use of a sectoral structure in measuring lateral movement.

2. Movement into Destination Areas.

The only regularity observed is that, in general areas distant from the CBD have higher proportions of sectoral movement (figure 3:5b). The reason suggested is the same as that given for movement from origins, the use of a sectoral structure in measuring lateral movement. The Kruskal-Wallis ANOVA between groups failed to establish a significant difference ($0.34 < 7.82$, at the .05 level, 3 d.f.).

c. Summary.

From the foregoing analysis it has been established that for movement within Hamilton a general pattern of sectorally biased movement does exist. Of the eleven tenure divisions all but three have sectorally biased patterns of movement, although only three exceed 50 percent. Movers from ownership property have a higher

*3 The few areas which did not have a sectoral pattern were regarded as special cases whose inclusion would have biased the results.

Table 3:6

Percentage of Moves Within Home Sector by Typology Groups

Typology Groups	Sectoral Movement	
	From Origin Areas	Into Destination Areas
1. High Economic Level Old		
Beerescourt *1	100.0	---
Hamilton Lake		
River Road	100.0	---
Mean Rank	18.5	
2. High Economic Level New		
Dinsdale	---	34.1
Glenview	34.9	---
Chedworth	59.9	49.9
Queenwood	---	---
Chartwell	49.9	35.9
Riverlea	66.6	43.4
Mean Rank	12.7	9.00
3. Medium Economic Level New		
Te Rapa	---	75.0
St Andrews	61.6	46.1
Livingstone	---	40.7
Melville	38.6	35.8
Enderley	47.4	30.7
Hillcrest	37.7	38.7
Silverdale	---	53.8
Mean Rank	10.7	10.6
4. Medium Economic Level Old		
Forest Lake	43.1	47.4
Norton	---	50.0
Maeroa	41.9	---
Fairfield	41.0	34.6
Hamilton East	34.2	38.1
Mean Rank	8.5	10.7
5. Rental Old		
Whitiora	29.8	60.8
Frankton	34.1	37.8
Hamilton West	---	43.2
Claudelands	25.9	25.1
Hamilton North	37.6	---
Central City	48.2	---
Mean Rank	5.0	9.3

*1 Excluded because a large rental population swamps the typology classification.

--- No Sectoral Bias at .05 level.

Kolmogorov-Smirnov One Sample Test (Test 2)

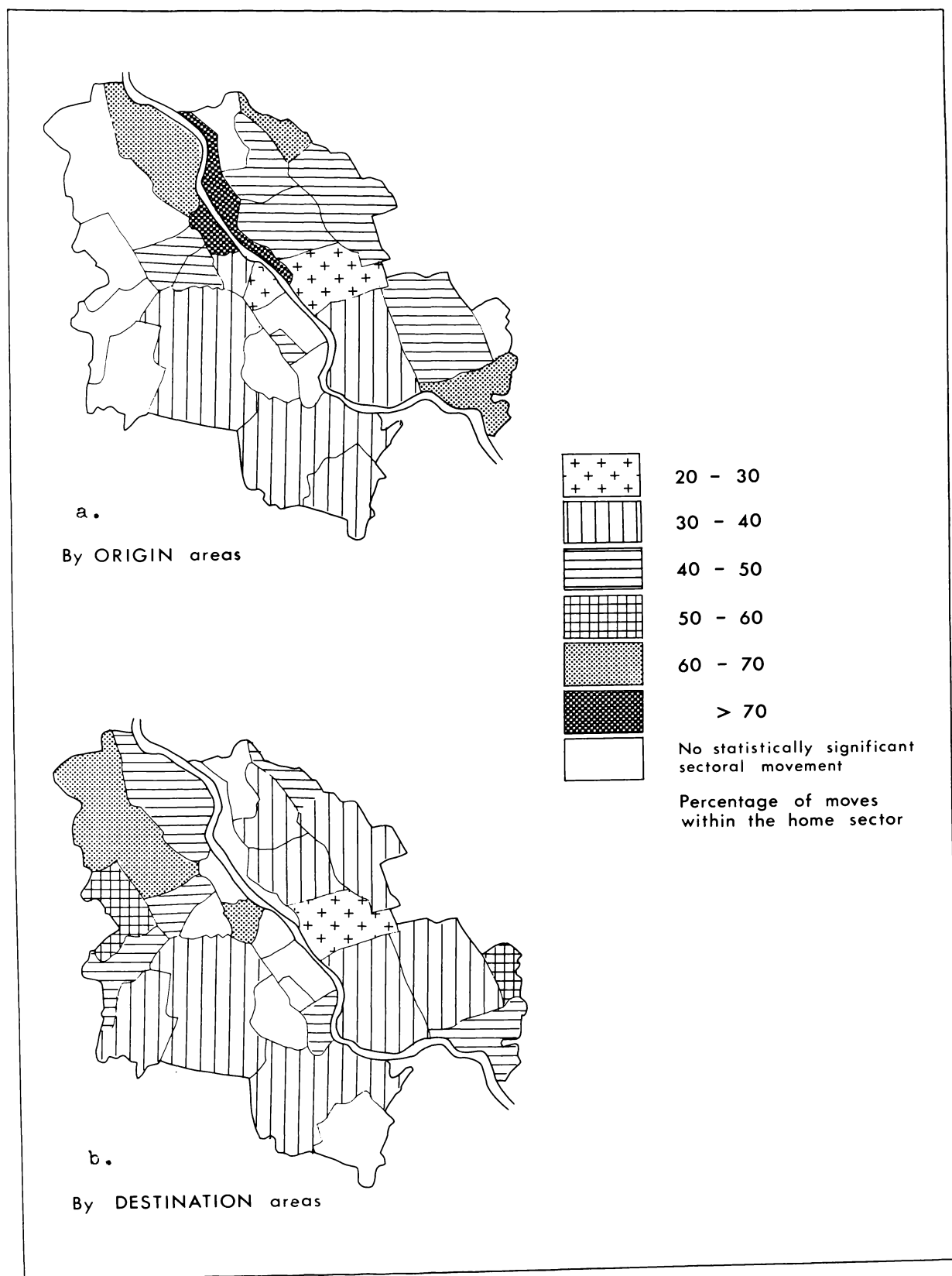


Figure 3:5 Distribution Of Sectoral Movement.

propensity to move within their home sector than movers from rental property. This latter finding, however, raises the concern that a sector used to measure restricted lateral movement falsely constrains inner city lateral movement. Also there is a positive relationship between the economic status of an area and sectoral movement.

Section B Criticism of the Sectoral Measurement Concept

The basic problem with the usage of the geometric form of a sectoral wedge is that it places unrealistic constraints on a person's length of laterally constrained movement, for the maximum degree of lateral movement is a function of the distance the initial residence is from the downtown centre. To illustrate this, given a 35 degree (unsigned) home sector, a person living 400 metres from the city centre (orientation node) has a maximum lateral distance of movement of 77.8 metres, compared with 155.6 metres at 800 metres, or 311.2 metres at 1.6 kilometers. This disparity in lateral movement is particularly important in this study, where people live within 400 metres of the city centre or as distant as 5.0 kilometers.

To examine the question of the form of lateral movement four analyses were conducted, in which for the first three the data matrix is limited to moves within the origin half of the city (i.e. a base line at 90 degrees from the common axis).

The first of these analyses of the form of lateral movement examines the lateral distance of destinations from the common axis by grouping all move destinations into 200 metre radial distance groups from the orientation node (i.e. downtown centre) and computing the mean and standard deviation of lateral movement for

each group. Figure 3:6 presents the results of this analysis, where the means and standard deviations (which were added to the means) give little support to the expected sectoral wedge shape based upon the downtown centre, but rather a corridor approximately 2 kilometers wide. The spatial form of lateral movement for 'Ownership to Rental' movement is an inverted wedge shape with a wider base close to the orientation node, due primarily to the inner city dispersal of dwellings as a result of non-residential functions (figure 3:7). 'Ownership to Ownership', 'Rental to Ownership', and 'Rental to Rental' moves form more of a corridor, although for 'Ownership to Ownership' an inner city sectoral dispersion is again evident. From this set of analyses, therefore, there is little support for the notion that at an aggregate level lateral movement takes the form of a sectoral pattern based upon the city centre.

The second test examines lateral movement from the origin of the move, where it was expected that radial movement towards the periphery would exhibit a sectoral form. Furthermore, it may be that the position of a person's initial residence in terms of radial distance from the city centre effects this propensity to move sectorally. To examine both of these suggestions the lateral movement was analysed by firstly dividing the total data set into ten groups based upon the distance that the origin residence was from the orientation node (i.e. the downtown centre). Each group was of move origins within a 400 metre zone, and for these groups a polynomial regression line was fitted to the means of lateral movement.*⁴ However, only those means based upon more than five

*⁴ The polynomial regression curve selected had a maximum 4 k order polynomial. The purpose in using this analysis system was simply to display the major regularities in the patterns of lateral movement.

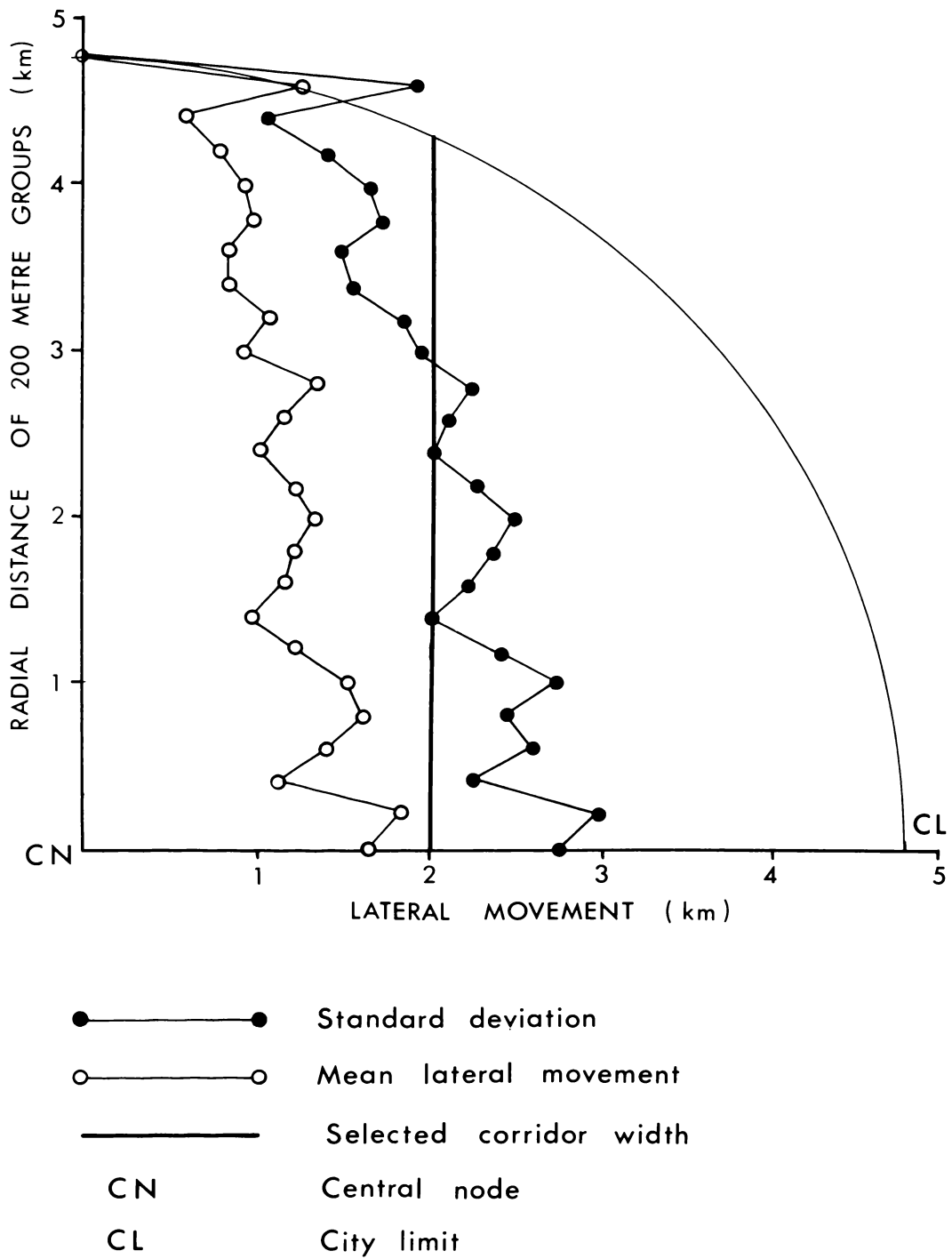


Figure 3:6 Distances Of Lateral Movement For The Total Population Of Movers.

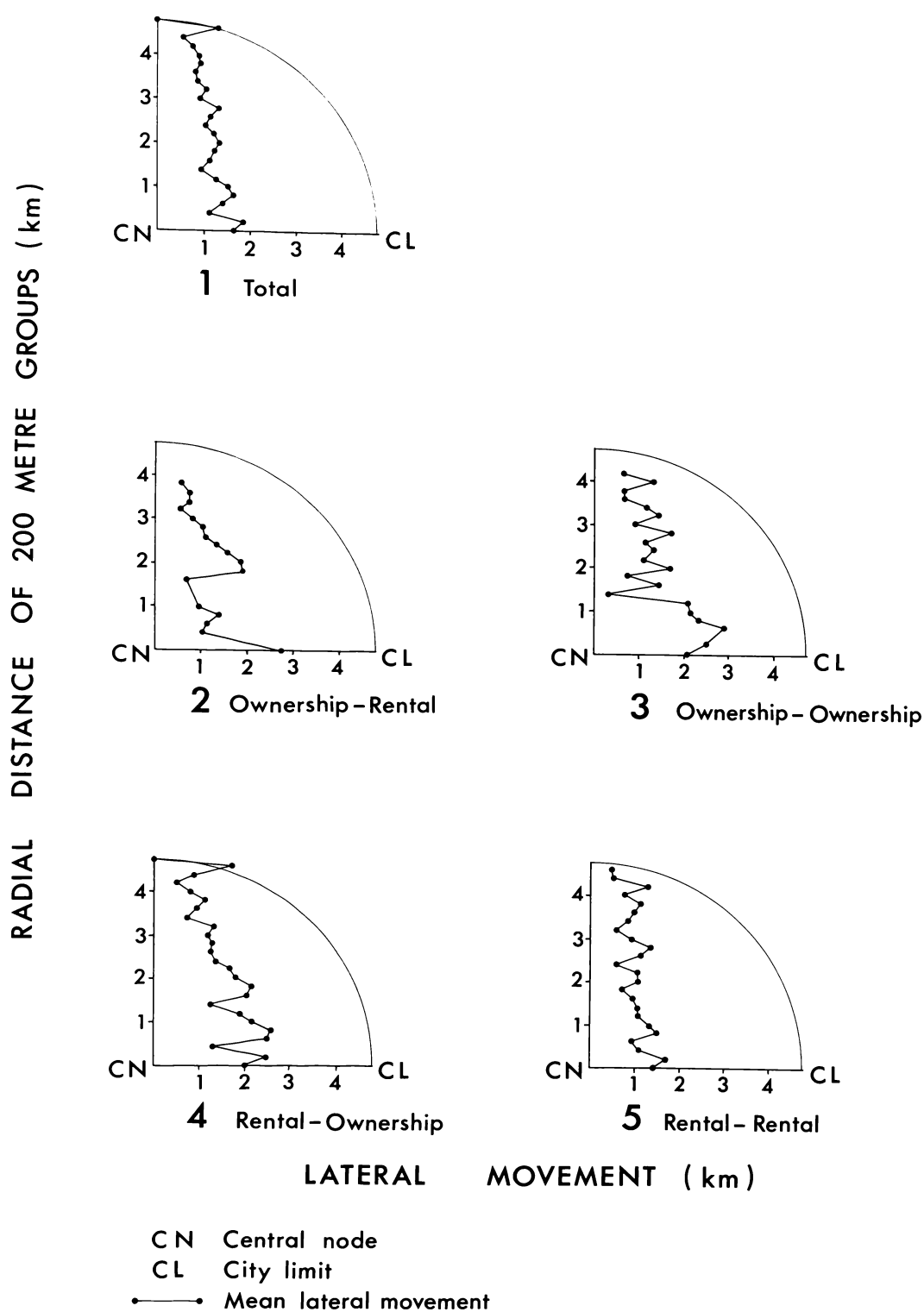


Figure 3:7 Mean Distances Of Lateral Movement For The Total Population And The Four Major Tenure Groups.

moves per category were included. From figure 3:8 there is for the first 1200 metres from the city centre and again at the 2000 metre group a strong tendency for sectoral movement outwards. But for the other seven groups no pattern of sectoral movement outwards exists, and the dominant trend is the reverse, a sectoral form inwards. As the first three categories account for less than 40 percent of all moves, there is only limited support from this analysis for the sectoral movement concept.

Because of the limitation set by the number of observations within each tenure division, the above set of analyses could not be conducted at the level of the tenure groups. Instead the third set of analyses is based upon the distance of lateral movement within the home area, outwards and inwards. The home area was defined as the 400 metre radial distance zone in which the origin is located (i.e. the same zones as used in the previous analysis). Figure 3:9a and b present the results of that analysis in which two measures of movement are given:

- (i) Unsigned mean distance of lateral movement outwards, within the home area, and inwards; given by the length of each of the three horizontal lines from the centre mark.
- (ii) Proportion of movement outwards, within the home area, and inwards.

For the total population, out-movement and in-movement have very similar mean distances of lateral movement, which reflects the general corridor pattern established in the previous analysis. This is reinforced by the relative balance in the proportions of out-movement and in-movement from the movers' origins. Similar patterns of corridor movement were established for 'Ownership to Rental' and 'Rental to Rental' movers, although the bulk of

RADIAL DISTANCE BY 400 METRE GROUPS (km)

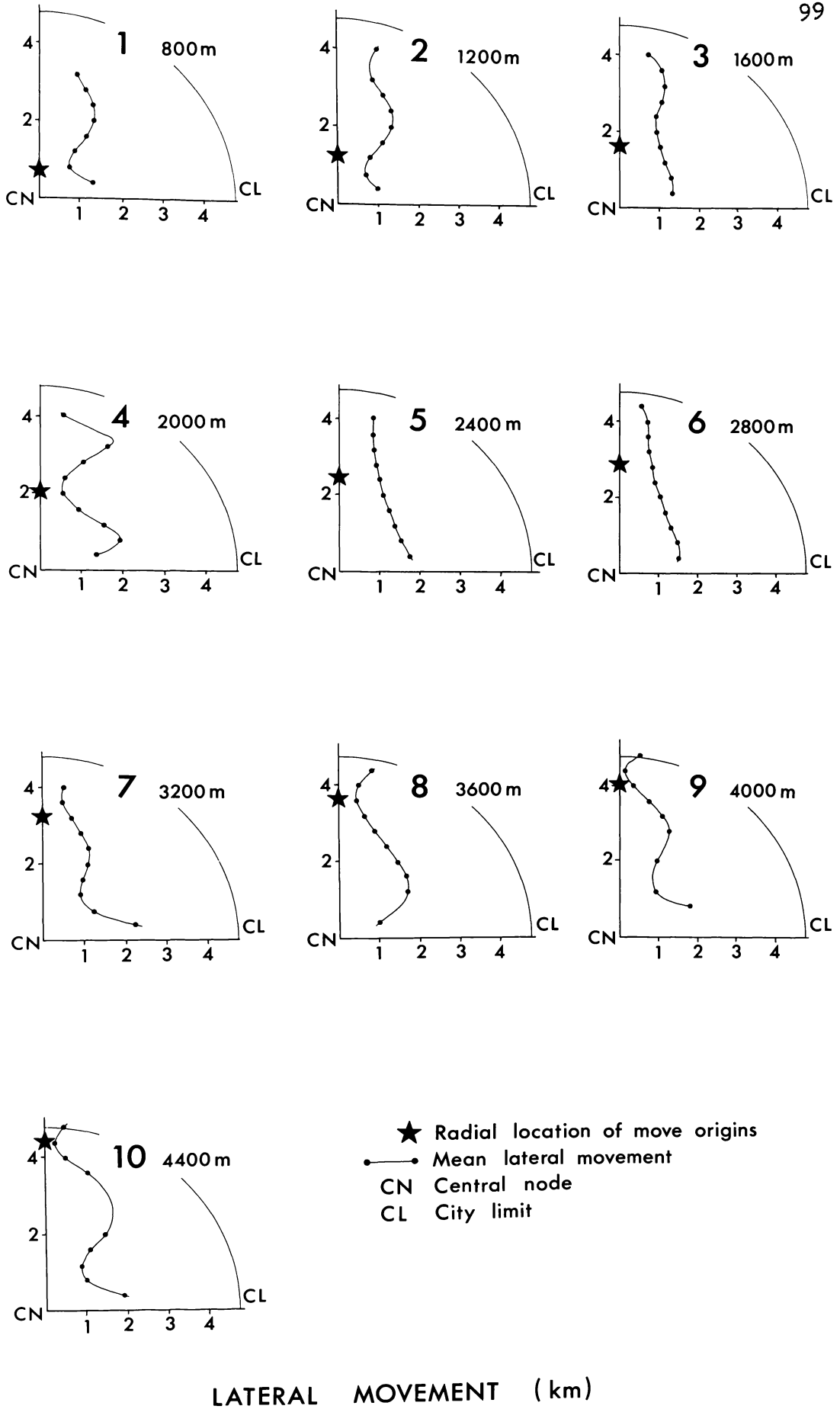


Figure 3:8

Mean Distance Of Lateral Movement For The Total Population By Radial Distance Groups Of Origins.

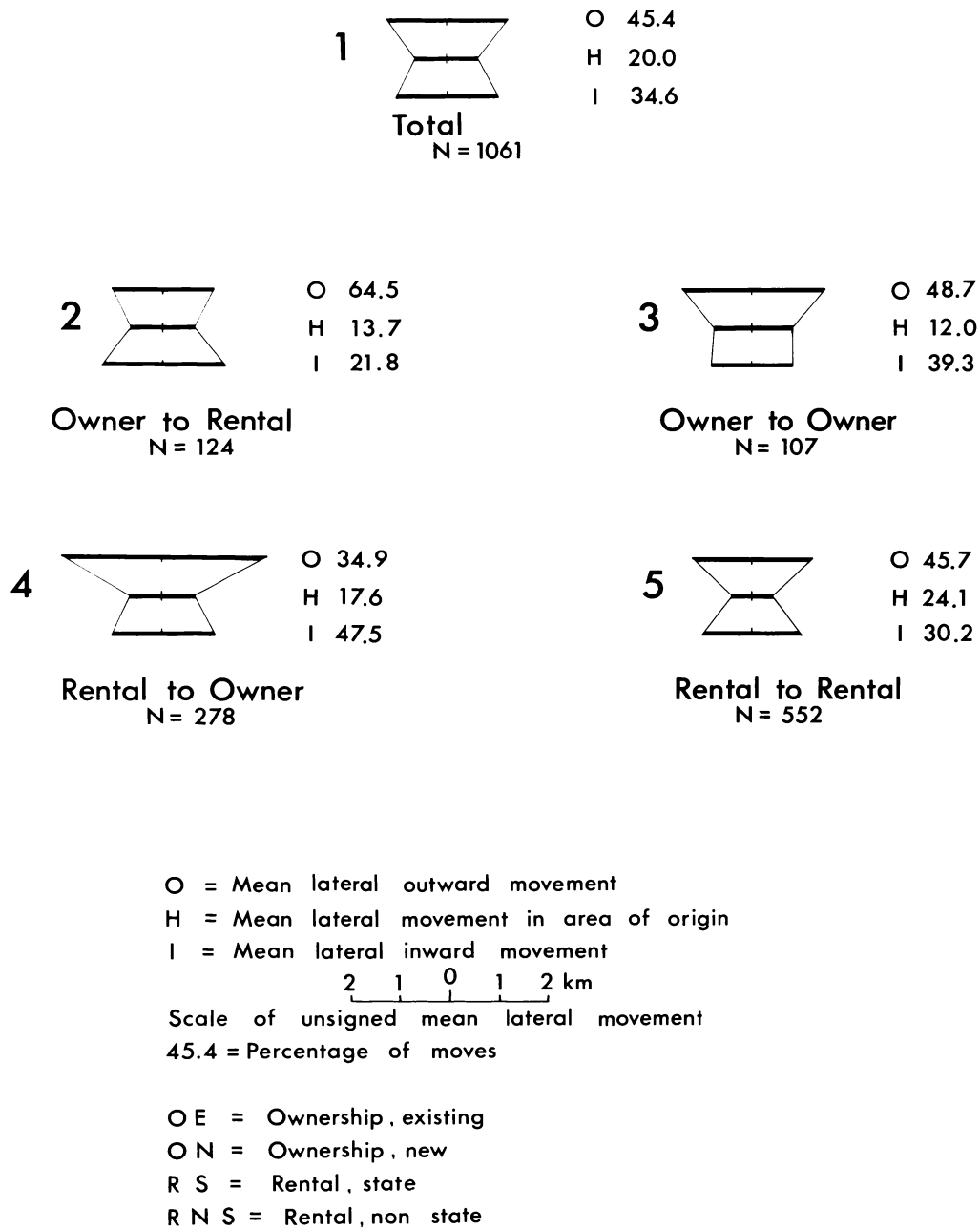
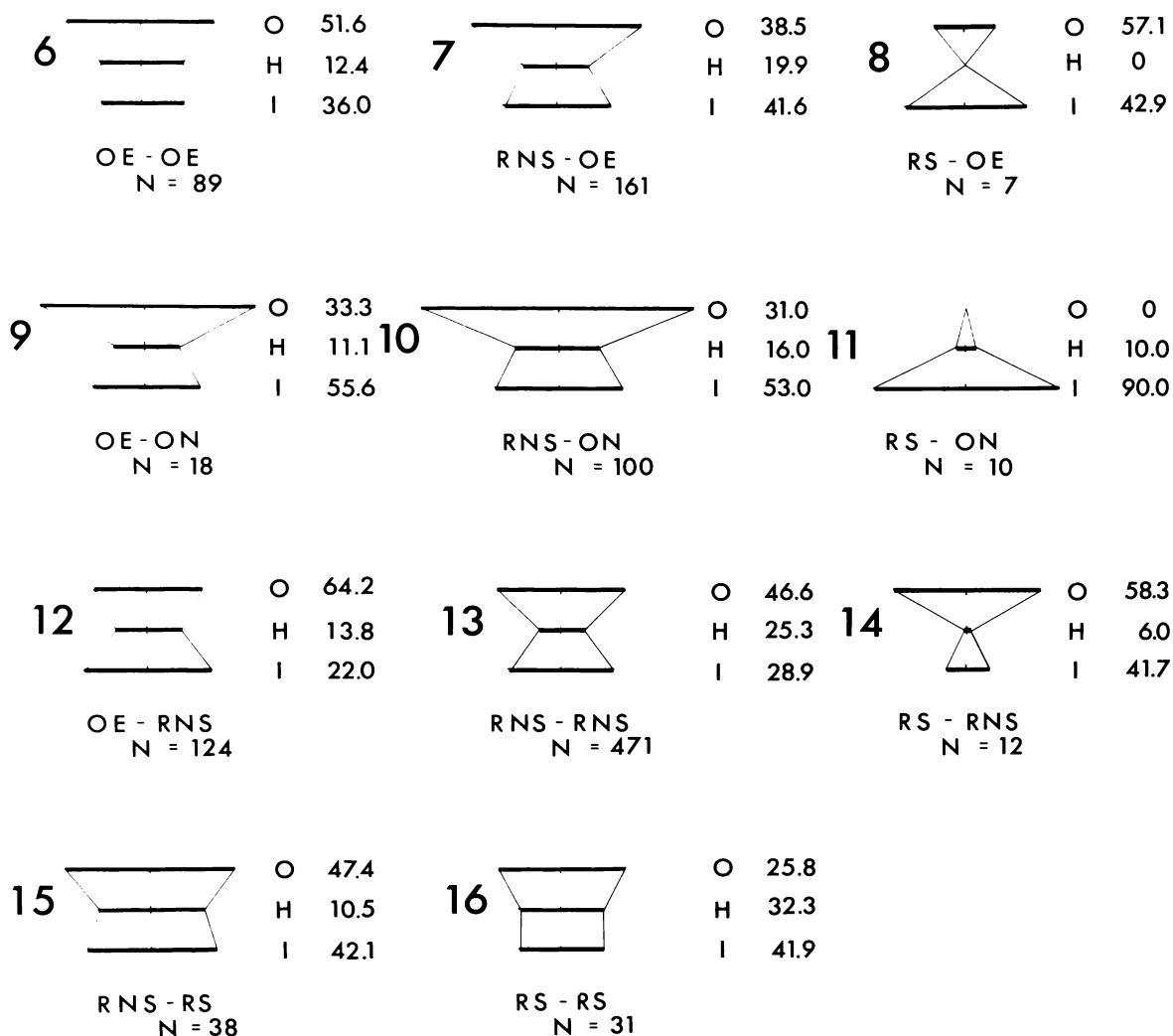


Figure 3:9a Mean Lateral Movement, Outwards And Inwards From The Home Origin, For The Total Population And The Four Major Tenure Groups.



O = Mean lateral outward movement
 H = Mean lateral movement in area of origin
 I = Mean lateral inward movement
 2 1 0 1 2 km
 Scale of unsigned mean lateral movement
 45.4 = Percentage of moves

OE = Ownership, existing
 ON = Ownership, new
 RS = Rental, state
 RNS = Rental, non state

Figure 3:9b

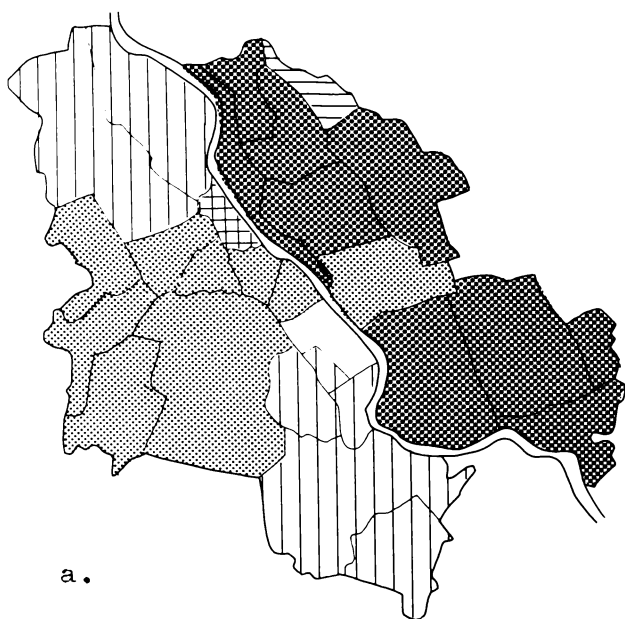
Mean Lateral Movement, Outwards And Inwards
 From The Home Origin, For The Eleven Lower Leven
 Tenure Groups.

'Ownership to Rental' movers moved to destinations at greater distance from the downtown centre. The sectoral pattern is, however, more evident in the ownership destination groups, but again for those groups it would be better to describe the movement by a corridor form due to the proportion of moves inwards. Divided into the lower levels of tenure, support for the form of sectoral movement outwards was established for only three of the eleven groups: 'Ownership Existing to Ownership New', 'Rental (NS) to Ownership New', and 'State to Rental (NS)'. But even here support cannot be given for the sectoral form as for the first two the majority of movers moved inwards, and for the third group the number of observations were too small to generalise. Therefore, the failure of this study to establish evidence of a strong sectoral pattern of movement further supports the argument that it is unrealistic to impose the geometric constraints of a sector upon the measurement of restricted lateral movement within Hamilton.

The fourth method of examining lateral movement centred on establishing whether areas which are spatially contiguous are interlinked into localized regions of movement, although there is the possibility that areas may be linked within a hierarchical framework of movement to better areas. To overcome the limitations of sample size in establishing the interconnectivity between areas a method of computation termed a generated interconnectivity matrix was developed (Appendix 3). The resulting profiles of the interconnectivity matrix for each area were then grouped, using the HGROU algorithm. As with its previous usage the major break in the error term resulted in the selection of five groups for the movement from origins and four groups for movement to destinations. Figure 3:10a displays the results of that analysis of moves from origin areas which supports the notion that the linkages form

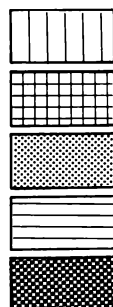
groupings of contiguous areas and not a hierarchical structure. However, that structure is not as clearly localized as expected, for upon the westside one group is split into two, and the eastside forms almost one continuous group. Movement into destinations (figure 3:10b), however, more clearly divides the westside into three groups, whereas on the eastside only the areas of River Road, Claudelands and Hamilton East disrupt the obvious eastside grouping. At the two group level (figure 3:11) the analysis of movement to both origins and destinations is clearly divided into an eastside-westside division, which emphasises the river as a barrier to movement, although as has already been shown in Chapter 2 it is in no way a major barrier. An explanation for the existence of a clear split into three sectors of movement on the westside and unclear divisions on the eastside appears to lie in the internal road networks of the city and the position of the CBD upon the westside. Rooding on the westside is divided into three principal arterial radial routes based upon the CBD; north to Auckland, west to Raglan, and south to Te Awamutu and Te Kuiti. The eastside's rooding pattern is one of four internal arterial routes which run parallel to the river; River Road, Grey - Heaphy - Bankwood roads, Galloway - Peachgrove - Hukanui roads, and Tramway road. However, at a much lower level than for the westside groupings, the eastside can be divided into three groups, giving a northern, central, and southern grouping of areas upon both sides of the river. These divisions are termed the six physical corridors of intra-urban movement (figure 2:2).

The results of these four studies suggest that the sectoral framework for measuring the degree of lateral movement should be replaced. However, in selecting a method it is necessary that it be able to exclude movement across to the other half of the city,



By ORIGINS

5 groups



Group. 1

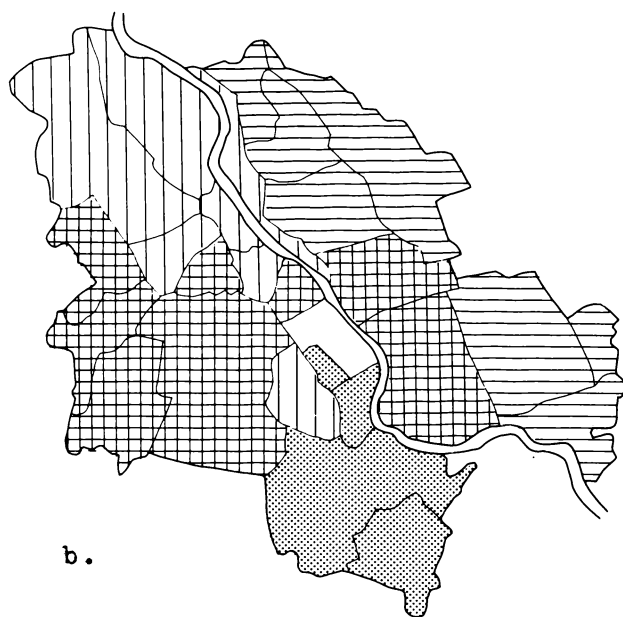
Group 2

Group 3

Group 4

Group 5

HGROUP groupings



By DESTINATIONS

4 groups

Figure 3:10 Inter-Area Movement Interconnectivity.



Figure 3:11 Inter-Area Movement Interconnectivity At The Level Of Two Groups.

for that movement is not considered laterally restricted irrespective of the distance of the move. One possible suggestion is that a distance decay function based upon the home origin be used. But an important stumbling block to using that approach is the un-determinable ratio between lateral and radial movement, in that in some areas movers shifting towards the periphery of the city are forced to jump long radial distances over stable areas, while in other areas they are not. It would appear that the best structure to use in measuring restricted lateral movement is a corridor, based upon the orientation node and running parallel to and on both sides of the common axis. The major problem, however, with this construct is the width of the corridor to use. Reference to figure 3:6 will indicate that a corridor width of 1.2 kilometers incorporates the bulk of the means of lateral movement, but a 2 kilometer corridor intuitively was more acceptable in that it allows for movers in the six physical corridors to move within their home physical corridor. However, another problem in accepting a corridor form is that at greater radial distances than five kilometers from the downtown centre it can also become a restrictive construct upon lateral movement. In larger cities probably a corridor which develops into a sector would be the best measurement construct.*5

The actual proportion of the total moves expected within the 2 kilometer home corridor was 33 percent, compared to 19 percent for the sectoral construct. Therefore, marked increases in the proportion of restricted lateral movement between the two systems

*5 It could be argued at this point that the above argument is tautological in that the sector form has not been found to provide a good measure of restricted lateral movement, but that a corridor does, therefore, we have corridor movement. This is not so in that the topic still remains restricted lateral movement and only the method of measurement has changed.

of measurement were expected, although this was expected to be limited to the inner city areas. With the exception of Glenview (figure 3:12) this pattern was established, and the actual differences (table 3:7) display substantive increases of biased movement for the inner areas of Whitiora, Hamilton North, and Claudelands. The tenure groups also display related changes, with the increases for inner city rental destinations much larger than those for ownership destinations (table 3:8). A clearer set of results were obtained for eight of the eleven lower tenure divisions, in that 'Ownership Existing to Ownership New' and 'Rental (NS) to Ownership New' did not have a significant increase, whereas 'Ownership Existing to Rental (NS)', and 'Rental (NS) to Rental (NS)' did.

Section C Residential Mobility Within the Home Corridor

As with the study of sectoral movement this section is divided into two topics, first, the system of corridor measurement used, and secondly, the results of the analysis of corridor movement.

C:1 System of Corridor Measurement

Following the same procedure as used in the sectoral movement statistical tests patterns of corridor movement were tested for:

- (i) The existence of a biased distribution lateral movement.
- (ii) Corridor bias.
- (iii) Non-Corridor bias.

To conduct these analyses the home half of the city was divided into thirteen lateral distance categories each 400 metres wide, and similarly thirteen lateral distance categories upon the opposite

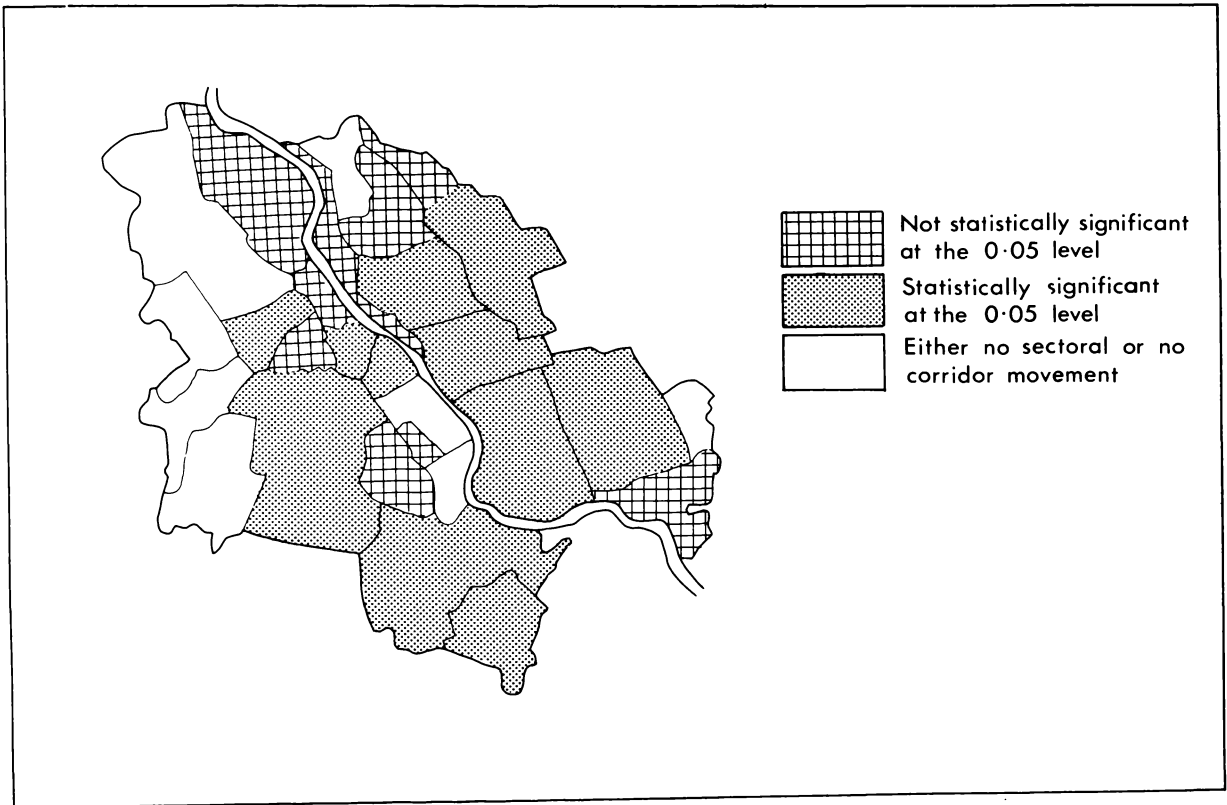


Figure 3:12 Comparison Between The Degree Of Lateral Movement Measured Using The Corridor And Sectoral System Of Measurement.

Table 3:7

Percentage Difference Between Sectoral and Corridor Movement by
Origin Areas

Area	Percentage Sectoral Movement (A)	Percentage Corridor Movement (B)	Percentage Difference (B - A)
Te Rapa	---	---	---
St Andrews	61.6	68.3	6.7
Beerescourt	100.0	100.0	0.0
Forest Lake	43.1	56.8	13.7*
Norton	---	---	---
Maeroa	41.9	51.6	9.7
Livingston	---	---	---
Whitiora	29.8	48.9	19.1*
Hamilton North	37.6	56.5	18.9*
Frankton	34.1	44.6	10.5*
Dinsdale	---	---	---
Hamilton Lake	42.8	49.9	7.1
Hamilton West	---	---	---
Melville	38.6	50.3	11.7*
Glenview	34.9	52.4	17.5*
Chedworth	49.9	59.0	9.1
Queenswood	---	---	---
Chartwell	49.9	54.9	5.0
Fairfield	41.0	53.4	12.4*
Enderley	47.4	57.8	10.4*
River Road	75.0	75.0	0.0
Claudlands	25.9	46.0	20.1*
Hamilton East	34.2	43.3	9.1*
Hillcrest	37.7	51.4	13.7*
Silverdale	---	---	---
Riverlea	66.6	74.0	7.4
Central Hamilton	48.2	62.0	13.8*

* Significantly different at the .05 level, One Sample Proportions Test.

--- either no statistically significant sectoral or corridor biased movement.

Table 3:8

Percentage Difference Between Sectoral and Corridor Movement by
Tenure Groups

	Percentage Sectoral Movement (A)	Percentage Corridor Movement (B)	Percentage Difference (B - A)
Total Population	37.8	49.7	11.9*
<u>Major Tenure Groups</u>			
Owner to Rental	44.8	56.7	11.9*
Owner to Owner	49.0	56.7	7.7*
Rental to Owner	36.0	44.1	8.1*
Rental to Rental	35.5	50.4	14.9*
<u>Lower Level Tenure Groups</u>			
Ownership Existing to:			
Ownership Existing	46.1	54.6	8.5*
Ownership New	63.9	67.9	4.0
Rental (NS)	45.3	57.3	12.0*
Rental (NS) to:			
Ownership Existing	34.5	46.9	12.4*
Ownership New	37.8	40.9	3.1
Rental (NS)	35.1	51.0	15.9*
State to:			
Ownership New	68.7	56.2	-12.5*
State	60.9	65.8	4.9

* Significantly different at the .05 level
One Sample Proportions Test.

Table 3:8Percentage Difference Between Sectoral and Corridor Movement by Tenure Groups

	Percentage Sectoral Movement (A)	Percentage Corridor Movement (B)	Percentage Difference (B - A)
Total Population	37.8	49.7	11.9*
<u>Major Tenure Groups</u>			
Owner to Rental	44.8	56.7	11.9*
Owner to Owner	49.0	56.7	7.7*
Rental to Owner	36.0	44.1	8.1*
Rental to Rental	35.5	50.4	14.9*
<u>Lower Level Tenure Groups</u>			
Ownership Existing to:			
Ownership Existing	46.1	54.6	8.5*
Ownership New	63.9	67.9	4.0
Rental (NS)	45.3	57.3	12.0*
Rental (NS) to:			
Ownership Existing	34.5	46.9	12.4*
Ownership New	37.8	40.9	3.1
Rental (NS)	35.1	51.0	15.9*
State to:			
Ownership New	68.7	56.2	-12.5*
State	60.9	65.8	4.9

* Significantly different at the .05 level
One Sample Proportions Test.

side of the city. The ordering of both sets of categories began at the common axis, with the categories on the opposite side of the city following on from the outermost category on the home side of the city. However, there exists a major problem in analysing corridor movement as compared with sectoral movement, and that is the expected random distribution of moves do not conform to a uniform set of angles. Rather corridors cut across the vacancy sets density pattern and each additional width of the corridor has proportionally less of the city's area, due to the circular form of the expected distribution of moves. Therefore, for each tenure sub-set and area the expected distribution of moves within each lateral distance category had to be computed (Appendix ³~~4~~). But as with the tests upon sectoral movement the finding of a corridor bias does not provide an explanation. All it displays is that in comparison with the expected distribution of all destinations uniformly dispersed around the orientation node the observed pattern of movement is laterally restricted.

C:2 Results of the Analysis of Corridor Movement

The system of presentation of the discussion of the results from the analysis of corridor movement follows the same procedure as used for sectoral movement. That is the patterns of corridor movement are discussed under the headings of the total population, the four major tenure groups, the lower level eleven tenure groups, and the spatial pattern. However the results from this analysis are more difficult to interpret than those for sectoral movement, in that each sub-set has a different density pattern making the expected proportion of moves within each sub-sets home corridor different. For comparative purposes between sub-sets, therefore, the proportion of expected non-corridor movers who moved within

their home corridor is used; termed unexpected corridor movers.

a. Degree of Movement within the Home Corridor.

1. Total Population.

Table 3:9 presents the results of this analysis where for the total population 50 percent of all moves were within the home corridor, which accounted for approximately 33 percent of this populations distribution of vacancies. As with the study of sectoral movement no non-corridor bias was found for this or any sub-set of that population.

2. Four Major Tenure Groups.

For moves categorized by major tenure divisions, moves from ownership property had the highest degree of corridor movement with 40 percent of 'Ownership to Ownership' and 34 percent of 'Ownership to Rental' moves who were unexpected corridor movers, compared to 25 percent 'Rental to Ownership' and 23 percent 'Rental to Rental'. Statistical tests upon the proportion of corridor movement support this pattern as do the tests upon the proportion of unexpected corridor movers (tables 3:10, 3:11).

3. Eleven Lower Level Tenure Groups.

As with sectoral movement three State Housing groups did not have a pattern of bias corridor movement, while for two other State Housing groups the degree of corridor movement was extremely high (table 3:12). The highest proportion of corridor movement was by movers from 'Ownership Existing to Ownership New' property. Moreover, all but two of the eight tenure groups had more than 50 percent of their destinations within the home corridor. The exceptions were: 'Rental (NS) to Ownership Existing' and

Table 3:9Percentage of Corridor and Unexpected Corridor Moves : Four Major Tenure Groups

	Expected Percentage of Random Moves Within Home Corridor	Observed Percentage of Corridor Moves	Unexpected Corridor Moves
Total Population	32.5	49.7	25.5
<u>Tenure Groups</u>			
Ownership to Rental	34.8	56.7	33.9
Ownership to Ownership	28.0	56.7	40.2
Rental to Ownership	25.5	44.1	25.0
Rental to Rental	36.0	50.4	22.5

All Corridor Biased at .05 Level.
Kolmogorov-Smirnov One Sample Test (Test 2).

Table 3:10Comparative Tests Upon Proportions of Corridor Movement Between Four Major Tenure Groups

Z Values, Unsigned				
Tenure Groups	Ownership to Rental	Ownership to Ownership	Rental to Ownership	Rental to Rental
Ownership to Rental	----	0.004	2.993*	1.593
Ownership to Ownership		----	2.775*	1.507
Rental to Ownership			----	2.394*
Rental to Rental				----

* Significantly Different at .05 level.
Two Sample Proportions Test.

Table 3:11Comparative Tests Upon Proportions of Unexpected Corridor Movement
Between Four Major Tenure Groups

Z Values, Unsigned

Tenure Groups	Ownership to Rental	Ownership to Ownership	Rental to Ownership	Rental to Rental
Ownership to Rental	----	1.008	1.939*	2.657*
Ownership to Ownership		----	3.167*	3.942*
Rental to Ownership			----	0.904
Rental to Rental				----

'Rental (NS) to Ownership New' moves. Also a higher proportion of corridor movers from ownership existing rather rental (NS) origins was again evident here. Finally, the statistical tests upon the actual proportions of corridor movement (table 3:13) and unexpected corridor movement (table 3:14) re-established clearly the dichotomy between ownership and rental (NS) origins. The latter tests established that movers from 'Ownership Existing to Ownership New' dwellings had a higher propensity to move within their home corridor than movers from 'Ownership Existing to Ownership Existing' dwellings.

b. Spatial Pattern of Corridor Movement.

In total four principal spatial features from the spatial patterns of corridor movement were established. First, the northern Hamilton areas of River Road, Beerescourt, and St Andrews plus Riverlea stand-out as having very high proportions of corridor out-movement (figure 3:13a). But they also have a low degree of corridor in-movement (figure 3:13b). This feature, therefore, reflects the earlier finding upon the dispersion of movers origins and destinations, where movement from high status origins were found to be highly localized and movement into those areas very dispersed. Secondly, out-movement from four westside areas (Te Rapa, Norton, Livingstone, and Dinsdale) did not establish a pattern of statistically biased corridor movement, which probably reflects limits in the range of the vacancy set in those areas plus low levels of desirability with this section of the city. Thirdly, the inner city areas of Frankton, Whitiora, Hamilton North, Claudelands and Hamilton East exhibit the opposite pattern to that observed for the high status areas, in that the degree of corridor movement into these areas is greater than that for out-movement.

Table 3:12Percentage of Corridor and Unexpected Corridor Moves : Eleven Lower Tenure Groups

Tenure Groups Origin/Destination	Expected Percentage of Random Moves Within Home Corridor	Observed Percentage of Corridor Moves	Unexpected Corridor Moves
Ownership Existing/ Ownership Existing	29.4	54.6	35.9
Ownership New	20.3	67.9	60.0
Rental (NS)	34.8	56.7	33.9
Rental (NS)/ Ownership Existing	29.1	46.9	25.4
Ownership New	19.8	40.9	26.5
Rental (NS)	36.8	51.0	22.5
State	33.0	----	----
State/ Ownership Existing	28.0	----	----
Ownership New	17.4	56.2	46.2
Rental (NS)	32.0	----	----
State	26.3	65.8	53.3

---- No Corridor Bias at .05 level.
Kolmogorov-Smirnov One Sample Test (Test 2).

Table 3:13Comparative Tests Upon Proportions of Corridor Movement Between Eight Lower Level Tenure Groups, Presented by Tenure of Origin Groupings

Z Values, Unsigned								
Tenure Groups	OE/ OE	OE/ ON	OE/ RNS	RNS/ OE	RNS/ ON	RNS/ RNS	ST/ ON	ST/ ST
OE/OE	----	1.288	0.477	1.161	1.750*	2.555*	0.123	1.349
OE/ON		----	1.130	1.700*	2.110*	2.615*	0.781	0.186
OE/RNS			----	1.838*	3.161*	3.613*	0.039	1.096
RNS/OE				----	1.386	1.322	0.738	2.454*
RNS/ON					----	3.290*	1.222	3.012*
RNS/RNS						----	0.426	1.922*
ST/ON							----	0.700
ST/ST								----

* Significantly Different at the .05 level.
Two Sample Proportions Test.

Table 3:14

Comparative Tests Upon Proportions of Unexpected Corridor Movement
Between Eight Lower Level Tenure Groups, Presented by Tenure of
Origin Grouping

Z Values, Unsigned

Tenure Groups	OE/ OE	OE/ ON	OE/ RNS	RNS/ OE	RNS/ ON	RNS/ RNS	ST/ ON	ST/ ST
OE/OE	----	2.050*	0.317	3.022*	1.944*	1.722*	0.730	1.750*
OE/ON		----	2.298*	3.989*	3.336*	3.073*	0.789	0.475
OE/RNS			----	3.645*	1.931*	1.351	0.897	2.074*
RNS/OE				----	0.272	0.903	1.704*	3.373*
RNS/ON					----	1.290	1.555	3.011*
RNS/RNS						----	2.070*	4.000*
ST/ON							----	0.439
ST/ST								----

* Significantly Different at the .05 level.
Two Sample Proportions Test.

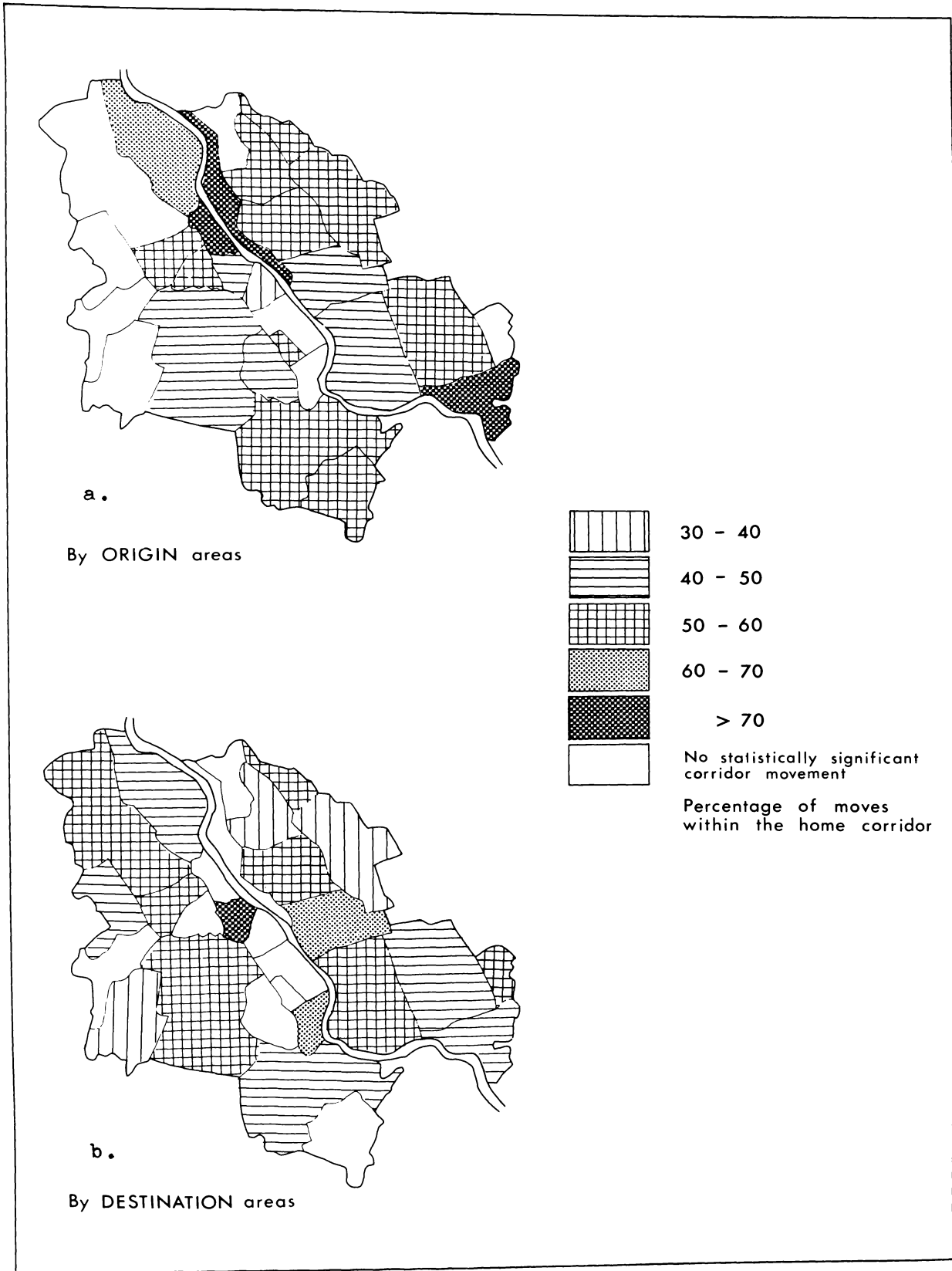


Figure 3:13 **Distribution Of Corridor Movement.**

This again supports the earlier findings of the dispersion of movement. Finally, the proportion of corridor out-movement by areas was compared with the object of establishing if there was any significant difference between and within the groups using a Kruskal and Wallis one-way analysis of variance test. Within this analysis the data used was the proportion of unexpected corridor movers for those areas which held corridor biased movement. The few areas which did not have that pattern were regarded as special cases whose inclusion would have biased the results. The analysis of variance for unexpected corridor out-movement established a significant difference between the groups ($9.83 > 9.49$ at the .05 level, 4 d.f.), and the rankings of each group clearly indicate a decline in the degree of corridor movement down the typology scaling of areas (table 3:15). This finding suggests that there is a higher propensity for corridor movement the higher the typology grouping. For unexpected corridor in-movement, however, no significant differences between typology groups was established ($0.48 < 7.82$ at the .05 level, 3 d.f.)

c. Summary

The principal findings within these results are first, that 50 percent of all moves were within the limits of a 2 kilometer home corridor, which compared with the expected proportions of corridor movement suggests a strong pattern of restricted lateral movement within Hamilton. But in concluding so, it must be remembered that there is also a large proportion of movers who moved to a residence outside the limits of their home corridor. Secondly, movers from ownership property as opposed to rental property have the highest degree of corridor movement, and within that group 'Ownership Existing to Ownership New' moves rank first. Therefore, it is the

Table 3:15Percentage of Unexpected Corridor Moves by Typology Groups

Typology Groups	Corridor Movement	
	From Origin Areas	Into Destination Areas
1. High Economic Level Old		
Beerescourt	100.0	----
Hamilton Lake *1		
River Road	62.3	----
Mean Rank	16.0	----
2. High Economic Level New		
Dinsdale	----	21.0
Glenview	35.4	----
Chedworth	36.5	39.2
Queenwood	----	----
Chartwell	38.0	20.2
Riverlea	64.7	32.2
Mean Rank	12.0	7.9
3. Medium Economic Level New		
Te Rapa	----	36.7
St Andrews	56.2	32.8
Livingstone	----	----
Melville	26.9	23.9
Enderley	37.5	15.4
Hillcrest	31.4	30.0
Silverdale	----	44.9
	9.3	10.0
4. Medium Economic Level Old		
Forest Lake	36.7	39.2
Norton	----	35.8
Maeroa	----	----
Fairfield	34.8	24.9
Hamilton East	12.2	22.9
Mean Rank	6.7	9.8
5. Rental Old		
Whitiora	20.9	56.7
Frankton	18.9	28.6
Hamilton West	----	27.4
Claudelands	16.5	23.1
Hamilton North	31.7	----
Central City	----	----
Mean Rank	4.0	10.0

* Excluded because a large rental population swamps the typology classification.

---- No Corridor Bias at .05 level.
Kolmogorov-Smirnov One Sample Test (Test 2).

renters as opposed to the owners who have the higher propensity to move outside of their home corridor. Thirdly, three State Housing groups did not have a pattern of biased corridor movement, whereas for two others the degree of corridor movement was found to be extremely high. Fourthly, the degree of corridor movement from high economic areas tended to be very high, but for movement into those areas very low rates were established. In contrast the opposite pattern was established for the inner city areas, although tests between the typology grouping of areas established a significant difference for only corridor out-movement, suggesting a higher propensity for corridor movement the higher the economic status of the origin area.

Section D Hierarchical Movement

To complete this study of the patterns of restricted lateral movement the topic of non-corridor movement is very briefly examined. The objective in doing so is to aid the development of an explanation of corridor movement. As argued in Chapter 1 two factors other than urban form are viewed as the reasons for restricted lateral movement; random movement within a vacancy sub-set and sectoral specific housing demand (non-random movement). These explanations can be extended to cover movement outside of the home corridor. Under the random explanation non-corridor movement is a function of the relationship between the housing demand and the vacancy sub-set, whereas for non-random movement it is either a deliberate decision to move to a specific area, or the result of housing demand exceeding supply within the home corridor.

In developing this research into the characteristics of non-corridor movement it is accepted that the city is spatially

differentiated by socio-economic stratification, therefore, it is expected that a feature of non-corridor movement will be movers shifting to areas of higher economic status. It is, therefore, hypothesized:

That non-corridor movers have a higher probability than non-corridor movers of moving to areas of higher economic status. However, the hierarchy used to examine that hypothesis is really not a true hierarchy, but rather a hierarchical stratification of areas based on the economic typology grouping of areas derived from the analysis in Chapter 2. The order in the hierarchical stratification of areas is:

1. High Status Old.
2. High Status New.
3. Medium Status New.
4. Medium Status Old.
5. Rental Old.

For the purpose of a number of statistical tests the distance between the hierarchical levels is assumed to be equidistant. Finally, this section is divided into two topics, first, the general patterns of hierarchical movement and secondly, corridor and non-corridor hierarchical movement.

D:1 General Patterns of Hierarchical Movement

The general patterns of hierarchical movement are examined in terms of movement up, down, or at the same level within the hierarchy. Table 3:16 presents the results of this analysis for four major tenure groups, from which the summation of the total pattern of movement for each group suggests three general patterns. First, for 'Ownership to Ownership' and 'Rental to Ownership' moves the general pattern of movement is upwards, although only for

Table 3:16

Percentage of Moves Up, Down, and At the Same Level Within the
Typology Hierarchy, by Tenure Groups

Tenure Group	Typology Group	Number of Observations	Percentage of Moves		
			Up	Down	Same Level
<u>1. Ownership to Rental</u>					
	HO	4	----	nso	nso
	HN	44	4.88	78.05	17.07
	MN	53	16.33	48.98	34.69
	MO	44	39.02	21.95	39.02
	RO	40	67.57	----	32.43
	Total	185	30.23	38.95	30.81
<u>2. Ownership to Ownership</u>					
	HO	11	----	72.73	27.27
	HN	17	5.88	58.82	35.29
	MN	61	34.43	34.43	31.15
	MO	42	71.43	4.76	23.81
	RO	24	75.00	----	25.00
	Total	155	45.16	26.45	28.39
<u>3. Rental to Ownership</u>					
	HO	11	----	75.00	25.00
	HN	54	1.89	50.94	47.17
	MN	125	19.01	23.97	57.02
	MO	98	80.21	8.33	11.46
	RO	184	82.78	----	17.22
	Total	472	54.11	15.80	30.09
<u>4. Rental to Rental</u>					
	HO	4	----	nso	nso
	HN	43	2.44	78.05	19.51
	MN	234	15.25	41.26	43.50
	MO	217	36.41	29.61	33.98
	RO	407	54.38	----	45.62
	Total	905	37.20	21.90	40.90

nso = Not Sufficient Observations.

'Rental to Ownership' moves is that so for the majority. Secondly, 'Ownership to Rental' moves were evenly divided between movement up, at the same level, and down. Thirdly, 'Rental to Rental' moves were balanced between movement up, and at the same level. In other words, the general trend was for movement upwards to ownership property and for 'Rental to Rental' moves, but downwards for 'Ownership to Rental' moves. Examined by computing the mean destination typology score for each typology origin group, the general pattern for the total pattern of movement, is a mean destination in the range of the middle new and middle old status dwellings (figure 3:14). However, the order of typology groups by destinations is maintained, although the dispersion of destinations compared to origins has greatly been reduced by intra-urban movement. The same pattern of destinations, although less dispersed, was established for 'Ownership to Rental' and 'Rental to Rental' movement, suggesting for 'Rental to Rental' movers that as with ownership moves non-corridor movement improves the standard of housing. But for 'Ownership to Ownership' and 'Rental to Ownership' movers the mean scores of destinations are higher and also there are changes within the ordering of the typology destinations. In effect, intra-urban movement suggests a general leveling out of the differences between movers in terms of their origin areas, which besides people changing their socio-economic status possibly reflects the lack of extreme differentiation and segregation within the study area. As previously stated this is in part because Hamilton is a small city, but also because of the egalitarian nature of New Zealand society.

One of the problems within the foregoing analysis was that the general trend of redistribution overshadows what other patterns might have existed. In an attempt to overcome this, the expected

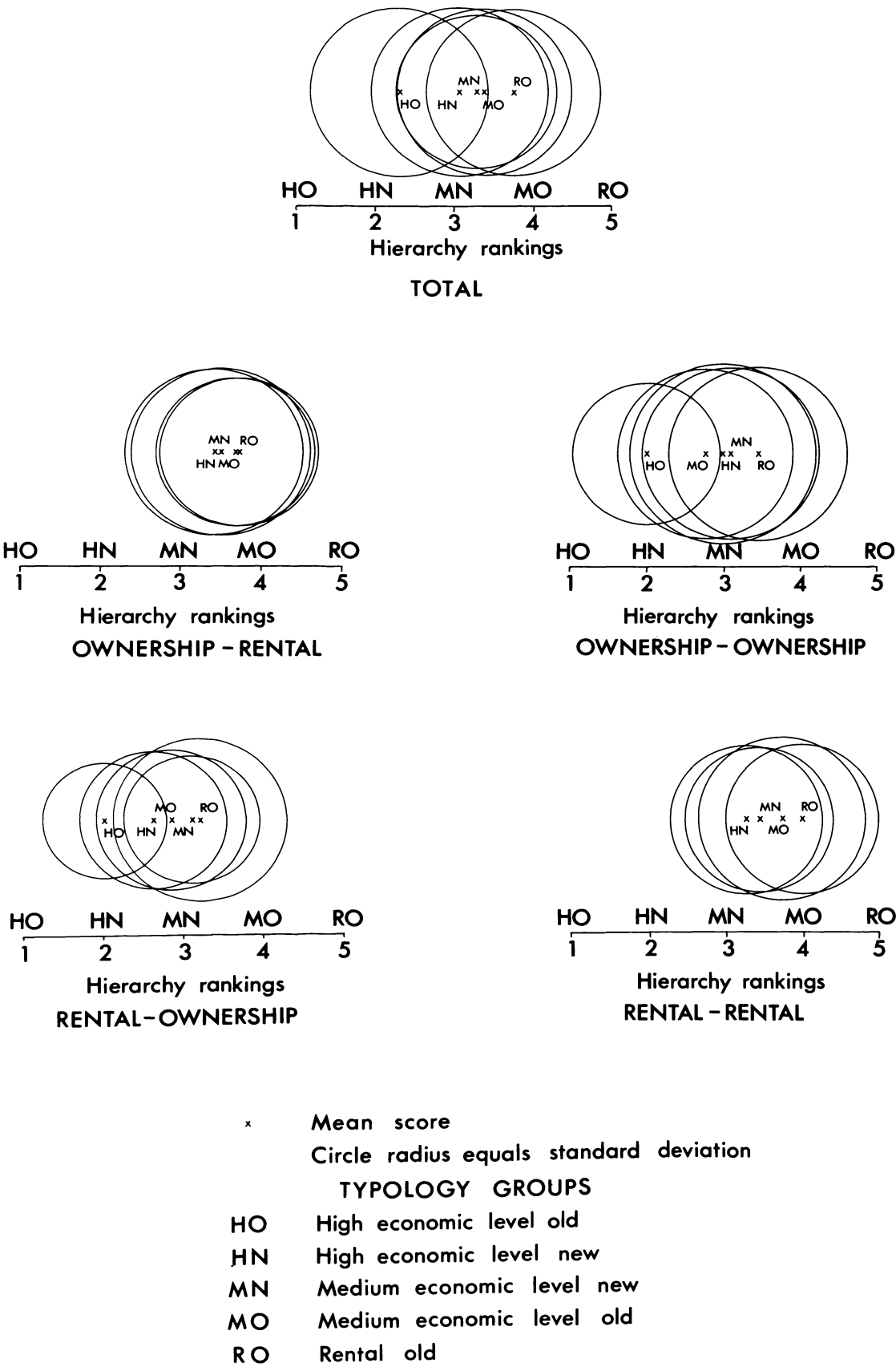


Figure 3:14 Mean Destination Of Movers By Origin Area
Typology Group Upon The Typology Hierarchy.

numbers which would have moved into each category given the general trend were calculated by multiplying the number of total origins at each hierarchical level by the number of total destinations at each hierarchical level and dividing each calculation by the total number of moves. Then the expected number of moves in each cell of the 5 x 5 matrix was subtracted from the observed pattern of movement and the results expressed as percentages of each origin typology grouping. The results of this analysis show that localized movement at the same level in the hierarchy was the dominant secondary pattern (table 3:17).

D:2 Corridor and Non-Corridor Hierarchical Movement

To provide an initial test of the hypothesis given above the mean level of the distribution of mover's origins and destinations for the total population and the four major tenure divisions were established for both corridor and non-corridor sub-sets (table 3:18). The difference between these two means represents the degree of movement up or down the hierarchy, and from these differences it can be seen that non-corridor movers have a far greater degree of movement up the hierarchy than corridor movers. Examined in terms of the proportion of moves up, down, and at the same level, table 3:19 indicates that for all tenure groups non-corridor movers are characterised by a greater proportion of moves up the hierarchy than corridor movers. As many as 43 percent more non-corridor movers move up the hierarchy than do corridor movers. Movement at the same level is clearly a feature of corridor movement with the largest difference 45 percent. A similar pattern of a higher proportion of non-corridor movers dominates movement down the hierarchy, but the proportional differences are relatively small. To establish if these differences between the two patterns

Table 3:17Secondary Patterns of Movement from Typology Origins for the
Total Population of MoversA. Expected Number of Moves

		Destinations					
Typology Groups		HO	HN	MN	MO	RO	Sum of Row
Origins	HO	0.7	5.2	10.0	6.8	7.3	30
	HN	3.9	27.2	52.9	35.6	38.4	158
	MN	11.6	81.5	158.4	106.6	114.9	473
	MO	9.8	69.1	134.3	90.4	97.4	401
	RO	16.0	112.9	219.4	147.6	159.1	655
Sum of Column		42	296	575	387	417	1717

B. Residual (Observed - Expected) as a Percentage of Total Moves
From Each Typology Origin

		Destinations					
Typology Groups		HO	HN	MN	MO	RO	
Origins	HO	24.3	16.0	-6.6	-16.0	-17.6	
	HN	0.7	13.1	0.7	-4.8	-9.7	
	MN	-1.2	0.3	11.1	-1.4	-8.8	
	MO	1.0	1.7	-4.3	5.1	-3.6	
	RO	-1.1	-5.2	-5.3	-0.2	11.7	

Table 3:18Difference Between Degree of Corridor and Non-Corridor Movement Up or Down the Typology Hierarchy

Tenure Group	Corridor Movers			Non-Corridor Movers			Difference Between Corridor and Non-Corridor Patterns of Movement (A - B)
	Mean Level Upon Typology Hierarchy		O - D (A)	Mean Level Upon Typology Hierarchy		O - D (B)	
	Origins	Destinations		Origins	Destinations		
Total Population	3.79	3.64	.12	3.95	3.31	.64	-0.52
Ownership to Rental	3.22	3.61	-.39	3.61	3.56	.05	-0.44
Ownership to Ownership	3.22	3.03	.19	3.48	2.94	.54	-0.35
Rental to Ownership	3.67	3.20	.47	3.95	2.92	1.03	-0.56
Rental to Rental	4.09	4.03	.06	4.07	3.54	.53	-0.47

Table 3:19

Difference Between Corridor and Non-Corridor Movers Proportion of Movement Up, Down, and At Same Level Within Typology Hierarchy, by Tenure Group

Tenure Group	Typology Group	Number of Observations		Proportional Differences Corridor - Non-Corridor		
				Up	Down	Same Level
		Corridor	Non-Corridor			
<u>Total Population</u>						
	HO	29	1	----	nso	nso
	HN	91	67	-.025	-.142	.165*
	MN	235	238	-.161*	.009	.153*
	MO	175	226	-.186*	-.043	.229*
	RO	327	328	-.349*	----	.349*
<u>1. Ownership to Rental</u>						
	HO	3	1	----	nso	nso
	HN	30	14	nso	.014	-.081
	MN	32	21	-.144	-.055	.200
	MO	21	23	-.375*	-.071	.445*
	RO	19	21	-.082	----	.082
<u>2. Ownership to Ownership</u>						
	HO	11	0	----	nso	nso
	HN	9	8	nso	-.181	.306
	MN	32	29	-.133	.096	.068
	MO	22	20	-.068	-.005	.073
	RO	14	10	-.429*	----	.429*
<u>3. Rental to Ownership</u>						
	HO	11	0	----	nso	nso
	HN	30	24	nso	-.300*	.341*
	MN	53	72	-.319*	-.042	.361*
	MO	36	62	-.089	.091	-.002
	RO	78	106	-.233*	----	.233*
<u>4. Rental to Rental</u>						
	HO	4	0	----	nso	nso
	HN	22	21	nso	-.130	.178
	MN	118	116	-.097*	.001	.096
	MO	96	121	-.184*	-.110*	.293*
	RO	216	191	-.393*	----	.393*

nso = Not Sufficient Observations

* Significant Difference at .05 level.
Two Sample Proportions Test.

of behaviour were significant a series of two sample proportional tests were conducted. From that analysis the two initial patterns are reaffirmed, however, no significant trend of difference for movement down the hierarchy was established.

Therefore, support is given to the hypothesis:

That non-corridor movers have a higher probability than corridor movers of moving to areas of higher economic status.

In otherwords, a characteristic of non-corridor movement is the improved status of the movers destination area.

Section E Chapter Summary and Conclusion

As a result of criticisms with Adams' (1969), Brown and Holmes' (1971), Whitelaw and Gregson's (1972), Whitelaw and Robinson's (1972), Clark's (1971, 1972), and Donaldson's (1973) research designs and/or systems of analysis used to measure restricted lateral movement (Appendix 1) uncertainty lay over the existence of that pattern as a general regularity of intra-urban mobility. This was particularly so for the study of Hamilton in that with a population of 80,000 Brown and Holmes' claim that strong patterns of sectoral movement did not exist within their study area Cedar Rapids because of that city's small size (110,000) was central to that feeling. Therefore, the first objective in searching for the explanation of restricted lateral movement was to examine the patterns of intra-urban mobility within Hamilton so as to test the research thesis:

That residential mobility within Hamilton is laterally restricted.

For reasons relating to the notion that dwelling tenure and the

economic characteristics of the mover and the suburb were important explanatory variables underlying the propensity for a mover to move within their home sector those variables or surrogates of them were at the basis of the data matrices analysed.

Patterns of movement were initially measured using a 35 degree sectoral construct as the limits of restricted lateral movement. That system of measurement was later changed to that of corridor measurement due to, the criticism that sectoral form unrealistically constrained the maximum distance of lateral movement in the inner city, and as a result of four tests upon the form of lateral movement. In using a 2 kilometer home corridor to assess the degree of restricted lateral movement the observed pattern of movement was tested against the expected distribution of the movers' destinations invariantly dispersed around the city centre. As a result the tests upon lateral movement do not establish that the patterns of movement were non-randomly biased, just that they were biased. From that study the principal findings were:

- (i) Fifty percent of all movers were found to have moved within their home corridor.
- (ii) All but three of the tenure sub-sets had biased corridor movement, and these three involved the special case of State Housing.
- (iii) Movers from ownership property as opposed to rental property were more likely to have moved within their home corridor.
- (iv) Corridor out-movement from the suburban areas was positively related to the economic typology of the area, which suggests that movers of higher economic status have a higher propensity to move within their home corridor.

As a result of these findings the first research thesis is accepted; 'that residential mobility within Hamilton is laterally restricted'. Finally to conclude this study an examination of non-corridor movement supported the hypothesis 'that non-corridor movers have a higher probability than corridor movers of moving to areas of higher economic status'.

Although it is not possible to determine whether the explanation of corridor movement was the result of random movement within a vacancy sub-set or non-random movement, it is possible to develop via deductive reasoning a speculative interpretation of these results based upon the two non-random movement hypotheses: the restricted image hypothesis and the locational attachments hypothesis. Taking first the restricted image hypothesis, it would appear that movers whose origins were outer city ownership property held a more restricted sectoral image of the city, than did movers from inner city rental property, hence the explanation of the different degrees of corridor movement. Probably, inner city residents images were very different in that they focused upon the central city areas, with their images of both peripheral home corridor areas and non-corridor areas restricted. Therefore, a greater proportion of their moves tended to be random. Alternatively, it could be argued that movers who owned their initial dwelling, compared with those movers whose initial dwelling was rental property, had more developed locational attachments as a result of the act of ownership and the household's older life-family cycle status. Hence locational attachments can be viewed as the explanation of the higher rates of corridor movement from ownership property. There is however, no way that these findings can be used directly to support the explanation of the restricted image hypothesis or the locational attachments hypothesis until after the

study of those explanations, which is the objective of the following chapters in Part II of this research. But speculatively the second explanation is more appealing if it is assumed that people living in a small city are unlikely to possess a restricted image of their city. Furthermore, within the context of the locational attachments hypothesis a large proportion of non-corridor movement may be viewed as an extension of the general model of corridor movement, in that they may represent a population of movers holding locational attachments with their origin area who desired to stay within their home corridor but had to move elsewhere to obtain dwellings of higher economic status.

PART II

SEARCH FOR THE EXPLANATION OF RESTRICTED LATERAL MOVEMENT

Chapter 4. Introduction to Part II

. From the introduction of three hypotheses which were seen as explanations of restricted lateral movement (Chapter 1), the topic was divided into the role of urban form, random, and non-random movement. Non-random movement or sector specific movement was viewed as having two different explanations: the restricted image hypothesis, and the locational attachments hypothesis. As it has been argued that the urban form of Hamilton did not explain the established patterns of restricted lateral movement (Chapters 2 and 3) the objective of this second part of this research is to examine the second and third research theses:

1. That the primary reason for restricted lateral movement is sectorally specific housing demands rather than random movement within a vacancy sub-set.
2. Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis.

To examine these theses, the research procedure was divided up into several parts. In the first, a search of variables which underlie the process of movement was conducted, utilizing Brown and Moore's (1970) construct of the 'two-phase decision process model of intra-urban mobility'. But in doing so, it was also considered necessary to satisfy the third of Blalock's (1964) assumptions underlying the procedure of causal analysis; that is, that outside variables while operating, do not have confounding influences that disturb the causal patterns amongst the variables explicitly being considered (Chapter 1). To do so, the research design was extended to the study of the whole topic of the decision process behind moving and relocation. Secondly, so as to obtain

direct measurement of locational attachments, data was collected upon the topic of a mover's association with its origin home area, destination home area, and with any other areas of the city. Thirdly, those two sets of studies were viewed as a prelude to the development of an explanatory and predictive model of corridor movement.

Starting from the position in 1971, of no empirical research into the role locational attachments had upon the direction of intra-urban movement, and with only one other attempt to operationalize the Brown and Moore's decision process construct (Brown and Longbrake, 1969, 1970), which was totally different in its approach and objectives, this research was fraught with uncertainty. There was no guarantee that this approach would enable the researcher to establish an explanatory model of corridor and non-corridor movement, for it could have been that there were many different and unrelated explanations, not only between individuals, but for each individual's pattern of movement. There was also the possibility that the whole research effort would be wasteful, in the sense that the explanation for corridor movement could have rested upon a single element of the decision process, or have been due to aspects outside of the decision process.

Within this chapter the topics covered are: the locational attachments hypothesis, Brown and Moore's two phase decision process model of intra-urban mobility, the particulars of the questionnaire study from which the data used within this research was derived, and the format of the following chapters.

1. Locational Attachments Hypothesis

The locational attachments hypothesis has already been

introduced as an alternative explanation of non-random restricted lateral movement. However, it has not been discussed at any length. To do so, it was decided to discuss firstly the concept of the neighbourhood, in that the neighbourhood is closely related to the locational attachments hypothesis, and because it is a major source of continual debate by sociologists, and planners and architects. Within sociology the arguments have focused upon the existence of the neighbourhood and the role of the neighbourhood and within planning and architecture upon Perry's (1929, 1939) 'neighbourhood unit concept' (Lee, 1968; Keller, 1968; Suttles, 1972; Issacs, 1948, 1949; Mumford, 1954; Stea, 1965). The reason here for concern over the topic of the neighbourhood, rests upon the very real fear that researchers who discount the existence of neighbourhoods, will also use that argument to attack the concept of locational attachments. Therefore, interest at this point focuses upon the sociologists problem of the definition and delimitation of a neighbourhood. These topics, however, are only briefly reviewed, in that they are covered in depth in the works of Lee (1968 and associated articles) and Keller.

a. Problems of defining a neighbourhood.

In a very general sense, the neighbourhood can be viewed as the smallest unit operating in the city above the level of the family. But as Lee states, 'the definition and analysis of neighbourhood has been an intractable problem in sociological theory since the 1920s'. The principal reason for this can be seen by reference to Glass' (1948) use of two distinct definitions:

- (i) An area delimited by virtue of the special physical characteristics of the area and the special social characteristics of its inhabitants, and

- (ii) A territorial group, the members of which meet on a common ground within their own area for primary social contacts.

The problem is, therefore, that the neighbourhood concept has a physical as well as social component, which are often very difficult to net as a single concept, and possibly best examined at this stage as two separate concepts (Lee, 1968). Keller extends that viewpoint by dividing the physical and social neighbourhood concepts into four, sometimes incompatible, dimensions, all of which have to be included in the one term neighbourhood:

- (i) A physical delimited area having an ecological position in a larger area and particular physical characteristics arising from natural geographic conditions, and from a particular configuration of activities and usages. The work of the 'Chicago School' refers to these as 'natural areas'.
- (ii) The functional neighbourhood in the organization of town or city, shops, clubs, schools houses, etc.
- (iii) An area representing certain values both for the residents and for the larger community. Such values as cleanliness, quiet, safety, social solidarity, political cohesion, ethnic or religious compatibility, aesthetic quality and social prestige.
- (iv) A field or cluster of forces working in and on an area to give it a special atmosphere. An immigrant ghetto, a middle class suburb, or skid row area has a special aura that effects how the area looks and how people look at the area. In part, this is an inscrutable phenomenon, and like the personality of an individual cannot be reduced to the composite elements

since it is an outcome of their interrelations.
Each individual and activity contributes to this
collective effect even while they are subordinate
to it.

(pp. 91-92).

b. Problems in delimiting the neighbourhood.

These problems centre about which of those four dimensions of the neighbourhood the researcher is interested in, or upon interrelating all four, and the means by which to operationalize, measure, and analyse the collected data. As a result, studies of the physical form of the neighbourhood have been very few, with the standard approach in urban geography the very weak approximation of a neighbourhood, derived from the social analysis work of Shevky and Bell (1955), termed factorial ecology (Berry and Rees, 1969; Johnston, 1971b, 1973a, 1973b; Murdie, 1969; Timms, 1971). However, the existence of the neighbourhood has been found in person's sketch maps of the city (Orleans, 1967; Lee, 1968), although there was little correspondence between individual's maps. This difference between individuals relates to each individual's neighbourhood being a personal and unique phenomena, based upon personal experiences in a physical and social environment. Even within a household, each member is likely to hold a spatially different set of limits to their neighbourhood, although all will be based upon the same reference node: the home residence. The reasons for the different levels of local behaviour can be attributed to such factors as; the number of friends, membership of clubs, usage of local amenities and shopping, different physical localities and different individual variables (e.g. age, income, education, culture, length of residence, place of work, etc.) (Lee,

1971).

c. Locational Attachments and the Neighbourhood Concept.

The relationship between the locational attachments hypothesis and the neighbourhood concept is for some persons very strong, while for others, it is very weak or non-existent. Other sources of locational attachment are, sentiment, which is itself a specialized emotion attaching itself to selected points rather than to a neighbourhood (Keller, 1968) or just a desire to maintain familiarity with part of the city which the person knows (Caplow, 1949; Simmons, 1968). Locational attachments are further complicated by the fact that they may depend upon a person's perception of real or imagined alternatives to those attachments in the wider urban area. Therefore, the reasons and form of an individual's locational attachments are very varied and complex, particularly those associated with the concept of the neighbourhood.

In terms of the locational attachments hypothesis, the neighbourhood is not viewed as a primary group which supplies the information to the individual and controls the household's movement. Nor are the individual's social contacts seen to be restricted in their distribution to the home neighbourhood. Similarly, nor does the individual's knowledge have to be restricted to the limits of the home corridor, although if it were it would probably increase the person's degree of locational attachments, due to fear of uncertainty in moving outside the home corridor.

All that is claimed under the concept of localized attachments is:

- (i) That the act of living at a set location within a city does involve the individual in locational considerations,

if just to identify the location of their dwelling so that when undergoing a journey from it, they can return to it.

- (ii) For some, this locational identity will develop over time into locational associations through one, or a number, of the elements of urban life: informal social contact; the use of local amenities and shopping facilities; joining of formal social and sporting clubs; participation in affairs of the local community; associations with schools, churches, and other local organisations; heightened localized familiarity based upon work and household service journeys (i.e. shopping, schooling, etc.); and localized preferences. Plus there is also the role territoriality, whether it be innate or learned (Stea, 1965, 1969; Lee, 1971).
- (iii) Then at the time of making the decision on where to relocate, for some of those possessing locational associations, the associations will become locational attachments. As a result the objective of their search is to select a new residence which enables them to maintain at least some, if not all, of those attachments. Therefore, it is hypothesized, that those who hold associations with their origin area and live outside of the inner city, will move within their origin home corridor if they can find a vacancy which meets their aspiration demands. If not, they will be forced to either adjust their housing demand to meet the available vacancy set, reconsider their decision to move by making adjustments to accommodate

the reasons for that decision, or be forced to move outside their home corridor.

- (iv) For others, the locational associations will be traded off for the advantages of better opportunities elsewhere. It is this group, plus those holding locational attachments but forced to move outside of the home corridor, and those not holding locational associations, which are seen to be the non-corridor movers.

To put the locational attachments hypothesis in a more formal manner, it is claimed:

That people living within the urban area, but outside of the inner city, identify themselves with their home area by some form of locational association. When they decide to move, locational associations will for some become locational attachments and these will restrict their movement to the origin home corridor, as long as the home corridor can provide the type of dwelling wanted.

2. Brown and Moore's Two Phase Decision Process Model of Intra-Urban Mobility.

Brown and Moore (1970) established a behavioural framework for the study of residential movement based upon the decision process of the household. Centred upon the concept of 'place utility', which is the level of satisfaction a person holds with a given residence (Wolpert, 1965), their work develops out of a number of earlier studies. Rossi (1955), for example suggests five stages in residential relocation:

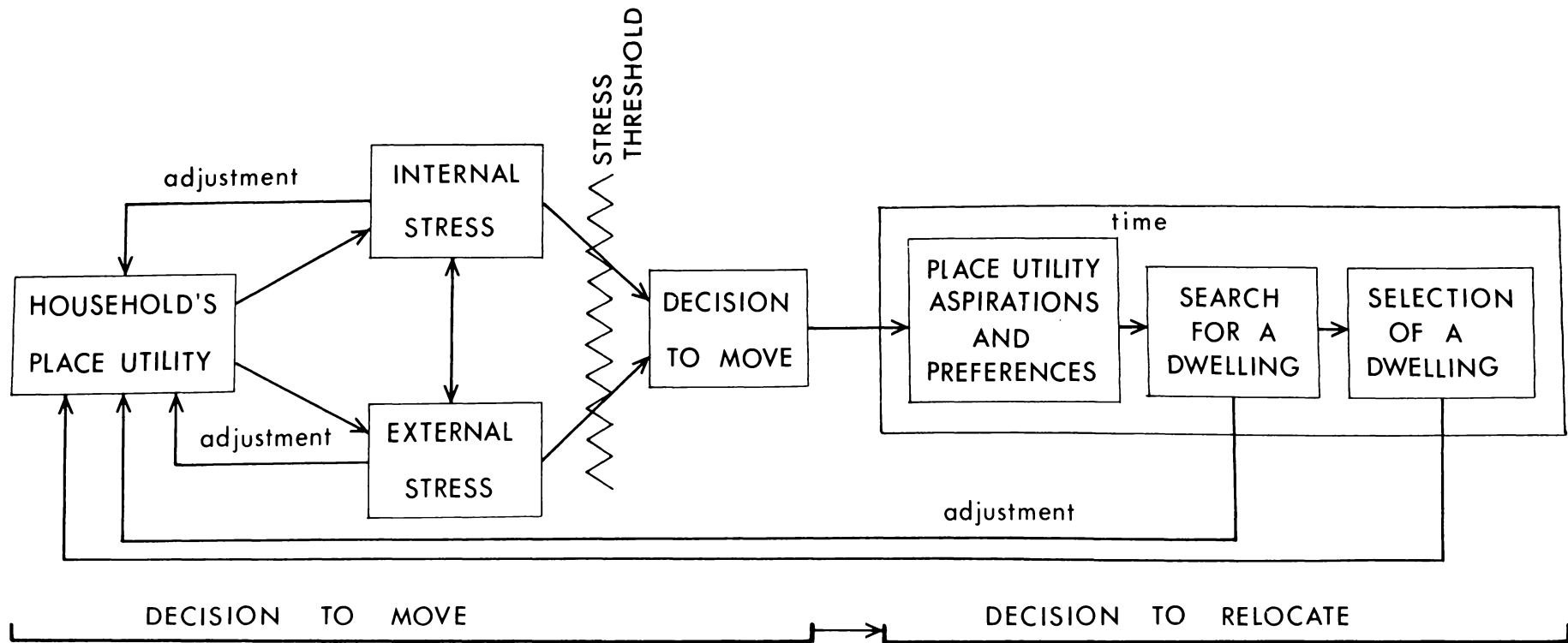
1. Formation of mobility desires.
2. Formulation of the intention to move.
3. A building up of expectations.
4. The elimination of expectations.
5. Decision to relocate.

The two phase decision process model of Brown and Moore's combines categories 1 and 2 into 'the decision to move', and categories 3 to 5 into 'the decision to relocate' (Moore, 1972).

a. The Decision to Move.

Figure 4:1 presents the basic layout of Brown and Moore's model. In it the voluntary decision to move results from the development of stresses within the household's place utility. These stresses are derived internally to the household, due to such reasons as technological obsolescence, style obsolescence, functional obsolescence, or depreciation of the dwelling, and externally to the household, from site obsolescence and locational obsolescence (Lowry, 1960; Grigsby, 1963; Clark and Cadwallader, 1973). The degree of importance that a stress exerts upon the household's place utility is dependent upon the stress threshold level of the household, for this determines whether the stress can be met by adjustment within the present dwelling, or the need to move. Internal stress adjustments may be either, accepting the stress as part of normal life or carrying out adjustments to the dwelling. External stresses, however, are more difficult to adjust, in that they are usually beyond the immediate control of the individual, therefore, adjustment must normally occur within the household.

Figure 4:1 Two Phase Decision Process Model Of Residential Mobility.



b. The Decision to Relocate.

After making the decision to move, the household embarks upon the process of relocation, which could result in the selection of a new residence. Figure 4:1 presents the decision to relocate as three steps:

- (i) Evaluation of place utility aspirations and preferences.
- (ii) The search for a dwelling.
- (iii) The selection of a dwelling.

(i) Evaluation of Place Utility Aspirations and Preferences.

Place utility aspirations and preferences are a set of values related to what the household wants and desires in a new dwelling. This in itself is dependent upon a person's perception of real or imagined alternatives, which in part are restricted by their 'awareness space', defined as "those locations within the total urban space about which the independent migrant household has knowledge (or knowledge above some threshold level) before the search begins" (Brown and Moore, 1970).

(ii) Search for a Dwelling.

The person's search for a dwelling is limited by the spatial extent of the area contained in their awareness space, within which the search area is selective, based upon their aspiration and preference sets. Again the areas selected for searching are dependent upon their perception of real or imagined alternatives.

(iii) Selection of the Dwelling.

As the result of the search, the person may decide to select a dwelling and thereby complete the decision to relocate. However,

the search may be unsuccessful, in that the type of dwelling desired was not found, or that the stresses involved in the search for a new dwelling may exceed those causing the decision to move. In both cases the decision to move may be revoked.

(iv) Time.

Although not a separate step in the decision process, the importance of time must be considered. Limits on time can affect the aspiration set, the preference set, awareness space, the search process, and the possibility of finding a suitable dwelling. Aspirations and preferences can change through the search process by means of realisation of achievable aspirations, preferences and trade-offs, and by increasing awareness space. Awareness space can be increased by means of search, and the vacancy set is also subject to changes over time. Furthermore, time can limit the search period available, turning a voluntary move decision into a forced relocation decision. Therefore, within limits the rationality of the selection decision is in part subject to time.

3. Questionnaire Study.

The examination of each element of the decision process model demanded a questionnaire study rather than one based on secondary data. But within the framework of this survey, a major decision had to be made on whether to collect data upon a mover's awareness and preference images at either the: pre-move decision, pre-search, or at-move stage. The argument favouring the pre-move decision stage, was that those variables could be directly incorporated within a pre-move decision predictive model of corridor movement. The principal disadvantage at collecting that information at that stage, however, was that the pre-move images related to a state

prior to the movers putting into operation their decision to relocate, and in doing so did not permit the establishment of an accurate measure of those elements as used in the selection of a new residence. Similarly, the pre-search images were discarded, in that a mover's awareness and preference images were subject to change during the search period. Therefore, the study of at-move images was adopted, and in doing so it was argued that if the objective of further research was to establish a pre-move decision predictive model of corridor movement, it would be necessary to establish the relationship between the pre-move decision and at-move images.

a. The Sample.

It was decided to sample the total population of persons purchasing ownership property within Hamilton over a selected time period (termed for this chapter the sample). So that the decision process would be fresh within their minds, the movers were interviewed as soon as possible after their move. But in so doing, there was still the problem of measuring accurately attitudes in a post hoc research design (Lauer, 1971; Murphy and Golledge, 1972). As it was September 1971 when the tested interview schedule was finalized, the sample was taken from the months of July and August 1971. These two months at the end of winter, had no apparent special movement characteristics which made them markedly different from other periods in the year.

The addresses of the sample were obtained for the purchased 'existing dwellings' from the land sales register of the New Zealand Government Valuation Department, Hamilton Office, and for 'new dwellings' completed and occupied, from the rating records of the

building inspection section of the Hamilton City Council. Interviews were begun in late September 1971 and completed by early April 1972; each interviewee being contacted by letter one week prior to the interview. Initially one interview per week night was conducted with the head of household, taking between 90 to 120 minutes, but by March 1972 daytime interviews with wives were found necessary so as to speed up the data collection. This change in the person interviewed was taken as a last resort, as it was evident when husbands and wives were interviewed together that their attitude responses varied considerably, although as later shown the search and selection process was dominantly a combined husband and wife effort. Due in part to the absence of finance for research assistance all interviews were conducted by the writer, which had the advantage of removing the effect which different interviewers may have had upon attitude measurement. In this way the same standards of interviewing were maintained throughout the survey.

The sample of houses purchased and completed in July and August 1971 totalled 205 dwellings, of which 38 were either, rented (11), incorrect addresses (6), purchases where no move had taken place (8), or dwellings either being converted into flats or had been demolished (13). Of the 167 potential interviews, 123 or 74 percent were successfully completed, with the figures for the sub-sets of existing and new dwellings almost exactly the same as that of the total population (table 4:1).

Another way the sample can be sub-divided was into the 99 households who moved within the city limits of Hamilton, and the 24 households who moved into the city from outside those limits. Of that 24, 8 had previously lived within Hamilton, 4 would have been intra-urban movers but for the city's boundaries, 3 were

Table 4:1Details of Interviewing

	Percentages		
	Existing Dwellings (N = 107)	New Dwellings (N = 60)	Total Sample (N = 167)
Successful Interviews	72.90	75.00	73.65
Refusals	9.35	6.66	8.38
Not Contacted After Extensive Revisiting	17.75	18.33	17.96

movers from local Waikato areas, and 9 were unfamiliar with Hamilton prior to their move. Of the 99 intra-urban movers, 16 had made a 'two stage move' within a few months, the first of which was a non-intra-urban move. As their origin residence within Hamilton was unlikely to have involved any specific locational considerations, nor was it likely that time had allowed them to develop locational attachments, it was decided for the purpose of examining the concept of corridor movement to remove that group from the intra-urban sub-set. Therefore, the total data set was sub-divided into 83 'intra-urban single stage movers', and a grouping of 40 movers who were in a very loose sense termed 'non-intra-urban movers'. The reason for retaining the non-intra-urban movers within the study was, that it was felt that the interpretation of corridor and non-corridor movers' characteristics would be aided by a third control group.

The spatial distribution of the sample was slightly biased in that the inner city areas of Frankton, Hamilton East, Claudelands and Fairfield appear under-represented (figure 4:2). The major reason was that those areas were rental areas, and also they contained the bulk of ownership dwellings whose uses had changed.

b. Profile of the Sampled Population.

(i) Familism.

As expected, the bulk of the sample were married households (94 percent). Of the married and solo households (98 percent), termed here as families, 71 percent had children, with a ratio of 2.41 children per family. This supports the notion that the purchasers of dwellings had a well established family base. Families were predominantly in the early phases of the family life cycle, with approximately 25 percent of the married couples newly

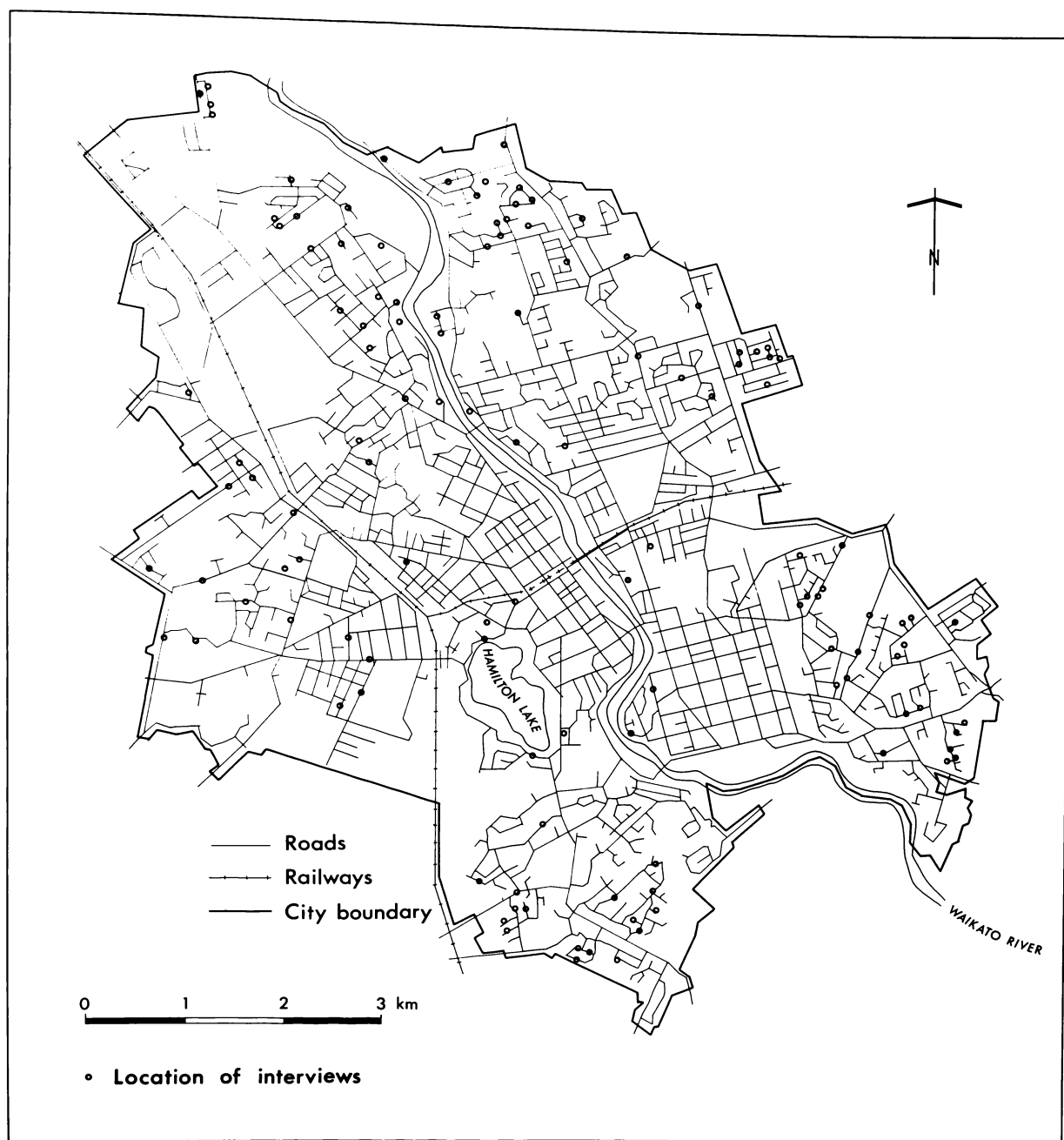


Figure 4:2 Location Of Mover Households Interviewed (Destination).

formed families without children, and 37 percent with all their children younger than secondary school age (12 - 13 years). Only 17 percent of families had children at pre-school, primary, and secondary school age and over, and 17 percent had dependents of secondary school age and over.

(ii) Age.

Sixty-one percent of the heads of household were under the age of 40 years, and 32 percent were under 30. Therefore, house purchasing appeared to have been biased towards young households. To examine that, the age group structure of married males was tested against that of the observed purchasers. Unfortunately the 1966 New Zealand Census did not publish locational breakdowns of those figures, so it was necessary to use the total figures for New Zealand. Accepting the errors derived from the fact that Hamilton did have a younger age pyramid base than the total New Zealand population (Goodall, 1972), a chi-square test established a significant difference between the two (table 4:2). For the sample, the '25 to 30' age group made up a substantially larger proportion of the purchasing population than expected, which was reflected to a lesser degree in the '20 to 25' and '30 to 40' age groups. Movers in the age groups over 40, however, were under-represented, which indicated that they were less mobile, probably due to having achieved a level of place utility which exceeded movement stresses.

(iii) Income.

Because of the limited size of the sample and the doubtful accuracy of the person's stated income, it was decided to reduce the five income categories of the questionnaire to three. Table

4:3 displays the distribution of income, with the bulk of heads of household within the lowest category (59 percent). However, it was argued that in purchasing a dwelling the level of income was secondary to a person's capital.

(iv) Education.

As a general feature, the sample's level of formal educational attainment was high, in that 46.5 percent of heads of household had more than three years secondary school education, and 23 percent had attended university. Only 2 respondents had not gone beyond primary school (table 4:4). To compare the sample's level of formal education with that of the total New Zealand male population, the sample's age structure was used as the basis for computing the expected level of formal education within each age group. In doing so, 1966 Census data was used, with the 1966 age cohorts taken so as to match the sample population of 1971. The results from that very general comparison suggested that the sample was significantly different from the national population, in that they had a much higher level of formal educational attainment.

(v) Occupation.

The occupational structure of the heads of household was dominated by three major groups:

1. Professional, Technical and Related Workers.
2. Sales Workers.
3. Production Workers.

It was again not possible to assess from the published Census how representative this structure was to that of Hamilton's total population. But a general comparison was conducted by comparing the sample's occupational distribution with that of the structure

Table 4:2Comparison Between the Sample and Expected Age Distribution

Age Groups	Number of Movers in Sample	Expected Number (Calculated from New Zealand Census, Married Males, 1966.)	Difference
	(A)	(B)	(A - B)
20 to 25	12	6	6
25 to 30	26	12	14
30 to 40	35	27	8
40 to 50	20	27	- 7
50 to 60	19	23	- 4
60	8	25	-17
	<u>120</u>	<u>120</u>	

Chi-square $38.76 > 11.07$ at the .05 level
 Chi-square Two Independent Samples Test.

Table 4:3Generalized Income Structure of the Sample

Income Groups (Dollars)	Number of Movers in Sample	Percentage of Sample
Lower, < 4,000	65	59.09
Middle, 4,000 - 6,000	32	29.09
Upper, > 6,000	13	11.81
	<u>110</u>	

Table 4:4Comparison Between the Sample and Expected Levels of Formal Education Attainment

Formal Education Attainment	Number of Movers in Sample (A)	Expected Number (Calculated from New Zealand Census, Male Education, 1966. Adjusted for Comparability of age profiles) (B)	Difference (A - B)
Primary School	2	30	-28
Secondary School			
Up to 3 years	64	62	2
Over 3 years	29	19	10
University	28	12	16
	<u>123</u>	<u>123</u>	

Chi-square $52.78 > 7.82$ at the .05 level, 3 d.f.
 Chi-square Two Independent Samples Test.

of non-rural occupational categories for New Zealand males (1966 Census). The results (table 4:5) indicated a higher proportion of the sample's heads of household were: (i) professional, technical and related workers, and (ii) sales workers.

(vi) Summary.

In summary, the profile of the sample was one of; predominantly young families, numbering approximately four persons per household, in which the head of household was below the age of 40, with a level of formal education above the expected, which was reflected in part by the bias in occupational structure towards professional and sales workers, but in the lower income groups primarily due to age.

4. Chapter Format.

Following the framework of Brown and Moore's 'two-phase decision process model of intra-urban mobility', the first set of analyses were a series of univariate tests upon the data to determine upon which variables corridor and non-corridor movers were different. The topics are:

1. Movement, the Movers, and the Decision to Move (Chapter 5).
2. Aspirations and Preferences (Chapter 6).
3. Awareness Space (Chapter 7), within which the 'restricted image hypothesis' was examined.
4. Search and Selection Process (Chapter 8).

It was expected that the individual variables which differentiated between the corridor and non-corridor movers would be either, elements of, related to, or the results of locational attachments. To test the locational attachments hypothesis, locational associations held by corridor and non-corridor movers were at first

Table 4:5Comparison Between the Sample and Expected Occupational Structure

Occupational Categories	Number of Movers in Sample (A)	Expected Number (Calculated from New Zealand Census, Male Non-Rural Occupations 1966) (B)	Difference (A - B)
1. Professional, Technical and Related Workers	28	11	17
2. Administrative, Executive and Managerial	4	9	-5
3. Clerical Workers	11	12	-1
4. Sales Workers	21	9	12
5. Workers in Transport	13	8	5
6. Craftsmen	4	33	-29
7. Production Workers	23	20	3
8. Service, sport and Recreational Workers	2	4	-2
9. Armed Forces	2	2	0

Chi-square = 75.17 > 15.51 at the .05 level, 8 d.f.

Chi-square Two Independent Samples Test.

examined by univariate tests to determine if the two sub-sets were different, and then all variables which underly the basic dimensions of mobility were re-examined within a multi-variate design, from which the aim was to extract a locational association component of discrimination (Chapter 9). Finally, within that chapter, the basis of a predictive model of corridor movement was developed.

Chapter 5. Movement, the Movers, and the Decision to Move

In searching for the explanation of corridor movement the first task of this study is to establish the sub-sets of corridor and non-corridor movers. The degree of corridor movement should be similar to that found within the study of restricted lateral movement (Chapter 3). The personal characteristics of the movers and their reasons for moving are then examined to establish which if any variables differentiate between the patterns of corridor and non-corridor movement. Developing from the locational attachments hypothesis it was expected that the personal characteristics of the non-corridor movers would reflect a population holding low levels of attachments to their home area. Therefore, non-corridor movers were expected to be youthful and less established than corridor movers, who were expected to have an older age and more developed familism structure, and possibly a history of lower household mobility. In the decision to move, the differences between the two populations life - family cycle characteristics were also expected to be present. Within this chapter, therefore, three hypotheses are put forward:

- (i) That the degree of corridor movement within the questionnaire population was similar to that observed in the study of restricted movement (Chapter 3).
- (ii) That the two populations of corridor and non-corridor movement can be differentiated by the corridor population, being older, with a more developed level of family status, and less mobile.
- (iii) That the two populations of corridor and non-corridor movement can be differentiated upon the basis of reasons for moving.

To examine these three hypotheses this chapter is divided into three sections with the concluding discussion presented at the end of this chapter. The three topics are; first, corridor and non-corridor movement, secondly, personal characteristics of the questionnaire population, and thirdly, the decision to move.

Section A Corridor and Non-Corridor Movement

As with the study of restricted lateral movement (Chapter 3) corridor movement was defined as movement from one's origin residence to a destination within a 2 kilometer unsigned corridor based upon the central city and centred upon the home origin. Prior to measuring the degree of corridor movement the same procedure as used in Chapter 3 was adopted, by which the origins and destinations of movers, coded by cartesian co-ordinates were rotated to a common axis using the Transmap algorithm option 'rotate only'. Within this study the tenure groupings of origins are 'Rental' and 'Ownership Existing' and the destinations 'Ownership Existing' and 'Ownership New'.

Of the 83 intra-urban movers 66 percent were from rental property and 41 percent were corridor movers. A comparison between the degree of corridor movement in this population and that of the restricted lateral movement study (Chapter 3) is presented in table 5:1.*¹ Tests upon the proportional differences between the two studies established that there was a significant difference

*1 Of the 83 intra-urban movers 34 were established as corridor movers, however, for the purpose of later analyses based upon the six physical corridor divisions of Hamilton it was decided to add to the corridor movers population 4 non-corridor movers who moved within their home physical corridor. In this way it was possible to equate movement within the six physical corridors with corridor movement.

Table 5:1Comparative Tests Between the Proportions of Corridor Movement in the Questionnaire Population and the Total Population 1971

Tenure Groups	Number of Observations	Percentage of Corridor Moves		Difference
		Questionnaire Population	Total Population 1971	
		(A)	(B)	
(A - B)				
<u>Major Groups</u>				
Ownership to Ownership	28	60.7	56.7	4.0
Rental to Ownership	55	30.9	44.1	-13.2*
<u>Lower Level Groups</u>				
Ownership Existing to:				
Ownership Existing	20	60.0	54.6	5.4
Ownership New	8	62.5	67.9	-5.4
Rental to:				
Ownership Existing	30	40.0	46.9	-6.9
Ownership New	25	20.0	40.9	-20.9*

* Significantly Different at the .05 level. Two Sample Proportions Test.

for 'Rental to Ownership' movement, which from the break-down of that data is due primarily to movement from 'Rental to Ownership New' property. This pattern is probably due to refusals to be interviewed or the failure to contact pre-move renters. But with only one of the four groups significantly different, support is given to the hypothesis:

That the degree of corridor movement within the questionnaire population was similar to that observed in the study of restricted lateral movement (Chapter 3).

Table 5:1 also displays that movers from 'Ownership Existing' property moved primarily to 'Ownership Existing' rather than to 'Ownership New' property, although both types of movement have similar proportions of corridor movement. For movement from 'Rental' origins a slightly higher proportion of moves were to 'Ownership New' dwellings, although a greater proportion of moves to 'Ownership Existing' dwellings were corridor movers. In otherwords, movers from an 'Ownership' property were more likely to move within their home corridor and to 'Ownership Existing' dwellings, whereas non-corridor movers were more likely to be renters moving to 'Ownership New' dwellings.

Also of interest in introducing the population of this interview study is the spatial distribution of movers' origins, in that from the outset it should be determined if the distribution of the movers' origins may be a reason for the difference in the patterns of corridor and non-corridor movement. The system of measurement used to assess the distribution of the movers' origins involved three measures:

- (1) The sector of the city within which the origin was located, given by the angle of the mover's origin from the common axis.

(ii) The radial distance of the origins from the downtown centre.

(iii) The plotted spatial distribution of the origins.

By conducting t-tests between the corridor and non-corridor subsets upon both the mover's origin angle and radial distance, no significant differences were established (table 5:2). But as both the origin angle and radial distance are independent measures, the lack of a significant difference need not establish that the distributions are similar, hence the plotting of the movers' origins. Figure 5:1, therefore, provides the additional evidence necessary to support the conclusion that the corridor and non-corridor movers' origins were similarly distributed.

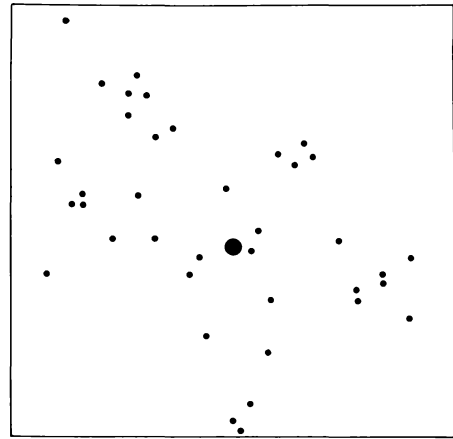
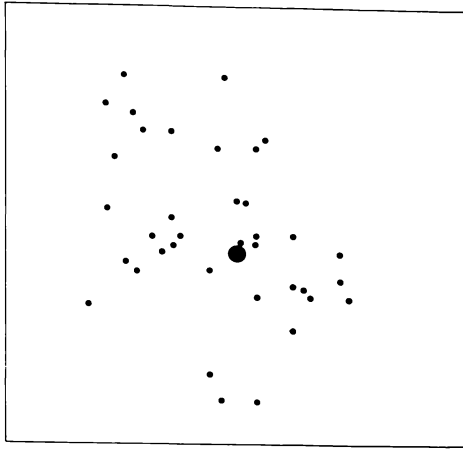
Section B Personal Characteristics of the Questionnaire Population

To examine the hypothesis that corridor and non-corridor movement patterns can be differentiated in accordance with the personal characteristics of the two populations, two studies were undertaken. First, a set of social, economic, and family status variables, and secondly, a set of housing and migration history variables were examined. If in these studies the two populations are found to be different, support for the restricted image hypothesis will be questioned by an explanation of restricted lateral movement based upon the personal characteristics of the mover. This expected difference in the two populations personal characteristics is as previously stated based upon the locational attachments hypothesis, in that persons holding locational attachments are expected to be of an older age and more developed familism structure, and possibly with a history of lower house-

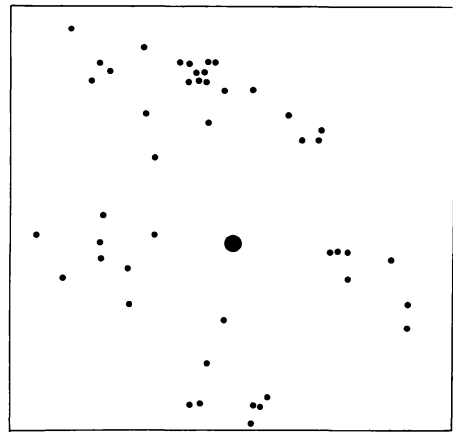
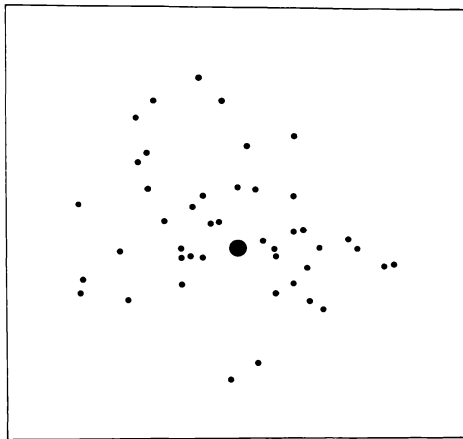
Table 5:2Comparative Tests Between the Distribution of Corridor
and Non-Corridor Origin Nodes

Sub-sets	Mean Values	
	Degrees	Radial Distance (km)
Corridor	178.25	2.16
Non-Corridor	147.05	2.05
t-values		
Corridor/Non-Corridor	1.31	0.20

No Significant Differences at the .05 level.
t-tests, unsigned.

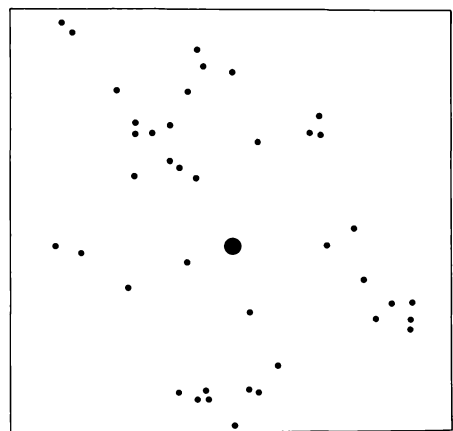


Corridor Movers



Non Corridor Movers

● City centre



Non Intra Urban Movers

ORIGINS

DESTINATIONS

Figure 5:1 Location Of The Sub-set's Origins And Destinations.

hold mobility. However, as stated in Chapter 1, even if these expected differences are established it will not be possible to link this new explanation to the locational attachments hypothesis until after the whole topic of the mobility decision process and locational associations has been examined (i.e. Chapter 9), otherwise one would also be guilty of giving an explanation without the knowledge that all variables which may affect the explanation had been taken into account.

The reason for initially dividing this study into two topics was because the second topic, housing and migration history variables, represented a departure from other studies, in that the role of these variables and their relationship to the socio-economic, familism variables was uncertain.

B:1 Social, Economic, and Family Status Analysis

The establishment of socio-economic and family status dimensions within the structure of urban areas using social, economic, and family status variables has been well documented (Johnston, 1971b). Data at the level of census mesh block aggregations is normally used within those analyses, but this approach can also be applied to establishing the characteristic dimensions of individual movers. Variables used in this analysis are, therefore, key social economic, family, and ethnic variables, selected after detailed consideration of the variables relating to the mover's decision to move. These variables are:

- (i) Marital status of head of household.
- (ii) Number of children below secondary school level per household.
- (iii) Total number of persons per household.

- (iv) Wife employed outside of the household.
- (v) Ethnic type of head of household.
- (vi) Formal educational level of head of household.
- (vii) Income group of head of household.
- (viii) Dwelling's cost.
- (ix) Age of head of household.
- (x) Occupation of head of household.

First, a comparison was conducted between corridor and non-corridor populations scores upon each variable, and secondly a principal axis - factor analysis^{*2} was conducted with the purpose of comparing the underlying dimensions between the populations. The reason for the two sets of analyses of similar nature upon the same data set, is that the comparative analyses of individual variables are only reported so as to display figures which can be directly related to future studies. This is because the factor loading matrix and factor scores from the principal axis - factor analysis are for that purpose meaningless. However, the factor scores are viewed as the basis for testing the hypothesis in that the multi-variate analysis by collapsing the variables down to a reduced number of dimensions removes from consideration variables which are highly related to an underlying variable. In other-words, tests upon the individual variables may establish a large proportion of differences, but they may all be related to an underlying variable, or they may exclude from consideration combinations of variables which form a variable not directly measured.

*2 Principal axis - factor analysis is a principal components analysis with unity in the diagonal of the correlation matrix, rotated using the systems developed for factor analysis. In this study the rotation option is the orthogonal solution, which enables easier interpretation of the factor loading construct by limiting each variable to one major positive and one major negative loading.

a. Comparative Analysis.

The comparison between corridor and non-corridor scores upon each of the ten variables (table 5:3) established that they were significantly different for all but two variables. The two exceptions were marital and ethnic status. Variables indexing the number of children, total number of persons per household, formal education, income group and occupation were found to be scored significantly lower by the non-corridor population. The non-corridor movers had a higher proportion of wives externally employed to the household and a higher proportion of dwellings purchased in the middle price group. These findings, therefore, established that non-corridor movers were different from corridor movers, in that they were characterised by a young, new family group with lower formal education, job and income levels, yet with the power to purchase similar priced dwellings, although with a bias towards the middle price group.

Non-intra-urban movers were different than the two intra-urban sub-sets, in that they had larger numbers of children and fewer wives who worked outside the home. In addition, when compared with non-corridor movers they had a higher level of formal education, income, a larger proportion of professional and sales workers, plus larger families.

b. Factor Analysis.

To examine this conclusion further a principal axis - factor analysis was conducted upon six of those eight variables for 123 observations. The two variables removed were the wife employed outside the household and the occupation of the head of household; the first because the variable had a nominal scaling, and the second because an interval scale could not be assumed. Using the

Table 5:3Comparative Tests Between the Sub-sets Personal Socio-Economic,
Family and Ethnic Characteristics

Sub-sets Variables	Percentages (Unless otherwise stated)		
	Corridor	Non-Corridor	Non-Intra-Urban
	(N = 38) 1.	(N = 45) 2.	(N = 40) 3.
(i) Marital Status of Head of Household			
Married	89.47	100.00 ^{*1}	90.00
Solo	7.89	0.00 ^{*1}	5.00
Single	2.63	0.00	5.00
(ii) Mean Number of Children Below Secondary School Level Per Household	1.21	0.82 ^{*1,3}	1.88 ^{*1}
(iii) Mean Number of Persons Per Household	3.66	3.18 ^{*1,3}	4.13
(iv) Wife Employed Outside of the Household	32.35	42.22	16.67 ^{*2}
(v) Ethnic Type of Head of Household			
European	94.73	95.55	95.00
Maori	2.63	2.22	5.00
Other	2.63	2.22	0.00
(vi) Formal Educational Level of Head of Household			
Primary	2.63	0.00	2.50
Secondary up to 3 years	55.26	60.00	40.00 ^{*2}
Secondary over 3 years	13.15	20.00 ^{*1,3}	17.50
Technical Institute	0.00	6.67 ^{*1,3}	0.00
Teachers College	2.63	2.22 ^{*1,3}	7.50
University	26.31	11.11 ^{*1,3}	32.50
(vii) Income Group of Head of Household			
Lower < \$4,000	44.73	71.11 ^{*1,3}	40.00
Middle \$4,000 - \$6,000	31.57	20.00 ^{*3}	27.50
Upper > \$6,000	10.52	4.44 ^{*3}	17.50

Continued

Table 5:3 Continued

	Corridor	Non-Corridor	Non-Intra-Urban
(viii) Dwelling Cost			
< \$10,000	44.73	35.55 ^{*1}	37.50
\$10,000 - \$15,000	31.57	53.33 ^{*1}	40.00
> \$15,000	23.68	11.11	22.50
(ix) Age Groups			
< 30	26.31	44.44 ^{*1,3}	20.00
30 - 50	52.63	31.11 ^{*1,3}	60.00
> 50	21.05	24.44	20.00
(x) Occupation of Head of Household			
Professional	31.57	11.11 ^{*1,3}	27.50
Administrative	2.63	2.22 ^{*1}	5.00
Clerical	0.00	13.33 ^{*1}	12.50
Sales Workers	10.52	28.88 ^{*1,3}	10.00
Farmers	0.00	0.00	5.00
Miners	0.00	0.00	0.00 ^{*1}
Workers in Transport	15.78	13.33	2.50
Craftsmen	2.63	6.67	0.00
Production, Process Workers	23.68	20.00	12.50
Service	0.00	0.00	5.00
Armed Forces	0.00	0.00	5.00
No Occupation	13.15	4.44	15.00

* Significantly different from the sub-set in the column indicated by the sub-script, at the .05 level.

For proportions, Two Sample Proportions Test.
For means, Two Sample Independent t-test.

Note, for income groups, persons with no occupation, which are primarily those retired, make up the remainder.

characteristic root of 1.0 as the cut off, two dimensions were extracted. The first accounted for 36.04 percent of the variance in the data, and the second 27.96 percent, which totals 64.0 percent explained variance within this analysis. The orthogonal rotated (Varimax) factor matrix is presented in table 5:4:

Factor 1. This dimension was interpreted as economic status, due to high loadings upon income, education, age groups and dwelling costs.

Factor 2. Interpreted as family status, due to high loadings upon the number of children and the total number of persons within the household.

Of the amount of variance explained within each variable (communalities) only the level of formal education was not closely related to the two main dimensions.

From the distribution of factor scores the means for each sub-set were computed (table 5:5), which indicated that corridor movers had a middle position in terms of economic and family status between the higher level non-intra-urban and lower level non-corridor movers. To test this difference a series of t-tests were conducted between the three sub-sets. The results show that the corridor population was significantly different from the non-corridor population for economic status, but for family status the difference was not quite significant. Corridor and non-intra-urban movers held similar levels of economic status, but significantly different levels of family status, in that non-intra-urban movers had a higher level. Non-corridor compared to non-intra-urban movers were totally different with significantly lower economic and family status.

An obvious question with regard to these findings concerns the high level of family status among the non-intra-urban movers,

Table 5:4

**Personal Socio-Economic and Family Characteristics Orthogonal
Rotated (Varimax) Principal Axis - Factor Analysis Matrix**

Factors Variables	Loadings		Communalities
	1	2	
Number of Children	-.079	.949	.906
Total Number of Persons	-.001	.950	.902
Formal Education Level	.472	.185	.256
Income Group	.824	.163	.706
Age Group	.671	-.201	.490
Dwelling Cost	.760	.022	.577

Table 5:5

**Comparative Tests Between Sub-sets Personal Socio-Economic and
Family Characteristics Factor Scores**

Factors Sub-sets	1	2
a. <u>Mean Factor Scores</u>		
Corridor	.07	- .02
Non-Corridor	-.28	- .27
Non-Intra-Urban	.26	.37
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	2.05*	1.56
Corridor/Non-Intra-Urban	0.96	1.71*
Non-Corridor/Non-Intra-Urban	3.15*	2.91*

* Significantly different at the .05 level.
t-tests (unsigned).

when compared with both of the intra-urban sub-sets. The answer would appear to be that non-intra-urban movers are primarily persons moving for career advancement, which necessitates them to move at a stage when their life-family cycle is in the child rearing phase (Abu - Lughod and Foley, 1960), whereas intra-urban movers tend to under-go a period of stability at that stage and are more likely to move at the earlier pre-child / child bearing or later child launching / post-child / widowhood phases. Within the life-family cycle framework one could extend the findings of this analysis to suggest that non-corridor movers were characterised by the earlier pre-child / child bearing phases compared to corridor movers who were in the later child launching / post-child / widowhood phase.

B:2 Migration History and Housing Analysis

The notion that corridor and non-corridor movement can be differentiated upon the basis of migration history and housing variables was experimental. Foremost in this study was the idea that restricted lateral movement is related to a low degree of household mobility and possibly previous ownership of a dwelling, in that these variables are seen to underlie the concept of locational attachments. In total six variables were included within this analysis which followed the same system to that used above. The variables are:

- (i) Previous ownership of a dwelling.
- (ii) Number of moves while living within one's parental home.
- (iii) Total number of household moves in one's life.
- (iv) Largest city which one has lived in for more than

six months.

- (v) Length of residence within Hamilton.
- (vi) Intended length of residence within Hamilton.

a. Comparative Analysis.

From the above six variables, four were important in differentiating between the characteristics of corridor, non-corridor, and non-intra-urban movers: previous ownership, having moved while living with one's parents, largest city, and length of residence within Hamilton (table 5:6). However, only two significant differences were established between corridor and non-corridor movers. For the non-corridor movers the pattern was a lower degree of previous ownership and a higher proportion who had moved while living with one's parents. These results, therefore, only partially confirm the expected pattern.

Non-intra-urban movers were new residents (although a large proportion had previously lived in Hamilton) characterised by relatively high rates of previous ownership and mobility, and higher levels of urban experience.

b. Factor Analysis.

A principal-axis factor analysis was conducted upon four of those six variables, plus the six used in the previous factor analysis. The two variables not included were, previous ownership and the intended length of residence; the first because of its nominal scaling, and the second because no significant differences were established. Inclusion of the total number of household moves in one's life, for which in the univariate tests no significant difference was established, was because this

Table 5:6

**Comparative Tests Between the Sub-sets Personal Mobility History
and Housing Characteristics**

Sub-sets Variables	Percentages (Unless otherwise stated)		
	Corridor	Non-Corridor	Non-Intra-Urban
	(N = 38)	(N = 45)	(N = 40)
	1.	2.	3.
(i) Previous Ownership of a Dwelling	65.78	44.44 ^{*1,3}	67.50
(ii) a. Mean Number of Moves While Living in One's Parental Home	2.05	2.87	2.83
b. Never Moved While Within Parental Home	42.10	24.44 ^{*1}	27.50
(iii) Mean Number of Moves in One's Life	6.50	6.53	6.43
(iv) Largest City Lived In For More Than 6 Months (000's)			
< 100	55.26	44.44	27.50 ^{*1}
100 - 250	2.63	0.00	0.00 ^{*1,2}
250 - 500	5.26	11.11	32.50 ^{*1,2}
500 - 1,000	21.05	31.11	20.00
> 1,000	15.78	13.33	20.00
(v) Length of Residence Within Hamilton (Years)			
< 1	2.63	11.11	57.50 ^{*1,2}
1 - 5	36.84	42.22	15.00 ^{*1,2}
5 - 10	13.15	11.11	5.00 ^{*1}
> 10	47.36	35.55	22.50
(vi) Intended Length of Residence Within Hamilton (Years)			
< 5	7.89	8.88	12.50
5 - 10	18.42	22.22	22.50
> 10	73.68	68.88	65.00

* Significantly different from the sub-set in the column indicated by the sub-script, at the .05 level.

For proportions, Two Sample Proportions Test.

For Means, Two Sample Independent t-test.

variable may be important within a multi-variate analysis which includes a person's age.

Following the procedure previously outlined four dimensions were extracted, explaining 25.1 percent, 17.5 percent, 12.9 percent, and 10.7 percent of the total variance (66.2 percent in total). The orthogonal rotated (Varimax) factor matrix is presented in table 5:7. There are, however, difficulties in interpreting and naming the dimensions.

Factor 1. With high positive loadings on income groups, age groups and dwelling costs, this dimension appears to suggest economic achievement with age, but high negative loadings upon the length of residence suggest that it is biased towards the non-intra-urban movers. The interpretation, therefore, given to this factor was economic status.

Factor 2. With high positive loadings upon the number of children and the number in a dwelling this dimension was interpreted as family status.

Factor 3. With high positive loadings on education and the number of moves this dimension seems to indicate career mobility, however, its negative association with city size didn't support that interpretation. But as city size was positively associated with economic status (factor 1) this factor suggested a career status dimension contrasting with small town experience.

Factor 4. With positive loadings upon parental moves, the number of moves, and age, this dimension was

interpreted as mobility status.^{*3}

For each sub-set the means of the distribution of factor scores were calculated and a series of t-tests between them conducted. Mean scores (table 5:8) show that the corridor sub-set was characterised by a high level of economic status, medium family status, and low career and mobility status. Non-corridor movers had a very low level of economic and family status, low career and medium mobility status, whereas, the non-intra-urban population had a high level of economic, family status and career status, and a medium level of mobility status. The t-test analyses support the notion that corridor and non-corridor movers were different, for corridor movers had higher levels of economic and family status. However, no significant differences were found for career and mobility status. But the pattern of the corridor movers having a lower mean mobility score was in the expected direction. Non-intra-urban movers were found to be significantly different from corridor and non-corridor movers, with a higher level of career status, and also at the .1 level significantly higher levels of mobility status.

B:3 Conclusion

It is concluded that from the above and earlier analysis upon the personal characteristics of the mover household that support is given to the hypothesis:

^{*3} As a result of this factor matrix it would appear that in future a meaningful set of dimensions which are an extension of the accepted socio-economic, familism, ethnic status factorial ecologies can be achieved by adding to the analysis all variables relating to personal characteristics.

Table 5:7

Total Personal Characteristics Orthogonal Rotated (Varimax)
Principal Axis - Factor Analysis Matrix

Variables	Factors	Loadings				Communalities
		1.	2.	3.	4.	
Number of Children		-.105	.941	.003	-.092	.903
Total Number of Persons		-.024	.955	-.015	.009	.913
Formal Education Level		.338	.124	.768	-.099	.729
Income Group		.776	-.121	.120	.189	.667
Age Group		.570	-.114	-.087	.545	.643
Dwelling Cost		.727	.065	.062	.105	.548
Number of Parental Moves		.077	-.035	-.050	.764	.591
Number of Moves		.240	-.078	.513	.536	.615
Largest City		.301	.085	-.652	-.027	.524
Length of Residence		-.521	.216	.154	.380	.487

Table 5:8

Comparative Tests Between Sub-sets Total Personal Characteristics
Factor Scores

Factors		1.	2.	3.	4.
Sub-sets					
a. Mean Factor Scores					
Corridor		.14	-.01	-.16	-.13
Non-Corridor		-.26	-.31	-.13	.03
Non-Intra-Urban		.16	.36	.31	.08
b. t-test Values					
Corridor/Non-Corridor		2.23*	1.85*	0.18	0.95
Corridor/Non-Intra-Urban		0.10	1.62	2.51*	1.42
Non-Corridor/Non-Intra-Urban		2.56*	3.07*	2.71*	0.63

* Significantly different at the .05 level.
t-tests (unsigned).

That the two populations of corridor and non-corridor movement can be differentiated by the corridor population being older, with a more developed level of family status, and less mobile.

In addition the mobility analysis established that the non-corridor movers had a significantly lower level of economic status than the corridor movers, and that non-intra-urban movers were characterised by higher levels of economic, familism, and mobility status than either of the two intra-urban sub-sets. Therefore, support has been found for an alternative to the restricted image explanation of restricted lateral movement in the personal characteristics of the mover. These differences are also in the direction expected in terms of their conceptual relationship with the locational attachments hypothesis, although until tested later (Chapter 9) this relationship remains unproven.

Section C. Decision to Move

Rossi (1955, p.72) and subsequently many other workers have viewed 'residential mobility as a process by which the housing requirements of the household are gradually brought into congruence with its needs'. Within the strain-stress model of the decision to relocate (Wolpert, 1965) changes in a person's life-family cycle have been found to be the main reasons for moving. When sub-divided into the types of tenure of a person's origin, a comparative study of the research of Clark (1970), Eldridge (1967) and Armiger (1966) would suggest that life-family cycle and environmental factors are more important to movers from ownership than rental property. In that the majority of renters move to other rental property, major factors for renters moving

are changes in accessibility to work, urban renewal, and eviction. The major life-family cycle factors given by those three studies include changes in personal affairs, housing demands, income, and life style. Environmental factors given include, the neighbourhood's physical environment, the physical conditions of the residence, privacy, noise, invasion of the neighbourhood by other cultural groups, and increased land values.

The form of the life-family cycle model is well developed within the literature, although there is a lack of consensus upon the divisions. Abu-Lughod and Foley (1960), Beyer (1963) and Kaiser (1971) have all put forward models of stages in the life-family cycle. For example Abu-Lughod and Foley recognise six stages in the life-family cycle after marriage:

- (i) Pre-child.
- (ii) Child bearing.
- (iii) Child rearing.
- (iv) Child launching.
- (v) Post child.
- (vi) Widowhood.

This basic schema of the family cycle model can be transformed into life cycle - residential cycle models; for example Foote's (1960) residential cycle in which ten steps from marriage are viewed:

- (i) Rental to small furnished apartment, perhaps briefly prefaced by living with parents of one mate.
- (ii) Rental of large furnished apartments connected with changes of husband's jobs.
- (iii) Purchase of small second-hand house, building of small equity.
- (iv) Purchase of larger house, often coincident with

further changes of household's jobs or income,
further increase of equity.

- (v) Expansion of house by some remodelling, completion of payments, 'settling down, often while children are in high school'.
- (vi) For a few, custom-building of a house.
- (vii) Children leave home, neighbourhood begins to deteriorate.
- (viii) Sale of house longest occupied, purchase of smaller house or rental apartment near centre of city.
- (ix) Death of one mate: brief retention of separate home by survivor.
- (x) Sale of house, surviving mate moving in with a child or into an institution.

Although not directly applicable to the New Zealand scene, where steps ii and iii and possibly step i are often missed out by young married persons and where step iv is often obtained by governmental housing assistance, rather than through the development of equity, this residential cycle does stress the different reasons that may underlie a person's decision to move in terms of the life-family cycle.

C:1 Reasons for Moving

The object of this section is to examine very briefly the reasons for moving so as to establish support for the hypothesis:

That the two populations of corridor and non-corridor movement can be differentiated upon the basis of reasons for moving.

As stated in the introduction of this chapter the theoretical

basis for expecting a difference between the two populations reasons for moving was the argument of expected differences in life-family structure. In that the theoretical basis has been established by the foregoing analyses of the personal characteristics of the mover, differences related to the life-family cycle characteristics of the sub-sets are expected in their reasons for moving. To test this hypothesis two sets of questions were asked:

- (i) What were the reasons you had for leaving your previous dwelling (i.e. your last permanent dwelling)? Would you please rank those factors from the most to the least important.
- (ii) a. How satisfied were you with your previous dwelling?
(five point scale)
- b. How satisfied are you with your present dwelling?
(five point scale)

The first question on what were the reasons behind why the respondent decided to move, under-went major changes between the pilot study and the actual data collection, for in the pilot study the question asked included a check list of 35 reasons for moving which the mover was asked to consider prior to ranking those which were important. Unfortunately the check list resulted in the situation of confusion, in that respondents in anticipating that this list must be important answered yes to many more than they could rank. As a result it was decided to exclude the check list from this study, although it was considered that an alternative to doing so would have been to obtain semantic ratings of importance for each of the 35 reasons. This later approach was not adopted in view of the length of the total questionnaire, although it was desirable in terms of the argument previously

stated for adopting a multi-variate system of analysis upon the study of the variables of personal characteristics. In addition the usage of an open ended question resulted in taking the first ranked reason as the primary reason and the rest as secondary reasons, due to the many different answers given and variance in the number of reasons per mover. The reason for using an open ended question was that no established framework for an expected set of reasons for moving within the New Zealand scene existed.

A listing of the range of reasons given for moving and responses aggregated under those group headings are presented in tables 5:9, 5:10. In table 5:10 life-family cycle reasons for moving are dominant, but there were no significant differences between the totals for corridor and non-corridor movers. By subdividing the life-family cycle group up into dwelling factors, tenure factors and personal factors, a marked difference between the two populations was established, in that non-corridor life-family cycle reasons for moving were primarily tenure factors (i.e. they moved because they wanted to own rather than rent or they wanted to build), whereas corridor movers either disliked their previous dwelling's characteristics or their households had undergone personal developments. However, the only statistical differences established were for tenure and personal factors. Therefore, non-corridor movers were characterised by people wanting to leave the rental market, compared with corridor movers who had reasons more related to changes within the household.

To answer the second set of questions the mover was asked to indicate how satisfied they were with their pre-move and after-move dwellings upon the rating scale:

1. Extremely Satisfied.
2. Very Satisfied.

3. Just Satisfied.
4. Dissatisfied.
5. Very Dissatisfied.

Results for these questions established that for the pre-move dwelling both populations mean score of satisfaction was between just satisfied and very satisfied, whereas for the after-move dwelling it was in the range of very satisfied and extremely satisfied (Table 5:11). That increase for both populations was significant (t-tests), but t-tests between the two populations at each stage established no significant differences. Therefore, the notion that one group may have been more dissatisfied with their origin residence was discarded.

C:2 Summary

In conclusion, the analysis of the reasons for moving suggest support for the hypothesis, in that there are statistically significant differences between the two populations. Non-corridor movers apparently move because of the desire or need to own rather than rent, whereas corridor movers do so for reasons of complaints about their initial residence, or personal changes within the household. Therefore, these results do reflect the differences in the two populations life-family cycle characteristics found in the previous analysis. However, no marked difference was found in the levels of satisfaction between the sub-sets in terms of living at their previous or new residence. Nor does movement appear to have been a function of pressing dissatisfaction with their previous residence, but rather one of betterment and probably an expected phase within one's life. This finding may point to evidence that in the New Zealand scene a

Table 5:9

Range of Reasons Given for the Decision to Move,
Classified Under 5 Factors

1. Life - Family Cycle Factors

a. Dwelling Factors.

Dwelling not big enough.
Dwelling too big.
Larger section wanted.
Section too large.
Increase in rent.

b. Tenure Factors.

Wanted to own rather than rent.
Wanted to build.

c. Personal Factors.

Age.
Death of spouse.
Marriage.
Personal problems.
Acquired capital.

2. Environmental Factors

Area getting built out.
Dislike of area.
Dislike of noise.

3. Economic Factors

Speculation.

4. Accessibility Factors

Accessibility to relations.

5. Forced Moves

Eviction.
Urban Renewal.

Table 5:10**Comparative Tests Between Sub-sets Primary Reasons For Moving**

Sub-sets Aggregated Primary Reasons For Moving	Percentages	
	Corridor	Non-Corridor
1. Life - Family Cycle Factors		
a. Dwelling Factors	21.05	11.11
b. Tenure Factors	18.42	42.22*
c. Personal Factors.	26.31	11.11*
Total	65.78	64.44
2. Environmental Factors	13.16	13.33
3. Economic Factors	5.26	4.44
4. Accessibility Factors	0.00	2.22
5. Forced Moves	15.78	15.55

* Significantly different at the .05 level.
Two Sample Proportions Test.

Table 5:11**Level of Satisfaction Held With Pre-Move and After-Move Dwellings**

Sub-sets Dwelling	Mean Level of Satisfaction	
	Pre-Move	After-Move
Corridor	2.63	1.76
Non-Corridor	2.91	1.84

person's decision to move is not the result of stressors (Clark and Cadwallader, 1973) and suggest that a sub-set of the urban population deliberately sets about to establish the conditions so that they can move.

Section D Chapter Conclusion

Although it would be desirable at this point to make concluding statements for or against the research theses, this cannot be done because the three topics within this chapter form only part of the total residential mobility process. But this chapter has established that prior to the decision of where to relocate there were statistically significant differences between the characteristics of the corridor and non-corridor populations. For movers from ownership dwellings the probability of corridor movement was .61, whereas that for movement from rental dwellings .31. This plus the findings upon the different characteristics of the sub-sets suggests that a generalised modelling of restricted lateral movement can be established:

That corridor movers are previous house owners in the later child launching / post-child / widowhood life-family cycle phases, whereas non-corridor movers are previous renters in the pre-child / early child bearing life - family cycle phases.

It is, however, possible to speculate upon support for the research theses in that the evidence suggests that the explanation of corridor and non-corridor movement is non-random due to the differences in the characteristics between the two sub-sets. But at this point it is not possible to present a complete argument in

support of the role of either of the two non-random hypotheses: the restricted image and locational attachments hypothesis. It may be argued that the corridor movers hold restricted sectoral images of the city because their origins are peripheral ownership dwellings, whereas non-corridor movers with origins in the inner city rental areas held restricted images with no sectoral form. However, the finding of no major spatial difference between the two populations distribution of origins does not support that interpretation. Alternatively those differences in their characteristics suggest that the explanation of corridor movement is locational attachments, in that a person owning their origin dwelling and of older life-family cycle status was more likely to have held locational attachments.

Chapter 6. Aspiration and Preferences

Aspiration and preference sets are operationally defined as, what the mover wanted in terms of a new residence, with regard to the characteristics of the dwelling and its location. These aspiration and preference sets are subject to the mover's perception, which varies not only with the personal attributes of the individual, especially past experience and habitual responses, but also in terms of the quality of the information (Pred, 1967). In general they vary in accordance with the normal set of societal variables (i.e. age, sex, marital status, education, and culture), which with the spatial differentiation of the urban population upon the basis of those variables has stressed the importance of locational aggregates, within which members conform to the group's expected norms, values and levels of aspiration (Pred, 1967; Kates and Wohlwill, 1966; Sonnenfeld, 1967).

Life cycle/family cycle demands which form the primary strain-stress force behind moving, also dominate the aspirations and preferences of relocation. Weiss (1966) in a study of homeowners identified six important preference desires in locational choice:

- (i) Quality and character of homes in the neighbourhood.
- (ii) Sufficient interior storage space and rooms.
- (iii) Large lot.
- (iv) Neighbourhood with good reputation and prestige.
- (v) Total cost of the house and lot.
- (vi) Nearness to schools.

But the importance of cost often appears to have been understressed, simply because it is a more than obvious constraint, hence Rossi (1955) puts cost first. The role of cost was

supported within this study, where the price range of dwellings to be searched was very restricted, with a mean of 1.8 thousand dollars, and a mean unsigned difference between the mid-point of the mover's intended price range and the actual price paid of 1.7 thousand dollars. The mean direction of that difference was slightly negative (-0.06 thousand dollars).

The first topic of this chapter is to establish whether the corridor and non-corridor sub-sets' aspiration sets can be differentiated upon the basis of their aspiration sets. The conceptual basis for this expected pattern is the already established differences in the two populations socio-economic and family status, therefore, those populations are seen to be members of different groups which should hold different aspirations. In that their pattern of movement was viewed as sector specific, as a function of locational attachments, the corridor movers' aspiration set was expected to have specified a dwelling within their home corridor, whereas that of the non-corridor movers was not. The second topic is to establish whether the corridor and non-corridor sub-sets could be differentiated in terms of their preference rankings of housing types. As an experimental topic, the only expected pattern prior to analysing the aspiration sets was that upon the basis of the differences in their personal characteristics a difference in preferences was expected. The spatial distribution of area location preferences is the third topic, where the object was firstly to examine the notion that movers possessed images which were biased towards their origin home corridors (Horton and Reynolds, 1971b; Johnston, 1971a, 1972a), and secondly that corridor movers held a higher level of preference with their origin home corridor than did non-corridor movers. Here again the conceptual reasons for this difference was that the

corridor movers' relocation decision was sector specific due to locational attachments which were a function of the personal characteristics of the mover. The hypotheses of this chapter, therefore, are:

- (i) That corridor movers possess an aspiration set which emphasizes moving to a specific area, whereas non-corridor movers have a more generalised aspiration set.
- (ii) That corridor and non-corridor sub-sets can be differentiated in terms of their preference ranking upon different types of houses.
- (iii) That corridor movers preferred their origin home corridor more than did non-corridor movers.

Section A Aspiration Set

To enquire into what movers aspired to when they searched for a new dwelling, they were asked:

After having decided to move from your previous dwelling what were the factors you considered as important in your search for a new dwelling?

The analysis of those data follows the same procedure as that employed in the previous chapter; the individually ranked aspirations were grouped into primary and secondary aspirations, in which primary aspirations were those ranked first.^{*1} For the total 123 movers the list of aspirations was grouped into six major categories (table 6:1):

*1 As with the study of reasons for moving, a check list was also included within the pilot study, but for the same reasons was discarded for the actual study. Again a semantic scaling would have been desirable for the purpose of conducting a multi-variate analysis, but due to the length of the questionnaire this approach was not followed.

- (i) Dwelling factors.
- (ii) Site factors.
- (iii) Area factors.
- (iv) Accessibility factors.
- (v) Environmental factors.
- (vi) Additional factors.

Of the total set of aspirations given, over 20 percent were in the categories of dwelling, area, and accessibility factors (table 6:2). To establish whether the three sub-sets of movers could be differentiated between, tests were conducted upon their proportional distribution of the total responses over each of the six major categories. From that analysis (table 6:3), it was concluded that there were no significant or major differences between the sub-sets. When examined by primary aspirations, however, major differences were established between the corridor and non-corridor sub-sets (table 6:4), in that corridor movers aspired more to area and accessibility factors, and non-corridor movers to dwelling and environmental factors. This analysis was repeated for all individual categories which 10 percent or more of the total population gave as important. Major differences were established between corridor and non-corridor movers (table 6:5), favouring corridor movers in terms of:

- (i) Permanent materials.
- (ii) Size of section.
- (iii) Specific area for location (significant).
- (iv) Work location (significant).
- (v) Location of schools (significant).

whereas, favouring non-corridor movers in terms of:

- (i) General appearance of design of dwellings.
- (ii) Quality of area (significant).

Table 6:1Range of Aspirations Given Classified Into 6 Factors1. Dwelling Factors

Resale Value
 Permanent/Maintenance Free Material
 Age of Dwelling
 Condition of Dwelling
 Aspect of Dwelling
 Internal Dwelling Requirements
 General Appearance/Design of Dwelling
 Size of Dwelling
 Something to Develop

2. Site Factors

Flat Section
 Size of Section
 Home with a View
 Additional Section Characteristics
 Type of Street

3. Area Factors

Quality of Area
 Specific Location in Terms of Area
 Residential A Area
 Residential B Area
 Established Area
 Quality of Schooling in Area
 Side of Town, Eastside/Westside
 Type of People Living in Area

4. Accessibility Factors

Work Location
 Accessibility of Town (CBD)
 Location of Schools
 Convenience to Friends and Relations
 Availability of Public Transport
 Location of Shops and Proximity to

5. Environmental Factors

Quietness/Privacy

6. Additional Factors

Nothing Important

Table 6:2Total and Primary Aspiration Set Structure

Aspiration Factors	Percentage of Aspirations Given	
	Total Aspiration Set (N = 343)	Primary Aspiration Set (N = 123)
Dwelling	33.24	29.27
Site	11.37	8.94
Area	23.03	33.33
Accessibility	21.28	14.63
Environmental	9.33	8.94
Additional	1.75	4.88

Table 6:3Comparative Tests Between Sub-sets Total Aspiration Set Structure

Sub-sets Aspiration Factors	Percentage of Aspirations Given		
	Corridor (N = 115)	Non-Corridor (N = 115)	Non-Intra Urban (N = 113)
Dwelling	37.71	29.56	32.74
Site	13.04	13.91	7.07
Area	20.86	23.47	24.77
Accessibility	21.73	20.86	21.23
Environmental	6.08	10.43	11.50
Additional	0.86	1.73	2.65

No significant differences at the .05 level.
Two Sample Proportions Test.

Table 6:4Comparative Tests Between Sub-sets Primary Aspiration Set Structure

Sub-sets Aspiration Factors	Percentage of Aspirations Given		
	Corridor (N = 38)	Non-Corridor (N = 45)	Non-Intra- Urban (N = 40)
Dwelling ⁴	26.67	50.00 ^{* 1}	40.63
Site	10.52	11.11	5.00
Area	42.10	26.66	32.50
Accessibility	21.05	11.11	12.50
Environmental	2.63	13.33 ^{* 1}	10.00
Additional	2.63	4.44	7.50

* Significantly different from the proportion in the column indicated by the sub-script, at the .05 level. Two Sample Proportions Test.

⁴ The proportion who purchased sections were removed from the base population for this factor. The number of observations were respectively 30, 30, and 32.

Table 6:5

**Comparative Tests Between Sub-sets Principal Aspirations Within
The Total Aspiration Set**

Sub-sets Principal Aspirations	Percentage of Movers Giving Each Aspiration		
	Corridor (N = 38)	Non-Corridor (N = 45)	Non-Intra-Urban (N = 40)
1. Dwelling Factors⁴			
Resale Value	23.33	20.00	31.25* ¹
Permanent/Maintenance	26.67	13.33	3.12
Age of Dwelling	16.67	13.33	18.75
General Appearance/ Design	10.00	16.66	15.69
2. Site Factors			
Size of Section	23.68	11.11	5.00* ¹
3. Area Factors			
Quality of Area	10.52	26.66* ¹	25.00* ¹
Specific Location in Terms of Area	42.10	8.88* ¹	12.50* ¹
4. Accessibility Factors			
Work Location	31.57	13.33* ¹	10.00* ¹
Location of Schools	31.57	11.11* ¹	22.50
5. Environmental Factors			
Quietness/Privacy	18.42	26.66	32.50

* Significantly different from the proportion in the column indicated by the sub-script, at the .05 level.
Two Sample Proportions Test.

⁴ The proportion who purchased sections were removed from the base population for this factor. The number of observations were respectively 30, 30, and 32.

These differences suggested that corridor movers based their aspirations upon the betterment of their dwelling within a specific location, whereas non-corridor movers had a greater freedom of choice in their spatial mobility, in that they held a set of generalised aspirations centred upon the quality of the house and the area, which probably could have been met by any good quality area with dwellings of a good appearance. Limited support, therefore, has been found for the hypothesis:

That corridor movers possess an aspiration set which emphasizes moving to a specific area, whereas non-corridor movers have a more generalized aspiration set.

Non-intra-urban movers had a similar aspiration set to that of non-corridor movers, but when compared with the corridor sub-set negative differences were found upon:

- (i) Permanent materials (significant).
- (ii) Size of section (significant).
- (iii) Specific location in terms of area (significant).
- (iv) Work location (significant).,

and positive differences upon:

- (i) Resale value.
- (ii) Quality of area (significant).
- (iii) Quietness and privacy.

By supporting the non-corridor sub-set, this pattern stressed the difference of corridor movers, in that non-intra-urban and non-corridor groups had a much more generalised aspiration set.

Section B Housing Preferences

To extend the analysis of the aspiration set, a test using a

set of housing photographs was devised. Totally experimental in nature, the object was to obtain from preference rankings of various housing types more evidence of any basic differences between the corridor and non-corridor sub-sets. As stated in the introduction differences between the two populations were expected upon the basis of their differences in personal characteristics. The question asked was:

Would you place these housing photographs in order of the preference you hold with regard to living in them. Make your decisions as much as possible on the information given in the photograph.

Plate 1 presents the photographs used, all of which are of Hamilton dwellings. Each photograph was 20 x 15 cm in size, mounted upon a separate card, and presented in random order. They displayed both a general chronological sequence of architectural development within New Zealand's residential dwellings (Garrett, 1966) and a range of variation in socio-economic status. Most importantly, they covered the available range of dwelling types within Hamilton. They represented:

1. 'Old high status residence', built in the period of the 1920s - 1950s and was representative of an urban mansion.
2. 'Ultra-modern residence of the high status group', built in the new high status suburbs of the 1960s - 1970s.
3. 'Upper middle-high status contemporary dwelling', built in the 1960s - 1970s and normally individually designed.
4. 'Lower middle-middle status contemporary dwelling', built by building companies upon a standard design within new group housing sub-divisions. Termed 'group housing' this example was built in Roman brick, whereas



Plate 1 Housing Preference Photographs

others in Hamilton were built in local Huntly brick or in wood.

5. 'Lower middle-middle status dwelling of the 1940s - 1950s' normally wooden.
6. 'Waterfall front dwelling' based upon a break from traditional lines in following the streamlined curved steps of sky-scrappers of the late 1920s. These dwellings were built between the 1930s - 1950s.
7. 'State house', a typical example of the period 1936 - 1960, built for the State Advances Corporation under their low income, low rental, low cost housing scheme.
8. 'Ranch style dwelling', based upon the earlier Californian bungalow and mixed with features of the then popular Spanish Ranch style. Built in the 1920s - 1930s.
9. 'Californian bungalow', an example of the low cost building originally based upon American kit-set plans of the Californian bungalow, built in the 1920s - 1930s.
10. 'Queen anne villa', one of a variety of T villas built prior to 1920, but seldom before 1900.
11. 'Colonial cottage', of Victorian times, one of the permanent cottages of the settlers (nineteenth century).

Figure 6:1 presents the distribution of ranking scores for each photograph in which there was a marked preference for photographs 1, 3, and 4. Photographs 5, 7, and 8, were given medium positions in the preference rankings, while low preferences were given to photographs 6, 9, 10, and 11. Surprisingly the 'ultra modern' dwelling, photograph 2, had no marked pattern of preference. The mean scores of the rankings placed photograph 3,

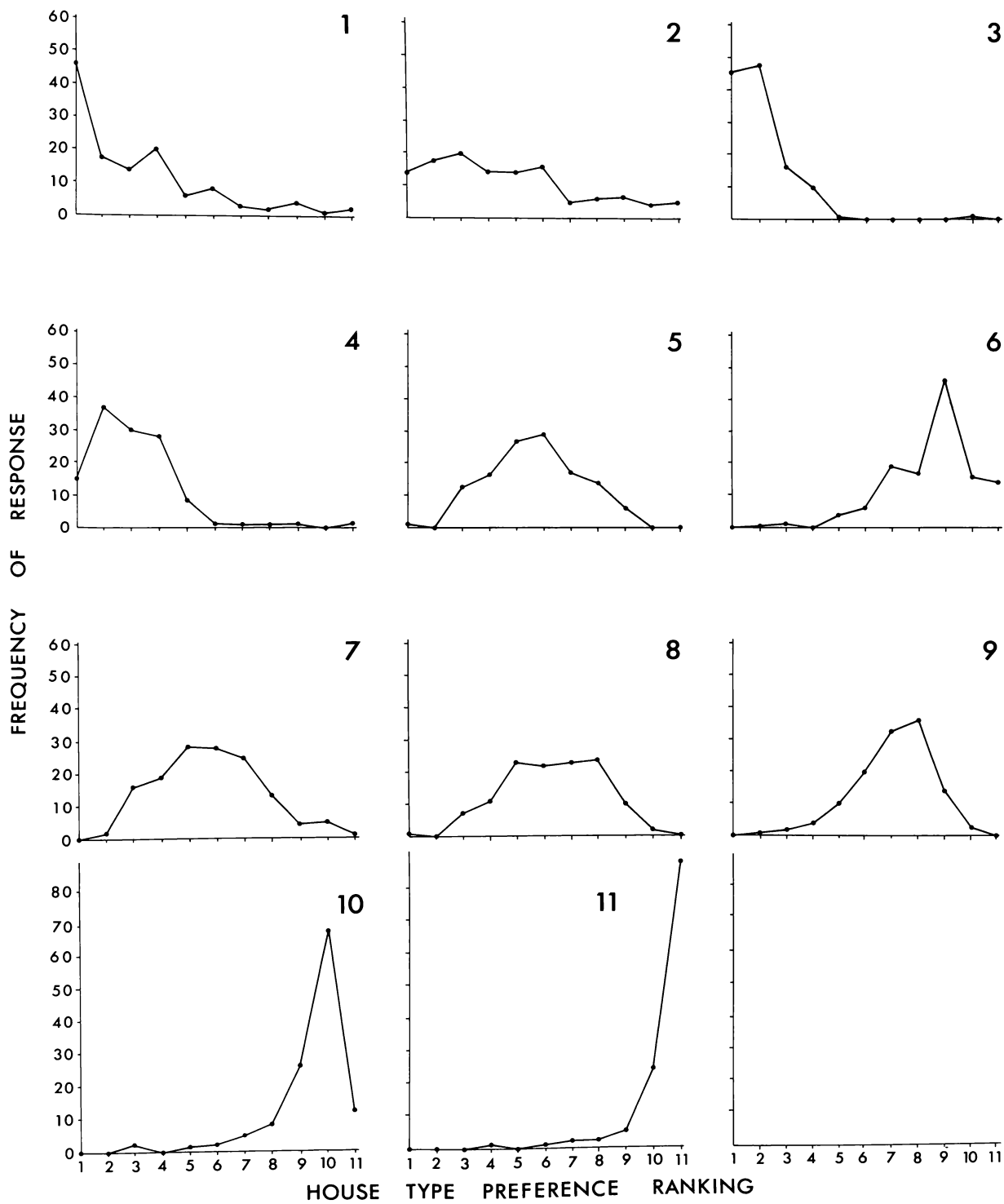


Figure 6:1 Distribution Of Preference Ranking Scores For Each Photograph.

the 'upper middle-high status contemporary dwelling' first, followed by the other contemporary dwelling, 'group housing' (photograph 4), and somewhat unexpectedly the 'old high status residence (photograph 1), which as characteristic of high status areas was only third (table 6:6). Bottom of the list were 'state house' (photograph 7), the 'queen anne villa' (photograph 10), and the 'colonial cottage' (photograph 11).

As with the previous analysis, the principal concern was the comparison of scores between the sub-sets. Here it was established that the corridor population had significantly different rankings to the non-corridor population on six of the eleven photographs. These differences were that corridor movers ranked photographs 1, 3, 7, 8, 9, and 10 higher than non-corridor movers. Compared to the non-intra-urban movers, corridor movers ranked photograph 10 higher, whereas non-corridor movers ranked photograph 1 higher and photographs 3 and 11 lower.

To establish what these differences meant and to look at each individual's ranking of houses, a principal axis-factor analysis was conducted upon the data so as to obtain the common dimensions which existed in the rankings of the photographs. Problems, however, arose within this analysis in interpreting the dimensions, as each photograph did not represent a known variable. Instead the interpretation involved searching the photographs after the dimensions had been established, with the object of determining the common features in the photographs upon each dimension. As an aid in interpretation, the foregoing study of aspiration sets suggests that one should expect dimensions on the general quality of dwellings and the specific characteristics of dwellings.

Table 6:7 displays the results of that analysis from which three dimensions were extracted, explaining 56.95 percent of the

Table 6:6Comparative Tests Between Sub-sets Ranked Housing Preferences

Sub-sets Photograph	Photo- graph Number	Total Population Mean Preference Ranking	t-Test Values		
			Corridor/ Non- Corridor	Corridor/ Non-Intra- Urban	Non- Corridor/ Non-Intra- Urban
Upper Middle Contemporary	3	2.01	-1.44 ^{*2}	-.02	1.37
Middle, Group Housing	4	3.02	-1.11	-.94	.26
Old High Status	1	3.13	-1.60 ^{*2}	.25	1.83 ^{*2}
Ultra Modern	2	4.65	.05	1.29	1.02
Waterfall Front	6	5.58	-.21	.38	.59
Middle, 1940s - 1950s	5	5.67	-1.21	-.39	.90
Ranch Style	8	6.30	-1.55 ^{*2}	-1.22	-.26
Californian Bungalow	9	7.06	3.13 ^{*1}	.57	-2.53 ^{*1}
State House	7	8.58	1.66 ^{*2}	.47	-1.15
Queen-Anne Villa	10	9.41	3.52 ^{*1}	2.55 ^{*1}	-1.39
Colonial Cottage	11	10.51	1.21	-.68	-1.87 ^{*1}

*1 Significantly different at the .05 level.

*2 Significantly different at the .1 level.

t-Tests.

total variance:

- Factor 1. With negative loadings on 'old high status residence' and 'ultra-modern', and positive loadings on the lower cost and ubiquitous 'upper-middle high status contemporary dwelling', 'group housing', lower middle-middle status dwelling of the 1940s - 1950s' and 'state houses', this factor suggested a 'cost - quality housing dimension'.
- Factor 2. This factor loaded positively upon the 'ranch style' and 'queen anne villa', and negatively upon the 'waterfall front dwelling'. Looking at the photographs, both the 'ranch style' and 'queen anne villa' had verandahs, whereas the 'waterfall front dwelling' did not. Interpreted as a 'details of dwellings dimension', the loadings for the other photographs supported that interpretation.
- Factor 3. Suggested an 'age dimension' with positive loadings on 'upper middle-high status contemporary dwellings' and 'group housing' built in the 1960s - 1970s period, and negative loadings on 'californian bungalow', the 'queen anne villa' and the 'colonial cottage' built prior to the 1940s.

Thus the expected dimensions, of general quality and the specific characteristics of the dwellings, were supported by those three factors. General quality appears to have been divided between the cost-quality of housing (factor 1) and the age of the dwelling (factor 3), whereas detailed consideration of the form of a

dwelling, in this case verandahs, was supported by details of dwellings (factor 2). Although no direct comparison can be made with other studies in the literature, due to a very different research design, work by Peterson (1967) did lend support to the interpretation above. In establishing that the multi-dimensional phenomenon of preference can be simplified to three basic dimensions, Peterson's first dimension of 'general physical quality' can be equated within this study with Factor 3 (age of dwelling), his second 'harmony with nature' with Factor 1 (cost-quality of housing), and his specific quality dimension 'noise' with Factor 2 (details of the dwelling).

Developing from this interpretation it was expected that the non-corridor sub-set would have had higher scores than the corridor sub-set upon Factors 1 and 3 and lower scores upon Factor 2. The reasoning behind this was that from the study of the characteristics of mobility (Chapter 5) and the aspiration sets, the non-corridor sub-set was found to be more interested in new housing and the general quality of housing. Taking the factor scores for each sub-set, the mean scores over those three dimensions supported the expected pattern (table 6:8). The non-intra-urban movers, however had similar mean scores to non-corridor movers upon Factors 1 and 3, but for Factor 2 were similar to corridor movers. To test the difference between those patterns a series of t-tests were conducted. For Factor 1 (cost quality housing dimension) (negative) no statistical difference between the corridor and non-corridor movers was established. But significant differences were established upon factors 2 (detail of dwellings) and 3 (age). The only statistical difference for the non-intra-urban population was with the non-corridor sub-set in terms of factor 3 (age). The reason why the non-intra-urban sub-set

Table 6:7Housing Preference Orthogonal Rotated (Varimax) Principal Axis-Factor Matrix

Factors Variables	Loadings			Communalities
	1.	2.	3.	
Upper Middle Contemporary	.527	-.241	.588	68.3
Middle, Group Housing	.599	-.393	.311	61.1
Old High Status	-.716	.266	.178	61.5
Ultra Modern	-.741	-.327	.021	65.6
Waterfall Front	.020	-.498	.250	31.1
Middle, 1940s - 1950s	.803	.077	.206	69.3
Ranch Style	-.036	.777	-.018	60.6
Californian Bungalow	.181	.041	-.741	58.5
State House	.547	-.360	-.152	45.3
Queen-Anne Villa	-.100	.611	-.370	52.1
Colonial Cottage	-.116	.306	-.647	52.6

Table 6:8Comparative Tests Between Sub-sets Housing Preference Factor Scores

Factors Sub-sets	1.	2.	3.
<u>a. Mean Factor Scores</u>			
Corridor	-.12	.23	-.13
Non-Corridor	.06	-.23	.04
Non-Intra-Urban	.04	.04	-.12
<u>b. t-test Values</u>			
Corridor/Non-Corridor	.90	2.81*	1.99*
Corridor/Non-Intra-Urban	.48	1.24	.08
Non-Corridor/Non-Intra-Urban	.10	1.48	1.91*

* Significantly different at the .05 level.
t-Tests (unsigned).

favoured older dwellings would appear to have been related to the personal characteristics of that group, and for career workers within that group their demand for readily resaleable property. It was often stated by movers on transfer that a new dwelling requiring development was not acceptable to their employers in terms of them guaranteeing the mortgages. Also in many cases career persons were not interested in developing a home within a new suburb, as they didn't have time, or were not likely to remain within the city to gain the benefits of development. Others, because of the older age structure of this sub-group, did not want to develop a section having previously done so. This study, therefore, added further evidence to the argument that the corridor and non-corridor sub-sets were different, and support was given to the hypothesis:

That corridor and non-corridor sub-sets can be differentiated in terms of their preference ranking upon different types of houses.

Section C Spatial Pattern of Preferences

The question of the spatial pattern of preferences was closely related to the restricted image hypothesis, in that preferences should have been heightened within the home corridor. However, although a mover must know about an area to hold any feelings of preference with it, there is no direct linkage between their level of familiarity and preference. The restricted sectoral image hypothesis was, therefore, not examined within this study of the spatial pattern of preferences, in which the topics studied were:

- (i) The general form of the at-move preference surface

with reference to the preference continuum as put forward by Horton and Reynolds (1971b).

(ii) The question of whether a localized preference image based upon the origin or destination home corridor existed.

(iii) The hypothesis:

That corridor movers preferred their origin home corridor more than did non-corridor movers.

The reason why the 'at-move' preference image was requested rather than the 'pre-move decision' image, was that the preference image seen to be the most important to a person's resulting movement was that derived after the person had seriously considered the prospect of moving and put into operation their preferences towards relocation. Ideally for this study it would have been better to have obtained the image just prior to the selection decision, in that the final selection may bias the image.

Before detailing the results of these studies, three organisational aspects must be dealt with. First the method by which the data upon the spatial pattern of preferences was obtained, was that each respondent was asked to place alongside a preference scale each of the 26 areas of the city, presented as a shuffled deck of 13 x 8 cm cards. These 26 areas were the set of sub-divisions of Hamilton derived from the consensus within a number of person's maps of the internal sub-divisions of Hamilton (Chapter 2). The question asked was:

According to your preferences to live in them, would you please place the area cards upon the scale:

1. Would prefer to live in.
2. Wouldn't mind living in.
3. Would live in if necessary.

4. Would prefer not to live in.

5. Would definitely not live in.

Any area which was not known had previously been removed, although in the factor analysis these few gaps were filled by the mean value for that area from the total population who knew the area. Second, there were five questions involving the rating of areas (preference, desirability, at-move familiarity, pre-move decision familiarity, and social status), each relating to different variables, therefore, within the questionnaire each question was ordered so as to minimize the effects of one set of placements upon another. For the same purpose the card deck was reshuffled before each question. Third, non-intra-urban movers were included, although they could not be classified according to their intra-urban origins. The reason for basing the factor analysis upon all 123 movers was in part because of a desire to have the largest population for that analysis, but most importantly for the purpose of increasing the base population for the resulting grouping analyses. Here the problem was that in having a small intra-urban population (83) the number of groups that could be derived from the grouping analysis based upon that population would have been greatly restricted, and this in turn would have forced the loss of the spatial identity of each group by forcing the grouping to a higher level of aggregation. In defence of having done so, it was argued that in the very broadest sense of the term 103 movers were intra-urban movers, and an additional 8 had previously lived in Hamilton. In total only 9 of the 123 were unfamiliar with Hamilton prior to their move.

There were a number of important advantages in using a shuffled deck of area cards over a written list of areas. First, this approach was found to establish great interest in the

question as the interviewee participated fully in establishing their answers, which became in some ways a game. Second, in contrast to a list, the individual could easily go back through their placement of areas and recheck that they had made the correct decisions upon a comparative as well as an individual basis. Third, presenting a shuffled deck of cards each time aimed at destroying any sequential grouping of areas.

C:1 What was the general form of the preference images?

To study the general patterning of at-move preferences for the total population the mean scores were calculated. Figure 6.2 shows a clear northern sector of high preference, and in addition Hamilton Lake and Hillcrest were also viewed as areas which people 'wouldn't mind living in'. A secondary characteristic was the high scores for the rest of the areas upon the east-side as opposed to the westside. With the exception of the suburbs which incorporate the northern ridge line (Forest Lake, Livingstone, Dinsdale) and the hills of Glenview, the remaining western areas were given a mean score within the category of 'would prefer not to live in'. This pattern appeared related to the lower socio-economic levels of those areas, and the location of industry in Te Rapa, Norton, and Frankton. Although the mean scores did not display the two extremes of preference (would prefer to live in, and would definitely not live in), this pattern did appear similar to that previously established within the typology study based upon the economic housing characteristics of the areas (Chapter 2). Support for that conclusion was given by grouping the area's preference score by their typology group and conducting a one-way analysis of variance, which established the

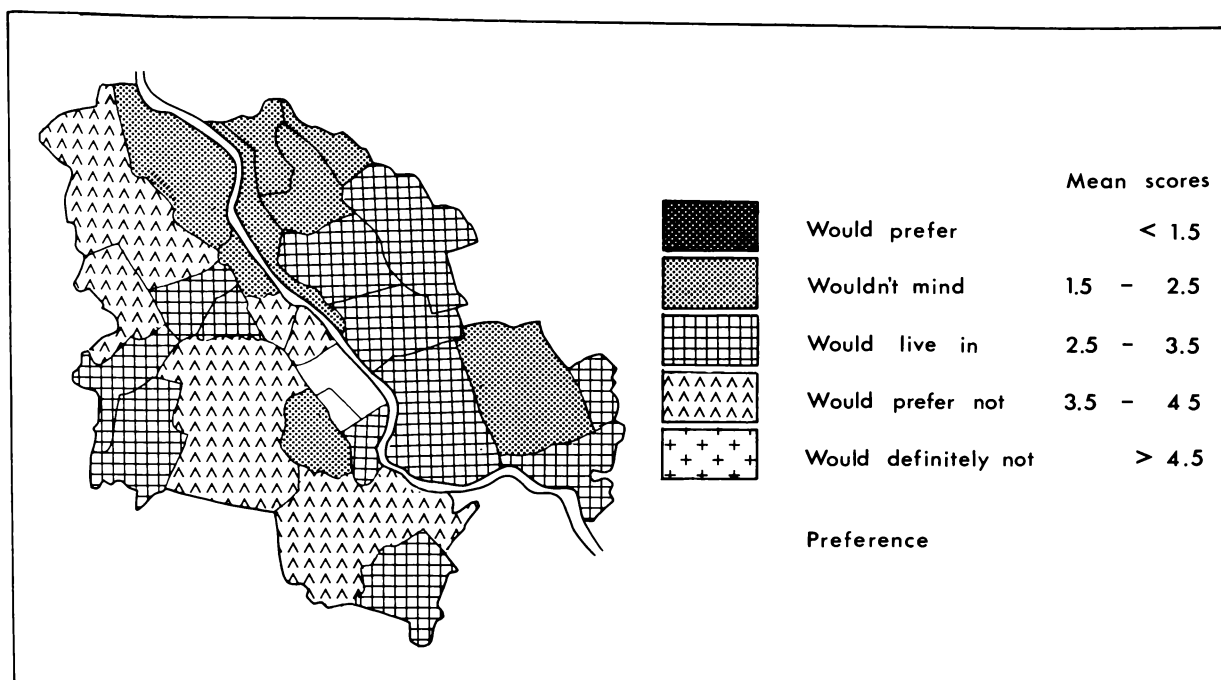


Figure 6:2 **Distribution Of Mean Preference Scores.**

expected pattern of a significant difference between groups (table 6:9). Furthermore, the mean group scores of the typology groupings were in the order expected, with the movers stating that they 'wouldn't mind living in' the high economic status areas, but 'would prefer not to live in' the rental areas.

Taking the aggregate mean scores for each of the six physical corridor groups by origins and destinations, the existence of a preference continuum was tested through a correlation with the mean scores of the total population over the 26 areas. Table 6:10 clearly supported the basic notion that the level of preference held for an area was very similar between all origin and destination groups. The greatest variation within the results was for destination Corridor 2. This pattern of high coefficients, however, doesn't indicate that every individual had a similar preference scaling of areas, because the use of locational aggregates removed the variance in individual's images from within the groups (Chapter 1).

C:2 Was there a restricted or localized preference image based upon the origin or destination home corridor?

This question was examined by three sets of analyses. The first was at the level of the 26 areas, with the second based upon the grouping of those areas. In both cases these analyses dealt with aggregate scores obtained by dividing the city into the six physical corridors. The third analysis involved examining the individual's preference surface as opposed to that of locational aggregates. For the first two analyses the notions of a localized image was examined by operationalizing that concept as requiring a statistically significant positive difference for

Table 6:9Comparative Test Between Typology Groups Area Preference Scores

Typology Groups	Mean Preference Scores
High Economic Level Old	
Beerescourt	2.30
Hamilton Lake	2.29
River Road	2.17
Group Mean	2.25
High Economic Level New	
Dinsdale	3.32
Glenview	2.95
Chedworth	2.08
Chartwell	2.10
Queenwood	2.15
Riverlea	2.72
Group Mean	2.57
Medium Economic Level New	
Te Rapa	3.56
St Andrews	2.08
Livingstone	3.24
Melville	3.52
Enderley	3.31
Hillcrest	2.06
Silverdale	3.43
Group Mean	3.03
Medium Economic Level Old	
Forest Lake	2.85
Norton	3.78
Maeroa	3.43
Fairfield	3.05
Hamilton East	3.23
Group Mean	3.27
Rental Old	
Whitiora	3.56
Hamilton North	3.67
Frankton	4.34
Hamilton West	3.44
Claudelands	3.36
Group Mean	3.67

Significantly different, F Ratio $5.36 > 2.84$
at the .05 level.
One Way Analysis of Variance.

Table 6:10Correlations Between the Locational Groups and the Total
Populations Mean Preference Scores Upon the 26 Areas

Home Corridor Groups	Correlation Coefficients	
	Basis for Grouping	
	Origin Home Corridor	Destination Home Corridor
Corridor 1	.950	.926
Corridor 2	.959	.750
Corridor 3	.948	.919
Corridor 4	---	.971
Corridor 5	.928	.855
Corridor 6	.975	.925

--- Not sufficient observations

areas within the origin home corridor between the locational aggregations mean preference scores and those of the total population. The reason why the total population could be used as the expected basis for establishing localized biases, was that the movers origins and destinations were dispersed all around the city. In the third analysis the topic of a restricted image was examined where that concept was operationalized by setting a preference threshold at a level on the rating scale.

a. Differences between the 26 areas.

To conduct this analysis the total matrix over the 26 areas was transformed into standardized 'z' scores so that each area had the same mean and standard deviation about the mean. The standardized intra-urban data were then divided into origin and destination groupings according to the structure of the six physical corridors, and the mean scores for the 26 areas computed. The results of this analysis are presented in figure 6:3, which suggested for movers grouped by origins that they possessed a weak localized preference image. In comparison the groupings by destination show clearly the existence of a localized preference image. To establish if those differences were statistically significant, the variance between the mean scores of the groups was compared with the total population, using t-tests. Following the trend of the means, the origin groupings were found to lack a significant localized preference surface (figure 6:4), whereas for the destination groupings this pattern was supported. That indicated that movers at the time of moving held localized preferences based upon their destination area, rather than upon their origin area. This finding was unexpected, as the locational aggregations of movers' assessments were compared with that of the

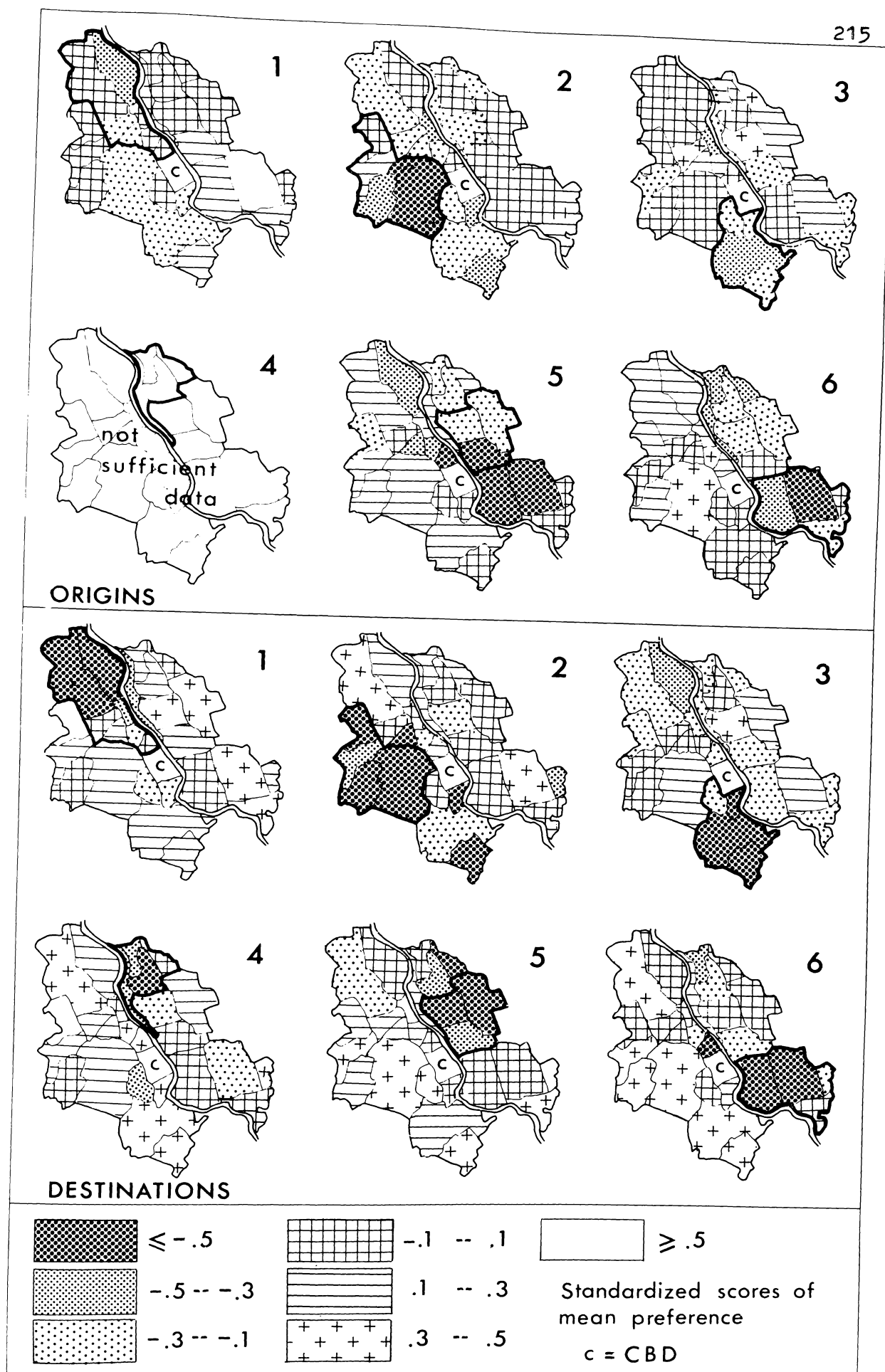


Figure 6:3 Distribution Of Mean Preference Scores By Corridor Groups.

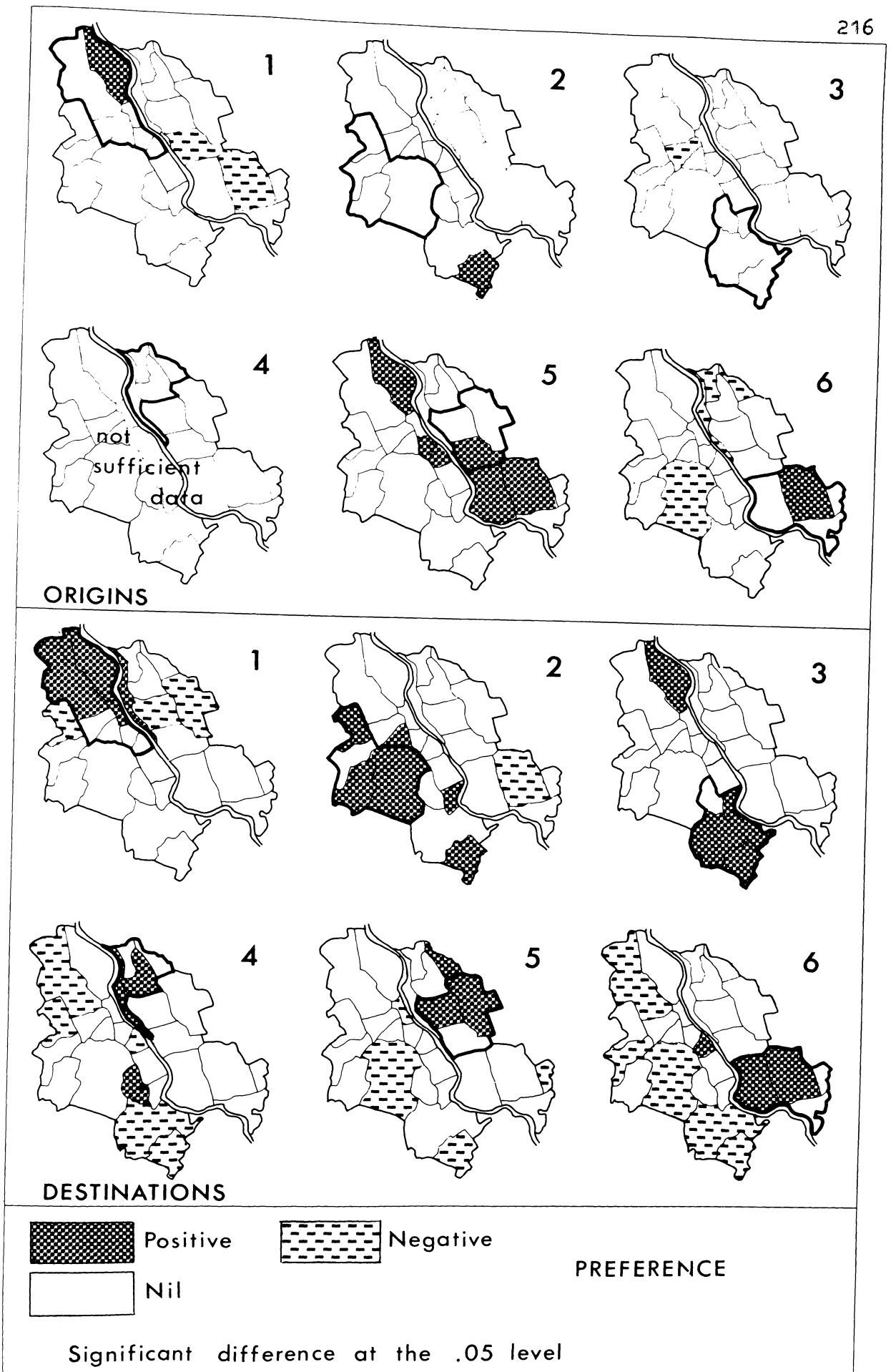


Figure 6:4 Statistical Tests For A Localized Preference Image.

total population of movers from all over the city, therefore, the fact that they had lived within that corridor should have resulted in higher levels of preference with areas within the origin home corridor.

b. Differences based upon the grouping of areas.

One of the limitations of the previous analysis was that it examined each area individually, when in fact the corridor image notion is based upon the grouping of areas into a corridor, which may have altered the structure of the localized preference image. To examine that, the preferences for the total set of movers (123) were factor analysed, using the 26 areas as variables. It was expected that if localized images did exist, the dimensions would form clear groupings of contiguous areas, due to the distribution of movers origins and destinations.

Nine factors were extracted, which accounted for 66.32 percent of the total variance. Taking the factor loadings of .4 and greater as factor suburbs (i.e. an area loading on that dimension), it was clear that a localized set of dimensions did exist (figure 6:5). Factors 4 and 8 can be interpreted as preference with Corridor 1, Factors 6 and 3 with Corridor 2, Factor 7 with Corridor 3, Factor 2 with Corridor 4, Factor 1 with Corridor 5, and Factor 5 with Corridor 6. Factor 9, however, differed from a localized dimension, in that it appeared to be linked with the upper status suburbs in the economic typology. The first eight dimensions, therefore, related to the six physical corridors and were termed factor corridors.

For a comparative study of movers' preference images aggregated according to origin and destination within the six physical corridors, their factor scores were compared with those

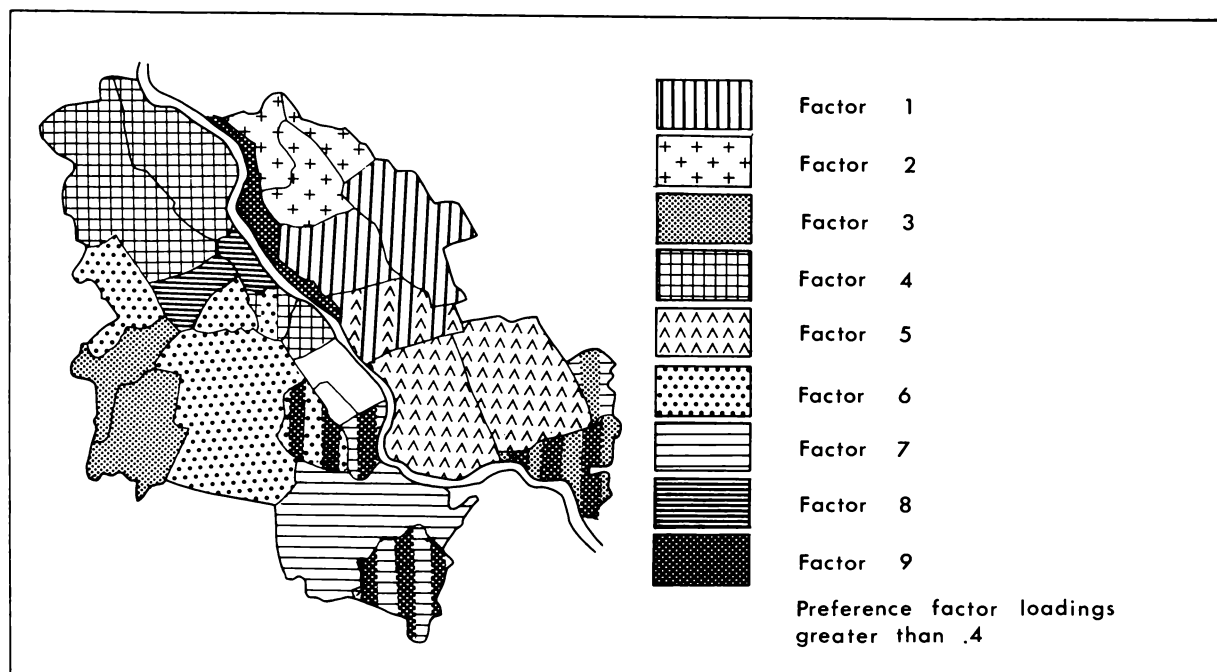


Figure 6:5 Distribution Of Preference Factors.

of the total population, by way of a series of t-tests. The objective was to see if the movers held restricted and localized preference images based upon their origin or destination. The results of those tests for origins are given in table 6:11, which indicated that in no corridor was the expected pattern of a significant difference obtained. The only differences were that movers in Corridor 1 had a significantly lower preference for Corridor 6, and for Corridor 3 with 5, whereas for Corridor 5 the level of preference with Corridor 6 was above the expected. These patterns serve to suggest a distance decay function in the movers' preference ratings; that is that preferences for an area decay with distance from that area. Examined by destination groupings, support was confirmed for heightened preference images for all but Corridor 4 (table 6:12). Further support was also given to the notion of distance decay functions in terms of Corridor 1 with 5, Corridor 2 with 6, Corridor 3 with 5, and Corridor 4 with 3. Therefore, these results although adding more information to our understanding of the preference structure, reinforced the previous finding in that for locational aggregates a localized structure based upon the origin home corridor was not established.

c. Individual preference surfaces.

Criticism with the above method of delimiting the existence of a localized preference image, stems from the fact that the data were aggregated by location. In so doing that method failed to take into account the variability of the individual images (see Chapter 1). To evaluate the validity of the localized preference image, therefore, it was necessary to examine the individual preference profiles. In order to conduct that analysis the

Table 6:11

Tests Between Origin Groups and the Total Populations Mean
Preference Scores Upon Each Factor Corridor

Origin Groups		Significant t-Test Values					
		1.	2.	3.	4. ¹	5.	6.
Factor Corridors							
	Factor Number						
1	4	--*					
1	8	--*					
2	3		--*				
2	6		--*				
3	7			--*			
4	2						
5	1		-2.21			--*	
6	5	-3.22				2.53	--*
	9						

* Expected significant results,
 Significance level .05, t-Tests.
 1 Not sufficient observations.

Table 6:12Tests Between Destination Groups and the Total Populations Mean Preference Scores Upon Each Factor Corridor

Destination Groups		Significant t-Test Values					
		1.	2.	3.	4.	5.	6.
Factor Corridors							
	Factor Number						
1	4	--*			-2.53		
1	8	1.78*					
2	3	-2.10	1.92*				
2	6		3.11*				
3	7			5.20*	-3.06		
4	2				--*		
5	1	-2.79		-2.43		4.54*	
6	5		-1.78				2.42*
	9						

* Expected significant results,
Significance level .05, t-Tests.

factor scores upon the nine factors were grouped by means of the HGROUP algorithm. The object was to group individuals with similar preference profiles, to identify the image by the preference profile, and to establish if that image was linked to any clustering of movers within the confines of the image. A level of nine groups was taken as the grouping cut-off, so as not to lose the basic identity of groups by forcing the grouping structure to a lower level.

The results of that analysis are presented in figure 6:6a and b. To interpret the groupings each was examined individually in terms of; first, the mean factor scores profile (C), which gives the structure of the group's ratings relative to that given by the mean of the total population (i.e. zero). From that graph the preference image was identified and sketched upon the diagram (A and B). Second, the mean scores profile for each group (D) was examined to determine if the spatial form of the group's preference image did comply with either a 'restricted image' or a 'localized image'; a restricted image was operationalized as requiring high preference scores above the awareness threshold within the home corridor areas, and preference scores for the areas outside of the home corridor below that threshold level, whereas a localized image required preference scores only within the home corridor above that threshold level. The awareness threshold level was operationalized at the rating level of 3.0 (would live in if necessary). Finally, the origins (A) and destinations (B) of group members were plotted, the location of which with regard to the identified preference image was the bases for determining if the mover's image was restricted or localized in terms of their origin or destination.

Another way of viewing this analysis was as an attempt to

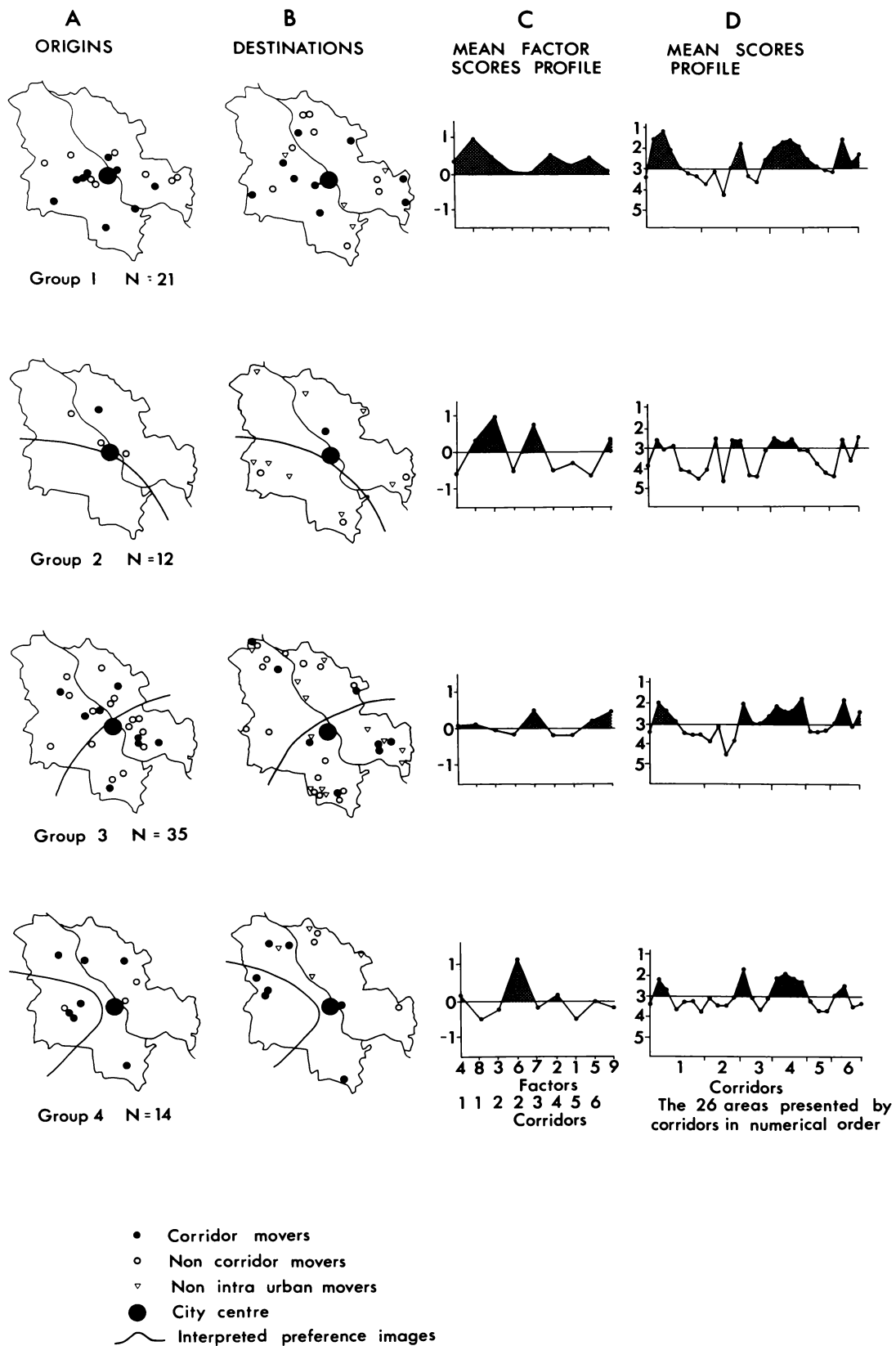


Figure 6:6a Analysis Of Individual's Preference Images.

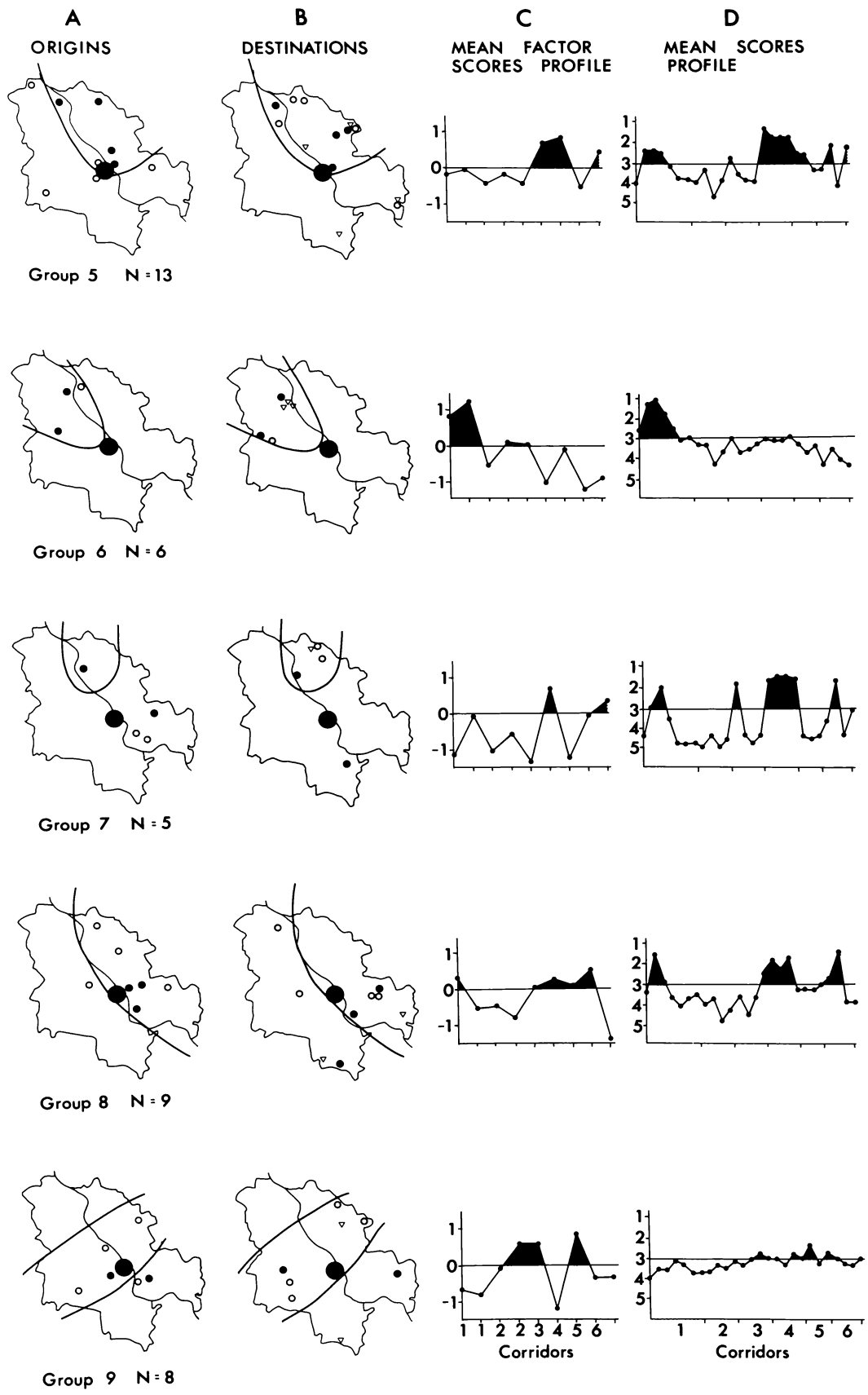


Figure 6:6b Analysis Of Individual's Preference Images.

predict the location of the intra-urban mover's origin or destination from their preference image.

The results of that analysis were:

- Group 1. Had high scores upon Corridors 1, 2, 4, and 6, with a tendency for those preferences to be above the mean levels for the total population. Such an image revealed no easily interpretable structure, and suggested a general high preference group with no localized pattern.
- Group 2. With the highest factor profiles in Corridors 2 and 3, this image was interpreted as having a preference bias upon Corridors 2 and 3, however, the mean scores profile displayed low preferences over all areas, which clearly did not support a restricted image.
- Group 3. The highest factor scores were in Corridors 3 and 6. Interpreted as a southern preference pattern, the mean scores profile indicated high preference scores also in corridors 1 and 4. Therefore, this group did not conform to a restricted image.
- Group 4. The image from the mean factor scores structure was based upon Corridor 2. The mean scores profile did not support a restricted image, but rather one of higher scores for Corridor 2.
- Group 5. The mean factor scores profile peaked in Corridors 4 and 5. In terms of the mean scores profile, this group, with the exception of Corridor 1's high scores, did conform to the pattern of a restricted image.
- Group 6. The factor scores profile indicated that this image was based clearly upon Corridor 1, and the mean scores profile displayed the pattern of a restricted image.

- Group 7. The factor scores profile suggested a preference profile based upon Corridor 4. With Area 12 excluded, the mean scores profile supported the pattern of a restricted image.
- Group 8. With relatively high mean factor scores upon Corridors 4, 5, and 6, this image was termed an eastside preference image. With the exception of preferences with Area 2, the mean profile suggested a restricted image.
- Group 9. With high mean factor scores upon Corridors 2, 3, and 5, this image suggested a middle city preference image based upon Corridors 2 and 5. But the mean scores profile had no peaks, only a near average level of preference, therefore, the notion of a restricted image for this group was discounted.

From that analysis, the major finding was that only four of the nine groups showed a marked tendency towards a restricted preference image. In these groups, 20 of the intra-urban movers were located within the area of the image by their origin or destination; 15 by their origin and 17 by destination, of which 12 were correctly located by both origin and destination. Four of the remaining five groups had images which were classified as biased localized preference images, and in those groups 26 further intra-urban movers were located within the limits of the image; 19 by their origin and 21 by destination, of which 14 were correctly located by both origin and destination. In total 46 of the 83 intra-urban movers possessed localized preference images, 34 by origin and 38 by destination.

The other important finding from that analysis was that of the 20 movers who held a restricted preference image, 10 were

corridor and 10 were non-corridor movers, and of the 46 who held a localized preference image, 19 were corridor and 27 were non-corridor movers. Therefore, it would appear that corridor and non-corridor movers cannot be differentiated between in terms of their possession of a restricted or localized preference image.

C:3 Can the corridor and non-corridor populations be differentiated in terms of preference with the origin home corridor?

This question was examined using factor scores because, first, for each individual corridor studied each score was relative to every mover's assessment. Second, a single score was obtained upon the aggregation of areas similar in spatial form to the home corridor. However, a problem did arise where the factor structure was mixed within a physical corridor, and here the highest factor score was taken and used in the t-tests between distribution of corridor and non-corridor scores. Table 6:13 presents the results of the t-tests upon the factor scores of the origin corridors, which established that corridor movers held a significantly higher level of preference with their origin corridor than did the non-corridor movers. Both, however, held very similar levels of preference with their destinations, with no significant differences, although the means of the corridor sub-set were higher than for either the non-corridor or non-intra-urban sub-sets. Therefore, support was given to the hypothesis:

That corridor movers preferred their home origin corridor more than did non-corridor movers.

Although, it must be recalled that the previous analysis showed that it was not possible to differentiate between the two populations simply in terms of the possession of a localized preference

Table 6:13

Comparative Tests Between Sub-sets Mean Preference Factor Scores
For Origin and Destination Home Corridors

Sub-sets	Home Corridors	
	Origin	Destination
a. <u>Mean Preference Factor Scores</u>		
Corridor ¹	.82	.85
Non-Corridor	.16	.71
Non-Intra-Urban	----	.72
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	4.50*	.79
Corridor/Non-Intra-Urban	----	.76
Non-Corridor/Non-Intra-Urban	----	.01

* Significantly different at the .05 level.
t-Test (unsigned)

1 Difference in the corridor movers mean scores between origins and destinations relates to corridor movers moving across physical corridor boundaries.

image.

Section D Chapter Summary and Conclusion

This chapter set out to examine the first phase of the mover's search process for a new residence, their aspiration and preference sets, with the object of determining if the corridor and non-corridor movers sub-sets could be differentiated between. Underlying that expectation was the conceptual argument that as already the two populations personal characteristics had been found to be different so would their aspiration and preference sets be different. The direction of this difference was seen as a function of locational attachments with the corridor movers expected to exhibit sector specific housing demands, whereas the non-corridor movers were not. The topics examined were; the mover's pre-move aspiration set, their housing type preference, and the spatial pattern of their at-move preferences.

From the analysis of their aspiration sets, corridor movers were found to be different from the non-corridor movers in that they emphasized more the desire to better their dwelling within a specific location, whereas non-corridor movers appeared to have held a more generalized level of aspirations centred upon the quality of the area. This finding suggests that corridor movers deliberately moved within their home corridor, whereas non-corridor movers were freer in that they could relocate in any area which met their set aspiration level of area quality. Housing type preferences for corridor movers were characterised by a greater concern with details of the dwelling, whereas non-corridor movers were biased towards new housing. That difference appears to suggest support for the previous finding that while both sub-

sets were interested in the quality of dwellings corridor movers were more concerned with the specifics rather than general quality. Finally, the study of the at-move preference image by locational aggregates established localized destination but not origin images. Localized images were also found in the study of individual mover's images, but here the proportion holding preference images based upon their origins and destinations were similar. Corridor movers, however, did hold a significantly higher level of preference with their origin corridor, although not for destinations or the proportion possessing localized images.

To conclude, partial support is given by the findings upon the aspiration set for the second research thesis:

That the primary reason for restricted lateral movement is sector specific housing demands rather than random movement within a vacancy sub-set.

However, no final conclusion can be given upon this thesis until the study of the relocation decision process is complete, in that the topic is more complex than just significant differences between the two sub-sets aspiration sets. With regard to the third research thesis (the two explanatory hypotheses of non-random restricted lateral movement) support is suggested for the locational attachments hypothesis by the differences established between corridor and non-corridor sub-sets aspiration sets, housing type preferences, and spatial patterns of at-move preferences. But in doing so these findings do not present any conclusive support against the restricted image hypothesis, in that in all cases sector specific housing demand may be the result of restricted images: corridor movers because of their personal characteristics may hold restricted images, whereas non-corridor

movers do not. Therefore, no conclusion in support of the third research thesis can be given until after all aspects of the decision to relocate have been examined. But it can be concluded that the findings of this chapter do not cast doubt upon the locational attachments hypothesis as the explanation of restricted lateral movement.

Chapter 7. Awareness Space

The theoretical importance of awareness space rests upon the notion that movers in their search for a new residence must possess some basic knowledge of the urban area in terms of spatial locations. Defined by Brown and Moore (1970) as "those locations within the total urban space about which the independent migrant household has some knowledge (or knowledge above some threshold level) before the search begins", 'awareness space' is akin to the 'environmental image' studied by Lynch (1960). Such images appear to be organised around a set of focal points, broken into named regions, or linked by remembered routes, which can be structured into paths, edges and districts. The acquisition of knowledge which makes up the environmental image is the result of information derived in two ways; by direct personal contact with the actual environmental foci, termed signal information, and by indirect contact resulting from tellings either by spoken or written word, or pictures, termed symbol information. The sources of symbol information are; individuals, specialised agencies (especially real estate agents), display boards, and press and news media. Within urban geography, these two aspects of 'action space', have been viewed as the concepts of 'direct action' and 'indirect action' space.

Direct action space can be defined more rigorously as that area of the city with which one is regularly in contact. It is the initial regular work and household service journeys (i.e. travel to shops, schools, etc) which establish the early perceptions and provide the basis for a core of meaning in the awareness space schema, to which later perceptions must be assimilated (Cox and Zannaras, 1970). Therefore, as intra-urban journeys become

routine and habitual the structural schema of the awareness space image filters out unrelated information and is thus self-perpetuating, with little addition to the spatial schema over time (Horton and Reynolds, 1971a). Each individual's perception is, however, subject to variations in his or her age, income, education, culture, previous experience, information storage and retrieval capacities, quality and quantity of information received, and the order of the receipt of information. But in general, a group spatially differentiated upon the basis of household characteristics, and living at relatively the same location within the city, have individual awareness space constructs which are approximately the same (Lynch, 1960; Gould, 1967, 1968; Horton and Reynolds, 1971a).

(i) Adams and Awareness Space.

This topic is the keystone to Adams' restricted image hypothesis. To recall the discussion of the theory underlying that hypothesis (Chapter 1), Adams, despite his claim that "there is ample basis for the argument that intra-urban movements of city residents depend on limited maps or mental images of the city" (p. 322), failed to test for the existence of a restricted image, nor did he test its linkage with sectoral movement. What he did do, however, was to set down clearly the principal control between the image and the pattern of movement, which was that the mental image of a mover was restricted to its home sector, and that knowledge of areas outside the home sector was blurry or non-existent. Therefore, the mover had to search for a dwelling within the vacancy set of the area it knew, and this would force it to select a dwelling within its home sector.

(ii) Research Objectives.

Within this chapter the research objective was to examine the first of the two explanatory hypotheses of non-random restricted lateral movement: the restricted image hypothesis. This involved the study of the general role of awareness space in terms of the relationship between its spatial form and the patterns of movement, which also made necessary the study of localized as opposed to restricted images, and the difference in the degree of localized knowledge held by corridor and non-corridor movers. By definition a 'restricted image' has a set spatial form, in which knowledge of areas within the home corridor exceeds the threshold of being able to consider the general quality of that area, while knowledge of all, or at least the bulk of areas outside the home corridor is below that threshold. In comparison a 'localized image' is one where knowledge of many, if not all of the areas outside of the home corridor exceeds the awareness threshold, but relative to those areas, knowledge of the areas within the home corridor is positively biased.

The study of the role of awareness space images involves five sets of data, which were independently analysed and presented; within each, the whole or parts of the total topic were studied so as to supply quantitative evidence for a conclusion. The notion of restricted and localized images were first examined in terms of the researcher's assessment of the mover's level of knowledge, using data upon: their knowledge of the general housing character of each area, their knowledge of selected shopping centres, and their ratings of the social status of each area. Then the mover's own assessment of their familiarity was analysed from familiarity ratings. The fifth study was based upon Lynch's approach of asking the interviewee to draw a quick sketch map of

their city, which provided additional information about the general structure of a mover's image of Hamilton.

Finally, an additional aspect of importance within these analyses, was that the images examined were the 'at-move' images as opposed to the 'pre-move' or 'pre-move decision' images. The reason for requesting the 'at-move' image was that this image was seen to be the most important to a person's resulting movement, in that it was derived after they had put into operation their decision to relocate. As argued earlier, it is first necessary for the researcher to establish the form of the image underlying the actual selection decision, then to develop research into the relationship between the 'pre-move decision' and 'at-move' images.

1. General Knowledge of Housing Type

To determine whether the mover's general image was restricted to the home corridor, the first of these studies examined if the mover knew the characteristic type of housing in each of the 26 areas. To do so a total of eight photographs of houses were presented, and each respondent was asked to place the name card of each area alongside the photograph that they thought was characteristic of that area. Only one photograph per area was allowed, which in many cases caused problems, in that most areas contained a large mix of types of housing; however, it was repeatedly stressed, that the most characteristic type of house was the one wanted.

The photographs are a selection from the 11 previously used in the preference rating test (Chapter 6), and are presented in plate 2. These photographs were classified as:

1. Old High Status Residence.



1



2



3



4



5



6



7



8

2. Ultra-modern Residence of the High Status Group.
3. Upper middle-high Status Contemporary Dwelling.
4. Group Housing.
5. Lower middle-middle Status Dwelling of the 1940s - 1950s.
6. State House.
7. Californian Bungalow.
8. Queen Anne Villa.

a. General Structure.

To obtain an objective assessment of the characteristic type of dwelling within an area, a system of analysis was developed using data upon the ages of dwellings sold in each area (1971). This system was based upon four steps:

- (i) From a study of the age structure of dwellings sold within the 26 areas, three age periods were selected as representative of the major divisions in the housing age structure: pre 1940s, 1940s - 1950s, and the 1960s - 1970s.
- (ii) To determine what were the characteristic age periods of each area, the number of dwellings sold in each age period for each area were calculated as a proportion of the total number of dwellings sold within the area. Then because by using sales data, different age periods were under-represented (due to stability within the sales of dwellings), these results were standardized within each age period by a 'z' transformation. These scores were then plotted (figure 7:1) and the expected age period of housing types characteristic of each area were determined by the positive scores.

(iii) The age classification was then related to the photographs, by selecting as the expected type of housing characteristic for each area, the photographs of that age period.

(iv) To test that the mover knew the basic housing character of an area, their response (figure 7:2) was compared with the expected photographs. The system of classification and results are presented in table 7:1.*1

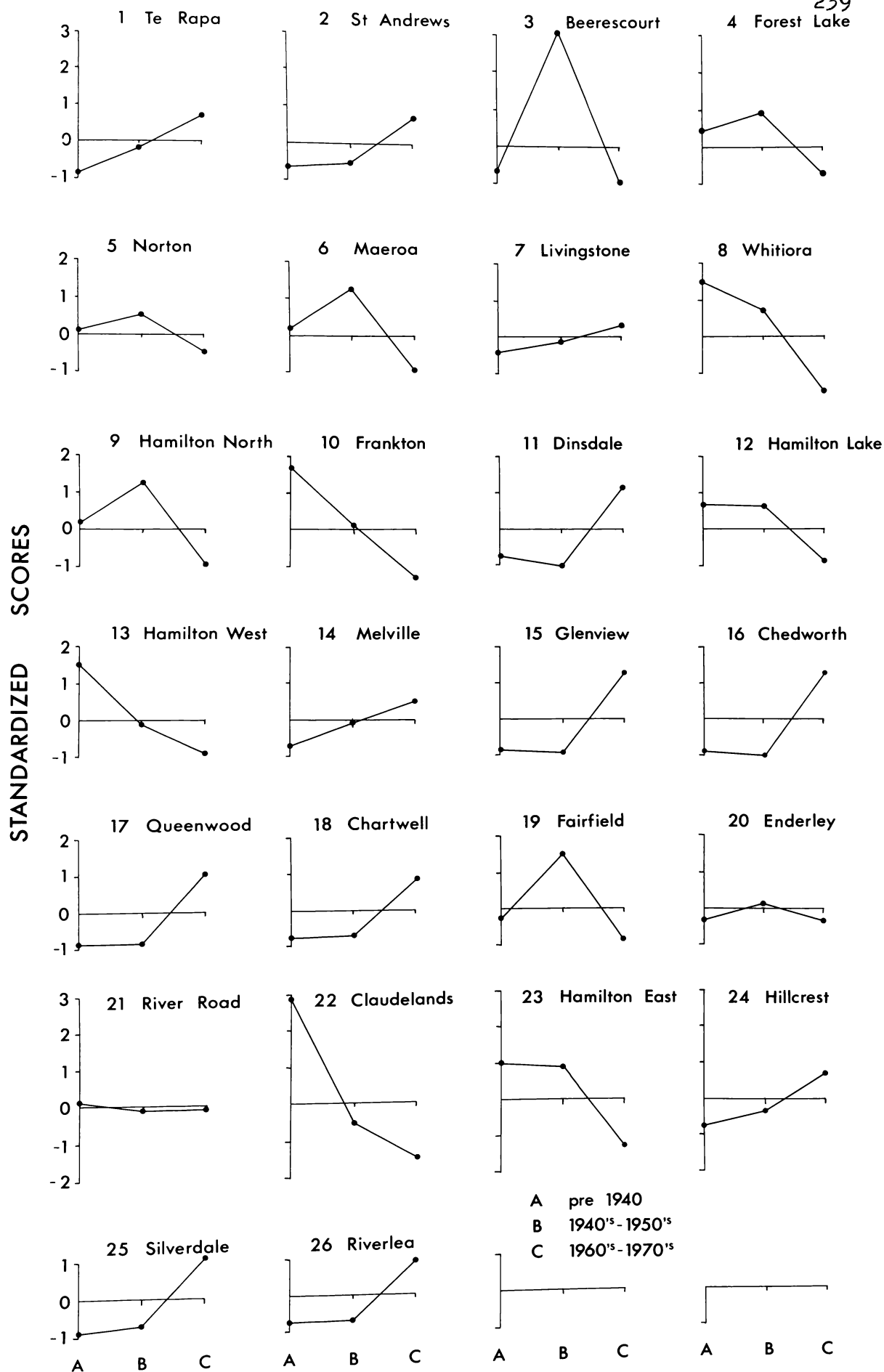
Those results indicated that for 18 of the 26 areas, 70 percent or more of all movers were correct in their assessment of the general housing character. Of the remaining 8 areas, only for Beerescourt, Te Rapa, Forest Lake, and Hamilton West were the proportions less than 55 percent. Results for the intra-urban population displayed a similar pattern, which suggests that movers held a high level of knowledge of the general housing character of the areas of Hamilton.

b. Localized Image.

To establish if movers possessed a localized image of housing character, the proportion of correct responses over the 26 areas within each physical corridor were compared with that of the total population.*2 Here the concept of a localized image was operationalized by establishing significant differences between the two distributions; a localized image required significant positive

*1 Because of the low degree of homogeneity within areas a number of areas have a wide range of correct answers. Unfortunately this limitation of this analysis was unavoidable.

*2 The reason for basing this comparison upon the total population was that as their origins were scattered all around the city that population should not hold a localized image.



HOUSING TYPES BY GROUPED AGE PERIODS

Figure 7:1 System Of Calculating Characteristic Age Periods.

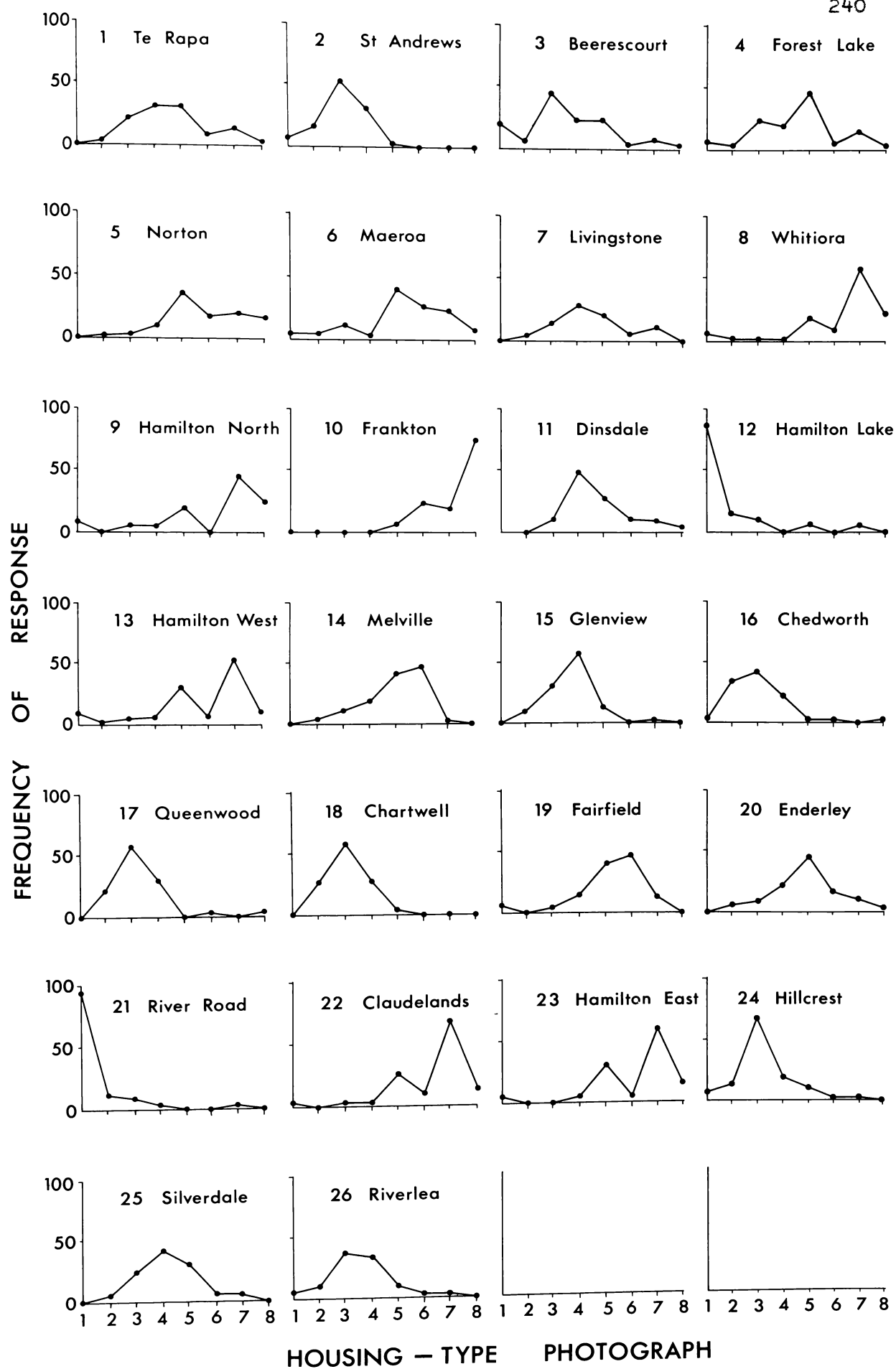


Figure 7:2 Frequency Distribution Of Characteristic Housing.

Table 7:1Knowledge of Area Housing Type Analysis

Typology Groups	Housing Age Classifica- tion	Photographs Selected As Represent- ative	Percentage of Movers Assessments Correct	
			Intra- Urban Movers	Total Popul- ation
<u>High Economic Level Old</u>				
Beerescourt	2	1,5,6	33.73	34.14
Hamilton Lake	1,2	1,5,6	74.69	73.98
River Road	1,2,3	1,5,6,2,3,4	98.79	97.56
<u>High Economic Level New</u>				
Dinsdale	3	2,3,4	48.19	48.78
Glenview	3	2,3,4	77.10	81.30
Chedworth	3	2,3,4	86.74	81.30
Queenwood	3	2,3,4	89.15	86.99
Chartwell	3	2,3,4	95.18	93.49
Riverlea	3	2,3,4	74.69	72.35
<u>Medium Economic Level New</u>				
Te Rapa	3	2,3,4	46.98	47.15
St Andrews	3	2,3,4	86.75	85.36
Livingstone	2,3	5,6,2,3,4	69.87	61.78
Melville	2,3	5,6,2,3,4	98.79	98.37
Enderley	1,2,3	7,5,6,2,3,4	92.77	88.61
Hillcrest	3	2,3,4	80.72	82.11
Silverdale	3	2,3,4	60.24	58.54
<u>Medium Economic Level Old</u>				
Forest Lake	1,2	7,5,6	57.83	51.21
Norton	1,2	7,5,6	67.46	59.34
Maeroa	1,2	7,5,6	77.10	71.54
Fairfield	2	5,6	74.69	70.73
Hamilton East	1,2	8,7,5,6	91.56	92.68
<u>Rental Old</u>				
Whitiora	1,2	8,7,5,6	86.75	84.55
Hamilton North	1,2	8,7,5,6	77.10	77.23
Frankton	1	8,7	77.10	75.60
Hamilton West	1	8,7	53.01	50.40
Claudlands	1	8,7	69.88	66.66

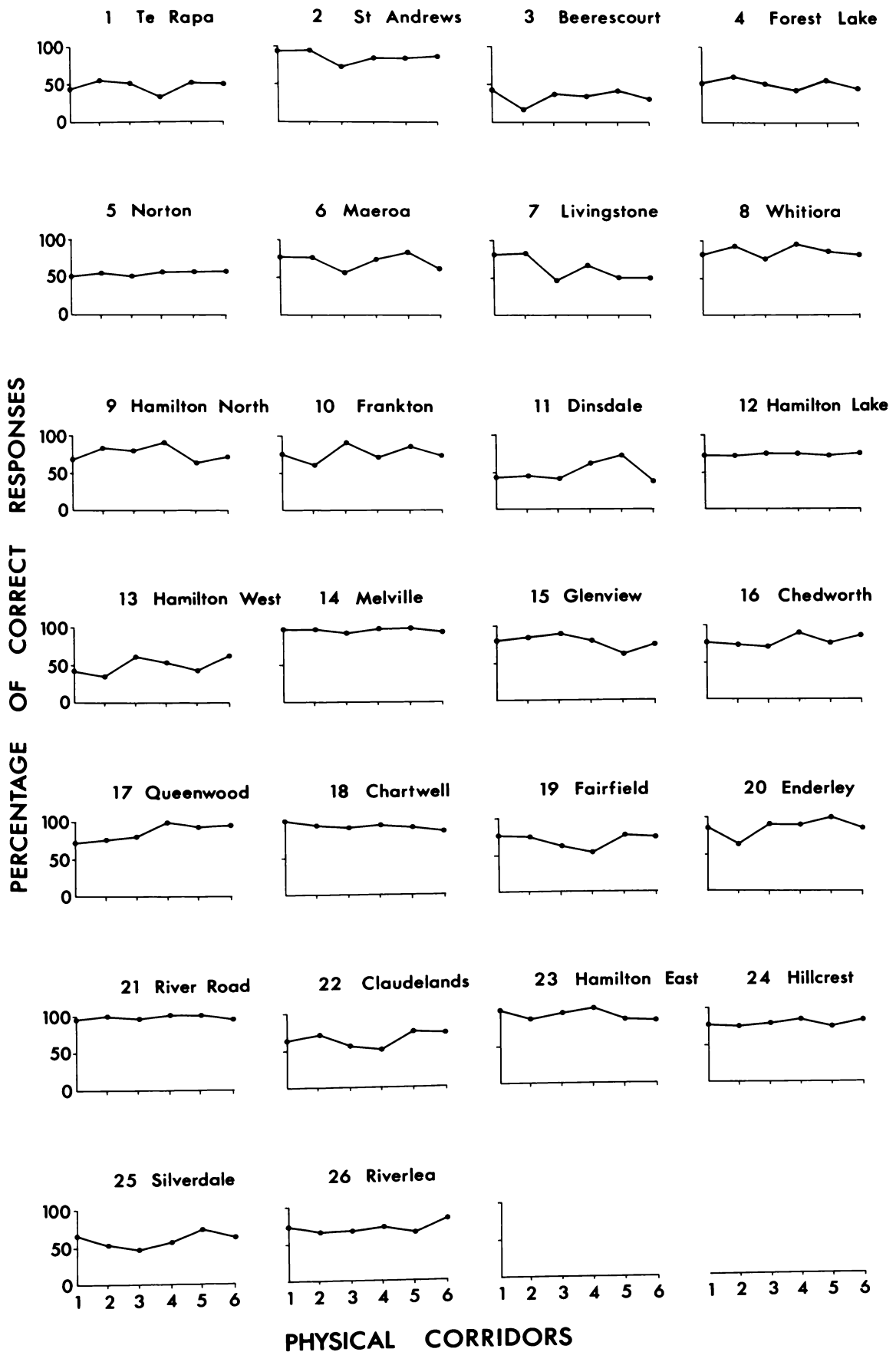


Figure 7:3

Correct Responses Of Characteristic Housing By
Corridor Groups.

Table 7:2**Comparative Tests Between Sub-sets Knowledge of Area Housing Type**

Typology Group	Percentage of Correct Responses		
	Corridor Movers (A)	Non-Corridor Movers (B)	Difference (A - B)
<u>High Economic Level Old</u>			
Beerescourt	28.94	37.77	- 8.83
Hamilton Lake	78.94	71.11	7.83
River Road	97.36	100.00	- 2.64
<u>High Economic Level New</u>			
Dinsdale	36.84	57.77	-20.93
Glenview	73.68	80.00	- 6.32
Chedworth	86.84	86.66	0.18
Queenwood	89.47	88.88	0.59
Chartwell	97.36	93.33	4.03
Riverlea	73.68	75.55	-1.87
<u>Medium Economic Level New</u>			
Te Rapa	50.00	44.44	5.56
St Andrews	81.57	91.11	- 9.54
Livingstone	63.16	75.55	-12.39
Melville	100.00	97.77	2.23
Enderley	89.47	95.55	- 6.08
Hillcrest	81.57	80.00	1.57
Silverdale	63.16	57.77	5.39
<u>Medium Economic Level Old</u>			
Forest Lake	60.52	55.55	4.97
Norton	71.05	64.44	6.61
Maeroa	71.05	82.22	-11.17
Fairfield	84.21	66.66	17.55*
Hamilton East	84.21	97.77	-13.56*
<u>Rental Old</u>			
Whitiora	76.31	95.55	-19.24*
Hamilton North	65.78	86.66	-20.88*
Frankton	71.05	82.22	-11.17
Hamilton West	47.36	51.11	- 3.75
Claudeland	71.05	68.88	2.17

* Significantly different at the .05 level.
Two Sample Proportions Test.

difference in the degree of correct assessment (F Ratio 0.149 $<$ 2.84 at the .05 level, 4 and 21 d.f.). Upon re-investigation it appeared that the size of the areas was important in the degree of correct assessment, in that movers more accurately assessed the housing types within larger areas. The study of that claim involved using the number of dwellings sold per area as a measure of an area's size. The correlation between the variable of size and the proportion of correct responses per area was .571, or 32.56 percent of the variance explained. By plotting that data it was found that the inner city and best known suburban areas worked against a higher relationship. When these areas were removed the correlation coefficient for the remaining 17 areas was .742 or 55.09 percent of the variance explained. It would appear, therefore, that movers had a more accurate knowledge of an area's housing character, the larger the size of the area.

d. Summary.

This study established that over 70 percent of all movers did hold an accurate image of the housing character of 18 of the 26 areas. Similar proportions were found for the intra-urban population. Furthermore, when the images of the six physical corridor aggregations were compared with that of the total population, no localized images were established, and between corridor and non-corridor sub-sets significant differences were found for only 6 of the 26 areas. The only other pattern was that the degree of knowledge of an area's housing character tended to have a positive relationship with the size of the area.

2. Shopping Centre Identification

The second method used to examine a person's general knowledge

of Hamilton, was a test based upon a series of 20 photographs of Hamilton shopping centres. Mounted separately upon card, each 8 x 6 inch photograph had to be identified by the mover in terms of the centre's location. Each photograph was viewed separately for a period of no longer than approximately 30 seconds.

In developing this test, the photographs (Plate 3a and b) had the names of all street and shopping locations on buildings blacked out, so that the mover could not search the photograph for location clues. To facilitate identification, the photographs were taken so as to incorporate all local landmarks (i.e. cross-roads, corner service stations, and hotels) and in the case of the two largest shopping centres, the CBD and Frankton, photographs were taken from both ends of the main street so as to cater for the person's direction of approach. The problem of a person systematically eliminating shopping centres and guessing the remainder, was overcome by presenting the photographs in random order and only once. In addition not all shopping centres within the city were represented, and the inclusion of more than one photograph of two shopping centres introduced the element of repetition and checking.

a. General Image.

The percentage of correctly identified photographs for each shopping centre is presented in table 7:3, from which it can be seen that there was a wide range in the degree of correct identification: 100 percent to 22 percent. However, for 13 of the 20 photographs over 70 percent of the all movers were correct in their assessment. All but one mover knew both of the CBD photographs, which was not surprising in that Victoria Street was the main CBD street and the only shopping centre with large



Plate 3a Hamilton Shopping Centre Photographs

Table 7:3Shopping Centre Identification, Correct Responses

Photographs of Shopping Centres	Percentage of Correct Responses Total Population	Standard Deviation For Six Aggregated Groups Correct Responses
<u>First Order Centre</u>		
CBD. Victoria Street North	100.00	0.00
CBD. Victoria Street South	99.00	1.77
Mean	99.50	0.88
<u>Second Order Centres</u>		
Frankton (East End	91.06	8.02
Frankton (West End)	73.17	7.10
Hamilton East	97.56	2.57
Mean	87.26	5.89
<u>Planned Shopping Centres</u>		
Te Rapa	84.55	6.08
Glenview	86.99	9.55
Chartwell	73.98	11.54
Mean	81.84	9.06
<u>Arterial Route Centres</u>		
Beerescourt	52.85	14.91
Dinsdale	86.18	11.78
Melville	73.17	9.26
Five Cross Roads	85.57	17.94
Claudeland	70.73	17.09
Hillcrest	70.73	18.12
Mean	73.20	14.85
<u>Neighbourhood Centres</u>		
Glenview Ulrich Avenue	42.28	13.32
Queenwood	21.95	20.88
Clarkin Road	66.67	20.44
Fairfield	56.91	18.91
Silverdale	28.46	9.24
Masters Avenue	45.53	19.99
Mean	43.63	17.13
Analysis of Variance F Ratio =	10.62	10.41

Significantly different at the .05 level, 4 and 21 d.f. = < 2.84

commercial buildings, plus a distinctive wide carriageway. For Frankton the photograph taken from the east or city end of the main street was correctly identified by more movers than the photograph from the west end. Hamilton East, the other major secondary shopping centre, was correctly identified by all but three movers, and high levels were also found for Te Rapa, Outer Glenview, and Chartwell, all of which were major planned shopping centre complexes. Similarly, the arterial route shopping centres of Dinsdale, Melville, Five Cross Roads, Claudelands and Hillcrest had high levels of identification, however, the surprise was the low level for Beerescourt since it was located at one of the busiest of intersections. The remainder, Glenview Ulrich Avenue, Queenwood, Clarkin Road, Fairfield, Silverdale and Masters Avenue were neighbourhood centres and have lower scores.

Using the classification of the shopping centres established above, namely:

- (i) First order centre.
- (ii) Second order centre.
- (iii) Planned centre.
- (iv) Arterial route centre.
- (v) Neighbourhood centre.

the notion that there existed a distinct decline in the movers' knowledge with the centres down that hierarchy, was tested by use of a one-way analysis of variance. The results of that analysis are presented in table 7:3, which clearly support the expected pattern both in terms of a significant difference and a decline in the mean scores of the groups down the hierarchy. There was, however, little difference in the degree of familiarity between the two top levels and similarly the planned and arterial route centres. The major break in the movers' knowledge was related to

the neighbourhood centres.

b. Localized Image.

To investigate whether movers did possess a localized bias in their knowledge of shopping centres, the intra-urban population was divided up into the six physical corridors by both origins and destinations, and the scores upon each area were standardized by a 'z' transformation. Figure 7:4a and b, presents each corridor's standardized score for each shopping centre by destination aggregations. The concept of a localized image was here operationalized as a score of one standard deviation or greater above the mean score of the total population within the corridor of the shopping centre. In otherwords, for movers to possess a localized image they must know the shopping centres within their home corridor at a level of at least one standard deviation above that of the total population. For the first and second order centres no localized images were established, however, at the level of planned centres localized images were established for Te Rapa and Glenview Outer, but not quite for Chartwell. At the lower levels two arterial centres, Beerescourt and Melville, and all neighbourhood centres, except Clarkin Road, had localized images. Results based upon origin groups were similar, although not as clearly localized.

To complete this study of localized images, the standard deviations of the variance between the scores for the six destination corridor groups, upon each of the 20 shopping centres, were grouped by hierarchy levels and subjected to a one-way analysis of variance (table 7:3). As expected the standard deviations increased in value down the hierarchy of shopping centres and the F Ratio supported a significant difference between the groups.

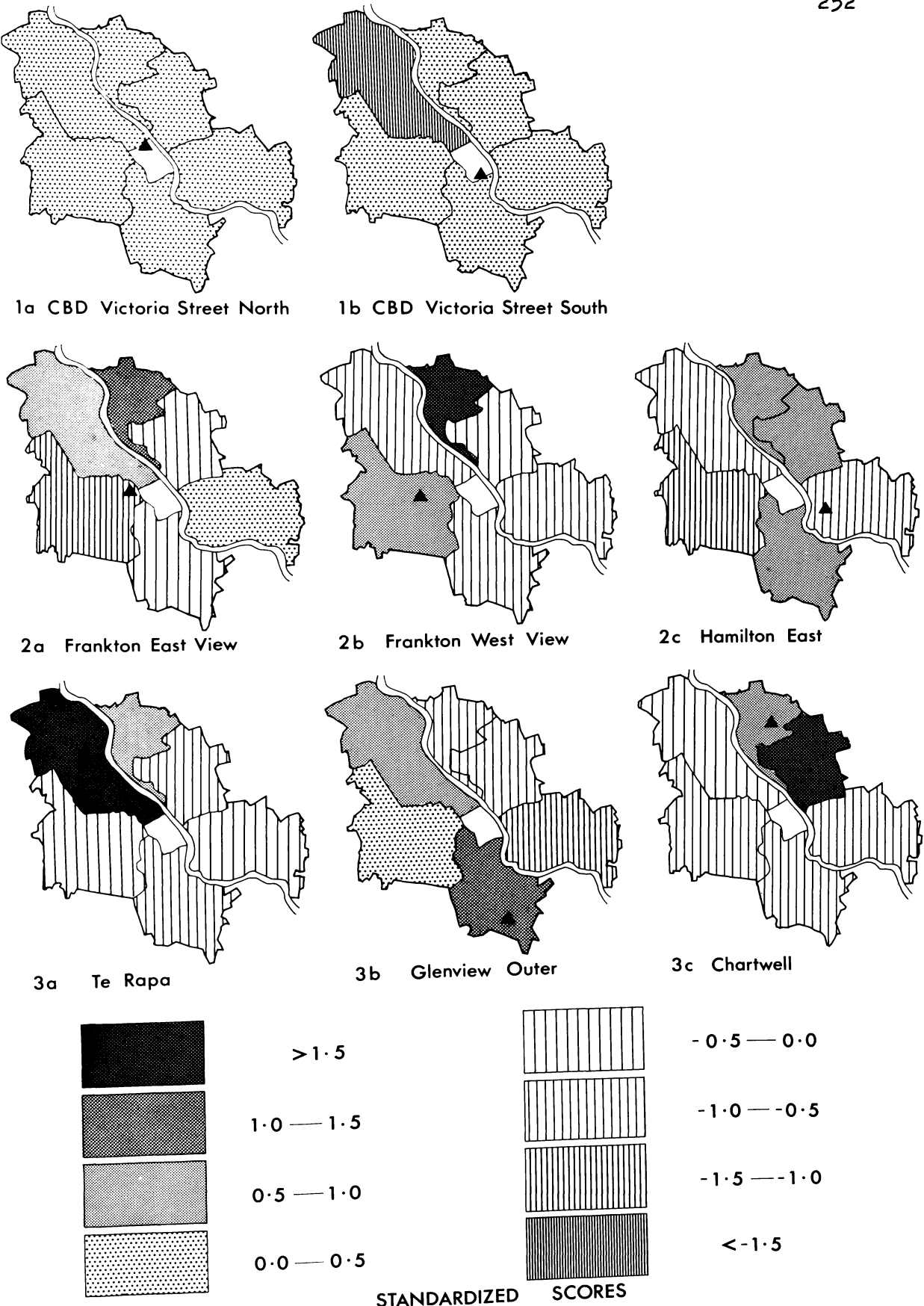
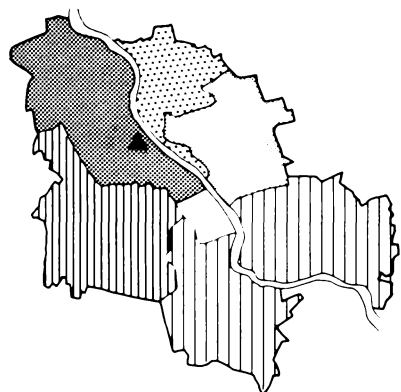
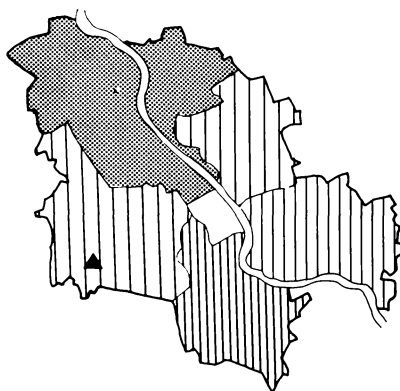


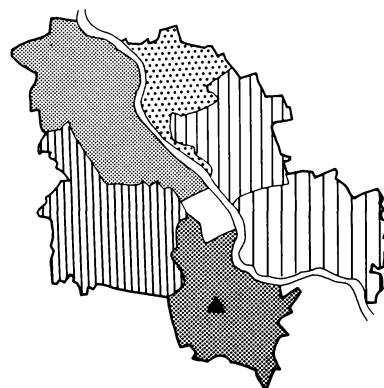
Figure 7:4a Distribution Of Variance In Shopping Centre Identification.



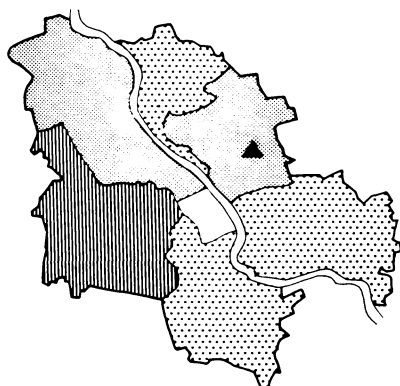
4 a Beerescourt



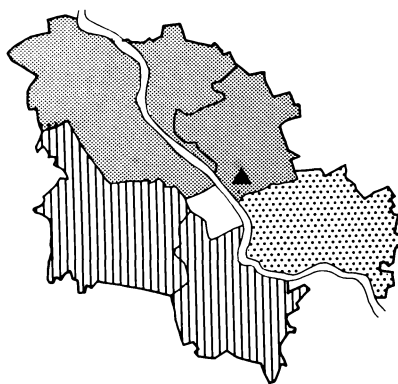
4 b Dinsdale



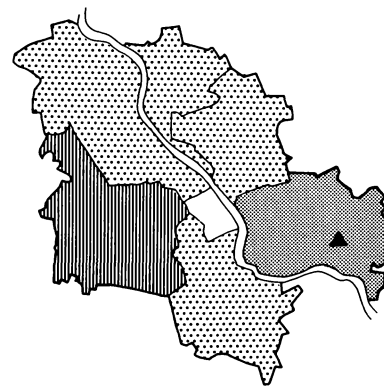
4 c Melville



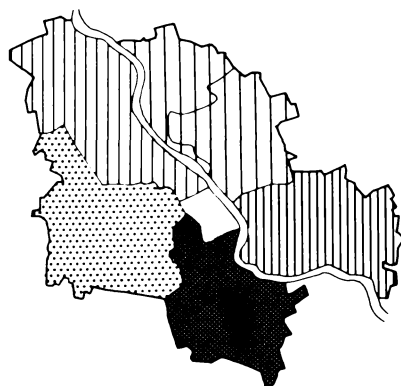
4 d Five Cross Roads



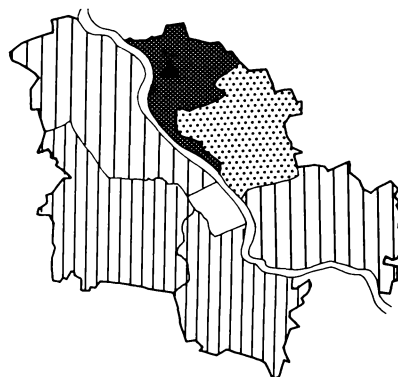
4 e Claudelands



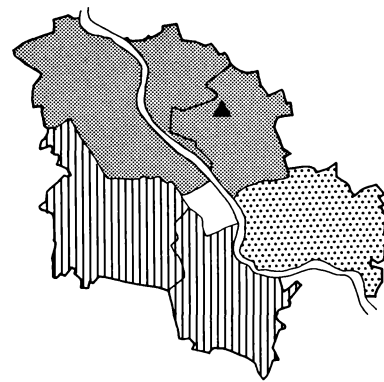
4 f Hillcrest



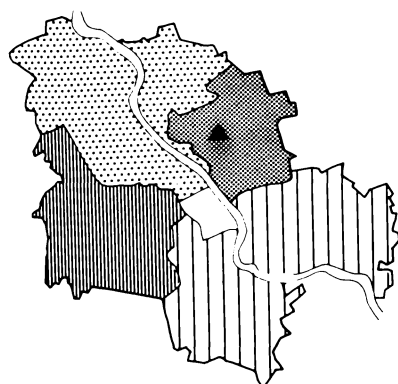
5 a Glenview Ulrich Avenue



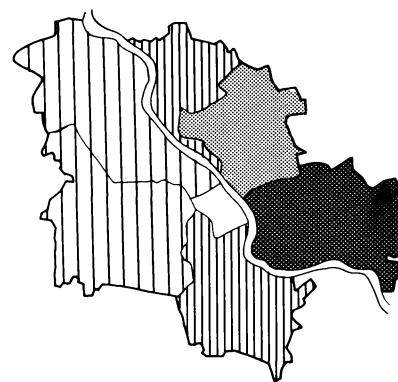
5 b Queenwood



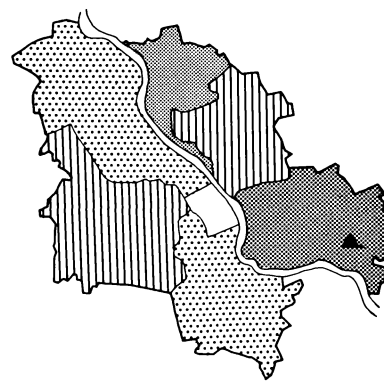
5 c Clarkin Road



5 d Fairfield



5 e Silverdale



5 f Masters Avenue

Figure 7:4b

Distribution Of Variance In Shopping Centre Identification.

This finding suggested that only at the level of neighbourhood centres did movers hold a restricted image of the shopping centres.

c. Corridor and Non-Corridor Images.

The degree of correct assessment by corridor and non-corridor sub-sets were compared to establish if one could differentiate between them. Table 7:4 presents the results of this analysis, which displays that for only three of the twenty photographs was there a significant difference between the two groups, and that these differences were all at the neighbourhood level, with higher values for the corridor sub-set. However, these neighbourhood images do not necessarily refer to the corridor movers' home corridor. This analysis, therefore, suggested that above the neighbourhood level the images of corridor and non-corridor movers were very similar, in that they comply with the earlier finding that the vast majority of movers had a very considerable knowledge of shopping centres throughout the city.

d. Summary.

Movers within Hamilton appear to have held a very detailed and complete knowledge of shopping centres above the neighbourhood level throughout their city. Localized images were found for two of the three planned centres, two of the six arterial route centres, and for all but one of the neighbourhood centres. However, except with the possible exception of neighbourhood centres no restricted images were established. The only significant difference established between corridor and non-corridor movers was at the neighbourhood level, where corridor movers had a higher level of knowledge.

Table 7:4

Comparative Tests Between Sub-sets, Shopping Centre Identification
Correct Responses

Sub-sets Photographs of Shopping Centres	Percentage of Correct Responses		
	Corridor (A)	Non-Corridor (B)	Difference (A - B)
<u>First Order Centre</u>			
CBD, Victoria Street North	100.00	100.00	0.00
CBD, Victoria Street South	97.36	100.00	-2.64
<u>Second Order Centres</u>			
Frankton (East End)	92.10	93.33	-1.23
Frankton (West End)	68.42	66.66	1.76
Hamilton East	97.36	100.00	-2.64
<u>Planned Shopping Centres</u>			
Te Rapa	94.73	88.88	5.85
Glenview	92.10	88.88	3.22
Chartwell	78.94	84.44	-5.50
<u>Arterial Route Centres</u>			
Beerescourt	55.26	60.00	-4.74
Dinsdale	89.47	93.33	-3.86
Melville	86.84	84.44	2.40
Five Cross Roads	84.21	91.11	-6.90
Claudlands	81.57	71.11	10.46
Hillcrest	78.94	71.11	7.83
<u>Neighbourhood Centres</u>			
Glenview Urlich Avenue	57.89	40.00	17.89*
Queenwood	18.42	33.33	14.91
Clarkin Road	81.57	62.22	19.35*
Fairfield	65.78	60.00	5.78
Silverdale	42.10	24.44	17.66*
Masters Avenue	57.89	51.11	6.78

* Significantly different at the .05 level.
Two Sample Proportions Test.

3. Social Status - Awareness Space

The third study was that of social status ratings, which like the previous two studies was aimed at examining the notion that the movers were very aware of the whole city. The use of social status ratings as a measure of a mover's awareness space, centres upon the notion that in general terms the social status of an area is an absolute measure. That is, the social status of an area, unlike familiarity, can be measured independent of an individual's rating scale and, therefore, by comparing that score with that of the individual's rating, their familiarity with the area can be assessed. Here it is assumed that because of familiarity, movers will rate areas within their home corridor above and areas outside of the home corridor below the actual social status level.

The question asked and the rating scale was:

Would you please place the area cards upon the given scale according to your assessment of their social status.

1. Upper.
2. Upper-Middle.
3. Lower-Middle.
4. Upper-Lower.
5. Lower-Lower.

Note that there are three social status groupings, of which the lower two are sub-divided into upper and lower levels.

a. General Structure.

The mean ratings of social status (figure 7:5) display that the areas of the 'northern sector' plus Hamilton Lake, Hillcrest

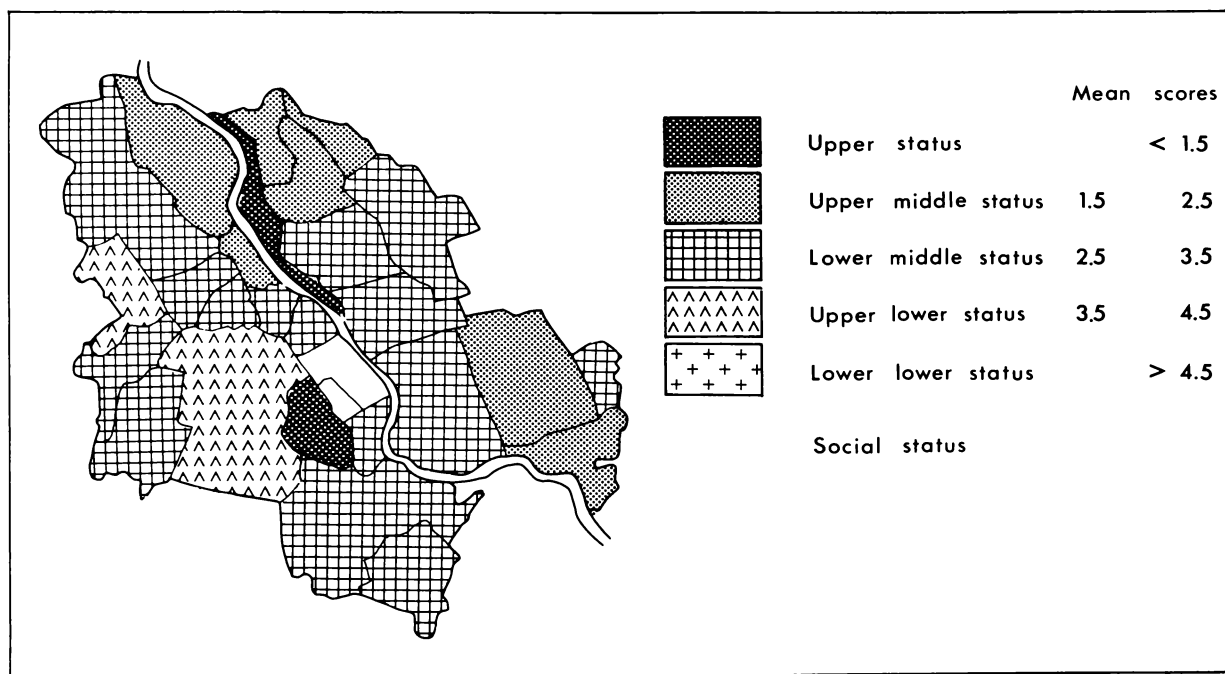


Figure 7:5 Distribution Of Mean Social Status Scores.

and Riverlea, were rated as the top status areas of Hamilton, with the bulk of areas grouped as lower-middle status. Only two areas, Frankton and Norton were viewed as of upper-lower status, with no areas in the bottom category: lower-lower status. This pattern, therefore, displays a close relationship with that previously observed in the economic typology groupings (Chapter 2); which was tested and supported by use of a one-way analysis of variance (table 7:5). In addition a study of the level of agreement between movers' assessments, using Kendalls analysis of concordance, suggests that movers' social status ratings exhibit a higher level of agreement than preference or familiarity ratings (table 7:6).

b. Localized Image.

Social status - awareness space was first examined by taking the intra-urban movers aggregated by origin and destination corridors, computing their mean ratings for the 26 areas, and comparing them, via a series of t-tests, with the mean ratings of all movers. The use of the mean ratings of all movers as the expected rating levels, was due to the lack of a readily available independent social status scale. This action was defended upon the grounds, first, that the total population is not spatially clustered, therefore, the means should not in themselves be spatially biased, and second, that those mean scores matched the patterns displayed by the study of the economic typology of areas. The selection of the t-test statistic related to the need to incorporate within this analysis a measure which allowed for variability between individual's ratings, in that not all movers possess the same frame of reference when rating the areas. Finally, the concept of a localized image was operationalized in terms of significant differences from the expected level of social

Table 7:5Social Status - Awareness Space, Comparison Between
Typology Groups Mean Social Status Scores

Typology Groups	Mean Social Status Scores Total Population	
<u>High Economic Level Old</u>		
Beerescourt	1.85	
Hamilton Lake	1.41	
River Road	1.33	
Group Mean		1.53
<u>High Economic Level New</u>		
Dinsdale	3.20	
Glenview	2.63	
Chedworth	1.61	
Chartwell	1.77	
Queenwood	1.83	
Riverlea	2.22	
Group Mean		2.21
<u>Medium Economic Level New</u>		
Te Rapa	2.84	
St Andrews	1.61	
Livingstone	3.08	
Melville	3.23	
Enderley	2.90	
Hillcrest	1.83	
Silverdale	3.04	
Group Mean		2.65
<u>Medium Economic Level Old</u>		
Forest Lake	2.52	
Norton	3.56	
Maeroa	3.22	
Fairfield	3.09	
Hamilton East	3.04	
Group Mean		3.09
<u>Rental Old</u>		
Whitiora	3.22	
Hamilton North	3.12	
Frankton	4.31	
Hamilton West	3.06	
Claudlands	3.15	
Group Mean		3.37

Analysis of Variance F Ratio $7.16 > 2.84$ at .05 level,
4 and 21 d.f.

Table 7:6Level of Concordance of Preference, Familiarity, and Social Status Ratings

Locational Groupings	Kendal's Analysis of Concordance		
	W Values		
	Preference Ratings	Familiarity Ratings	Social Status Ratings
Total Population	.346	.177	.562
Origin Groupings			
Corridor 1	.441	.323	.627
Corridor 2	.212	.327	.518
Corridor 3	.402	.330	.555
Corridor 4	.557	.396	.581
Corridor 5	.430	.333	.581
Corridor 6	.456	.232	.607

status; a localized image required significant positive differences only within the home corridor.

From figure 7:6 it is evident that the results of that analysis by origins and destinations display only scant support for a localized image. The only positive differences were by origins within Corridor 5, and by destinations within Corridors 2, 3, and 6. Even in just viewing the negative differences, little support is given for any spatial structure underlying the movers' social status ratings. Therefore, this data suggested a general pattern of consensus amongst the movers' ratings, which supports the notion that movers possessed a high degree of familiarity with all the areas of Hamilton.

Following on from that analysis the data were factor analysed with the objective of establishing if localized dimensions existed within the factor structure (i.e. clear grouping of contiguous areas loading upon the same dimension). This pattern was expected as a result of the dispersion of movers' origins and destinations. Then these dimensions were to be used to test for the existence of restricted images. Finally, this data was to be used in tests between the corridor and non-corridor sub-sets, where the object was to establish if the two groups could be differentiated. From the principal axis - factor analysis nine factors were extracted, which accounted for 62.53 percent of the total variance, and the factor loadings greater than .4 were mapped (figure 7:7). As can be seen from that diagram the factor structure was very mixed, and although localized dimensions can be traced, the overall impression was that this analysis failed to support the notion of a localized image. The result of this was that the subsequent set of planned analyses could not be conducted.

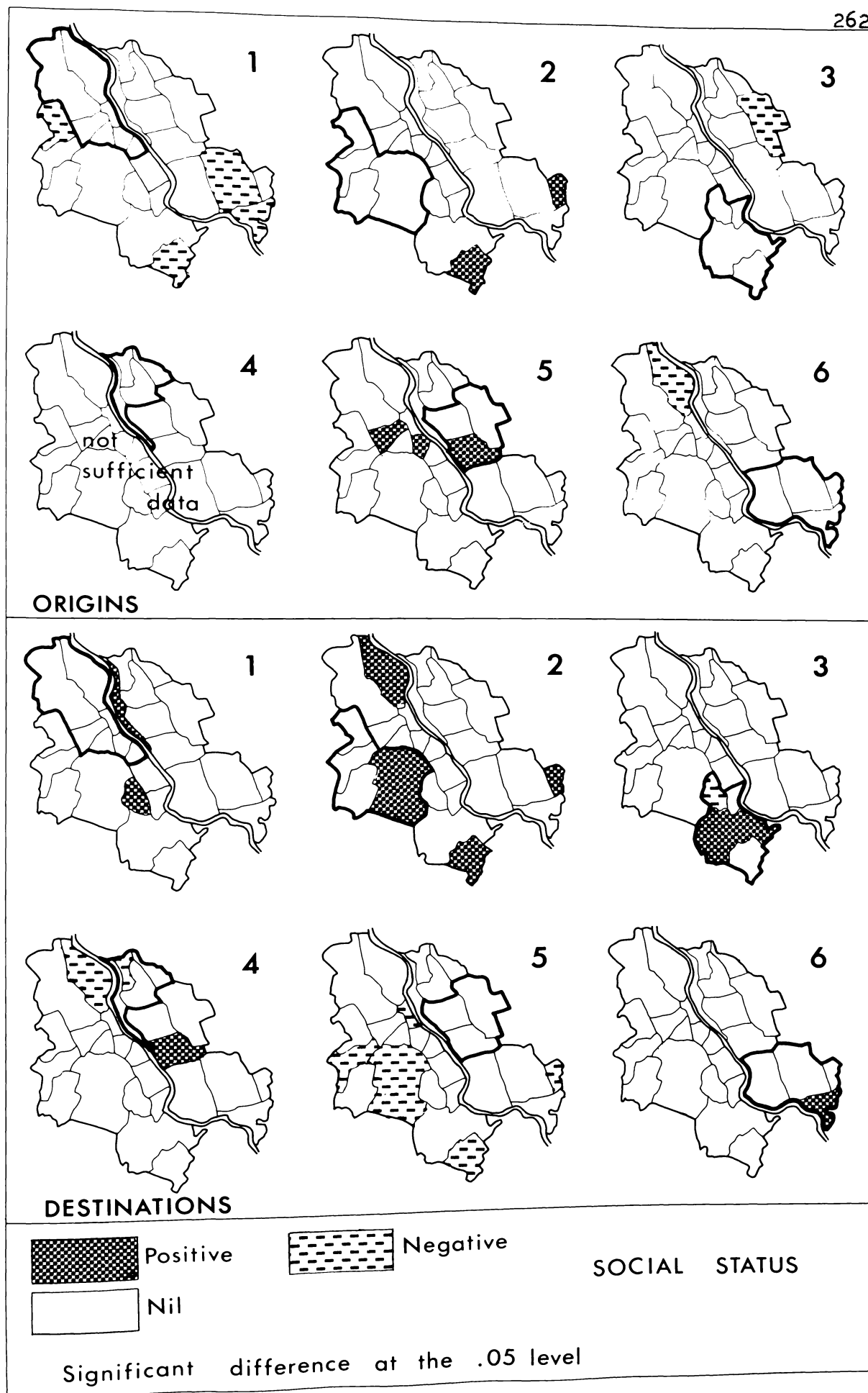


Figure 7:6 Statistical Tests For A Localized Social Status Image.

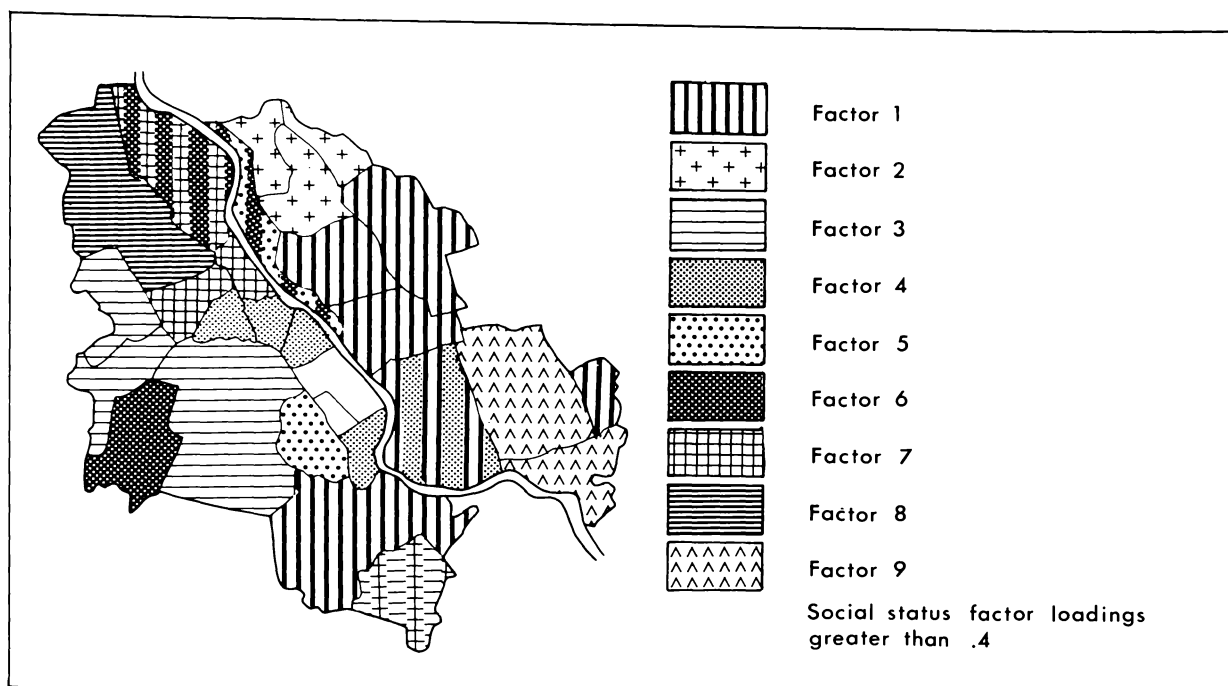


Figure 7:7 Distribution Of Social Status Factors.

c. Summary.

The major finding from this examination of the form of intra-urban movers' awareness space was that movers appear to have possessed a very detailed knowledge of the social status of areas throughout the city, and did not have a localized image. Probably this relates directly to the small size of the city, and the limited range in the status structure of areas within the city.

4. Familiarity Ratings

To establish if the mover's own assessment of their knowledge of the areas of Hamilton exhibited a restricted or localized image, movers were asked for their 'at-move' familiarity ratings. However, familiarity, unlike the tests on knowledge of housing character and shopping centres, is not only a test of the mover's knowledge, but also may include a measure of territoriality. The question asked and the familiarity rating scale was:

According to how familiar you are with the areas of Hamilton would you please place the area cards upon the scale:

1. Knew the area very well.
2. Knew the area quite well.
3. Knew the area.
4. Knew little about the area.
5. Knew very little about the area.

a. General Image.

Figure 7:8a presents the mean scores of familiarity for the total population at the at-move state, and it can be seen that in only four areas the mean score was below the level of 'knew the area' (3). The majority of areas were at the level of 'knew the

area' with five areas in the range of 'knew the area quite well'. No area was at the level of either extreme. By rankings of mean scores figure 7:8b showed, first, that the peripheral areas had the lowest rankings of familiarity, with the exception of the main northern route-way access and northern high status sector. Second, there was a general trend towards higher familiarity rankings with the inner city areas. Third, the high status areas of River Road and Hamilton Lake stand out as a separate grouping, furthermore they were ranked first and second respectively. Unlike preference ratings, therefore, the familiarity rating structure was based upon location as opposed to the economic typology of areas. A one-way analysis of variance upon the distribution of familiarity within typology groupings (table 7:7) supported that finding. But the very high familiarity scores with the highest group did suggest that movers possessed high familiarity with that extreme, although it could be argued that people were familiar with those areas because they also served major recreational purposes.

b. Localized Image.

In an attempt to establish if localized images did exist the spatial structure of the familiarity image was examined over the 26 areas. Using the same system as used for the study of social status - awareness space the concept of a localized image was operationalized as an image which required significant positive difference only within the home corridor. By comparing the aggregate scores of the intra-urban movers, by origin and destination corridors, with those of the total population via a series of t-tests, localized images were found for both sets of analyses (figure 7:9).

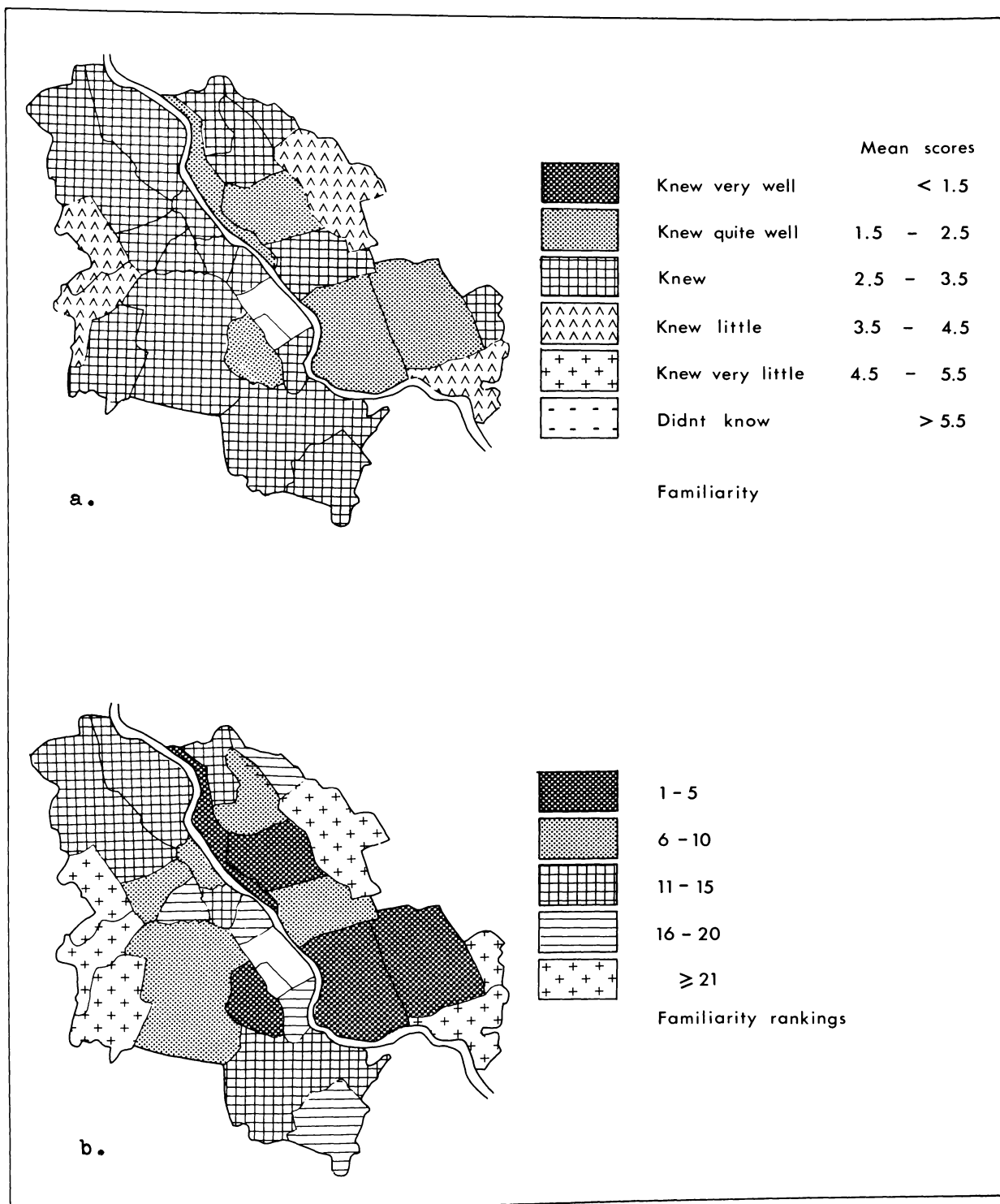


Figure 7:8 Distribution Of Mean Familiarity Scores, And Ranked Familiarity Scores.

Table 7:7

Familiarity Ratings, Comparison Between Typology Groups Mean
at-move Familiarity Scores

Typology Groups	Mean Familiarity Scores. Total Population
<u>High Economic Level Old</u>	
Beerescourt	2.60
Hamilton Lake	2.21
River Road	2.12
Group Mean	2.31
<u>High Economic Level New</u>	
Dinsdale	3.19
Glenview	3.08
Chedworth	3.20
Chartwell	2.62
Queenwood	2.98
Riverlea	3.52
Group Mean	3.10
<u>Medium Economic Level New</u>	
Te Rapa	2.93
St Andrews	2.73
Livingstone	4.15
Melville	2.79
Enderley	3.56
Hillcrest	2.23
Silverdale	3.37
Group Mean	3.11
<u>Medium Economic Level Old</u>	
Forest Lake	2.75
Norton	3.75
Maeroa	3.20
Fairfield	2.46
Hamilton East	2.38
Group Mean	2.91
<u>Rental Old</u>	
Whitiora	3.02
Hamilton North	3.08
Frankton	2.61
Hamilton West	3.18
Claudlands	2.53
Group Mean	2.88

Analysis of Variance, F Ratio 1.77 < 2.84 at .05 level,
4 and 21 d.f.

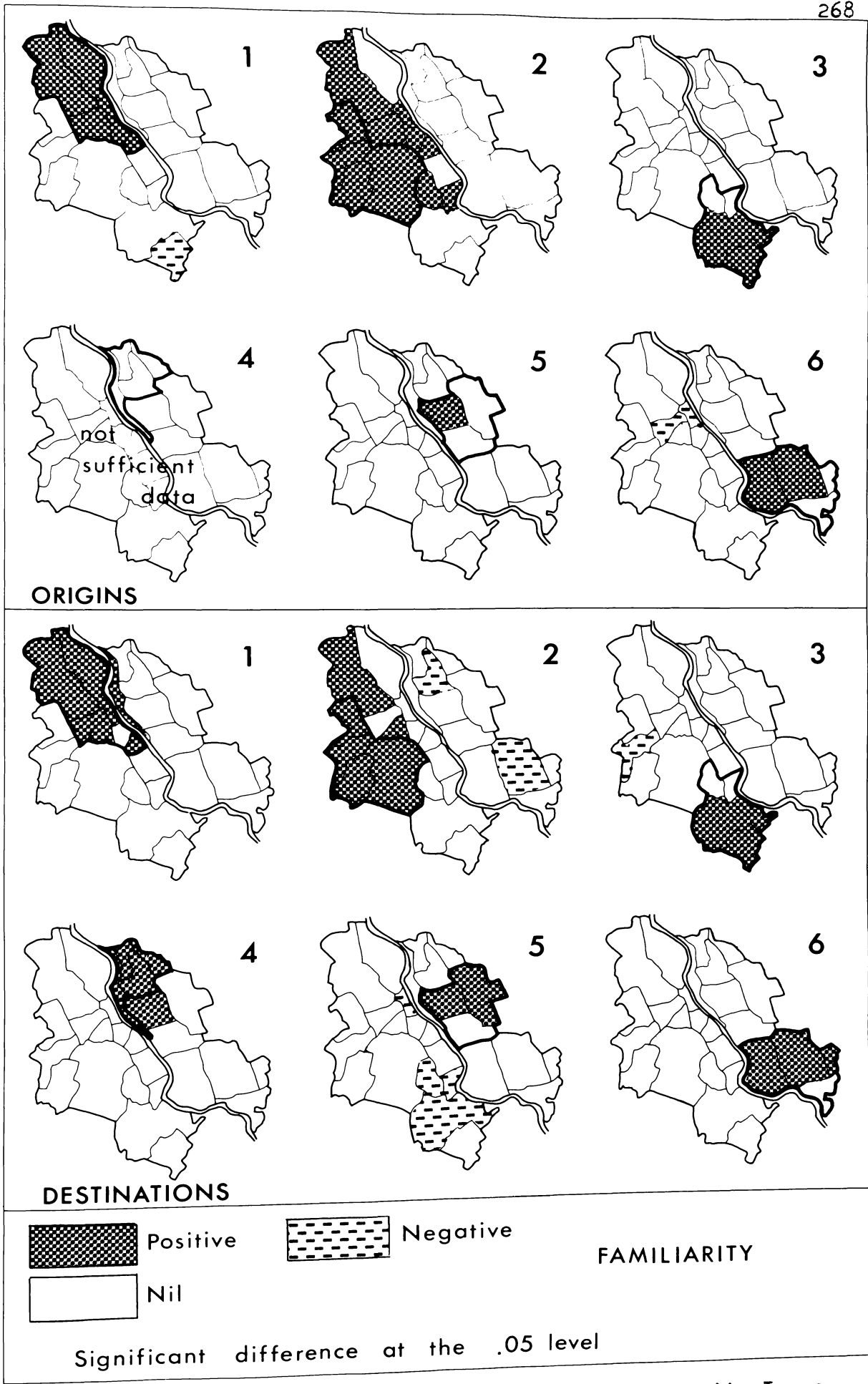


Figure 7:9 Statistical Tests For A Localized Familiarity Image.

Based upon the notion that if localized images did exist localized familiarity dimensions would result from a principal-axis factor analysis of that data, due to the spatial dispersion of movers' origins and destinations, six factors were extracted which accounted for 69.4 percent of the variance within that data. The orthogonal factor matrix loadings of .4 or greater were then plotted as factor suburbs, and the pattern of localized familiarity dimensions established (figure 7:10) was almost the same structure as the six physical corridors derived earlier from the inter-connectivity analysis (Chapter 3). Extending the analysis of localized images to a comparison between the factor score structure of each of the six corridor origin and destination groups and that of the total population, a series of t-tests were conducted. Table 7:8 presents the results of those analyses for origin groupings, which clearly showed that in all cases there was a significant bias in ratings towards familiarity with the home corridor. However, the only negative value was that of Corridor 1 with Corridor 3, which means that familiarity images based upon origin corridor aggregations were positively biased but not negatively. The same conclusion was reached for familiarity images by destination corridor aggregations, where Corridor 5 had negative familiarity with Corridors 1 and 3 (table 7:9).

c. Individual's Image.

From the review of the other researchers' studies of awareness space (Chapter 1) one of the major criticisms of the locational aggregation approach, as used above, was that it emphasizes consensus within the groups and falsely creates an image of localized bias. There was as displayed by figure 7:11 a large degree of variance in rating scores within each group. Therefore,

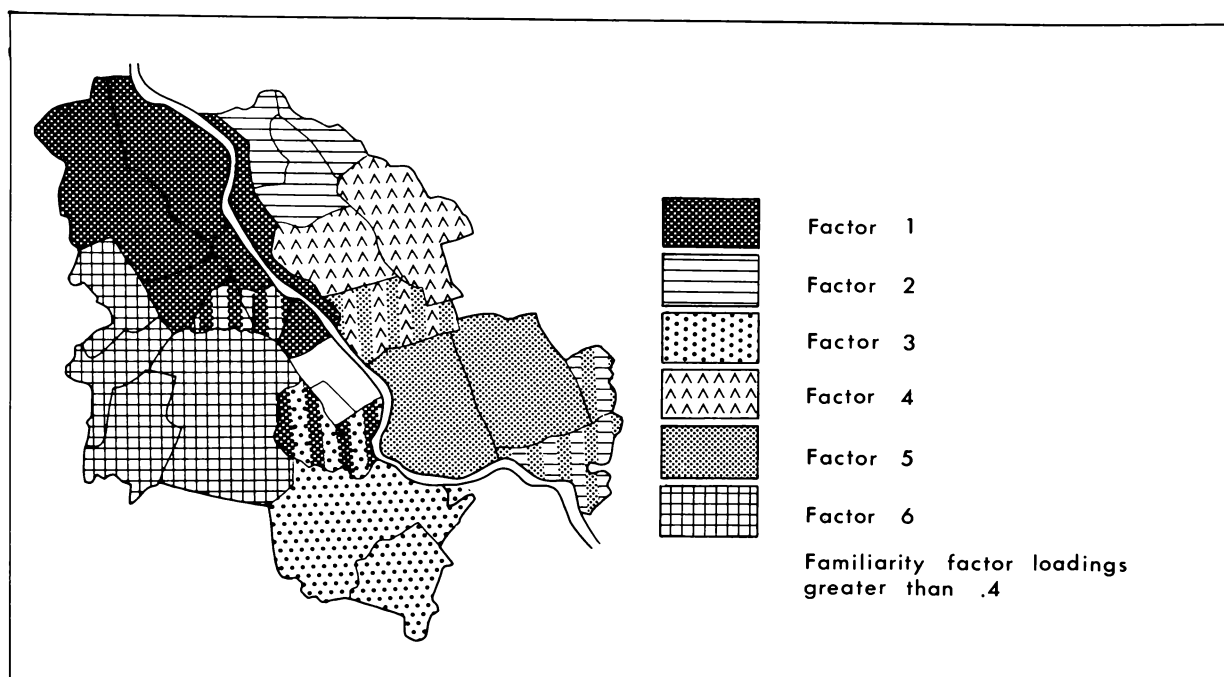


Figure 7:10 Distribution Of Familiarity Factors.

Table 7:8

Tests Between Origin Groups and the Total Populations Mean
Familiarity Scores Upon Each Factor Corridor

Origin Groups		Significant t-Test Values					
		1.	2.	3.	4. ¹	5.	6.
Factor Corridors							
	Factor Number						
1	1	2.86*					
2	6		5.66*				
3	3	-1.67		3.75*			
4	2				--*		
5	4					4.90*	
6	5						3.85*

* Expected Significant Results
 Significance Level .05, t-tests

1 Not sufficient observations.

Table 7:9

Tests Between Destination Groups and the Total Populations Mean
Familiarity Scores Upon Each Factor Corridor

Destination Groups		Significant t-Test Values					
		1.	2.	3.	4.	5.	6.
Factor Corridors							
	Factor Number						
1	1	4.07*				-3.01	
2	6		7.56*				
3	3			4.94*		-2.57	
4	2				3.51*		
5	4					8.59*	
6	5						3.84*

* Expected Significant Results
Significance Level .05, t-Tests

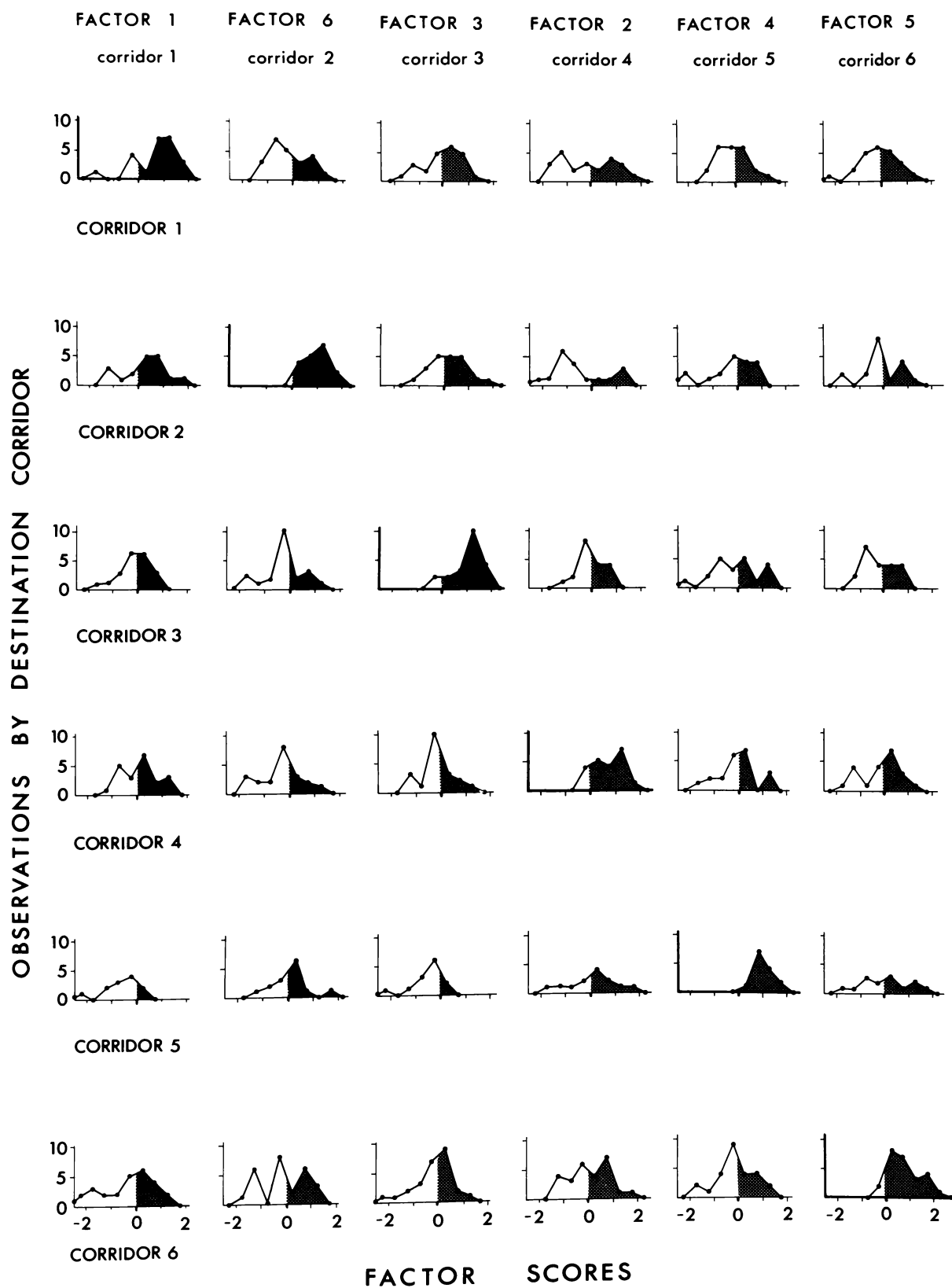


Figure 7:11

Frequency Distribution Of Factor Scores By Corridor Groups.

it was decided to test whether the approach using locational aggregations did group individuals which held similar images. To do so a discriminant analysis was conducted upon the aggregations. Table 7:10 presents the results by origins and destinations, from which it was established that only 51 percent by origins and 57 percent by destinations were correctly classified. Examined by corridor and non-corridor sub-sets it was argued that corridor movers would achieve a higher degree of correct classification. Results from the discriminant analyses support that pattern, in that 74 percent of corridor compared with 31 percent of non-corridor movers were correctly classified by origins (table 7:11). But by destinations no appreciable difference was established, in that 61 percent of corridor and 53 percent of non-corridor movers were correctly classified. Therefore, despite the establishment of a clear localized factor structure, the many misclassifications supported the argument that the data should be examined independently of any physical locational grouping.

To do so the hierarchical grouping profile algorithm HGROUP was used to group the individuals into 9 groups upon their familiarity factor scores profile. Following the same procedure as used in the previous chapter, the groups were interpreted, first, by the mean factor scores profile, which gives the structure of the groups ratings relative to that of the mean of the total population (i.e. zero). From that graph the familiarity image as interpreted was then sketched upon the diagram. Then second, the mean score profile was examined to establish if the spatial form of the image conformed to a restricted or a localized image; a restricted image was operationalized as an image requiring familiarity scores above the awareness threshold for the areas within the home corridor, and for the areas outside of the home

Table 7:10Familiarity Ratings, Linear Discriminant Analysis Between Corridor Aggregations

	Intra-Urban Movers	
	Number Correctly Classified	Number Misclassified.
a. <u>Origin Corridors</u>		
Corridor 1	11	9
Corridor 2	6	11
Corridor 3	4	3
Corridor 4	3	1
Corridor 5	5	11
Corridor 6	13	6
	<u>42 (50.60)</u>	<u>41 (49.40)</u>
b. <u>Destination Corridors</u>		
Corridor 1	6	9
Corridor 2	11	3
Corridor 3	10	3
Corridor 4	7	7
Corridor 5	8	3
Corridor 6	5	11
	<u>47 (56.63)</u>	<u>36 (43.37)</u>

Table 7:11Familiarity Ratings, Linear Discriminant Analysis Between Corridor Aggregations, Divided Into Corridor and Non-Corridor Sub-sets

	Sub-sets			
	Corridor Movers		Non-Corridor Movers	
	Correctly Classified	Mis-classified	Correctly Classified	Mis-classified
a. <u>Origin Corridors</u>				
Corridor 1	6	2	5	7
Corridor 2	6	2	0	9
Corridor 3	4	0	0	3
Corridor 4	2	0	1	1
Corridor 5	4	5	1	6
Corridor 6	6	1	7	5
	<u>28</u> (73.68)	<u>10</u> (26.32)	<u>14</u> (31.11)	<u>31</u> (68.89)
b. <u>Destination Corridors</u>				
Corridor 1	3	5	3	4
Corridor 2	6	2	5	1
Corridor 3	4	1	6	2
Corridor 4	0	1	7	6
Corridor 5	6	1	2	2
Corridor 6	4	5	1	6
	<u>23</u> (60.53)	<u>15</u> (39.47)	<u>24</u> (53.33)	<u>21</u> (46.67)

corridor below that threshold, whereas a localized image required familiarity scores above that threshold level only within the home corridor. The awareness threshold was given the rating level of 3.0 (knew the area). Finally, to determine what proportion of movers possessed a restricted or localized image the origins and destinations of the group's members were plotted. The results of that analysis (figure 7:12a and b) were:

Group 1. The factor scores profile indicated a heightened familiarity with Corridors 3 and 4, with lower scores upon Corridors 5 and 6. The mean scores profile did support the grouping of two restricted images based upon Corridors 3 and 4. However, the puzzle was why images based upon Corridors 3 and 4 should have been grouped together, in that those corridors were at opposite sides of the city.

Group 2. Primarily with low familiarity scores with Corridor 4, but also high familiarity with Corridors 1 and 3, this suggested a familiarity image based upon the western side of the river. But the mean scores profile established that only in Corridor 4 was there any marked pattern of familiarity bias, and then that was negative. Therefore, the image did not conform to the concept of a restricted image, but was termed a localized image of the areas of the westside.

Group 3. The factor profile established that the image was based upon Corridors 4 and 5, and the mean scores profile supported that as a restricted image.

- Group 4. Based primarily on Corridor 3, the mean factor scores profile suggested a bias in familiarity which extended to Corridor 5, but very markedly away from Corridors 1 and 6. The mean scores profile suggested that the image was only marginally a restricted image, based upon Corridor 3.
- Group 5. Clearly no localized bias was established within the factor structure, and the mean scores profile supported the notion that this was a grouping of movers who claimed to hold a high degree of familiarity with all the areas of the city.
- Group 6. The factor profile peaked in Corridor 4 with a negative score upon the adjacent Corridor 5. From the mean scores profile, support for a restricted image was given by low levels of familiarity with areas in Corridors 1, 2, 3 and 5.
- Group 7. The factor score profile established a familiarity bias upon Corridors 1 and 2. The mean scores profile supported that image as marginally a restricted image, in that high scores were also found for areas 18 (Chartwell), 19 (Fairfield), 22 (Claudelands), 23 (Hamilton East), and 24 (Hillcrest).
- Group 8. With no high positive mean factor scores and a mean scores profile of marked low familiarity with all areas, this suggested a grouping of movers with no localized bias and low familiarity over most of the city.
- Group 9. This group had its factor scores clearly biased

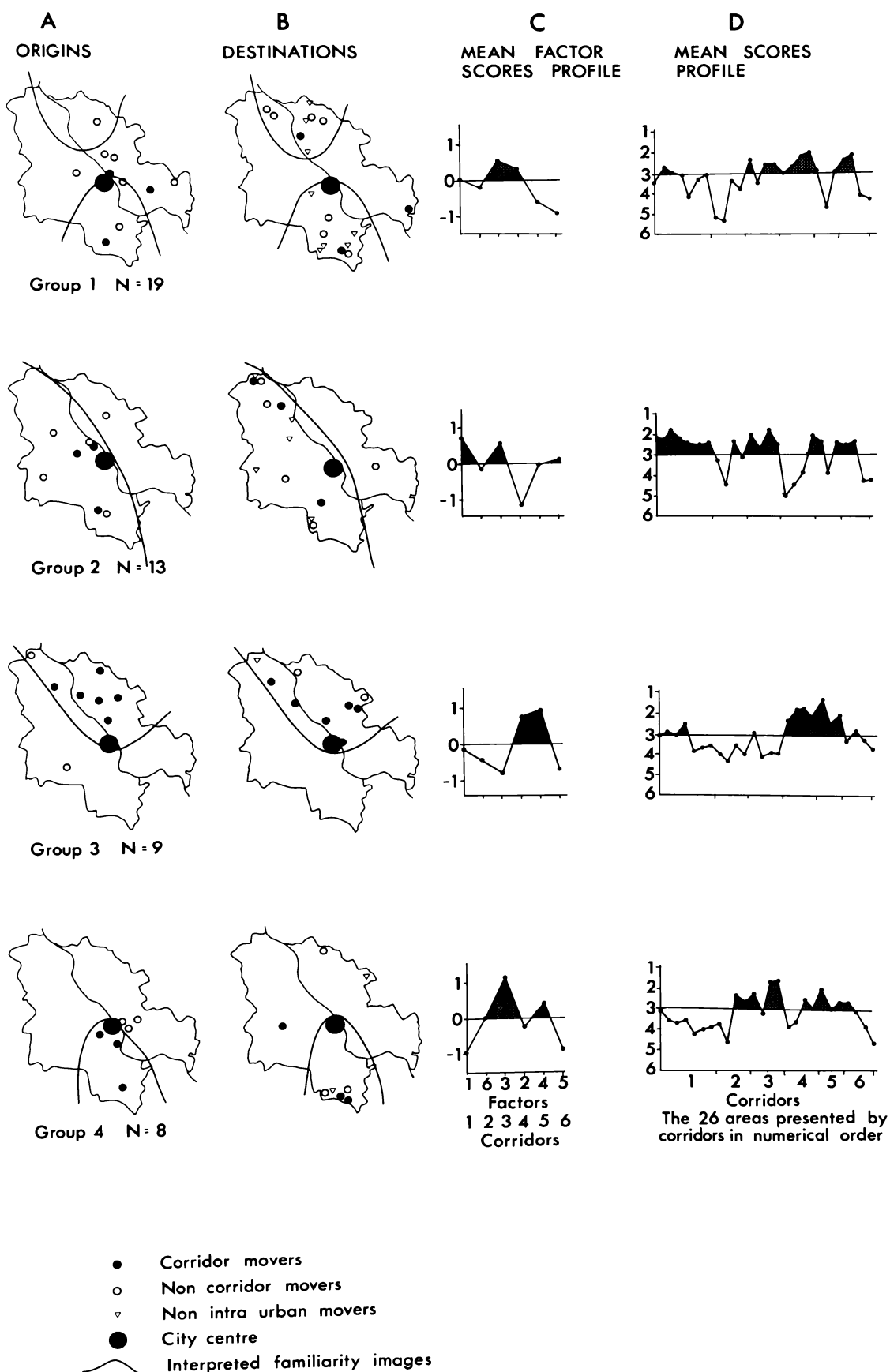


Figure 7:12a Analysis Of Individual's Familiarity Images.

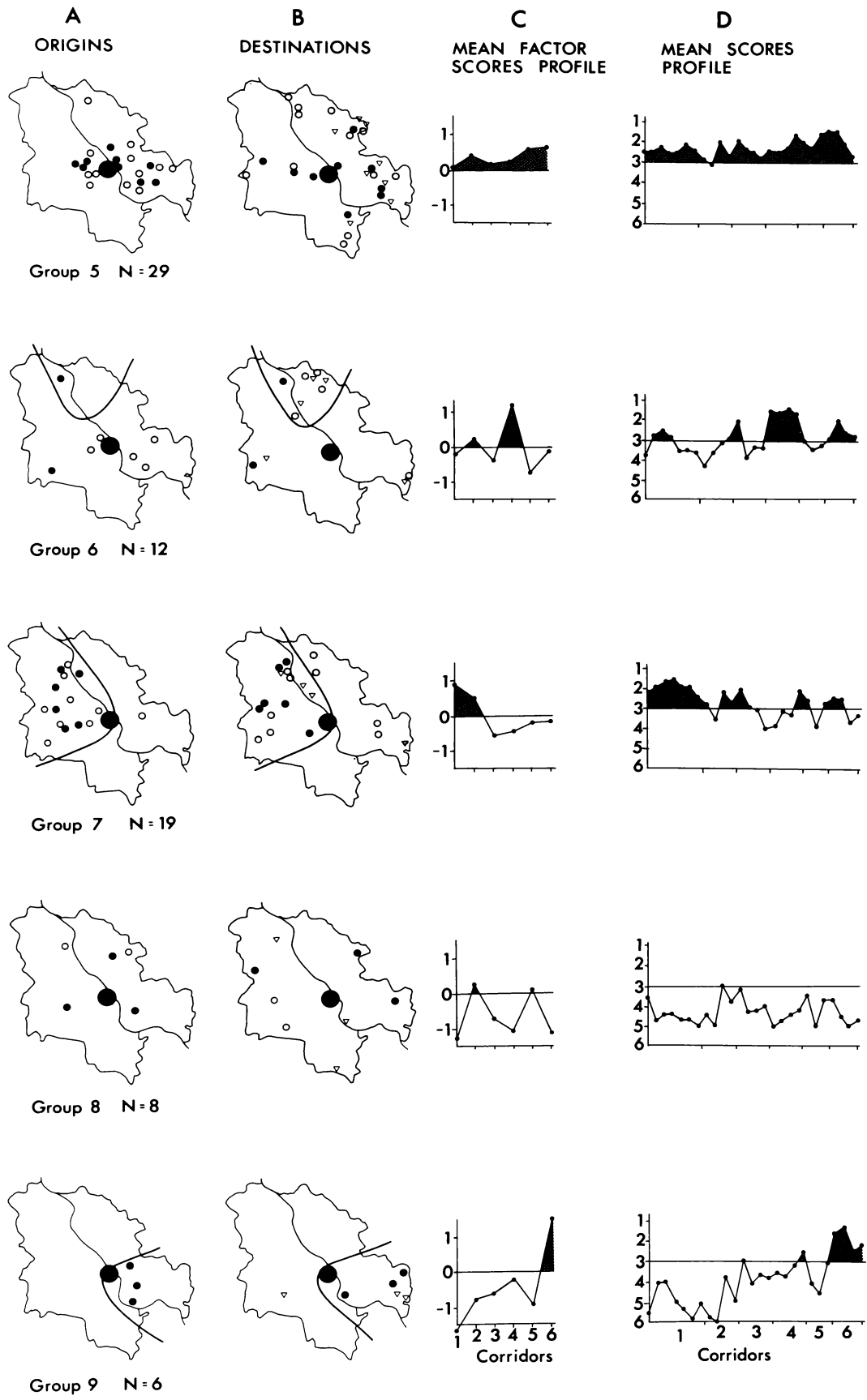


Figure 7:12b Analysis Of Individual's Familiarity Images.

towards Corridor 6, and the mean score profile displayed an image which most closely approximated the concept of a restricted image.

The foregoing analysis has established that for all but two of the nine groups, images had a marked localized bias. Of those seven, six had a restricted image and the seventh a localized image. In total 45 intra-urban movers (54 percent) were located within the limits of their restricted image, 32 by their origins and 40 by their destinations, of which 27 were located by both their origins and destinations. The addition of the group with a localized image increased that figure to 52 (63 percent). This analysis, therefore, has clearly established support for the notion of spatially restricted images, although based slightly more upon the destination than origin locations. Of the remainder, 21 had high familiarity with all of the city, 5 had images which contained very low levels of familiarity throughout the city, and for another 5, who were grouped with the restricted and localized images, their origins or destinations did not correspond to the limits of the image.

d. Corridor and Non-Corridor Movers' Images.

To compare the patterns of familiarity between corridor and non-corridor sub-sets two tests were conducted, the first of which involved taking the factor scores upon origin and destination corridors and comparing the two sub-sets' scores by way of a series of t-tests. As outlined in the previous chapter, the use of factor scores had two advantages. First, it gave a value for the home corridor which complies more with the notion of a corridor image than simply values based upon individual areas, and second, it provided a value which was standardized upon the level of familiarity which the total population had with that corridor,

and by so doing permits the individual's home corridor familiarity scores to be compared irrespective of the corridor concerned. From table 7:12 it was evident that the corridor and non-corridor sub-sets had significantly different levels of familiarity with both origins and destinations, and in both cases the corridor population had the higher values. However, there was a marked increase in familiarity by non-corridor movers with their destinations over their origins.

The second test examined the number of corridor and non-corridor movers whose familiarity images were based upon their origin or destination. In total 21 corridor (55 percent) and 24 non-corridor (55 percent) movers had restricted images which were based upon their origin or destination, which surprisingly indicates no marked difference between the sub-sets. However, when compared by origin and destination images the corridor population had 20 correctly classified by origins and 20 by destinations, of which expectedly 19 were located by both. In comparison non-corridor movers were more correctly located by destination (20) than by origin (12), of which only 8 were located by both.

e. Summary.

From the study of the general structure of movers assessments of their own familiarity with the areas of Hamilton, it was found that familiarity was not directly related to the economic typology structure of the areas. In otherwords, movers were not more familiar with areas because they were of higher typology status. The testing for a localized image supported that pattern of familiarity for both origin and destination locational aggregations. However, the challenge to the use of locational aggrega-

Table 7:12Comparative Tests Between Sub-sets Familiarity Ratings Factor Scores

Sub-sets	Origin Home Corridor	Destination Home Corridor
a. <u>Mean Factor Scores</u>		
Corridor ¹	1.07	1.11
Non-Corridor	0.43	0.74
Non-Intra-Urban		0.79
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	5.46*	2.59*
Corridor/Non-Intra-Urban		2.21*
Non-Corridor/Non-Intra-Urban		0.35

* Significantly different at the .05 level.
t-Test (unsigned)

1 Difference in Corridor mean scores relates to
corridor movers moving across physical corridor
boundaries.

tions was supported, in that a high degree of misclassification of familiarity images results. The subsequent analysis of the individual's familiarity profile clearly supported the notion that the majority of movers had a restricted familiarity image. Finally, a comparison between corridor and non-corridor sub-sets established that the corridor movers were different, in that they held a higher degree of familiarity with the origin and destination corridor, plus a higher proportion of movers who held restricted familiarity images based upon their origin home corridors, but not so for destinations.

5. Sketch Map Study

The fifth and final study of the general characteristics and form of the mover's knowledge of Hamilton was based upon Lynch's sketch-map approach, in that the interviewee was asked to:

Draw a quick sketch-map of Hamilton City, giving as much detail as possible to the street patterns.

The objectives of this approach were, first, to obtain a measure of the general spatial form of the mover's mental image, and secondly, to establish whether the CBD was the central node of that image. To facilitate such an analysis, considerable effort was expended to making the data collection as objective as possible. This included the interviewer in recording the order and names of the streets drawn, and the asking of the interviewer three questions relating to the drawing of the image:

1. Which way was the sketch map drawn:

- From the home to the CBD, or
- From the CBD to the home?

2. Did the image include a detailed street pattern beyond

the home residence (using the CBD-home axis as reference)?

3. Did the image include a detailed street pattern beyond the CBD (using the CBD-home axis as reference)?

However, despite these developments, numerous problems related to applying this technique and the quality of the data obtained, undermined any possible extensive analysis of the results. But for the fact that the results obtained did provide some important information with regard the populations' image of the city, and as a guide for further research, this study would not have been reported. The principal problems were:

- (i) The mover's inability to draw.
- (ii) The mover's refusal to draw, and in some cases the refusal to complete the sketch map.
- (iii) The effect of time upon sketching, in that for some movers if given an hour they could have sketched the street pattern of most of the city.
- (iv) The effect of scale through the size of the paper upon which the sketch was drawn, in that often it was found that a mover established an initial scale which did not allow them to sketch all of the city.
- (v) The interpretation of the question related to the difficulty in giving assistance without forming the answer for them. Most movers kept asking the question, 'is that what you want' or 'is that all you want'?

As a result of these problems, support is not given for the view that the resulting sketch-maps represent each individual's mental map of the street plan of the city, for in many cases they simply reflect the limitations and problems of sketch-mapping. However,

in not accepting these maps as the individual's image, I maintain that at a general level the sketches did represent a range of images which can be studied to establish if localized or non-localized images did exist. For this purpose 62 sketch maps from 83 intra-urban movers were examined, the remaining 21 were movers who either refused to draw a sketch map, or presented a sketch map which was totally uninterpretable.

a. General Structure.

To determine the general form of the sketch-maps, they were classified after data collection by reference to the whole range of sketches and notes upon the drawing of them. In total eight types of sketch maps were obtained (table 7:13), which were grouped into three basic categories: spatially limited, arterial route, and CBD sketch-maps. Spatially limited sketch maps accounted for less than half of the maps, and as shown in figure 7:13a these sketch maps take many different forms. Arterial route maps, which were the dominant structural form, likewise take a wide range of forms (figure 7:13b).

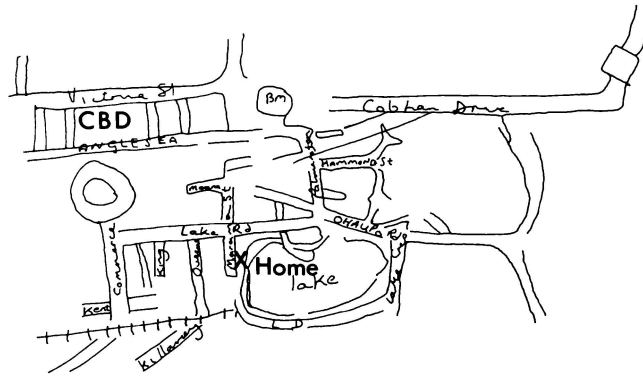
The results of the questions regarding whether the mover sketched streets in detail beyond the home residence and the CBD proved even less satisfactory, in that the vast majority of localized and arterial sketch-maps did not contain a great amount of detail. Of the 53 who included their home residence within their map only two plotted any detail beyond the home residence, and for detail beyond the CBD only seven did.

b. The Orientation Node.

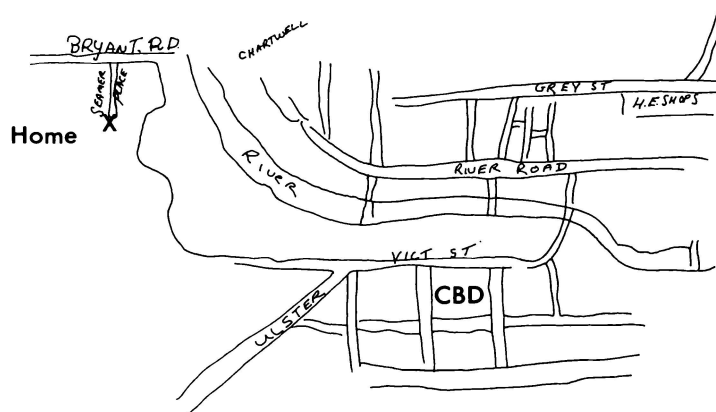
Evidence supporting the notion that the CBD was the orientation node of these sketch-maps comes from the answers to the first

Table 7:13Classification of Sketch Maps

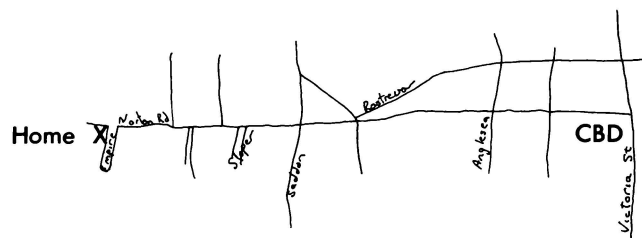
Details of Images Drawn	Number (N=62)
a. <u>Limited Sketch Maps</u>	
CBD, Home	15
CBD, Home, and Local Area in detail	3
CBD, Previous Home	6
CBD, Home, and then all of Hamilton in detail	1
	25 (40.32)
b. <u>Arterial Sketch Maps</u>	
CBD, Home and Arterial Routes	19
Arterial Routes and Home	9
CBD, Arterial Routes	7
	35 (56.45)
c. <u>CBD Sketch Maps</u>	
CBD, Only	2
	2 (3.23)
	62



1

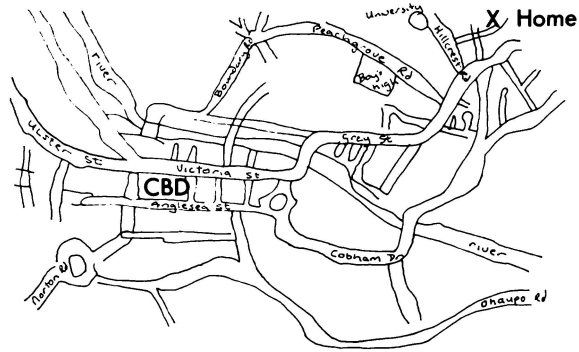


2

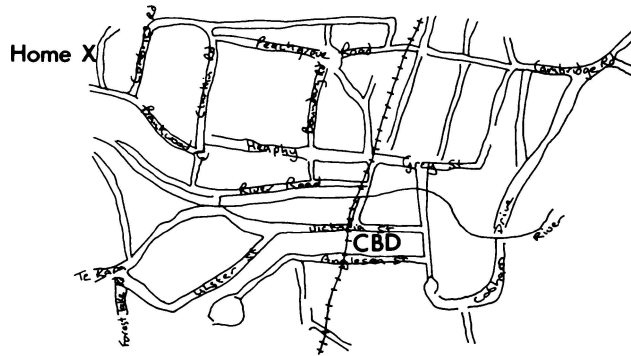


3

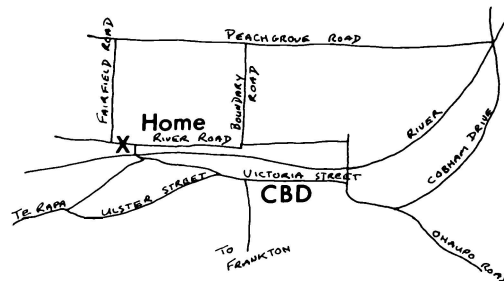
Figure 7:13a Examples Of 'Spatially Limited' Sketch Maps.



4



5



6

Figure 7:13b Examples Of 'Arterial Route' Sketch Maps.

question. Of the 53 who included their destination home residence upon the maps, 45 drew the image from the CBD to their home, although many did so via very indirect routes. An examination of the mean order of plotting the main roads, plus the river and bridges (table 7:14), reinforces that conclusion. Normally the main CBD street (Victoria Street) was plotted first, followed by the river and the bridges, then the main arterial route north (Te Rapa Road - Ulster Street), followed by a mixture of other arterial routes. A secondary feature of the maps general structure, was that the bridges and the river were the second and third most commonly mapped features.

c. Summary.

The results of this study in terms of portraying a mental image were very disappointing, in that no over-all confidence could be placed upon an individual's effort, for it may have simply reflected the problems in sketching as outlined above. Yet if these results are accepted at a very general level, then the findings established do provide additional information about a mover's mental image of Hamilton, which can be used to support the evidence derived from the other less skill dependent tests. In summary the main findings from this study were:

- (i) That the movers did see the CBD as the central orientation node.
- (ii) That they did recognise the river as an important element within the urban structure.
- (iii) All but nine movers out of the 62 connected their destination home residence into the sketch in some manner.
- (iv) The main sketch-map appeared to be one of arterial

Table 7:14Order Principal Streets, River, and Bridges Were Sketched

Principal Streets	Frequency Sketched (N = 62)	Mean Order Sketched
Victoria Street	61	2.00
River	40	1.95
Bridges	43	2.72
Te Rapa Road - Ulster Street	35	3.05
Ohaupo Road	15	4.73
Cobham Drive	25	4.72
River Road	23	4.39
Grey Street - Heaphy Terrace - Bankwood Road	29	4.51
Galloway Street - Peachgrove Road - Hukanui Road	14	6.21

arterial routes covering all of Hamilton, although 40 percent of movers did produce a localized map.

- (v) Detail within the maps was limited to around the CBD streets, beyond which most of the movers drew the main arterial routes, and left it at that.*3

6. Chapter Conclusion

It was established from the researcher's assessment of the general structure of the mover's awareness space; that the vast majority of movers did hold an accurate image of the general housing character of areas over the whole city, that their knowledge of shopping centres was in general a complete image above the level of neighbourhood centres, and that they held a high level of knowledge of social status of areas throughout the city. Only in terms of the mover's own assessment of familiarity was there any clear evidence to support a 'restricted image'. From these findings it was argued that movers had a high level of knowledge with the whole city, which was sufficient for them to be able to consider information upon vacancies throughout the city. Therefore, it was concluded that for Hamilton's intra-urban movers, their image of awareness space did not conform to Adams' notion of a restricted image, and as a result, the hypotheses underlying

*3 A sixth study was conducted upon the movers' desirability images. However, unlike the social status-awareness space study desirability ratings cannot be independently measured. Rather desirability ratings are a combination of the movers' preferences, familiarity and social-status ratings. Therefore, because desirability ratings cannot be used with any confidence to measure awareness space the results from this study are presented separately in Appendix 5. However, those results established that movers hold a high level of agreement on the quality of areas throughout the city, plus corridor compared with non-corridor movers were found to hold a significantly higher level of desirability with the origin home corridor.

Adams' restricted image hypothesis were rejected:

1. That the awareness image of the individual was restricted in spatial form to the origin home sector.
2. That the image outside of the origin home sector was blurry or non-existent.
3. That movers possessing a sectoral awareness image would move within their origin home sector.

In terms of a localized image, the studies of housing character and social status established no localized bias. However, the study of shopping centre identification and the movers own assessment of their familiarity, did. It would therefore, appear that although movers knew the whole city well enough to be able to consider dwellings within nearly all areas, they did hold a very strong bias in their images of familiarity with their origin and destination home corridors. That the study of an individual mover's assessment of familiarity established restricted images, suggested strong localized territoriality as the reason for that image.

Finally, corridor and non-corridor movers sub-sets were again found to be different, in that corridor movers held a higher degree of familiarity with their origin and destination home corridors, plus a higher proportion who held a restricted image based upon their home origin. This pattern therefore, suggested that corridor movers held a higher degree of territoriality with their origin home corridor, which may be linked to security, certainty, and preference, and thereby explain their pattern of movement. As a result the study of the movers' awareness space suggests support for the locational attachments hypothesis as the explanatory hypothesis of non-random restricted lateral movement.

Chapter 8. Search and Selection Process

In the previous two chapters it has been established that the corridor and non-corridor movers' sub-sets can be differentiated in terms of aspects of the controls upon search space and the selection of a dwelling. Here that research is extended to examine the notion that corridor and non-corridor populations can be differentiated upon:

1. General characteristics of the search process.
2. Spatial form of search behaviour.
3. Reasons for the selection of the dwelling.

Each of these three topics forms a separate section in this chapter, and for each a hypothesis was examined:

1. That the corridor population would have a different set of general search process characteristics.
2. That non-corridor movers have a more dispersed spatial pattern of search behaviour than corridor movers.
3. That there is a significant difference between the corridor and non-corridor populations' reasons for selecting their dwelling.

The reasoning behind the first hypothesis, upon the characteristics of the search process, was purely speculative as there existed no theoretical basis for expecting any difference. For the hypothesis on the spatial form of search space it was expected that corridor search space would be primarily confined to the origin home corridor, because they claimed within their aspiration sets to want a residence within a specific area. Non-corridor movers with an aspiration set centred more upon the general quality of an area and less upon a specific area, were expected to have much more dispersed search space. The aspirations of the mover were

also expected to carry across to the movers selection of a dwelling, therefore, the third hypothesis proposes that corridor movers' reasons will relate to moving within a specific area, whereas those of the non-corridor movers relate more to the general quality of the area and housing characteristics.

Within this chapter the search for dwellings and for sections are treated as different types of search, and where seen necessary, each is viewed separately.

Section A General Characteristics of the Search

To establish if corridor and non-corridor movers search involved significantly different procedures a series of eleven questions were asked. Within the format of this section those questions are examined, first, in a study of the general characteristics of the total populations search process, then secondly, in a comparative study between the corridor and non-corridor sub-sets. As there was prior to this study no theoretical basis for expecting that differences existed between the sub-sets, any attempt to develop a set of expected differences would have been pure speculation. However, the purpose of conducting these tests is to empirically determine what importance this aspect of the relocation process has in the search for the explanation of corridor movement.

A:1 Characteristics of the Total Populations Search Process

This study is divided into five topics:

- a. Sources of information upon the vacancy set used.
- b. Who searched for a new residence.
- c. Search period.

- d. Number of dwellings and sections searched.
- e. Continuance of search after finding the dwelling ultimately selected.

a. Sources of information upon the vacancy set.

Seventy-one percent of movers searched only for dwellings for sale, although an additional 15 percent who searched for dwellings for sale also searched sections and 1 percent also searched rental property (table 8:1). In total 87 percent of all the movers who purchased or had dwellings built for them searched for dwellings which were for sale. Only 13 percent of the movers restricted their search to sections. Of the 92 who ultimately purchased a dwelling, 88 percent at some time during their search consulted a real estate agent for information upon properties for sale. The second most frequently used source of information and the only other source which was used by more than 25 percent of movers was newspapers, which 55 percent used (table 8:2a). However, in terms of their ranking of the information sources importance, 79 percent rated real estate agents first and less than 10 percent favoured newspapers (table 8:2b). Similarly in the selection of their new residence, 77 percent used real estate agents, 11 percent newspapers, and 10 percent personal contacts (table 8:2c). Therefore, real estate agents were clearly the dominant sources of information but compared with the findings of Rossi (1955) and Herbert (1973) this pattern was extreme in terms of the usage of formal information sources. An explanation of these differences relates to the unique characteristics of the methods of property sales in Hamilton. First, because people rarely advertised their property privately the role of the only daily newspaper ('The Times') was not important beyond directing a person to a real

Table 8:1Comparative Tests Between Sub-sets Distribution of Type of Property Searched For

Sub-sets Type of Property Searched For	Total (N = 123)	Percentages		
		Corridor	Non- Corridor	Non- Intra- Urban
		(N = 38) 1	(N = 45) 2	(N = 40) 3
Dwellings for Sale	70.73	76.31	60.00	77.50 ^{*2}
Rental Dwellings	0.00	0.00	0.00	0.00
Flats	0.00	0.00	0.00	0.00
Sections	13.01	7.89	17.77	12.50
Dwellings for Sale and Sections	15.45	15.78	22.22	7.50 ^{*2}
Dwellings for Sale and Rental Dwellings	0.81	0.00	0.00	2.50

* Significantly different at the .05 level from the proportion in the sub-set indicated by the subscript. Two Sample Proportions Test.

estate agent. Secondly, due to newspaper real-estate advertisements not giving the vacancies addresses, nor were there many for-sale signs upon dwellings, save for building companies new housing sub-divisions, walking and driving around searching was not a practical means of collecting information. Thirdly, because of the accepted position of the real estate agents as the agency through which to purchase and sell property, the role of personal contacts as the source of information was weak.

For the 31 which had their dwelling built for them, a much smaller proportion consulted real estate agents or the newspaper for information in sections at any time within their search. But more were involved in walking or driving around searching, and not unexpectedly more contacted building companies (table 8:2a). But real estate agents were still ranked as the most important source of information, although only slightly ahead of building companies (table 8:2b). That pattern was reflected in the information sources used in finding the section selected (table 8:2c). Therefore, although walking and driving around were more important in the search for a section, as opposed to the search for a dwelling, the use of formal information sources still remains dominant. Here it accounts for 71 percent of the principal sources of information, although it was divided between real estate agents, building companies, and newspapers.

Within the context of study of the explanation of corridor movement the role of formal information sources raises a number of additional questions which are beyond the scope of direct investigation within this study. They centre upon the importance of the individual's awareness space in limiting the movers supply of information upon vacancies, for in attacking Adams' claim that a person's use of formal information sources is restricted to the

Table 8:2Usage of Information Sources During Search Process

	Dwellings Total Population (N = 92) 1	Dwellings Sub-sets Corridor Non- Corridor Non- Intra- Urban (N = 30) (N = 30) (N=32)			Sections Total Popula- tion (N = 31) 5
a. Sources of Information Used ⁶					
Percentage of Users					
Newspapers	55.43				29.05 ^{*1}
Personal Contacts	20.65				16.12
Walking or Driving Around	15.22				35.48 ^{*1}
Real Estate Agents	88.04				41.94 ^{*1}
Building Companies	2.17				32.26 ^{*1}
No Search	1.09				3.23
b. Primary Source of Information Used					
Newspapers	9.78	13.33	10.00	6.25	9.67
Personal Contacts	7.60	10.00	6.67	6.25	9.67
Walking or Driving Around	1.09	3.33	0.00	0.00	16.12 ^{*1}
Real Estate Agents	79.34	73.33	80.00	84.38	32.26 ^{*1}
Building Companies	1.09	0.00	3.33	0.00	29.05 ^{*1}
No Search	1.09	0.00	0.00	3.13	3.23
c. Information Source Used in Selection					
Newspapers	10.87	10.00	16.67	6.25	9.68
Personal Contacts	9.78	13.33	10.00	6.25	9.68
Walking or Driving Around	1.09	0.00	0.00	3.13	12.90 ^{*1}
Real Estate Agents	77.17	76.67	70.00	84.38	32.26 ^{*1}
Building Companies	1.09	0.00	3.33	0.00	32.26 ^{*1}
No Search	0.00	0.00	0.00	0.00	3.23

* Significantly different at the .05 level from the proportion in the column indicated by the subscript.
Two Sample Proportions Test.

6 Movers may use more than one information source.

Table 8:3Tests Upon Ranking of Real-Estate Agents and Newspapers as
Important Sources of Information

Sub-sets	Information Sources	
	Real-Estate Agents	Newspapers
a. <u>Mean Factor Scores</u>		
Corridor	1.23	1.89
Non-Corridor	1.08	2.00
Non-Intra-Urban	1.07	2.00
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	1.11	0.57
Corridor/Non-Intra-Urban	1.23	0.51
Non-Corridor/Non-Intra-Urban	0.01	0.00

No significant differences at the .05 level.
t-Tests (Unsigned)

vacancies which occur within the direct activity field of the mover's home sector the question is raised of does the role of the real estate agent extend beyond just a source of information and become a director of search space? That is, the real estate agent takes his clients to areas they know little about, or which they had not considered searching, because he considers these areas as suitable to their needs or where through experience he knows a sale probably can be made. This latter factor may be particularly important if the agent is working for commission on sales, and becomes of special importance within the study of corridor movement if the agent views the person's home neighbourhood as the most likely location to make a sale. Therefore, besides locational specialization the real estate agent's selling behaviour could be responsible for reinforcing corridor search space and movement. However, in this study, research into aspiration search spaces (presented in the next section) suggests that the real estate agent was of no major importance in the mover's spatial decision of search space.

b. Who Searched for a New Residence.

The search for a dwelling was found to be divided between two patterns, that of the husband and wife searching together, and that of the wife searching alone (table 8:4). It would appear that it was common for the wife to do the searching during the day, as the husband was at work, and then to take him after work to the dwellings she considered as suitable possibilities. In this way a large number of dwellings could be searched.

A similar pattern of search was followed for sections, although with a larger proportion of joint husband and wife searches. This latter finding probably relates to the search of

Table 8:4**Who Searched for the Dwelling or Section**

Who Searched	Total Population (N = 92)	Sub-sets		
		Corridor (N = 30) 1	Non- Corridor (N = 30) 2	Non- Intra- Urban (N = 32) 3
a. <u>For the Dwelling</u>	Percentages	Percentages		
Husband Only	13.04	6.66	13.33	18.75
Wife Only	33.69	40.00	30.00	31.25
Both Husband and Wife	44.56	43.33	56.66	34.37 ^{*2}
Other	7.60	10.00	0.00	12.50 ^{*2}
No Search	1.09	0.00	0.00	3.13
b. <u>For the Section</u>	Percentages	Numbers		
	(N = 31)	(N = 8)	(N = 15)	(N = 8)
Husband Only	9.67	0	3	0
Wife Only	25.80	0	7 ^{*1}	1
Both Husband and Wife	51.61	5	5	6 ^{*2}
Other	3.22	1	0	0
No Search	9.68	2	0	1

* Significantly different at the .05 level from the proportion in the sub-set indicated by the subscript. Two Sample Proportions Test.

sections being a freer process, in that it is less tied to having to arrange times with a real-estate agent to see through a dwelling. It is also less time demanding, in that a large number of sections can be viewed quickly, especially if they are within the same sub-division.

c. Search Period.

Over 70 percent of all purchasers of a dwelling expected to find a house within 3 months of beginning their search, and 65 percent did, although 43 percent had to find a dwelling within a limited time period (table 8:5). Purchasers of sections followed a similar pattern in which 80 percent of all purchasers expected to purchase a section within 3 months, 70 percent did, but only 20 percent were faced with any time restriction. Therefore, although the length of time given to search is very restricted it is normally no longer than the person expected when they began their search.

d. Number of Dwellings and Sections Searched.

The number of dwellings searched by each household varied considerably, with a very wide range (table 8:6a). The mean figure suggested approximately 24 dwellings per household. However, the actual number of dwellings which a household could recall searching was often a guess, which was a function of many people viewing a great many dwellings in terms of their external appearance and regarding this type of search as adequate. Others, however, only considered dwellings which they entered as searched. Therefore, it was decided to limit the concept of search to the number of dwellings seriously considered, although even here there is the problem of the different definitions of the

Table 8:5

Search Period for Dwellings and Sections

Search Period	Dwellings				Sections Total Population (N = 31)
	Dwellings Total Population (N = 92)	Sub-sets			
		Corridor (N = 30)	Non- Corridor (N = 30)	Non- Intra- Urban (N=32)	
	1	2	3	4	5
a. <u>Intended Length of Search</u>					
< 3 months	71.73	63.33	63.33	87.50 ^{*2,3}	80.64
3 - 6 months	20.65	23.33 ^{*3,4}	26.66	12.50	0.00
6 months - 1 year	4.34	13.33 ^{*3,4}	0.00	0.00	9.68
> 1 year	2.17	0.00	6.67	0.00	6.45
No Search	1.09	0.00	3.33	0.00	3.23
b. <u>Restriction Upon Time for Search</u>					
	43.47 ^{*5}	40.00	40.00	50.00	19.53
c. <u>Length of Search</u>					
< 3 months	65.21	56.66	63.33	75.00	70.96
3 - 6 months	26.09	30.00	23.33	25.00	16.13
6 months - 1 year	5.43	10.00	6.66	0.00	0.00
> 1 year	2.17	3.33	3.33	0.00	9.68
No Search	1.09	0.00	3.33	0.00	3.23

* Significantly Different at the .05 level from the proportion in the column indicated by the subscript.
Two Sample Proportions Test.

word serious. But faced with the alternative of obtaining a list of all addresses that a person could remember, which may in itself be spatially biased, the usage of that qualifying statement is seen as the best approach, in that it does provide a solid base by which to establish the search set. Table 8:6a presents the distribution and means of dwellings seriously considered, and it can be seen that for 41 percent of the population the only dwelling seriously searched was that selected. Only 17 percent of the movers searched more than two dwellings.

To study the number of sections searched it was decided to examine this topic in terms of the number of areas sections were searched in, as it is almost impossible for a person to recall exactly how many sections were viewed within a new sub-division. For the total population 65 percent searched in no more than two areas of the city, with 36 percent restricting their search to the area in which they finally selected a section. The mean number of areas searched was two (table 8:6c).

e. Continuance of the Search After Finding the Selected Dwelling.

One of the major statements in the conclusion of Brown and Holmes' (1971, p. 323) paper was that search appears to be systematic with the selected residence near the centre of the search space:

"The circular form of (search space), the location of the selected residence near its centre, and the similarity in size of that search space for all sub-groups suggests a uniformity in migrant search procedures once an area has been identified that generally satisfies the migrant household's aspirations. These findings also suggest that search procedures may be carried on in some optimizing

fashion, perhaps operating so as to systematically examine under spatial constraints, some perceived gradient surface of site desirability."

The technical basis for this argument has been shown as incorrect (Chapter 1), but the notion of the searcher maximizing its selection procedure rather than just satisfying its aspirations and preference sets is an important topic which was examined directly by two questions and the plotting of individual's search sets. The questions were whether the mover continued its search after finding the dwelling which it selected, and if so whether that search was restricted to the area the selected dwelling was in. The results of this study established that 82 percent of purchasers did not continue their search after finding the dwelling they selected (table 8:6d), and of those who continued their search 66 percent did not limit their search to the area which the ultimately selected dwelling was in (table 8:6e). Furthermore, the actual search space of selected individuals were not found to be circular (figure 8:1), thus as argued in appendix 1 Brown and Holmes' findings relate only to the aggregated search space and not that of an average individual's. For sections only one person continued its search after finding its selected section. Therefore, those findings plus those on the number of dwellings seriously searched indicate that movers were primarily searching for a dwelling which satisfied their requirements and having found one, they did not attempt to maximize their selection by continuing their search.

A:2 Corridor and Non-Corridor Movers

Comparative tests between the corridor and non-corridor sub-

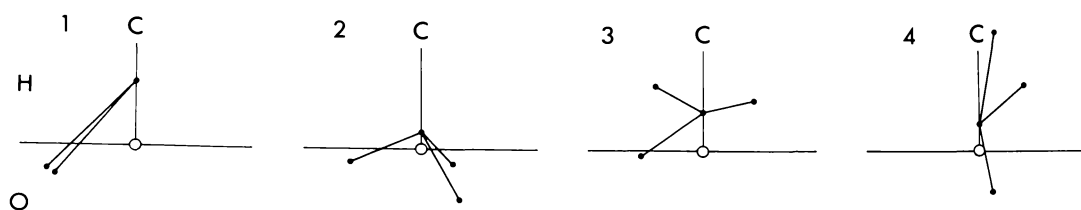
Table 8:6

Statistics of the Actual Search

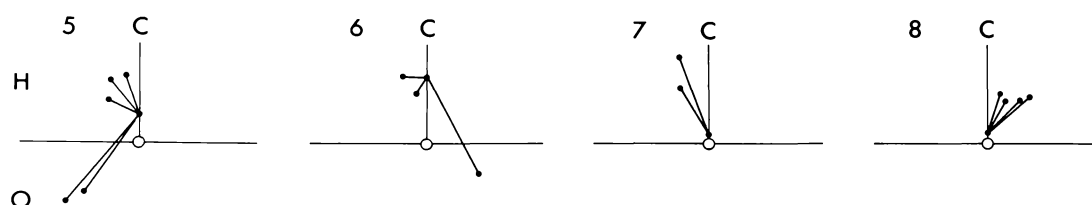
	Sub-sets			Total (Percentage) (N = 92)
	Corridor (N = 30)	Non- Corridor (N = 30)	Non- Intra- Urban (N=32)	
a. Number of Dwellings Searched				
< 5	7	6	5	19.57
6 - 10	9	5	4	19.57
11 - 20	4	5	9	19.57
21 - 50	6	13	9	30.43
> 50	4	1	5	10.87
Mean	24.60	18.43	29.84*2	24.41
b. Number of Dwellings Seriously Searched Other Than That Purchased				
0	11	12	15	41.30
1	11	9	4	26.07
2	2	6	6	15.22
3	3	3	3	9.78
3	3	0	4	7.61
Mean	1.33	1.20	1.44	1.39
c. Number of Other Areas in Which Sections Were Searched	(N = 8)	(N = 15)	(N = 8)	(N = 31)
0	3	5	3	35.48
1	3	3	3	29.03
2	1	1	1	9.68
3	1	6	1	25.80
Mean	1.00	1.53	1.00	1.26
d. Continuance of Search After Finding				
(i) Dwelling Ultimately Purchased	13.33	13.33	28.12	18.48
(ii) Section Ultimately Purchased	0.00	6.67	0.00	2.17
e. Movers Continuing Search Who Concentrated Search Around the Area of the Ultimately Purchased Dwelling	(N = 4)	(N = 5)	(N = 9)	(N = 18)
(i) Number Who Did	2	2	2	33.33
(ii) Number Who Did Not	2	3	7	66.67

Statistical tests were conducted upon variables a, b, and d. Variables a and b, involved t-Tests, and d a Two Sample Proportions Test.

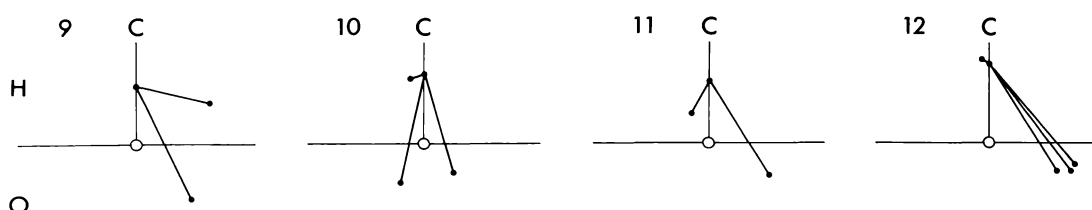
* Significantly different at the .05 level from the proportion in the column indicated by the subscript.



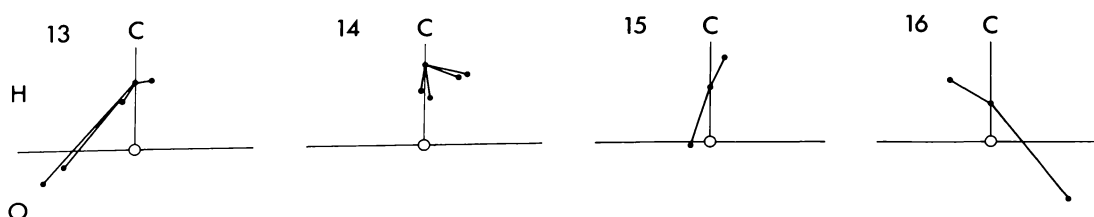
NON CORRIDOR SEARCH SET Based on ORIGIN reference nodes



CORRIDOR SEARCH SET Based on ORIGIN reference nodes



NON CORRIDOR SEARCHED SET Based on DESTINATION reference nodes



CORRIDOR SEARCHED SET Based on DESTINATION reference nodes

- H HOME half of the city
- O OPPOSITE half of the city
- Central city node
- C Home/ city centre axis

Figure 8:1 Examples Of Individual's Search Sets.

sets search characteristics for dwellings and sections established no major statistical differences upon any of the eight questions (tables 8:3 to 8:6).^{*1} The only major non-significant difference was that non-corridor movers searched more for sections. However, major differences were found between the non-intra-urban movers and the two sub-sets of intra-urban movers, favouring the non-intra-urban movers in terms of:

- (i) Their search based more upon the husband and wife searching separately, and assistance from other sources.
- (ii) They were in a much greater hurry to purchase a dwelling, and understandably a much larger proportion did select their dwelling in a shorter time period.
- (iii) They searched a greater number of dwellings per household, which probably reflects their level of knowledge of Hamilton's housing market. Although they on average like the intra-urban movers, tended to consider seriously only one other dwelling than the one purchased.

Therefore, from this study it was established that there is no basis for accepting the hypothesis:

That the corridor population would have a different set of general search process characteristics.

In doing so the null hypothesis is accepted:

That there is no significant difference between the search process characteristics of the corridor and non-corridor populations.

^{*1} The questions referred to are presented in Appendix 6 and are questions 23, 31-33, 53-55, 26, 27, and 28-29.

Section B Spatial Form of Search Behaviour

Within this section the search set is examined at two stages during the search process: the aspiration search set, which comprises the area which a mover thought it would have liked to have purchased a dwelling in prior to beginning its search, and the actual search set of dwellings considered seriously within the search. The spatial form of these two search sets were examined in terms of their relationship to the mover's origin and destination.

The reason for dividing this study into the topics of the aspiration and actual search sets is, that the actual search set may not reflect the basic desires of the mover, who may have been forced to search outside of its home corridor. If it were found that there was no difference between the corridor and non-corridor sub-sets aspiration search sets doubt would be cast upon the classification of movers by their selected pattern of movement, although it could be argued that until a person's search procedure has been operationalized there exists no basis for classification. In this case, as no information was collected upon why other vacancies were rejected, the actual move decision would appear the best measure of classification. However, it was expected that the hypothesized relationship would hold for both the aspiration and actual search set:

That non-corridor movers have a more dispersed spatial pattern of search behaviour than corridor movers.

To present a comparative study between the sub-sets' search space this section is divided into three topics. The first is a discussion of technical aspects behind the organization of the analyses. The second and third are a presentation of the results

from the study of aspiration and actual search sets.

B:1 Technical Aspects Behind the Study of Search Space

There are a number of complex technical topics which are basic to the results presented in this study of the movers' search space. Here they are discussed very briefly under the headings of:

- a. Search Set Examined.
- b. Systems of Analysis Used.

a. Search Set Examined.

Three major points involving the search sets examined need to be made. First, so as to increase the base population for the comparative study of corridor and non-corridor sub-sets, the data set used was the population of households who searched for a dwelling (107), rather than those who purchased a dwelling (92). As stated previously the search nodes were all dwellings seriously searched. Secondly, despite a preference for examining search space at the individual level, the analyses were conducted upon the sub-sets aggregated search space. This approach was made necessary by the limited size of each individual's search node set, for on average only one other dwelling than that purchased was seriously searched. However, in this data set every individual does not contribute the same number of search nodes to the aggregate search space, therefore, the same number of search nodes per observation should be randomly sampled. But because of the limited number of search nodes in this data set the total search set was used. Thirdly, no analysis of the search space of purchasers of sections was conducted, as the number in that population was too small to sub-divide into sub-sets (31).

b. Systems of Analysis Used.

So as to facilitate an understanding of the findings within this section it is necessary to state four important pieces of information. The first relates to the measurement of the dispersion of search nodes upon a two dimensional surface. This was achieved in the first instance by using Bachi's standard distance statistic (Bachi, 1962), which combines into a single measure the standard deviations of the dispersion along the x and y axes. But as no statistical test exists for comparing that statistic, it was necessary to examine the dispersion of search nodes independently along the x and y axes, termed the radial and lateral axes (radial axis was the downtown - reference node axis), using t-tests. Secondly, there was the question of whether to measure the dispersion of search nodes irrespective of the location of the mover's origin or destination, or to measure the standard distance that the search nodes were from the mover's origin or destination. The first measure is termed a study of the distribution of search space, and the second is a study of distance of dispersion of search space. These measures, however, are very different analyses in that potentially different results can be obtained, therefore, both are used in the study of the spatial form of search space. The first measure involved the Transmap option 'rotate only' with the mean centre for Bachi's statistic the mean centre of the distribution, and the second method involved the option 'rotate and translate' with the mean centre the mover's reference node. Thirdly, a standard ellipse was used to display the dispersion of search space about the mean centre of the distribution, where the mean centre of the distribution is the mean centre of the ellipse, and the length of the axes is the standard deviations (unsigned) of the dispersion of search nodes

measured along the x and y axes.*2 Fourthly, in the analyses of the aspiration search space the search node was the mean centre of the area.

B:2 Aspiration Search Set

A major problem in the study of areas which the movers thought they would have liked to have purchased a dwelling in prior to beginning their search, was that a number of movers did not have a precise set area, but rather intended to search 'everywhere' or in a major division of the city, such as the eastside or westside. Therefore, these movers could not be included in the analyses of the search space upon the dispersion of areas about the origin or destination. As a result a separate test was conducted upon this group, which established a significant difference between corridor and non-corridor sub-sets, in that the non-corridor sub-set exhibited a higher proportion of persons with an aspiration search set not precisely delimited (40.54 compared to 14.28 percent, significantly different at the .05 level, Two Sample Proportions Test).

For the remainder of the population (30 corridor and 22 non-corridor movers) Bachi's standard distance statistic clearly established that the distribution of the corridor sub-sets' aspiration search space, based upon the movers' origins, was less

*2 Two other measures used by Brown and Holmes (1971) were examined for possible use, but both were discarded. These were the ratio of linearity, erroneously termed by Brown and Holmes the coefficient of sectorality (see Appendix 1), and the angle of the orientation of the distribution of search nodes. The reason why the former was discarded was that it did not contribute to the interpretation of search space, whereas for the latter the spatial position of the search set relative to each individual search set had been destroyed by rotation.

dispersed. The same conclusion was derived from the dispersion of the search nodes from the mover's origin, and for the analyses of distribution and distance, based upon the mover's destination (table 8:7 and figure 8:2). Therefore, as expected the corridor movers' aspiration search space differs from that of the non-corridor movers' in that the distribution and distances of the intended search locations based upon both the origins and destinations were less dispersed. To test if these differences were significant a series of t-tests were conducted upon the search nodes dispersion, measured in terms of their lateral and radial co-ordinates. Those analyses (table 8:8) support the finding given by Bachi's statistic, that the non-corridor movers' aspiration search set was significantly more dispersed. Probably it extended all over the city, whereas the corridor movers' appears to have been more spatially restricted.

B:3 Actual Search Set

Following the same procedure as used in the study of the aspiration search set, Bachi's standard distance statistic clearly established that based upon their origins, the corridor sub-set's search set compared with the non-corridor sub-set's was less dispersed (table 8:7 and figure 8:2). The same pattern was established by destinations, although the differences between the two sub-sets was not great. Tests upon the statistical significance of these patterns (table 8:8b) established that in terms of movers' origins, the corridor movers' search set distribution was less dispersed. The distribution and mean centre of the non-corridor sub-set indicated that their search set probably extended all over the city. In terms of the distance of search

Table 8:7Bachi's Standard Distance Statistic For Aspiration and Actual Search Sets

Sub-sets	Bachi's Standard Distance Statistic			
	Dispersion About The Mean Centre of The Distribution (km)		Dispersion About The Movers Origin or Destination Node (km)	
	Aspiration Search Set	Actual Search Set	Aspiration Search Set	Actual Search Set
a. Based Upon Origin Reference Node				
Corridor	2.64	2.60	1.83	2.07
Non-Corridor	3.35	3.71	3.23	3.59
b. Based Upon Destination Node				
Corridor	2.67	2.97	1.99	2.56
Non-Corridor	3.37	3.52	3.29	3.11
Non-Intra-Urban	3.29	3.69	2.79	3.74

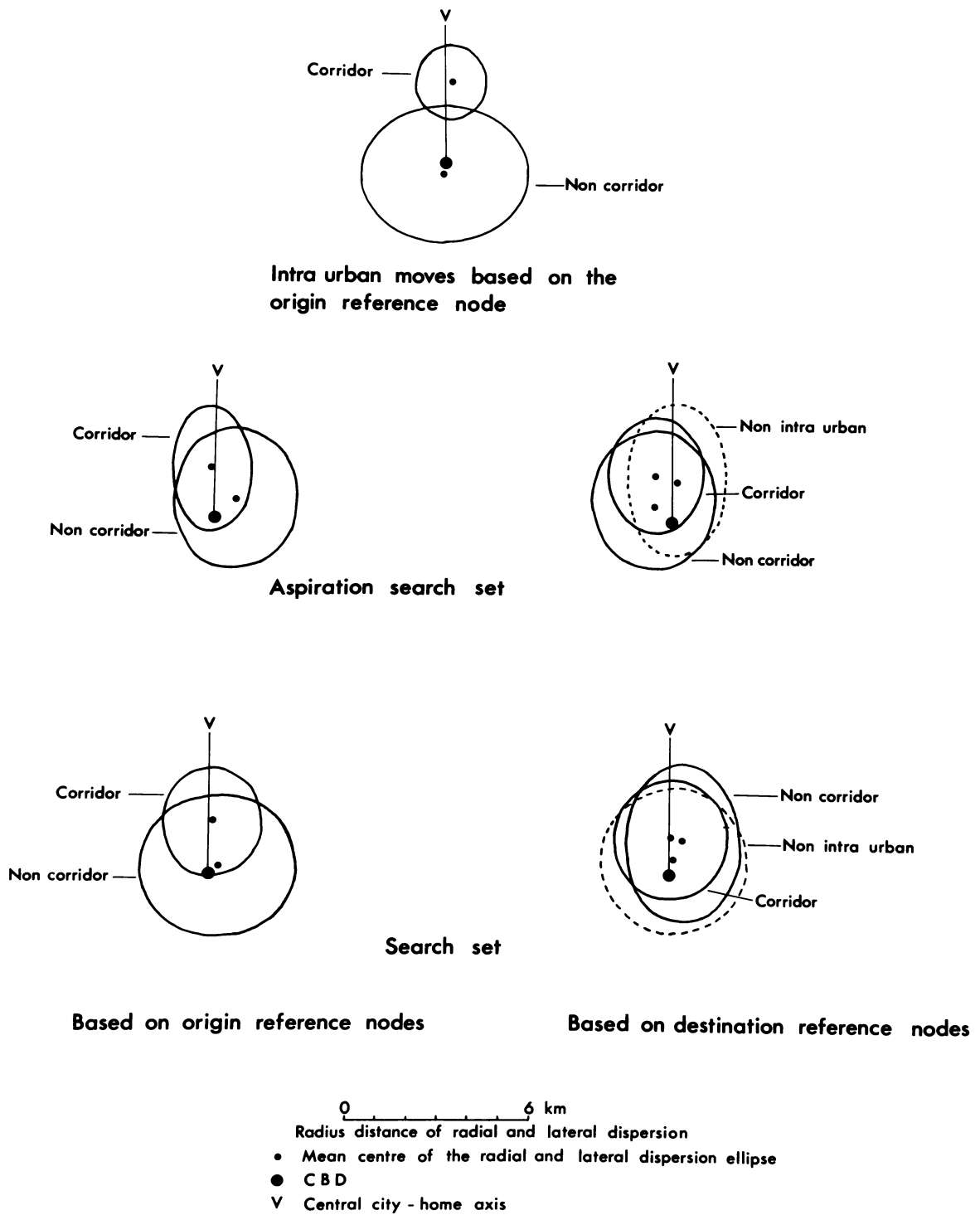


Figure 8:2 Dispersion Of Aspiration And Actual Search Sets.

Table 8:8Comparative Tests Between Sub-sets Upon the Distribution of the
Aspiration Search Set and Actual Search Set

Direction Sub-sets	t-Test Values			
	Mean Centre of Distribution		Distance of Dispersion from Movers Origin or Destination Node	
	Lateral	Radial	Lateral	Radial
a. <u>Aspiration Search Set</u>				
(i) Based Upon Origin Node Corridor/Non- Corridor	2.01*	2.12*	4.47*	2.49*
(ii) Based Upon Destination Node				
Corridor/Non- Corridor	0.01	1.68*	1.44	2.11*
Corridor/Non-Intra- Urban	1.91*	0.42	0.27	1.82*
Non-Corridor/Non- Intra-Urban	1.45	1.20	1.99*	0.55
b. <u>Actual Search Set</u>				
(i) Based Upon Origin Node Corridor/Non- Corridor	0.37	4.18*	6.73*	2.37*
(ii) Based Upon Destination Node				
Corridor/Non- Corridor	0.69	0.18	0.02	1.22
Corridor/Non-Intra- Urban	0.12	1.41	1.26	2.29*
Non-Corridor/Non- Intra-Urban	0.51	1.06	1.23	0.85

* Significantly Different at the .05 level.
t-Tests (Unsigned)

nodes from the movers' origins the corridor sub-sets were much closer in both lateral and radial directions. But by destination no significant difference was found between either element of the form of the sub-sets search space, although non-corridor movers did exhibit a greater radial bias. This finding on destinations suggested that the two sub-sets search sets based upon the dwelling purchased were similar.

To further the analysis of the search set based upon the movers origin (figure 8:3), that distribution was examined in terms of: the proportion of the search set within the home origin half of the city, the lateral distance of the search set in the home origin half of the city, and the proportion of the search set within the spatial limits of the 2 km home corridor. The first of these studies, the examination of the proportion of the two sub-sets' search nodes within the home half of the city, established a higher proportion of corridor movers' search nodes within that area; all but 12 percent were not, compared to 53 percent for non-corridor movers (table 8:9a). Corridor movers distance of lateral search within the origin home half of the city was almost half that of the non-corridor movers (table 8:9b). Similarly the corridor sub-set was significantly different with a greater proportion of their search node set within the 2 km home corridor. Seventy percent of the corridor movers' search set were within those confines, whereas only 19 percent were of the non-corridor movers' (table 8:9c).

B:4 Section 2 Summary and Conclusion

The foregoing examination of the movers search set established that the corridor population had a significantly less dispersed

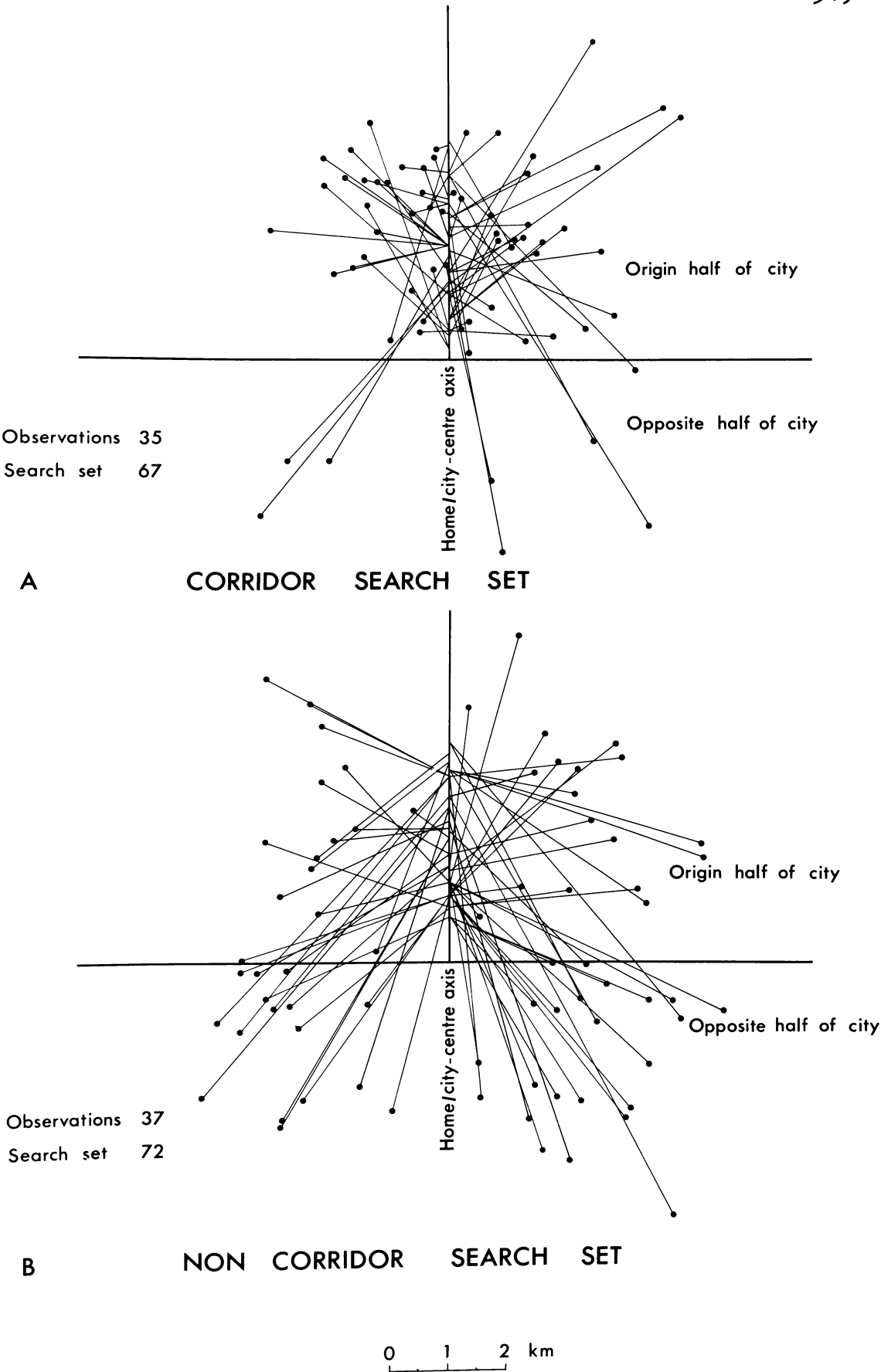


Figure 8:3 Distribution Of Sub-set's Actual Search Set.

Table 8:9Additional Comparative Tests Between Sub-sets Actual Search Set

	Sub-sets	
	Corridor (N = 67)	Non-Corridor (N = 72)
a. Percentage of search nodes within home origin half of the city	88.05	47.22*
b. Distance of lateral search from origin within home origin half of the city (in km)	1.32	2.47*
c. Percentage of search nodes within 2 kilometer home corridor	70.14	19.44*

- * Significantly different at the .05 level.
 a. and c. Two Sample Proportions Test.
 b. t-Test.

aspiration search set based both upon the movers origins and destination. This besides establishing further the differences between the two sub-sets, substantiates the earlier findings upon the movers' aspiration or preference set, in that the two sub-sets can be differentiated between by attitudes held prior to the decision to search for and selection of a dwelling. Corridor movers also had a less dispersed actual search set based upon their origins. However, examined by destination no significant difference was established between the sub-sets, although there was a bias towards a more dispersed search pattern by non-corridor movers. Therefore, these findings upon both the movers' aspiration search set and actual search set support the hypothesis:

That non-corridor movers have a more dispersed spatial pattern of search behaviour than corridor movers.

Section C Selection of Dwelling.

The subject of why a mover selected its new residence is divided into four topics, based upon five questions. The topics are:

- a. Adequate selection of vacancies.
- b. Reasons for selection of a new or existing dwelling.
- c. Critical reasons in selection of the area.
- d. Critical reasons in selection of the dwelling.

To present the results of this study this section is divided into, first, a presentation of the general characteristics of the selection and secondly, comparative tests between sub-sets to examine the hypothesis:

That there is a significant difference between the corridor and non-corridor populations' reasons for selecting their

dwelling.

With regard to that hypothesis the study of the adequacy of vacancy set was expected to establish no differences between the sub-sets. However, in the selection of a new or existing dwelling significant differences were expected, in that the personal characteristics and preferences of the sub-sets have already been found to be different (Chapters 5 and 6). For the same reason significant differences were expected upon the critical reasons for selection of the area and the dwelling. Finally, as an additional study, the spatial distribution of the destinations is examined, in that it could be argued that the location of destinations was an explanation of corridor movement.

C:1 General Characteristics of Dwelling Selection

a. Adequate Selection of Vacancies.

Only 55 percent of purchasers of dwellings were satisfied with their selection of vacancies (table 8:10a). Even accepting that some people would never be satisfied, that finding coupled with the earlier findings upon the number of search nodes seriously searched and continuance of search reinforced the notion of a sub-optimal selection. A similar conclusion could also be drawn for the 31 purchasers of sections, in that only 45 percent were satisfied with the available selection of sections (table 8:10b).

b. Reasons for Selection of New or Existing Dwellings.

Reasons for purchasing a new rather than an existing dwelling were categorized under four headings; financial factors, preference factors relating to cost, other preference factors, and other factors (table 8:11). The findings of this study indicate

Table 8:10Adequacy of the Vacancy Set

Sub-sets	Corridor Movers	Non- Corridor Movers	Non- Intra- Urban Movers	Total
a. Adequate selection of dwellings from which to make a choice	60.00	60.00	46.87	55.43
b. Adequate selection of sections from which to make a choice	0.00	66.66	50.00	45.16

Table 8:11

Principal Reasons Why a New or Existing Dwelling Were Not Purchased

Reasons	Principal Reasons Why	
	Purchasers of an Existing Dwelling Did Not Purchase or Build a New Dwelling (N = 78)	Purchasers or Builders of a New Dwelling Did Not Purchase an Existing Dwelling (N = 45)
1. Financial		
Couldn't get finance	6	19
Lack of finance	<u>12</u>	<u>2</u>
	18 (23.08)	21 (46.67)
2. Preference factors related to cost		
Financial prospects	4	0
Cost of getting what one wanted	<u>5</u>	<u>2</u>
	9 (11.54)	2 (4.44)
3. Preference		
Wanted to build	0	13
Didn't want to build	5	0
Buying what you can see	7	0
Required special features	0	6
Didn't want to spend time developing	23	0
Didn't want to waste time building	8	0
Didn't want to live in new areas	2	0
Distance from town (CBD)	<u>2</u>	<u>0</u>
	47 (60.26)	19 (42.22)
4. Others		
Unable to see anything suitable	<u>4</u>	<u>3</u>
	4 (5.13)	3 (6.67)

Table 8:12Comparative Tests Between Sub-sets Reasons For Not Purchasing a New or Existing Dwelling

	Percentages		
	Corridor Movers	Non-Corridor Movers	Non-Intra-Urban Movers
	1.	2.	3.
a. Reasons Why Purchasers of Existing Dwellings Did Not Purchase or Build a New Dwelling	(N = 26)	(N = 24)	(N = 28)
Financial	19.23	33.33	17.85
Preference factors relating to cost	23.07	4.16 ^{*1}	7.14 ^{*1}
Preference	53.84	54.16	71.42
Other Reasons	3.84	8.33	3.57
b. Reasons Why Purchasers or Builders of New Dwellings Did Not Purchase an Existing Dwelling	(N = 12)	(N = 21)	(N = 12)
Financial	33.33	52.38	50.00
Preference factors relating to cost	0.00	4.76	8.33
Preference	66.66	28.57 ^{*1}	41.66
Other Reasons	0.00	14.28	0.00

* Significantly different at the .05 level from the proportion in the column indicated by the subscript.

(Two Sample Proportions Test)

that purchasers of new dwellings did not purchase an existing dwelling because of financial and preference factors. Financial reasons which 47 percent gave, result from it being easier to obtain loan money upon a new than an existing dwelling. As a result many of these movers were faced with the choice of a new dwelling requiring considerable development or no ownership property. In contrast with the purchasers or builders of new dwellings 60 percent of purchasers of existing dwellings preferred not to purchase or build a new dwelling. Financial reasons were only important for 23 percent and these tended to be those wanting dwellings in the higher price range. The principal preference reason given for not purchasing or building new property was that they did not want to spend time developing the property.

c. Critical Reasons for Selection of Area.

Forty-one percent of movers had no critical reason for selection of their dwelling in that particular area, although this does not mean that they would have lived in any area. The reasons given as critical were grouped under the classification of: environmental factors, location factors, accessibility factors, economic factors and search factors. Within these divisions (table 8:13) only four reasons were given by approximately 10 percent or more of the total population; quality of the area, specific location in terms of area, proximity to work, and resale value.

d. Critical Reasons for Selection of Dwelling.

Seventeen percent of movers had no critical factors in their selection of their new residence, which does not necessarily mean that the dwelling was more important than the area, in that it could also indicate that there is more choice in the range of

Table 8:13Critical Reasons for Selecting a Dwelling or Section Within the
Selected Area

Factors	Frequency Given	Percentage of Total Movers (N = 123)
1. Environmental Factors		
Quality of Area	16	13.00
Established Area	3	2.44
Pleasant area to live in	5	4.07
Quietness of area - privacy	5	4.07
Others	7	5.69
2. Locational Selection Factors		
Specific Location in terms of area	17	13.82
Residential A (Zoning)	1	0.81
Residential B (Zoning)	1	0.81
Side of Town, West/East	6	4.88
Previously lived in the area	3	2.44
3. Accessibility Factors		
Schooling	11	8.94
Proximity to relatives	1	0.81
Proximity to work	21	17.07
Distance from Town (CBD)	8	6.50
4. Economic Factors		
Resale Value	14	11.38
Price of dwelling in area	5	4.07
5. Search Factors		
Real Estate Agency	1	0.81

(Note each mover could give more than one critical reason)

Table 8:14Comparative Tests Between Sub-sets Critical Reasons For Selecting
a Dwelling or Section In That Area

Sub-sets	Percentages		
	Corridor Movers	Non-Corridor Movers	Non-Intra- Urban Movers
	(N = 38)	(N = 45)	(N = 40)
a. <u>No Critical Reasons For Selection In That Area</u>	26.31	53.33 ^{*1}	40.00
b. <u>Critical Reasons</u>	(N = 28)	(N = 21)	(N = 24)
Environmental Factors			
Quality of Area	7.14	33.33 ^{*1}	29.16 ^{*1}
Locational Selection Factors			
Specific location in terms of area	42.85	9.52 ^{*1}	12.50 ^{*1}
Accessibility Factors			
Proximity to work	35.71	19.04	29.16
Economic Factors			
Resale Value	14.28	14.28	29.16

* Significantly different at the .05 level from the proportion in the column indicated by the subscript.
(Two Sample Proportions Test)

dwellings than areas. The critical reasons given were classified under four headings: structure factors, site factors, search factors and economic factors. But only three reasons were given as critical by approximately 15 percent or more of the population and all were structural factors: permanent maintenance free, internal dwelling requirements, and size of dwelling (table 8:15).

C:2 Corridor and Non-Corridor Sub-sets

The first of the comparative tests between sub-sets, upon the adequacy of selection of dwellings, established no significant differences between the corridor and non-corridor movers. But for sections corridor movers appear less happy with the available selection (table 8:10). If related to the concept of locational attachments, this finding appears to stress the problems of finding a section in the home corridor or close to the previous residence.

For purchasers of existing dwellings a significant difference was established between sub-sets in their attitudes to purchasing or building a new dwelling. Corridor movers were more concerned with financial gains or getting what they wanted in existing dwellings, many not wanting to develop a new dwelling, whereas the non-corridor movers reasons were more financial (table 8:12a). For those who purchased a new dwelling the reason why they did not purchase an existing dwelling also established a significant difference, in that corridor movers were more concerned with preference, compared with non-corridor movers whose reasons were more financial restraints (table 8:12b). Therefore, it would appear that in their selection of new or existing dwellings the corridor population was not as directly concerned with financial

Table 8:15

Critical Reasons For Selecting The Actual Dwelling, Independent Of
Its Location

Factors	Frequency Given	Percentage of Total Movers Who Purchased a Dwelling (N = 92)
1. Structural Factors		
Permanent maintenance free	13	14.13
Age of Dwelling	7	7.60
Conditions of house	5	5.43
Internal dwelling requirements	15	16.30
General appearance/design of dwelling	11	11.96
Size of dwelling	19	20.65
Quality of dwelling	3	3.26
Established dwelling	7	7.61
2. Site Factors		
Aspect of Dwelling	5	5.43
Section characteristics	10	10.86
Position on street	1	1.09
Privacy	5	5.43
Availability of amenities		
(i) Transport (Buses)	1	1.09
(ii) Shops	2	2.17
3. Search Factors		
Availability at the time	4	4.34
4. Economic Factors		
Resale Value	7	7.61
Value for money *1	9	9.78
Within price range *1	6	6.52

(Note each mover could give more than one critical reason)

- *1 As stated within the study of the movers' aspiration and preference set this variable is understressed because it is the major constraint within which the search was conducted and not an element of choice.

Table 8:16

**Comparative Tests Between Sub-sets Critical Reasons For Selecting
The Actual Dwelling, Independent of Its
Location**

Sub-sets	Percentages		
	Corridor Movers (N = 30)	Non-Corridor Movers (N = 30)	Non-Intra- Urban Movers (N = 32)
a. <u>No critical reasons for selection of the dwelling</u>	33.33	6.67 ^{*1}	12.50 ^{*1}
b. <u>Critical reasons</u>	(N = 20)	(N = 28)	(N = 28)
Structural Factors			
Permanent Maintenance Free	25.00	17.85	10.71
Internal Dwelling Requirements	25.00	25.00	10.71
Size of Dwelling	30.00	17.86	28.57

* Significantly different at the .05 level from the proportion in the column indicated by the subscript.
(Two Sample Proportions Test)

factors but primarily preferences, whereas non-corridor movers were more restricted in their choice by financial factors.

The corridor sub-set was found to have a significantly lower proportion of movers that had no critical reason for selecting the area within which they purchased a dwelling. Which suggests again that corridor movement was more location orientated than non-corridor movement (table 8:14a). This conclusion also held for those giving critical reasons for their selection, in that a non-corridor mover was found to be significantly more biased towards the quality of the area, which favoured the non-corridor movers (table 8:14b), whereas the corridor movers were biased towards the selection of their dwelling in a specific area.

In their selection of the new residence the corridor population had a significantly greater proportion who gave no critical factors for that decision (table 8:16a). This again can possibly be explained by the corridor movers' preference for the areas in that they placed the area more as the critical factor in their search, whereas the dwelling was more important for the non-corridor population. But when the sub-sets members who cited critical factors were compared, no significant differences were established (table 8:16b).

Finally, the spatial location of the selected dwellings was examined by means of the three measures used previously in the testing of the spatial distribution of origins (Chapter 5): the sector, the radial distance from the downtown centre, and the plotted distribution. As expected no significant difference was established for the distribution of destinations about the city, but the non-corridor movers destinations from the downtown centre were found to be at a significantly greater distance (table 8:17, and figure 5:1), which is probably due to the higher proportion of

Table 8:17Comparative Tests Between Sub-sets Distribution of Corridor and
Non-Corridor Destination Nodes

Sub-sets	Degrees	Radial Distance (km)
a. <u>Mean Values</u>		
Corridor	193.61	2.86
Non-Corridor	213.55	3.53
Non-Intra-Urban	195.84	3.48
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	0.57	2.02*
Corridor/Non-Intra-Urban	0.48	2.06*
Non-Corridor/Non-Intra-Urban	0.06	0.16

* Significantly different at the .05 level.
t-Tests (unsigned)

new dwellings purchased in that sub-set. But as the plotted distribution indicates no other marked spatial differences between the two sub-sets, it can be concluded in a very general sense that there was no evidence to suggest a major difference in the dispersion of corridor and non-corridor movers' destinations. However, to accurately assess the role of this factor, it would have been necessary to sub-divide the population into their vacancy search sub-sets, and calculate each mover's probability of corridor movement under the design of random movement within the vacancy sub-set. Unfortunately computational and data problems did not allow this to be measured, however, the studies of the spatial distribution of the vacancy set (Chapter 2) suggest that the internal structure of the city was of little importance. Therefore, in excepting the results given, it is concluded that as with the distribution of movers' origins there doesn't appear to be any evidence to suggest that the distribution of destinations explains corridor and non-corridor movement.

As a result of the differences between corridor and non-corridor sub-sets it was concluded for the study of a mover's selection that the hypothesis is accepted:

That there is a significant difference between the corridor and non-corridor populations' reasons for selecting their dwelling.

The explanation of these differences in terms of first, the purchasing of a new or existing dwelling and secondly, critical reasons for the selection of the area, appear to be the direct result of the personal characteristics of the corridor and non-corridor sub-sets; the non-corridor population is a younger population. Therefore, it is tentatively argued that the differences in the selection process between sub-sets is related to

the concept of locational attachments.*³

Section D Chapter Summary and Conclusion

Following the basic aim of the three previous chapters in attempting to establish the variables which differentiated between the corridor and non-corridor movement behaviour, the foregoing series of analyses examined the topics of: the general characteristics of the search process, the spatial form of search behaviour, and the selection of the dwelling.

From a series of univariate tests upon the general characteristics of the search process no major significant differences between the corridor and non-corridor movement sub-sets were found to exist over the variables of:

1. Type of dwellings searched.
2. Information sources used.
3. Who searched.
4. Length of intended search.
5. Time restrictions upon the search.
6. Actual search period.
7. Number of dwellings searched.
8. Continuance of the search after finding the ultimately selected dwelling.

An examination of the spatial form of search behaviour, divided into a study of the aspiration and actual search sets, established that the non-corridor movers' search sets were significantly more dispersed than that of corridor movers. Finally, four topics of the selection decision process were examined:

1. Adequate selection of vacancies.

*³ The questions referred to are presented in Appendix 6 and are questions 30, 51-52, and 11-12.

2. Reasons for selection of a new or existing dwelling.
3. Critical reasons in selection of the area.
4. Critical reasons in selection of the dwelling.

From which it was established that while no major statistical differences existed in the distribution of destinations, corridor movers' reasons for selection were significantly different from non-corridor movers in terms of firstly, the corridor movers appear to have moved more deliberately to a specific area and secondly, the corridor movers were against purchasing or building new dwellings, whereas the non-corridor movers were forced by financial factors into not purchasing existing dwellings.

With regard to the two research theses, the examination of the movers' search process has established further evidence in support of the notion that restricted lateral movement is not a pattern of random movement, but rather non-random home corridor specific housing demand. The locational attachments hypothesis is also supported by the finding that corridor movers deliberately selected their dwelling in a specific area. However, as with the previous three chapters, the interlinking of all of these univariate tests under the concept of locational attachments has not been examined. Therefore, until having done so within the following chapter, it is not possible to reach any conclusion as to whether the explanation of these patterns of differences between the sub-groups is locational attachments or some other factor.

Chapter 9. Locational Association

Within the framework of Brown and Moore's (1970) decision process model the previous four chapters have in their study of the two research theses examined two topics, whether the restricted image hypothesis was an explanation of restricted lateral movement, and what other variables within the decision process model of relocation differentiate between the corridor and non-corridor aggregate populations. The object of this chapter is to bring together these findings so as to test the validity of the third research thesis:

Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis. As it has already been established that as an explanation of restricted lateral movement there is no support for the restricted image hypothesis (Chapter 7), the topic of this chapter is solely an examination of the locational attachments hypothesis:

That a household deliberately selects a nearby location in order to maintain spatial familiarity, social contact, institutional links, or access with the origin area.

To present the examination of that hypothesis this chapter is divided into two sections, the first of which presents an attempt to measure directly a person's assessment of their locational attachments. Then the argument is examined that all the variables within the study of the movement decision process which were found to univariately discriminate between the populations of corridor and non-corridor movers were either elements of, related to, or results of a single causal factor, locational association. However, prior to presenting the results of these analyses it

would appear appropriate at this point to restate the argument behind the locational attachments hypothesis.

Based upon the notion that people within the urban area held associations with the immediate area around their home, the locational attachments concept argues that when the decision to relocate is acted upon one of the primary forces within the spatial movement decision is the change of localized associations to locational attachments. The way it operates is that locational attachments act as a tie or bond to the home corridor, in that only by moving within the home corridor can the mover maintain spatial familiarity, social contact, institutional links, or access with the origin area. Therefore, if a person possessing a strong feeling of locational association decides to move and the vacancy set within the home corridor provides the type of dwelling required that movement is very probably restricted to the home corridor.

Section A Direct Tests Upon Locational Association

In developing the questionnaire a number of problems were encountered in the attempt to measure directly locational associations, although none of these suggest any criticism of the concept. Within the pilot study some respondents did not clearly understand what one was referring to when asked if they held any associations with their origin area. Furthermore, the population in general had little idea as to the range of variables which could be considered as associations, so it was found necessary to present examples of what one meant by associations. This was simply for the purpose of clarification and in no way is it seen as forced feeding. Secondly, this problem of identifying associations was further compounded when they were asked to assess

the strength of individual associations upon a rating scale for many appear to have little notion as to the strengths of associations, whereas others very readily were able to rate every association. Thus the final questionnaire simply asked for a general assessment of the strength of association with the area and not for each variable. Thirdly, problems were found in establishing what were the associations they held with their home area, in that a number of associations were derived from larger spatial units. To overcome this associations were examined at two different levels, the home area and a larger sub-division of the city.

So as to cover the range of locational associations four sets of questions were asked (table 9:1), for the purpose of establishing:

- a. The number of movers who held locational associations.
- b. The level of association held by those who possessed locational associations.
- c. The type of associations held by those who possessed locational associations.

For the first two topics the study of the replies aimed at testing the hypothesis:

That corridor movers have a higher degree of association with the origin area than do non-corridor movers.

Answers to the third topic were expected to display differences in terms of the types of associations between sub-sets. Finally, the results from three additional questions related to locational association are presented.

- a. The number of movers who held locational associations.

For the origin areas it was established that 71 percent of

Table 9:1Questions Asked Within The Direct Study of Locational Association

1. a. While living at your previous dwelling within the area of _____ did you hold any feelings of association with that area?

For example - (read out the list).

- (1) Association with schools in the area.
- (2) Friends living in the area.
- (3) Membership of clubs.
- (4) Groups or associations within the area.
- (5) Relations living in the area.
- (6) A strong identity of living in that area.
- (7) Lived in that area for a number of years.
- (8) Ownership of property in that area.
- (9) Location of employment within that area.

- b. How strong were those feelings of association with the suburb or area?

- (1) Extremely strong.
- (2) Very strong.
- (3) Strong.
- (4) Weak.
- (5) Very weak.

- c. What types or kinds of association did you have with that suburb or area of _____ while living in your previous dwelling?

(for this question repeat the list given above and add additional associations).

2. a. Looking now on a larger scale, while you were living in your previous dwelling in the area of _____ did you feel any association with the larger areas of:

(give only the local divisions).

- 1 (a) North Hamilton, West of the river.
- (b) North Hamilton, East of the river.
- (c) South Hamilton, West of the river.
- (d) South Hamilton, East of the river.
- (e) The west side of the Frankton railway line.
- 2 (a) The west side of the river.
- (b) The east side of the river.

Sections b and c were the same as for question 1.

3. As for question 1 a, b, c but related to the destination area while living at one's previous residence.

4. As for question 1 a, b, c, but here it was asked were there any other areas within Hamilton that one held associations with.

corridor movers compared to 38 percent of non-corridor movers held locational associations (question 1a). That difference was significant at the .05 level ($Z = 3.039$). A similar pattern was found for destination areas in which 74 percent of corridor and 47 percent of non-corridor movers held associations (significantly different, $Z = 2.499$) (question 3a). However, at the level above the local area (question 2a) and with other areas (question 4a) similar levels of association were found for both types of movement behaviour. The figures were respectively; 42 and 38 percent, and 11 and 9 percent. Therefore, as hypothesized the corridor and non-corridor sub-sets held different levels of locational association within their home origin area, although the proportion of non-corridor movers who held associations with their origins and destinations was higher than expected. Also of importance were the non-corridor movers' higher levels of association outside the home corridor, primarily derived from associations with their destination; 56 percent compared to 11 percent for the corridor population. These figures raise the question of external associations having been a 'pull force' which forced non-corridor movers to move away from their origin corridor. However, from the interviewing it was felt that these associations were weak and only recognized because the mover had moved outside their home origin corridor. Their importance appears to be related to the selection of a particular area after having decided to move away from the home corridor.

- b. The level of association held by those who possessed locational association.

To compare the sub-sets' levels of rating their associations a series of t-tests were conducted upon the populations which held

associations (question 1b). The reason for excluding from this analysis those who did not hold locational associations was that in effect the ratings of association is in the first instance a nominal measure. For the level of associations with one's home origin area the corridor movers mean level was in the range of strong to very strong associations (2.2), whereas for the non-corridor movers it was weak to strong (3.5), which was significantly different at the .05 level ($t = 3.246$). By destinations the same pattern was established with corridor movers associated at the level of strong to very strong (2.5) and those of the non-corridor movers in the range of weak to strong (3.5) (significantly different, $t = 2.456$). The same pattern was also found for associations with the large spatial units (question 2b), in that corridor movers held strong to very strong (2.7) associations compared with the non-corridor movers' weak to strong associations (3.1). Therefore, this analysis reaffirmed support for the previously established hypothesized relationship: that corridor movers held a significantly higher level of associations with their home origin area.

c. The types of association held by those who possessed locational associations.

Associations given (question 1c) were categorized into 10 types (table 9:2), the most important of which were:

- (i) Associations with schools in the area.
- (ii) Friends living in the area.
- (iii) Familiarity with the area.
- (iv) Strong identity of having lived in the area.
- (v) Lived in that area for a number of years.

Of minor importance appear to be;

- (i) Membership of clubs, groups or associations within the area.
- (ii) Relations living within the area.
- (iii) Ownership of property in the area.
- (iv) Locations of employment within the area.

By origin area (table 9:2a) 8 of the 10 types of association were given more by corridor movers, suggesting that besides the higher levels of association they may have a wider base of associations. However, no significant differences in terms of the distribution of associations over the 10 types was found, which suggests that the two populations have a similar basis of associations. At the level above the local area (question 2a) two significant differences favouring corridor movement were established (table 9:2b):

- (i) Strong identity of living in that area.
- (ii) Location of employment within that area.

The forms of association with the destinations display a much more marked set of differences between the two sub-sets (table 9:2c) in that the corridor movers have a higher number of associations related to:

- (i) Schools in the area.
- (ii) Familiarity with the area.
- (iii) Strong identity with that area.
- (iv) Lived in that area for a number of years.

While for the non-corridor population associations were biased in terms of:

- (i) Relations living in the area.

Therefore, in terms of the types of associations the patterns established did not display any marked differences between the sub-sets based upon origins, which was against the expected pattern.

Table 9:2

Comparative Tests Between Sub-sets Forms of Locational Association

Sub-sets Forms of association with the area	Percentages		Difference (A - B)
	Corridor Movers	Non-Corridor Movers	
	A	B	
a. Associations with the origin area	N = 27	N = 17	
Schools	55.55	35.29	20.26
Friends	66.66	82.35	-15.69
Membership of clubs etc.	18.51	17.64	0.87
Relations	29.62	17.64	11.98
Familiarity	62.96	47.05	15.91
Strong identity with area	51.85	29.41	22.44
Length of residence	59.25	52.94	6.31
Ownership of property	25.92	17.64	8.28
Employment	14.81	23.52	-8.71
b. Associations with Major divisions of the Urban Area	N = 16	N = 17	
Schools	43.75	41.17	-2.58
Friends	50.00	41.17	-8.83
Membership of clubs etc.	12.50	35.29	22.79
Relations	25.00	47.05	22.05
Familiarity	43.75	35.29	-8.46
Strong identity with area	43.75	17.64	-26.11*
Length of residence	43.75	47.04	3.30
Ownership of property	18.75	5.88	-12.87
Employment	50.00	23.52	-26.48*
c. Associations with the destination area	N = 28	N = 21	
Schools	35.71	0.00	-35.71*
Friends	50.00	52.38	2.38
Membership of clubs etc.	14.28	4.76	-9.52
Relations	25.00	42.85	17.85
Familiarity	46.42	19.04	-27.38*
Strong identity with area	25.00	4.76	-20.24*
Length of residence	28.57	4.76	-23.81*
Ownership property	10.71	9.52	-1.19
Employment	21.42	14.28	-7.14
Previously lived in the area	17.86	23.80	5.95

* Significantly different at the .05 level
Two Sample Proportions Test.

d. Additional Measures of Association.

Finally, three other aspects of locational association were examined, the first of which was the study of the level of satisfaction a person held with their origin and destination areas. The questions asked were:

- 1a. During the majority of the period within which you were living at your previous address in the area of _____ how satisfied were you with living in that area? (6 point scale).
- 1b. How satisfied are you with living in this area of _____? (6 point scale).

From the arguments upon locational attachments it was expected that compared with non-corridor movers corridor movers would have held a higher level of satisfaction with their previous area. This was supported by statistical tests (table 9:3a), but by destination area table 9:3b indicates that no significant difference exists. A second question which is more directly related to the concept of locational associations was:

2. Would you have preferred to have stayed within your previous area if you could have found a house which met with what you wanted?

The replies established that 63 percent of corridor movers would have preferred to stay within their home corridor compared to 31 percent of the non-corridor movers, which was a significant difference at the .05 level ($Z = 2.926$). Thirdly, friendship ties were examined. The data for this study comes from 3 questions:

- 3a. How friendly were people within your previous area or neighbourhood? (6 point scale).
- 3b. How much friendly contact did you have with your

Table 9:3Comparative Tests Between Sub-sets Levels of Satisfaction

Sub-sets Rating Scale	Percentages		t-Value
	Corridor Movers N = 38	Non-Corridor Movers N = 45	
a. For Origin Area			
1. Extremely satisfied	21.05	6.67	
2. Very satisfied	34.21	17.78	
3. Just satisfied	34.21	53.33	
4. Slightly dissatisfied	5.26	15.56	
5. Very dissatisfied	0.00	2.22	
6. Extremely dissatisfied	5.26	4.44	
Means Corridor/Non-Corridor	2.45	3.02	2.32*
b. For Destination Area			
1. Extremely satisfied	23.68	31.11	
2. Very satisfied	47.37	35.56	
3. Just satisfied	18.42	33.33	
4. Slightly dissatisfied	7.89	0.00	
5. Very dissatisfied	2.63	0.00	
6. Extremely dissatisfied	0.00	0.00	
Means Corridor/Non-Corridor	2.18	2.02	0.82

* Significantly different at the .05 level.
t-Test, Unsigned.

next door neighbours at your previous address?
(6 point scale).

- 3c. How much friendly contact did you have with other persons within your area while living at your previous address? (6 point scale).

The only significant difference established within the replies (table 9:4) was that the corridor population assessed friendship levels within the home corridor higher than the non-corridor population, which again tends to emphasize the satisfaction corridor movers held with their origins.

e. Section A Summary.

This section completes the search for variables which differentiate between the patterns of corridor and non-corridor movement. However, unlike the previous four chapters the foregoing analyses are directly related to the research of locational attachments. From these analyses strong support is given to the notion that locational attachments explain corridor movement, in that:

- (i) Seventy-one percent of all corridor movers possessed locational associations compared to 32 percent of non-corridor movers.
- (ii) Of those who possessed locational association it was found that corridor movers had a significantly higher level of locational association.
- (iii) Corridor movers held a higher level of satisfaction with their origin area.
- (iv) Sixty-three percent of corridor movers would have stayed within their home corridor compared to 31 percent of non-corridor movers.

Table 9:4

Comparative Tests Between Sub-sets Levels of Assessed Friendliness

Sub-sets Rating Scale	Percentages		t-Value
	Corridor Movers N = 38	Non-Corridor Movers N = 45	
a. <u>How friendly people were within the origin area</u>			
1. Extremely Friendly	23.68	4.44	
2. Very Friendly	47.37	28.89	
3. Just Friendly	18.42	35.56	
4. Indifferent	7.89	28.89	
5. Unfriendly	2.63	2.22	
6. Hostile	0.00	0.00	
Means Corridor/Non-Corridor	2.39	2.95	2.61*
b. <u>How much friendly contact with neighbours at origin</u>			
1. Very large amount	23.68	13.33	
2. Large amount	23.68	20.00	
3. Little	23.68	31.11	
4. Very little	28.95	26.67	
5. None at all	0.00	8.89	
Means Corridor/Non-Corridor	2.58	2.97	1.55
c. <u>How much friendly contact with other persons at origin</u>			
1. Very large amount	2.63	0.00	
2. Large amount	13.16	11.11	
3. Little	28.95	28.89	
4. Very little	50.00	42.22	
5. None at all	5.26	17.78	
Means Corridor/Non-Corridor	3.42	3.67	1.24

* Significantly different at the .05 level.
t-Test, Unsigned.

- (v) Corridor movers assessed friendship levels within the home area higher than non-corridor movers.

Section B Multi-Variate Study of Locational Attachments

Although, the previous section of this chapter has established that locational association can be measured directly and that it differentiates between the two patterns of movement, it is still necessary in the testing of the locational attachments hypothesis to establish support for the argument that the variables found to differentiate between corridor and non-corridor movement within the analysis of the decision process were either elements of, related to, or the results of a single factor 'locational attachments'. It may be that these variables are individually explanatory factors or more likely interrelated in other explanatory concepts for different sub-sets of the population. To examine the validity of this argument this section is divided into two topics. First, the differentiating variables from the previous four chapters are reviewed to establish if the conceptual argument for inter-linking them and grouping them under the factor of locational association is valid. Secondly, this claim of interlinkage is tested statistically, using a multi-variate analysis design. Finally, the basis for a model for predicting corridor movement is put forward.

B:1 Conceptual Linkages Between the Differentiating Variables and Locational Association

From the previous four chapters the univariate tests established a set of differentiating variables between corridor and

non-corridor movers. Conceptually these differences are related to the dimension of locational attachments in terms of:

- a. Desire to stay within one's home corridor.
- b. Localized preference and familiarity images.
- c. Personal characteristics of the movers.

- a. Desire to stay within one's home corridor.

Attitude questions and search behaviour indicate ties to the home area amongst the corridor movers suggesting support for the locational attachments hypothesis, in that they:

- (i) Emphasize more within their aspiration set the desire for the betterment of their dwelling within a specific area.
- (ii) Had reasons for moving more related to changes within the household as opposed to the non-corridor movers general desire to own rather than rent or build.
- (iii) Housing preferences were towards the details of dwellings, whereas non-corridor movers were biased towards new dwellings, which relates in part to the non-corridor populations economic position which is reflected in their younger age.
- (iv) Emphasized more a specific area as the critical reason for selecting the new residence, whereas non-corridor movers focused upon the dwellings with their interest in areas limited to finding an area with a satisfactory level of quality.
- (v) Had a more spatially restricted aspiration search set and an actual search set based upon their home origin with 70 percent of the search set located within the 2 km home corridor compared to 19 percent

for the non-corridor population.

b. Localized preference and familiarity images.

The study of the movers preference and familiarity images supported the hypothesis of locational attachments, in that:

- (i) Corridor movers were found to hold higher levels of preference and desirability with their home origin corridor.
- (ii) From the analysis of familiarity patterns support for that conclusion was given in that; first, 53 percent of corridor movers possessed restricted localized familiarity images based upon their origin corridor compared to 27 percent of non-corridor movers and secondly, the corridor movers had a higher level of familiarity within their origin corridor.

c. Personal Characteristics of the movers.

Probably the causal factor for the previous findings is the establishment of differences in the personal characteristics of corridor and non-corridor movers, which gives support to the locational attachments hypothesis in that:

- (i) Developing from the argument that a person possessing locational associations would most likely be a person with a developed level of family status and that these people are more likely to be older with a more developed level of careerism and thus higher socio-economic status, it was found that the corridor mover population were of an older age and higher levels of socio-economic and family status.
- (ii) Associated with that argument was the finding that

corridor movers were likely to have moved from ownership property into an existing dwelling, whereas non-corridor movement was more from rented and into new dwellings.

d. Summary.

The differentiating variables derived from the study of the relocation decision process model suggest that corridor movers held a more expressed desire to move within their origin home corridor, which was reflected in their aspiration search set, actual search set, and selection of a dwelling. This is seen to be the result of that populations higher age, economic, and family status levels, which is reflected in the higher degree of movement from ownership property. Therefore, there does exist a strong conceptual argument which links all of the differentiating variables to the notion of locational association being the cause of corridor movement.

B:2 Statistical Interrelationship

a. Analysis design.

The first of the two analyses sets out to examine which variables discriminate between corridor and non-corridor movement in terms of a multi-variate design. The reason for this is that one cannot directly interrelate univariate discriminations into an explanatory model because the variables which differentiate in the univariate analyses may be related to different sub-sets of the population. Also those variables which fail to differentiate by themselves may do so within a univariate design, where the common relationship between variables is partialled out. Therefore, it

is necessary to test the hypothesis that locational attachments forms the discriminating component by including all variables which conceptually underly the basic decision process of mobility within a multi-variate discriminant analysis. However, in the usage of this technique involving a dichotomous grouping one major problem is that only a single discriminating component is obtained, as a result the measurement of secondary factors of discrimination is not directly possible. The test of the locational association concept is therefore dependent upon the form of the component of discrimination and the degree of discrimination.

The algorithm used was that of Veldmans (1967), from which one can determine:

- (i) Whether the discrimination between the groups is significant (F Test).
- (ii) Discriminant weights of the discrimination; these are analogous to the partial regression weights in the multiple regression equation, in that each weight represents the relative importance of that variable with the other variables 'partialled out' (Tatsuoka, 1970). Together these form a discriminant function, the number of which is one less than the number of groups. The significance of each function in the discrimination is determined by a Chi-square test.
- (iii) Discriminant scores, which are the summation of scores for each individual after multiplying out the discriminant function.
- (iv) Component loadings of discrimination, which are the correlations between the original variable and the discriminant scores, and can be interpreted similarly to the components from factorial analyses.

The variables within this analysis were:

1. Personal Characteristics of the Household.
 - (i) Socio-economic status factor scores. (X_1)
 - (ii) Family status factor scores. (X_2)
 - (iii) Career status factor scores. (X_3)
 - (iv) Mobility status factor scores. (X_4)
2. Measures of Satisfaction With the Previous Residence.
 - (i) Satisfaction with one's origin area. (X_5)
 - (ii) Satisfaction with one's previous dwelling. (X_6)
3. Origin Corridors Preferences and Awareness.
 - (i) Preference factor scores with one's origin corridor. (X_7)
 - (ii) Familiarity factor scores with one's origin corridor. (X_8)
 - (iii) Desirability factor scores with one's origin corridor. (X_9)
4. Measure of Quality of Life Within the Origin Area.
 - (i) How friendly people were within the origin area. (X_{10})
5. Personal Characteristics of Housing Preferences.
 - (i) Housing cost-quality factor scores. (X_{11})
 - (ii) Housing details factor scores. (X_{12})
 - (iii) Age of dwelling factor scores. (X_{13})

The input of all variables was as standardized 't' scores with all high scores positively scored. An inter-correlation analysis (table 9:5) supports the notion that all variables are relatively independent measures as the highest correlations do not exceed .5.

b. Analysis results.

The results of the linear discriminant analysis between the

Table 9:5

Intercorrelation Matrix of the Thirteen Variables Used in the Discriminant Analysis

Variables	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃
X ₁	1.00	-.01	-.08	.06	.26	.27	-.04	.33	.02	.33	-.19	-.25	.01
X ₂		1.00	-.07	-.05	-.05	-.22	.03	.12	.08	.09	-.12	.24	-.10
X ₃			1.00	.12	-.14	-.15	-.11	.03	-.06	-.11	-.24	-.17	.24
X ₄				1.00	.03	.20	.09	.02	.15	.05	.30	-.20	.07
X ₅					1.00	.48	.17	.28	.06	.26	.07	-.01	.03
X ₆						1.00	.06	.18	-.05	.24	.01	-.22	-.03
X ₇							1.00	.48	.28	.22	.06	.20	-.11
X ₈								1.00	.02	.29	-.21	.07	.07
X ₉									1.00	.12	.07	.14	.18
X ₁₀										1.00	-.04	.01	.18
X ₁₁											1.00	.09	-.13
X ₁₂												1.00	-.29
X ₁₃													1.00

Variable set X₁ Socio-economic status X₂ Family status X₃ Career status X₄ Mobility status
 X₅ Satisfaction with origin area X₆ Satisfaction with origin residence X₇ Preference with home origin
 X₈ Familiarity with home origin corridor X₉ Desirability of home origin corridor corridor
 X₁₀ Friendliness of home area X₁₁ Housing quality X₁₂ Housing details X₁₃ Age of housing

corridor and non-corridor groups over the 13 variables were:

- (i) That 86 percent of the total intra-urban movers were correctly classified; 87 percent and 84 percent for the corridor and non-corridor movers groups respectively.
- (ii) The discrimination between the two groups was significant at the .001 level ($F = 5.112$, d.f. 13 and 69), as was the single discriminant function (Chi-square = 50.926, d.f. 13).
- (iii) The discriminant function with the weights presented in the order of the variables listed above was:

$$Y = .365X_1 + .097X_2 + .278X_3 - .167X_4 + .070X_5 + .108X_6 \\ + .336X_7 + .505X_8 + .193X_9 + .057X_{10} + .005X_{11} + \\ .485X_{12} - .298X_{13}$$

In which the principal discriminant variables with positive weights were: familiarity (X_8), details of dwelling (X_{12}), socio-economic status (X_1), preference (X_7), and career status (X_3). A negative weight was given upon dwellings age (X_{13}).

- (iv) Loadings upon the component of discrimination clearly establish the expected dimension of discrimination as locational attachments (table 9:6); with significant positive loadings on socio-economic status, family status, satisfaction with origin area, preference with origin home corridor, familiarity with origin home corridor (interpreted as territoriality), desirability of home corridor, and details of housing. The only major significant negative loading was upon age of dwelling.

Therefore, these results support the hypothesis that it was locational attachments which was the underlying explanation of corridor movement.

To test that hypothesis further it was decided to examine the argument that one could from these variables predict accurately whether a mover would have moved within its home corridor according to the measure of locational association. It was hypothesized:

That those movers who held locational associations would have moved within their home corridor given freedom of choice.

Ideally a test of this hypothesis would involve using the direct measurement of locational association as the dependent variable within a multiple regression analysis from which the regression residuals could be used to determine the group of expected corridor movers. Unfortunately, a major limitation within this research design is that the direct measurement of locational association is essentially a nominal variable and not a continuous interval scaling, for initially a person either holds locational associations with an area or he does not. Only for those holding associations can the degree of locational association be directly measured. Even here the problem is complex as the accuracy of the given ratings is suspect due to the complexity of the concept. Therefore, this research design could not be followed.

The method of analysis selected is multi-variate discriminant analysis in which the dependent variable for the grouping was whether the mover claimed to have locational associations with their origin home area or not. The independent variables were the same set of variables as used above in the corridor/non-corridor multivariate discriminant analysis, where the two groups were expected to be significantly different. Also the component of discrimination was expected to reflect that previously found

within the multi-variate discrimination between corridor and non-corridor movers, and the mover's discriminant scores between analyses positively correlated. Individuals were after the analysis reclassified upon their discriminant scores which was in effect a new interval measurement of locational association. The expected pattern of grouping was that those classified as holding locational associations would be corridor movers, whereas those grouped within the grouping of persons not holding locational associations were expected to be non-corridor movers. The degree of correct prediction can be seen as serving to indicate how accurate this locational association model is at predicting the direction of movement.

However, prior to examining the results of this analysis it is necessary to state that with a dichotomous classification a random assignment of moves would result in 50 percent corridor and non-corridor movers, which in this sample could give a measure of correct assignment close to the observed 46 percent of the movers who were corridor movers. Such an assignment, however, would be based upon an explanation of random movement, which is in opposition to the findings of the previous chapters and multi-variate analysis. Furthermore, under the method adopted potentially all corridor movers could be completely misclassified, giving a measure of 0 percent correct assignment.

Results from that discriminant analysis were:

- (i) That the discrimination between the groups was significant at the .05 level (F test 1.932, 13 and 69 d.f., $p = .0408$) as was the single discriminant function (Chi-square = 23.434, 13 d.f., $p = .0380$).
- (ii) In total 27 percent (22) of persons who claimed to either hold locational association or not were

misclassified, 29 percent (13) in the original locational association group and 24 percent (9) in the non-locational association group.

- (iii) As expected the component of discrimination had high positive loadings upon basically the same set of variables as those found within the discrimination between the corridor and non-corridor groups. The significant positive values were upon socio-economic status, satisfaction with origin area, satisfaction with origin dwelling, preference with origin home corridor, familiarity with origin home corridor (interpreted as territoriality), and friendliness of origin home area (table 9:6). A significant negative value was established for career status.
- (iv) The correlation between the two analyses discriminant scores was .549, which was significant at the .05 level. Therefore, although locational association and corridor movement are strongly related that relationship is not the complete explanation of corridor movement.
- (v) The discriminant function was:

$$Y = .040X_1 + .137X_2 - .066X_3 - .259X_4 + .482X_5 + .247X_6 \\ + .383X_7 + .241X_8 - .060X_9 + .578X_{10} + .109X_{11} - \\ .238X_{12} + .028X_{13}$$

Here the principal discriminant variables with positive weights were: friendliness (X_{10}), satisfaction with origin area (X_5), preference (X_7), satisfaction with previous dwelling (X_6), and

Table 9:6

Components of Discrimination

Variables	Analysis 1	Analysis 2
	Corridor/ Non-Corridor Groupings	Locational Association/ Non-locational Groupings
X ₁ Socio Economic Status	.359*	.399*
X ₂ Family Status	.245*	.074
X ₃ Career Status	-.001	-.235*
X ₄ Mobility Status	-.114	-.051
X ₅ Satisfaction with Area	.323*	.694*
X ₆ Satisfaction with Dwelling	.135	.526*
X ₇ Preference with Home Origin Corridor	.621*	.503*
X ₈ Familiarity with Home Origin Corridor	.739*	.588*
X ₉ Desirability of Home Origin Corridor	.232*	.074
X ₁₀ Friendliness	.318*	.719*
X ₁₁ Housing Cost-Quality	-.150	-.017
X ₁₂ Housing Details	.504*	-.091
X ₁₃ Age of Dwelling	-.294*	.086

* Significantly associated with discriminant Scores at the .05 level.

(F Test Value $\geq$.218)

familiarity (X_8). Those with negative scores were:
mobility status (X_4) and details of dwelling (X_{12}).

This pattern re-emphasizes the argument that locational association is a multi-variable dimension in that through partialling most of the principal variables remain as major discriminating variables.

In terms of the reclassified data 71 percent of corridor movers were grouped within the locational association group compared to 31 percent of non-corridor movers. The non-locational association group contained 69 percent of the non-corridor movers and 29 percent of the corridor movers. This difference in the distribution of corridor and non-corridor movers was found to be statistically significant at the .001 level (Chi-square = 11.59, 1 d.f.). Following the hypothesis that one should be able to equate locational attachments with corridor movement, 66 percent of movers within the locational association group were corridor movers and 74 percent of the non-locational association group were non-corridor movers. Therefore, in using the locational association model 70 percent of all movers' direction of movement was correctly predicted, which clearly lends support to the hypothesis.

The finding that 31 percent of movers holding locational association were non-corridor movers, however, does raise the question of whether this pattern of movement was due to the effect of the vacancy set in that these movers were potentially corridor movers, but could not find a suitable dwelling within their home corridor, or that the model for predicting the direction of movement needs to include additional concepts or measures within it to improve its degree of prediction. Within this study only a very scant test of the first of these suggestions is possible as the further development of the locational attachments model lies

beyond the scope of this study. To do so reference was made to the question of:

Would you have preferred to have stayed within your previous area if you could have found a dwelling which met with what you wanted?

As previously stated a total of 14 non-corridor movers answered yes, therefore they could be classified as forced non-corridor movers. Of the 14 non-corridor movers classified as holding locational associations 8 stated that they would have preferred to have stayed within their previous area. Therefore, given complete freedom of choice the degree of correctly predicted corridor movers can be increased from 66 percent (27) to 86 percent (35).

Furthermore, the number of corridor movers wrongly classified is in part due to the fact that as with a random distribution of movers some people with no locational associations must move to destinations within their home corridor. Such a figure could be as high as 21 movers (calculated from figures in Chapter 3).

c. Concluding Comments

The foregoing analyses have therefore, clearly established the validity of the second and third research theses:

That the primary reason for restricted lateral movement is sectorally specific housing demands rather than random movement within a vacancy sub-set

Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis.

The locational attachments hypothesis being:

That a household deliberately selects a nearby location in order to maintain spatial familiarity, social contact, institutional links, or access with the origin area.

As a result the locational attachments model can be put forward as a predictive model^{*1} of the direction a mover will move:

$$C = (L_i, Vs_k)$$

Where:

C = Corridor movement.

L_i = Locational association with origin home area (i)

Vs_k = Vacancy sub-set within origin home corridor (k)

For this particular study area locational attachments may be measured using a restricted variable set. Following Tatsuoka's (1970) rule of thumb, that the only variables important in the discrimination are those with discriminant weights of approximately half that or greater of the largest discriminant weight, these variables would be:

- (i) Satisfaction with area. (X_1)
- (ii) Satisfaction with dwelling. (X_2)
- (iii) Preference scores. (X_3)
- (iv) Familiarity scores. (X_4)
- (v) Friendliness of area. (X_5)
- (vi) Mobility status. (X_6)
- (vii) Details of housing preferences (housing details). (X_7)

The recalculated discriminant function upon those seven variables, which has no loss in the power of discrimination is:

$$Y = .513X_1 + .231X_2 + .368X_3 + .245X_4 + .619X_5 - .241X_6 - .210X_7$$

The correlation between the discriminant scores of this discriminant function and that based upon the thirteen variables is .989.

Within the predictive model to establish whether the mover held locational associations the procedure is to multiply out the individual's scores upon the variables by the discriminant analysis and sum the results. Then compare that total with the mid-point between the locational group centroid score (82.509) and the non-locational association groups (69.178) to establish to which group the member belongs (King, 1969, p.207).

- *1 "The process of relating theory and research involves postulating theoretical models representing oversimplified versions of reality" (Blalock and Blalock, 1968, p.159).

A predictive model is viewed as a stage in the sequential development between establishing a statistical explanation and a causal relationship. The explanatory model is the first step in an attempt to derive the causal relationship between an observed result and a set of theoretically related variables. The second step is to use the explanatory model to predict an expected result for further populations or samples. It is in taking this step that a predictive model or a series of predictive models are created, with its power as a predictive model dependent upon its degree of accurate prediction. As a result the third step involves retesting the predictive model, which may in turn establish the need for alterations to that model due to the asymmetrical relation between certain variables, such as minor changes in the weightings of variables or in the way of their measurement. However, no change will be made to the general form of the explanatory model, otherwise the whole theoretical structure would have to be re-examined. Finally, if over a number of studies a very high degree of accurate prediction is obtained, then the fourth step is the establishment of a causal relationship and thereby a causal model. However, again it must be stressed that causality is a theoretical tool.

With regard to this research only the second step has been reached, hence the thesis' title: 'Towards An Explanation And Prediction Of Residential Movement'.

Such a sequence of models in the investigation of a research problem is similar to that argued by Moore (1966):

"After the initial conceptualization of the problem has determined the particular aspects of a set of phenomena to be examined, the first step would be a representation of the observations on that set; inferences drawn at this point would lead to attempts to explain the functional relationships of the observed system or sub-system, - the final stage would then be the integration of accepted hypotheses from the previous processes into a model to predict the behaviour of the system within a given frame of generality". (p.18)

However, Moore appears to view the explanatory stage continuing through the procedure of retesting, and that,

"not until satisfactory models of these sub-systems have been built and tested can a predictive model operating at a high level of specificity be constructed". (p.37)

Chapter 10. Summary and Conclusion

A : Summary

This study set out to develop further the explanation and prediction of residential mobility by examining one aspect of the direction of residential movement: lateral movement within the city. The origins of this interest stem from the studies of Adams (1969), and Brown and Holmes (1971), in which Adams claimed that the cause of restricted lateral movement (i.e. sectoral movement) is that movers possess a restricted sectoral image of the city based upon their home sector. Brown and Holmes, however, failed to establish a strong pattern of sectoral search space within their study area, although they did put forward as a possible explanation of their findings the fact that urban structure in a small city lacks the pattern of homogeneous socio-economic areas in either a concentric or sectoral fashion. Therefore, at the time when this study was established the conflict between those two studies resulted in the basic research objectives centring upon establishing:

- (i) If a pattern of sectoral biased movement does exist within a small city.
- (ii) If a mover's image of the city takes the form of a restricted sectoral image.
- (iii) If a mover's restricted sectoral image actually controls its decision on spatial search and relocation, and
- (iv) The validity of an alternative explanatory hypothesis: 'That sectoral movement is the result of movers' possessing strong feelings of association with the origin home area, whereas non-sectoral movers are

characterized by their lack of or weak feelings of association.'

However, in developing this research the original research design had to be modified as a result of criticisms arising from, first, the theoretical basis of Adams' hypothesis and secondly, from the evidence given in the published literature supporting sectoral movement, and the restricted sectoral image.

The principal criticisms with Adams' research stem from:

- (i) Adams' failure to test the existence and role of the restricted image hypothesis. Rather his support for the hypothesis is based upon the study of directions of movement, and as a result is clearly a function of deduction and supposition and not a direct test of the hypothesis.
- (ii) Adams' claim that an individual's travel patterns are restricted to the home sector is seen for the average resident of an anglo-american city in the 1970s to be incorrect.
- (iii) Adams' argument that the restricted image limits a mover's usage of formal information sources to that which relates only to its home sector, is seen to be unfounded. More likely movers expect and use the real estate agent to obtain information on vacancies in areas outside their regular action space.
- (iv) Adams in his development of a causal hypothesis fails to follow a causal research design by not taking into account other variables which may explain sectoral movement. Related to this is Adams' failure to acknowledge other possible explanations of sectoral

movement which exist within the literature. Simmons (1968) for example clearly suggests two other explanatory reasons: locational attachments and urban structure. Therefore, Adams' hypothesis until tested can only be viewed as another explanation of sectoral movement, and not the causal explanation.

- (v) Adams' exclusion of non-sectoral movement from the hypothesis results in it being an incomplete conceptualisation of the reality it is attempting to explain. The question that needs to be answered is, what is the cause of non-sectoral movement?

However, although very severely questioned Adams' hypothesis cannot be discarded without testing. But as a result of those criticisms it was necessary to reformulate the restricted image hypothesis so as to make it more realistic by including non-sectoral movement and alternative explanations.

From a study of other published research upon, sectoral search space and movement, and restricted images, it was concluded that their research designs and methods of analysis were faulty, to the degree that in no case can the published research be used with any confidence in direct support for or against Adams' restricted image hypothesis. The outcome of those criticisms was that a number of ground rules were drawn up for conducting meaningful research upon the topic of the restricted image hypothesis. The principal rules are:

- (i) That only the system of direct sectoral measurement can be used to measure sectoral movement.
- (ii) In the search for an explanation of restricted lateral movement it is necessary that the distribution of the vacancy set be examined at the level of the vacancy

sub-sets.

- (iii) The images that a mover holds of the city must be examined at the level of the individual.

Developing from both sets of criticisms a theoretical framework for sectoral movement was put forward, which is divided into three explanations:

- (i) City Form.
- (ii) Random movement and internal city structure.
- (iii) Sector specific housing demand (Non-random movement).

For the explanation of non-random sectoral movement, two reasons were suggested:

a. Restricted image hypothesis.

That movers possessing a restricted image of the city based upon their home origin, will have their search for and selection of a dwelling restricted to the home sector, unless:

- (i) The home sector does not contain a suitable vacancy.
- (ii) The image's role is over-ridden by locational attachments.

b. Locational attachments hypothesis.

That a household deliberately selects a nearby location in order to maintain spatial familiarity, social contact, institutional links, or access with the origin area.

As a result of these developments upon the original research objectives this research set out to examine three research theses:

1. That residential mobility within Hamilton is laterally restricted.
2. That the primary reason for restricted lateral movement is sectorally specific housing demand rather than random movement within a vacancy sub-set.

3. Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis.

a. Thesis 1 - That residential mobility within Hamilton is laterally restricted

Working from Brown and Holmes' (1971) findings it was uncertain whether restricted lateral movement within Hamilton would account for a major proportion of moves. Initially, the patterns of movement were measured within the limits of a 35 degree home sector based upon each mover's home origin and the downtown centre. However, that system of measurement was criticised because it unrealistically constrained the maximum distance of lateral movement in the inner city. From a series of four tests upon the form of lateral movement a better system of measurement was adopted: a 2 kilometre home corridor based upon the home origin. Results from that study of restricted lateral movement established four principal findings:

- (i) Fifty percent of all movers were found to have moved within their home corridor.
- (ii) All but three of the tenure sub-sets had statistically biased patterns of movement. The exceptions all involved State Housing; the restricted distribution of which was seen to be the reason for that pattern.
- (iii) Movers from ownership property were more likely to have moved within their home corridor.
- (iv) The degree of corridor movement from an area was related positively to the economic typology of the area, which suggests that movers of high economic

status have a higher propensity to move within their home corridor.

These findings, therefore, result in support for the first research thesis. However, they do not establish that the laterally biased movement was the result of non-random movement, in that the actual movement patterns have been compared with an expected random distribution of movement to vacancies invariantly dispersed about the city centre upon an isotropic surface. To study the reasons for the observed sectoral bias each of the three explanations established earlier as the theoretical framework of restricted lateral movement were examined.

b. City Form.

The near circularity of Hamilton centred on the CBD removes from consideration the possibility of the city's shape as the explanation of corridor movement, in that the city's form allows for movement outside of the very narrow limits of the home corridor.

c. Thesis 2 - That the primary reason for restricted lateral movement is corridor specific housing demand rather than random movement within a vacancy sub-set.

The second and third explanations of random and non-random movement form the bases of the second research thesis. To examine that thesis three sets of analyses were involved; the first of which was the study of the distribution of the vacancy sub-sets. Here it was established that for both existing and new dwellings the degree of clustering in any of the vacancy sub-sets is not so extreme as to suggest that a mover's freedom of spatial choice is highly constrained.

The second test of this thesis involved a series of univariate

analyses centred upon the notion that under the concept of random movement no differences exist between the characteristics of corridor and non-corridor movers. This was because the reason for corridor movement is the relationship between the mover's origin and the vacancy sub-set. The variables examined covered the personal characteristics of the mover and their relocation decision process. But here interest centres upon the studies of the movers aspirations and preferences, where support was established for the corridor movers being different from the non-corridor movers, in terms of their primary aspirations, housing preferences, and spatial patterns of preference. The spatial patterns of preference displayed a marked tendency towards a restricted image, with the corridor movers holding a significantly higher level of preference with their origin home corridor than did non-corridor movers.

Third in this series of studies was an examination of the movers' search space. Here it was expected that the corridor movers search space would be primarily confined to the origin home corridor, whereas non-corridor movers, were expected to have a much more dispersed search space. To examine this both the movers aspiration search space and actual search space were studied. For the aspiration search space significant differences between corridor and non-corridor sub-sets were established. First, the non-corridor sub-set had a higher proportion of persons with an aspiration search set not precisely delimited. Secondly, the corridor movers aspiration search space for the remaining population was different, in that their distribution and distances of intended search locations based upon the origins and destinations were less dispersed. Thirdly, a similar relationship was found for the patterns of actual search, where again the corridor movers search set based upon the movers origin was less dispersed. A

more detailed study of the actual distribution of search nodes established:

That for corridor movers;

- (i) 88 percent were within the origin home half of the city compared to 47 percent of the non-corridor movers,
- (ii) The distance of lateral search for corridor movers was almost half that of the non-corridor movers,
- (iii) That 70 percent of the corridor movers' search set was within the 2 km origin home corridor compared to 19 percent of the non-corridor movers'.

Therefore, support was given to the second research thesis by these findings.

- c. Thesis 3 - Of the non-random explanations for restricted lateral movement the principal one is the locational attachments hypothesis, rather than the restricted image hypothesis.

The search for the actual explanation of non-random sectoral movement involved the study of two topics: first, the existence and role of the restricted image hypothesis, and secondly, the existence and role of the locational attachments hypothesis. Together these two sets of studies formed the basis of the third research thesis.

Working from the position of not expecting movers within Hamilton to possess a restricted image due to the small size of the city, the study of the restricted image hypothesis involved five tests upon the mover's awareness space. Three of these studies (the level of general knowledge of housing within each area of Hamilton, the identification of shopping centres within Hamilton, and the social-status ratings of each area of Hamilton) established that movers did possess a very detailed and almost complete

knowledge of the characteristics of areas throughout the city. However, the study of the movers own assessment of their familiarity with the areas of Hamilton found that 54 percent of intra-urban movers held restricted familiarity images, based almost equally upon their home origin or destination residence. From comparative tests between the sub-sets the only major differences established were that corridor movers held a higher degree of familiarity with the origin and destination corridor, plus a higher proportion who held restricted familiarity images based upon their origin home corridor. The result of this study, was that upon the basis of the first three analyses Adams' notion that movers possessed a restricted knowledge of the city limited to the area of the origin home sector and that this caused restricted lateral movement was rejected, for in terms of knowledge movers appear to have been able to consider dwellings within nearly all areas of the city. Instead the patterns of familiarity suggest that corridor movers held a higher degree of territoriality with their origin home corridor, which may be related to security, certainty and preference. Therefore, in rejecting the relationship between restricted knowledge and restricted lateral movement the finding of localized territoriality established additional support for the locational attachments hypothesis.

The study of locational attachments as the explanation of restricted lateral movement was divided into two sections, the first of which was an attempt to measure directly a persons assessment of their locational attachments. From that study 71 percent of corridor movers were found to hold associations with their origin areas compared to 38 percent of non-corridor movers. The level of associations rated upon a 1 to 5 scale were significantly higher for corridor movers for both their home origin

and destination area, although the types of association held were only different for the movers destination area. Additional measures related to locational association established that corridor movers:

- (i) Held a higher level of satisfaction with their origin area.
- (ii) Held a positive desire to stay within their origin home area.
- (iii) Indicated that their origin home area had higher friendship levels.

The second task of the locational attachments study was to interlink with the concept of locational attachments all variables which had been found in the previous studies of the movers personal characteristics and their relocation decision process to univariately differentiate between the corridor and non-corridor movers sub-sets. It was claimed that all those variables were either elements of, related to, or results of a single causal factor: locational association. To examine that relationship two approaches were used. First, the conceptual relationship between the variables was examined, from which it was argued:

- (i) That underlying the corridor movers relocation decision process were specific locational demands, which explain a number of the differences established between sub-sets on variables relating to: aspirations, preferences, search sets, and selection reasons.
- (ii) That corridor movers held locational associations as a function of their higher age, economic and family status. These differences in the personal characteristics of the sub-sets explain the established differences between the sub-sets upon variables

relating to: tenure of origin, reasons for moving, aspirations, preferences, and selection reasons.

Secondly, two multi-variate statistical analyses were conducted to establish if the differentiating variables were statistically interlinked and related to the concept of locational attachments. The first of two analyses was a discriminant analysis between corridor and non-corridor movers. From that analysis it was established that 86 percent of movers were correctly classified, with the discrimination significant at the .001 level. The component of discrimination clearly supported the expected dimension of locational attachments as the explanation for the difference in the patterns of movement, with major positive loadings upon:

- (i) Socio-economic status.
- (ii) Family status.
- (iii) Satisfaction with origin area.
- (iv) Preference with the origin home corridor.
- (v) Familiarity with the origin home corridor.
(Interpreted as territoriality).
- (vi) Desirability of the origin home corridor.
- (vii) Friendliness of origin home area.
- (viii) Housing details.

Only one major negative loading was established.

- (i) Age of dwelling.

The second discriminant analysis was between movers who claimed to hold locational associations and those who did not. For that analysis it was established that significant difference existed between the groups at the .04 level, and 73 percent of movers who claimed to hold locational attachments were correctly classified. As with the previous analysis the discriminant component estab-

lished the expected underlying grouping of variables which were conceptually related to the locational attachments hypothesis.

The major positive loadings were upon:

- (i) Socio-economic status.
- (ii) Satisfaction with origin area.
- (iii) Satisfaction with origin dwelling.
- (iv) Preference with origin home corridor.
- (v) Familiarity with the origin home corridor.
(Interpreted as territoriality).
- (vi) Friendliness of origin home area.

A major negative loading was established upon:

- (i) Career status.

In terms of the re-classified data, 66 percent of movers within the locational association group were corridor movers and 74 percent the non-locational association group were non-corridor movers.

Therefore, in using the locational attachments discriminant function to predict the direction of movement 70 percent of intra-urban movers directions of movement were correctly predicted.

This figure can be increased to 86 percent by including the variable on the availability of vacancies, and some of the remaining misclassified movers can be related to random movement.

Taken together these two sources of misclassification probably account for a large part of the unexplained variance in the correlation between the two analyses discriminant scores.

These findings upon the locational attachments hypothesis support that concept's acceptance as the principal explanation of corridor movement. Therefore, support was given to the third research thesis, and as a result a predictive model of restricted lateral movement based upon the variables of locational attachments

and the vacancy sub-set was developed. Also a predictive equation of locational attachments for future studies within Hamilton was presented.

B : Suggestions For Future Research

In no way can the findings of this research be viewed as a final statement upon the explanation of restricted lateral movement. Rather they represent only the beginnings of what should prove to be a very productive area of research. The major contributions of this study, however, are seen to be:

- (i) Its development of a conceptual framework of explanations of restricted lateral movement.
- (ii) Its development from Adams' restricted image hypothesis to the locational attachments hypothesis as the explanation of restricted lateral movement.
- (iii) Its development of a paradigm for the study of intra-urban movement patterns involving the usage of an operationalized two phase decision process model.

Therefore, to conclude this study a number of suggestions are made as to how this research topic could be developed.

a. Developments of explanation and prediction.

A key area for development is the quantification of the vacancy sub-set within each move's origin home corridor. This would involve establishing a measure of each mover's housing vacancy sub-set, such as the price range the individual was prepared to search in, which could be extended to include the characteristics of the dwelling (i.e. size, age, number of bedrooms, design, etc). What is required is a measure of the probability that the mover would

shift within its home corridor if all movers moved randomly within the limits of their vacancy sub-set. That measure is the proportion of each mover's vacancy sub-set within its origin home corridor during the actual search period. This figure should prove to be a valuable descriptive and comparative statistic for use in comparing the results of different studies upon the same or different cities. Therefore, the data used in the prediction equations should be reported, as is done here in Appendix 7, for only in this way can the results of studies upon the same or different cities be statistically interrelated and re-examined. Ideally that data should give:

- (i) Co-ordinates of the mover's origin and destination.
- (ii) Scores upon the dimensions of personal characteristics.
- (iii) Scores upon the dimensions of the relocation decision process model.
- (iv) Measurements of the vacancy sub-set within the home corridor.

b. To predict where a mover is expected to relocate.

The ability of predicting the direction that a mover will move does not allow one to predict the expected destination of the mover within the home corridor, therefore, an extension of the corridor movement model would be to relate the characteristics of the mover to the characteristics of the vacancy sub-set within areas of the home corridor. Ideally, one should be able to establish a high relationship between these characteristics, and with the usage of a distance decay function be able to predict accurately the destination of the move in terms of destination area within the home corridor.

c. Development of a causal model.

As a predictive model of the direction that movers within Hamilton will move, the next step in this study would be to test the power of the predictive equation. This would involve collecting data on another set of movers. Expectedly that study will result in a high degree of correct prediction, which would take one a step closer to establishing a causal model. However, because not all movers were correctly assigned by that equation a further development of the model would involve conducting a linear regression between the discriminant scores from the corridor/non-corridor and locational association/non-locational association discriminant analyses. From the individual's residuals it would be possible to establish which movers complied with the relationship and those that did not. Then taking the movers which were found to vary significantly from that relationship one could study that group to establish the reasons for their variance.

d. Improvements in the system of measurement.

A set of open ended questions were asked in the study of; reasons for moving, aspirations, preferences, and the critical reasons for selection. This approach was forced upon this study as a result of the length of the questionnaire and uncertainty over which variables would differentiate between corridor and non-corridor movers. Having now established which were the principal differentiating variables, it is suggested that in future the collection of data should be limited to semantic ratings on these variables. This data would then be factor analysed to establish the dimensions of: reasons for moving, aspirations, preferences, and the critical reasons for selection. Such an approach could also be extended to the measurement of locational attachments.

However, it is felt that it is probably necessary within each piece of research to re-test the listing of principal variables using an open ended question in a pilot study. By this means the variable set can be adjusted to changing conditions.

An additional question relating to associations could also be added. This is for movers to rate their feelings on movement in terms of how it has affected their locational association with their previous area.

e. Increased data sets.

The obtaining of data upon personal attributes via interviewing is an extremely time consuming and expensive task. For example in this study only 123 interviews were obtained from a six month interviewing period. One approach to improve the data base and still keep a measure of control upon the quality of information involves a two stage data collection system. First, a spatially representative sample of movers would be interviewed. Secondly, the questionnaire used in interviewing would then be used in a postal survey, and the replies sampled according to a sampling frame developed from the interview sample. The reason for not just using a postal survey is that attitude questions as opposed to factual questions are subject to the major problem of differing interpretations.

f. Role of city size.

One of the foremost questions with regard to the development of and understanding of the restricted image and locational attachments concepts is the exact role of city size. Here particular interest focuses upon:

- (i) The effect of city size upon the spatial patterns of

intra-urban travel, and hence a person's knowledge.

This question is related to that of whether people do adjust the scales of internal city distance to the size of the city that they are living in?

- (ii) The relationship between city size and its effect on the homogeneity of housing stock and personal characteristics within sub-districts of a city. The degree of an area's homogeneity may effect a person's ability to assess the general character of an area and hence influence its perception of the area as a possible site for relocation. Also it may influence the degree and strength of a person's association with the area, if the populations do not form a common ecological community.
- (iii) The effect upon the patterns of intra-urban mobility of, multi-nuclei city structure, area specialization of formal information sources, and local government divisions of the city. Here concern centres upon whether intra-urban movement patterns can be spatially restricted by these factors, rather than due to an individual's locational attachments or a restricted image.
- (iv) The effect of city size upon the system of measurement of restricted lateral movement. It is felt that in a large city a corridor developing into a sector may best provide a realistic system for the measurement of restricted lateral movement, in that a corridor would in itself become a restrictive form in the outer city.
- (v) The form and role of locational attachments within

sub-areas of the city and between cities of different sizes. Here it is suggested that the predictive equation developed for Hamilton could be used to provide a basis for comparing the difference between cities, by way of attempting to explain the variation in its predictive power.

g. Measurement of the quality of the human environment.

A question which arises out of this study is that of the practical application of an understanding of residential relocation. Interest here is focused upon assessing the quality of the human environment within a city and measuring the effect of developments within the urban area over time. Ways of achieving this could involve studies of the levels of desirability, satisfaction, friendliness, social status, and stressors, that people ascribe to sub-areas of the city. Another measure could be the degree and type of locational attachments held by people within an area. To this end additional data is presented in Appendix 7.

C : Conclusion

Underlying the findings of this research is the locational attachments argument, that people living within the urban area identify themselves with their home area by some form of locational association. When they decide to move, locational associations will for some become locational attachments and these will restrict their movement to the origin home corridor, as long as the home corridor can provide the type of dwelling wanted. Beginning from the position of examining Adams' restricted image hypothesis strong support has been found in opposition to that hypothesis and in favour of the locational attachments hypothesis as the

explanation of non-random restricted lateral movement. It has also been established that locational attachments relate more to a specific group within the urban population. Therefore, it is possible to put forward a generalized model of restricted lateral movement which is seen to extend beyond Hamilton to cities of all sizes. This is that non-corridor movers are young - first time house purchasers moving with very few restraints other than the price range of the vacancy sub-set, and the corridor movers are older - previous house owners who have established themselves in an area and as a result move within the limits of corridor specific housing demands.

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APPENDIXES

Appendix 1. A Critical Assessment of the Research Designs of
Analysis used in the Study of Sectoral, Search
Space, Movement, and Images

The following criticisms of other researchers' work represents a major section within this research. However, the role of this research is one of servicing the ground rules for studying the topic of restricted images, hence its relegation to an appendix. Another reason is that the complexity of the following arguments were found to detract from the readability of the research proper. In presenting these criticisms it must be noted that they are based upon published research and in a few cases crucial information regarding methods of analysis is missing or poorly stated, so that the re-examination of the studies was made extremely difficult. The conclusion of this critique is presented in Chapter 1: Section C.

A. Sectoral Search Space and Movement

a. Adams (1969)*¹

Adams' main analytic technique is his measurement of directional movement. Unlike sectoral analysis, which is the measurement of movement within a sector of the city, directional analysis is simply the measurement of the direction of movement (figure A1:1). However, inherent in Adams' directional analysis is the study of sectoral movement for he states:

"If expectations about migration behavior and mental maps of the city are correct, the distribution of angles based on a sample of moves within a given city would approximate a bimodal distribution of angles clustering near 180 degrees and zero degrees. Relatively few angles would fall around 90 degrees, indicating that migrants chose new housing of about the same kind and age range as their former housing. Such behavior would be somewhat abnormal because people move to acquire different housing rather than similar housing" (p. 312).

*1 This argument was published in Poulsen (1972).

But the angle of move does not control movement, for a sectorally constrained move depends upon its length and origin point as well as the direction of the move (Figure A1:2). All three attributes of a move describe the destination in relation to the origin point, and are not independent variables in themselves.

Furthermore, the notion that high or low angle moves indicate movement to different housing zones, while moves falling around 90 degrees indicate movement within the same zone, is incorrect. Moves of any direction can occur within a zone, for each zone has spatial properties of its own. Likewise, interzonal movement outwards can occur at angles which fall around 90 degrees (figure A1:3). In addition, Adams' statement implies that lateral moves have the same probability of occurring as movement inward or outward. This, however, is incorrect, for under a random movement simulation design, discussed later, the potential area for lateral and outward movement was found to decrease as the origin distance from the downtown centre increases while the potential area for inward movement increases. Figure A1:4 illustrates this point, with lateral movement arbitrarily defined as movement within a sector of 30 degrees either side of 90 degrees.

The second major criticism concerns Adams' testing the data for directional bias. Put simply, his null hypothesis of directional bias in intra-urban migration was uniform directions of movement. As a result he was forced to conduct radical alterations to his data within his simulation model, so as to maintain the pattern of uniform angles. But the null hypothesis is not uniform directions of movement, but random angles of movement. To have a pattern of uniform angles, the only requirement is that every angle be approximately equally represented.

So as to examine the differences between these two different null hypotheses a simulation study of a random and sectoral set of movements was generated using an equal area polar co-ordinate system (100 x 100). The assumptions for the random pattern of 100 moves were:

- (i) The population density is invariant.
- (ii) Movers originate at random locations within the city; each location is able to generate one movement.
- (iii) Destinations were calculated at random locations within the city; each location can be selected by only one mover.

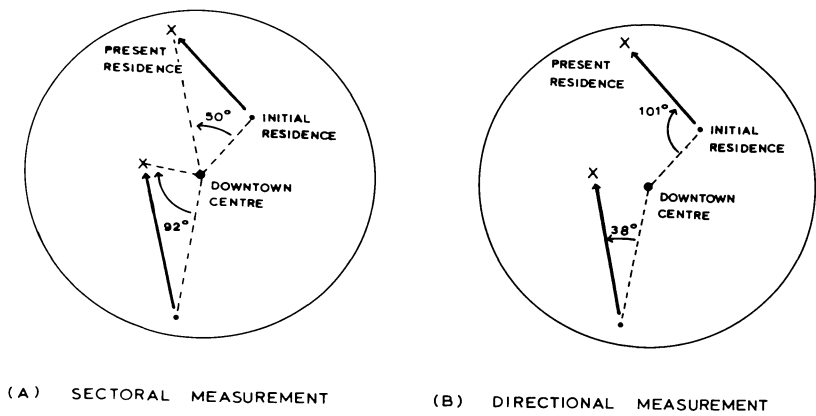


Figure A1:1

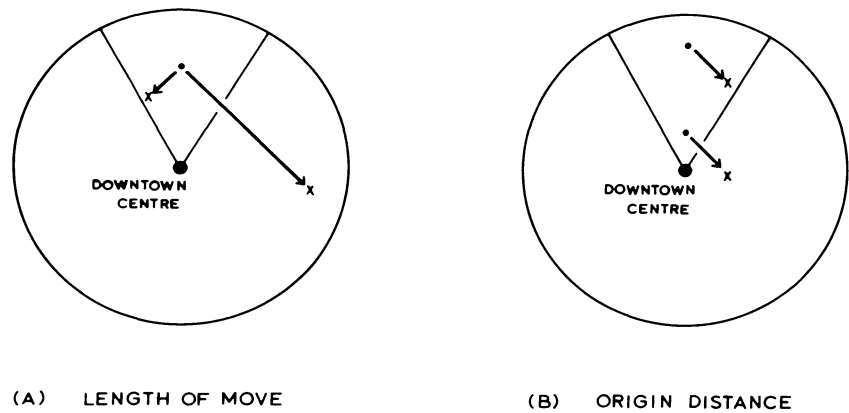


Figure A1:2

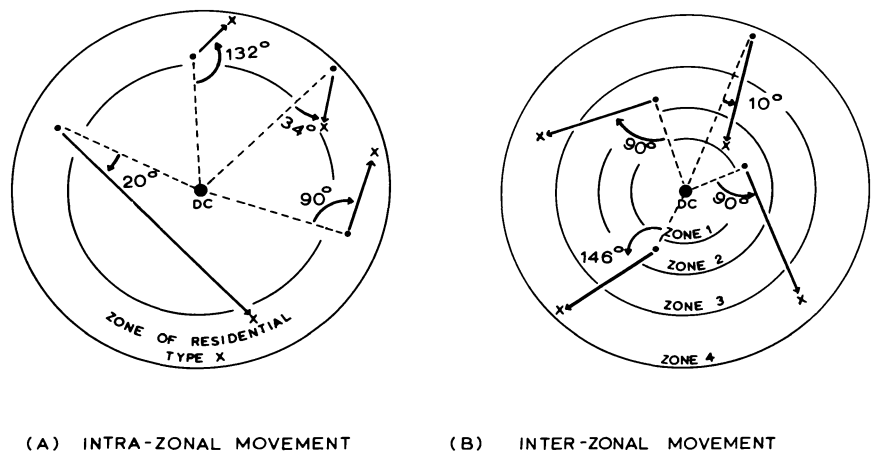


Figure A1:3

- (iv) Origins and destinations were linked by a random listing.

The assumptions for the sectoral pattern of movement differed from those used to generate the random pattern of movement in terms of the destinations. Instead of random destinations, sectoral destinations were selected for 60 of the 100 moves.

This simulation of random moves established that the pattern of angles did not conform to a uniform distribution, but rather a low angle unimodal distribution (figure A1:5a). The reason for this is that the more distant the origin point is from the downtown centre the greater becomes the potential movement inwards. Only if all origins were at the mid-point (i.e. the downtown centre) can a uniform distribution of move angles result under a random movement design, for only then is the number of possible locations equally spread about all angles.

Movement generated under sectoral simulation conditions revealed a bimodal distribution of angles with a mode in the high and low angle range (figure A1:5b). Inward movement resulting in the low angle mode included cross-city movement, while the high angle mode resulted from the increased probability of outward movement, caused by 60 percent of move destinations being sectorally constrained.

As a result of his selection of the wrong hypothesis, Adams' analysis of directional bias in intra-urban migration is criticised. But had he compared his data with the unimodal small angle distribution of the random pattern of movement, instead of with the uniform distribution resulting from random angles of movement, he would most certainly have found strong support for the acceptance of the hypothesis of directional bias in intra-urban migration patterns. Furthermore, the existence of modes representing outward movement in his data gives credibility to the sectoral concept, for such modes are the result of sectoral outward movement. However, Adams gives no indication of to what degree movement might be biased due to the form and structure of the study area.

In summary Adams' research has been strongly criticised for faults in the research design and upon theoretical arguments underlying his causal hypothesis (sections 1 and 2). But he did introduce an explanation for sectoral movement and had he examined the data correctly he would have obtained support for sectoral

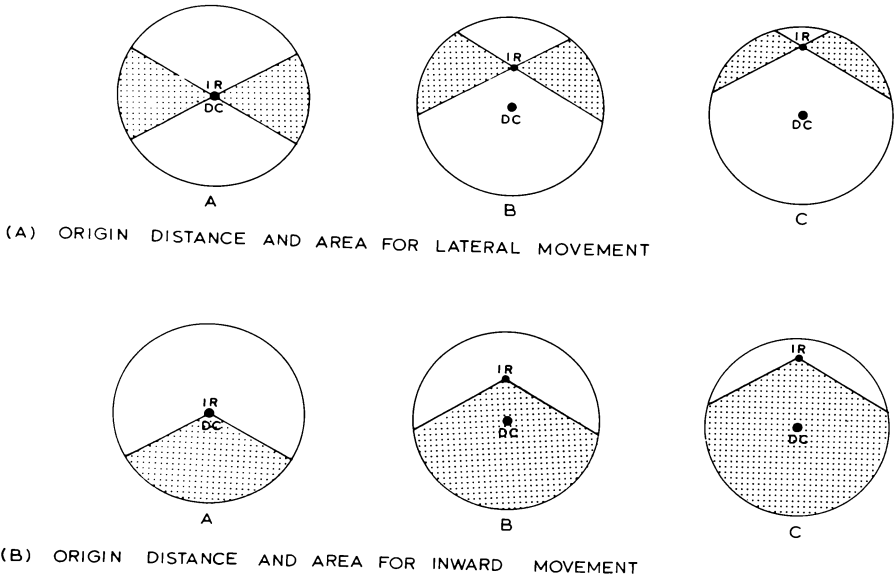


Figure A1:4

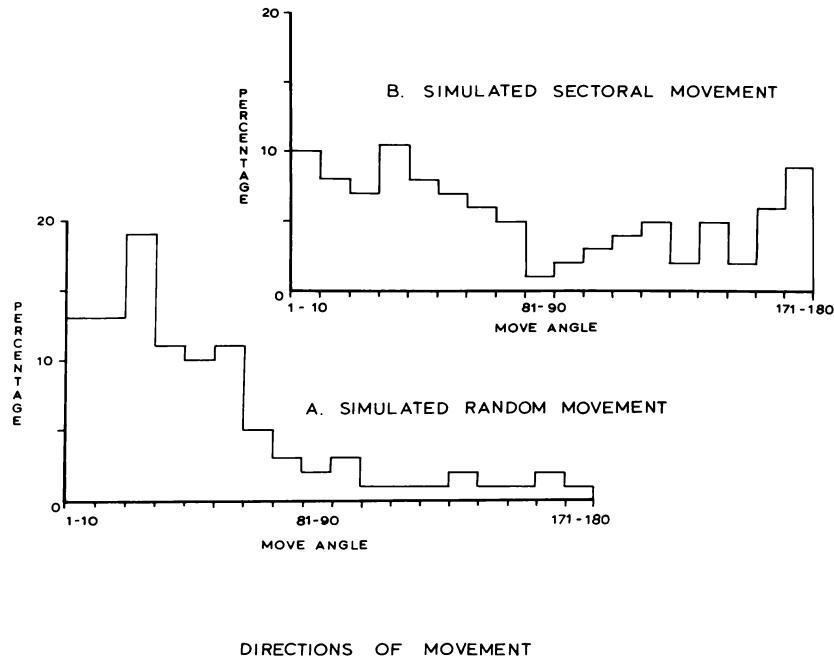


Figure A1:5

movement, although it could have been the result of the form and structure of Minneapolis and not restricted images.

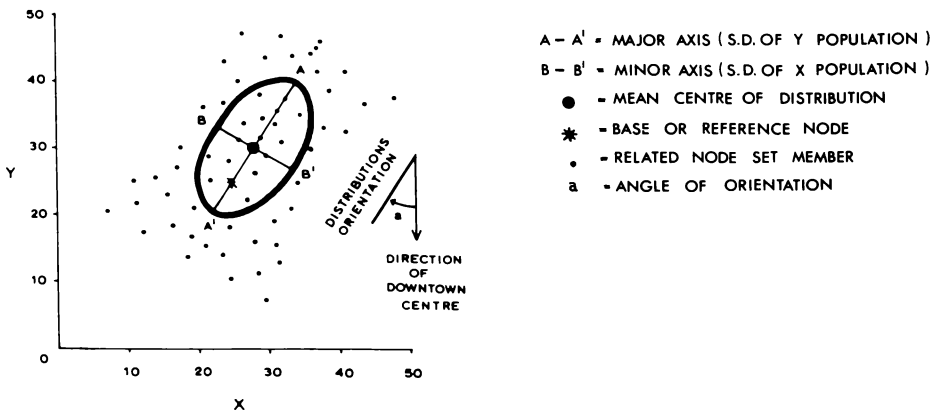
b. Brown and Holmes (1971)*¹

In their examination of the spatial form of search space Brown and Holmes first translate and rotate all the reference nodes (i.e. the location of the resident's dwelling at the time of the search) and the search node sets (i.e. the locations of all dwellings viewed in the person's search) using their algorithm 'Transmap' (Brown, Moore and Moultrie, 1969), then they apply a 'standard ellipse analysis' technique to that data (Hultquist, Holmes and Brown, 1972). The translation and rotation of the data node set is conducted so as to allow ease of comparative analysis between search node sets. It involves the rotation of all data node sets to a position where all reference nodes have a common axis, then all of the data node sets are collapsed so that all reference nodes have a common location, which is called the base node. As a result, angles and distances between the individual members of a search node set and their reference node are maintained, but their spatial positioning within the urban area and between other search node sets is lost. Standard ellipse analysis is basically an extension of the standard deviation statistic. By making each data point upon a cartesian grid a separate member of an x and y co-ordinate population, the means and standard deviations are calculated. The results form a measure of the aggregate dispersion of points in a vertical direction (x) and in a horizontal direction (y) from the mean centre. Through a method of rotation involving the correlation between the x and y populations and their respective standard deviations, the angle of orientation of the major axis is calculated and the data are then re-oriented so that the major axis and the vertical axis are the same. Measurements of the standard deviations are then recalculated and these are used as the axis of the ellipse (figure A1:6). Standard ellipse analysis thus calculates measures of dispersion about the mean centre of the population, the linear shape of the distribution, which is the ratio of the standard deviations, the angle of the orientation of the distribution, the position of the mean centre of the distribution and a measure of the dispersion given by the area of the ellipse.

Unfortunately Brown and Holmes use the measure of the linear shape of the distribution, which they call the coefficient of circularity (i.e. the ratio between standard deviations) as a measure of sectorality. They state that when the coefficient of circularity is zero, this indicates complete sectorality, and a coefficient of 1 indicates complete non-sectorality (circularity). But their use of standard ellipse analysis to measure sectorality is incorrect, for a sector is an angle of a circle and not a simple direct ratio between linear distance based upon a horizontal and vertical scale. In other words, standard deviations which are a measure of the linear dispersion of points in a distribution about the mean centre cannot be used to measure sectorality. To illustrate this point reference is made to two examples, both of which present one migrant's search space (figure A1:7). The base points can be either the initial or the present dwelling.

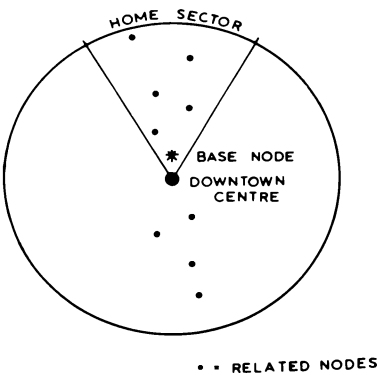
Figure A1:7a presents the situation where a migrant searches on both sides of the city. The coefficient of circularity of .23 indicates that this search space would, by Brown and Holmes' system of analysis, be regarded as highly sectoral. The second example (figure A1:7b) shows a situation where the search space is contained within the sector of residence, but the destinations are spread around the node. The resulting coefficient of circularity of 1.0, however, indicates that this search space is highly non-sectoral. As can be seen, those results are meaningless for standard ellipse analysis and its associated coefficient of circularity cannot be used to measure sectorality; the ellipse shows the degree of horizontal and vertical dispersion of points in the distribution from the mean centre, while the coefficient of circularity indicates whether that degree of dispersion is linear in form.

A further criticism of the work of Brown and Holmes concerns their use of the aggregate search space distributions as representative of average households. To obtain the average household's search space, each space should have been measured and classified separately, and only from an analysis of those group patterns could any conclusion based upon the concept of the average household's search space be presented. Thus the first of their two major conclusions which states that 'there does not appear to be support for an idea that would suggest a strong

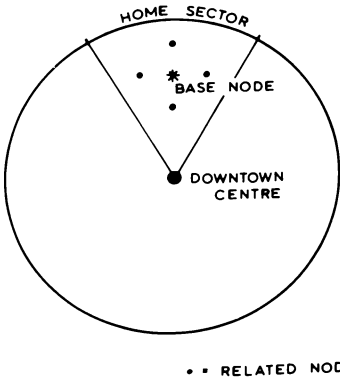
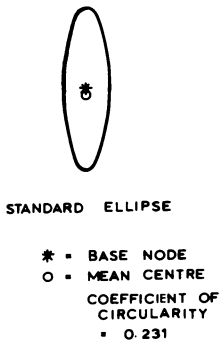


STANDARD ELLIPSE ANALYSIS

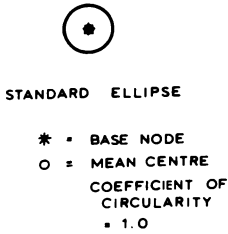
Figure A1:6



(A) NON-SECTORAL SEARCH SPACE



(B) SECTORAL SEARCH SPACE



STANDARD ELLIPSE ANALYSIS
AND SECTORAL ANALYSIS

Figure A1:7

sectoral ... bias to migrant search behaviour (in terms of) ... the initial residence site' must be rejected, for the individual's search spaces have not been examined in terms of sectorality.

Their other major finding can also be tempered with doubt, despite their claims to the contrary. They conclude that search space in terms of the selected new dwelling is circular in form with the location of the new residence near its centre, suggesting 'that search procedures are carried on in some optimising fashion, perhaps operating so as to systematically examine under spatial constraints, some perceived gradient surface of site desirability'. The first criticism of that analysis is that again they use aggregate data and interpret it as average individual patterns. It is possible that with multi-directional movement a number of patterns exists which when summed represents a circular search space. An illustration of such a possibility is given in figure A1:8, where three individual sets of non-circular search spaces when aggregated form a circular search space, with the base node and the mean centre at the same point. Therefore, secondly, the shape of the ellipse may possibly indicate that individual search patterns are random within limited areas, for a random pattern of angles would approximate a uniform distribution. Thirdly, the patterns may themselves be a product of awareness space for it may be that a person's recall ability is greatest in the area in which he now lives. Thus, by conducting interviews at a person's residence the data may be biased.

Finally, criticism is levelled at the measure of directional bias, given as the difference between the location of the base point and the mean centre of the distribution. The critical feature in measuring the mean of any distribution is the major influence of extremes and the shape of the distribution upon the mean, and thus also upon the measures of standard deviation. In the case of intra-urban migration, cross-city searches influence the position of the mean centre, simply because that type of move tends to be of greater length due to the necessity for such moves to pass over the central business and industrial area. Furthermore, the maximum distance that a move can be made within the home sector is the radial distance, whereas for cross-city moves the maximum distance is the diameter.

In conclusion, the results of Brown and Holmes' study can not be used as an attack upon the concept of sectoral movement in that

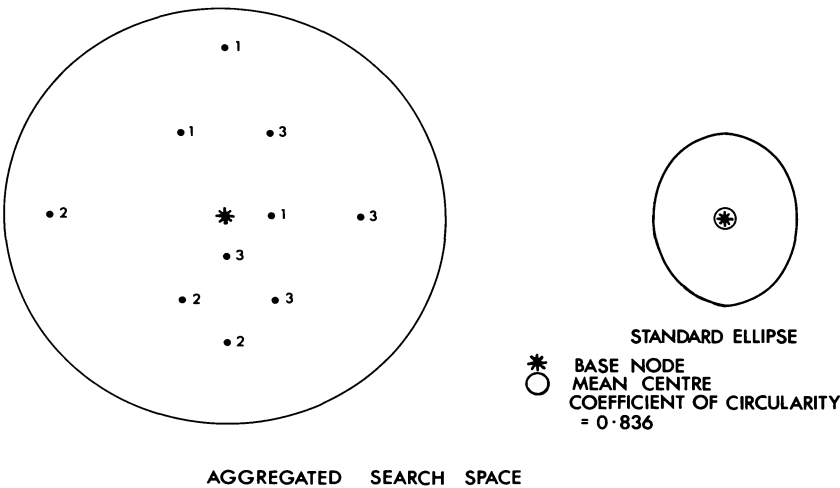


Figure A1:8

the analyses are faulty.

c:1 Clark (1971)

Clark's system of measuring sectoral bias, as any two coterminous 30 degree sectors which account for more than 50 percent of the movers, is criticized in that like Adams' analysis design it is a measure of directional bias. Therefore, as with Adams' system of analysis the same criticisms apply to this study of Clark's; principally:

- (i) That directional movement cannot be used as a measure of sectoral movement.
- (ii) That random movement does not represent a uniform distribution of angles of movement.

Besides his aggregation of angles of movement the only other major difference between the two studies is that Clark divided his population up into 36 localized cells. In other words he conducted the directional bias analyses 36 times. However, in doing so, his design is further criticized in that by collapsing each mover's origin upon a central cell reference node the exact position of the orientation node in relation to the movers origin is lost. As the bulk of movers are within the central cells, this helps to explain the low levels of so termed 'sectoral movement' in those cells.

c:2 Clark (1972)

Clark's second paper also receives the same basic criticisms as cited above, except that he does not include his comparative analysis with random directions of movement. However, two additional criticisms are:

- (i) That his evidence based upon bias in areas 1 and 2, rests upon peripheral areas with very few observations.
- (ii) That the complot plots do not appear to clearly support his conclusions about them.

Therefore, both Clark's 1971 and 1972 papers are considered faulty, and the results cannot be used to support or attack the concept of sectoral movement.

d. Whitelaw and Gregson (1971)

Their analysis design consisted of two different sets of

analyses. The first set included a 'directional bias segment analysis' and a regression analysis upon the distribution of search nodes, termed a 'sectoral bias analysis'. The second set of analyses repeats those used by Brown and Holmes (1971). In both cases the data used have been 'rotated and translated' (p. 8).

Criticisms of the first set of analyses centre about the use of rotated and translated data, and the application of the regression analysis. As previously stated, the relationship between the spatial position of the reference nodes and the orientation node is lost by rotation and translation. Therefore, in the 'directional bias segment analysis' the search nodes cannot be classified as those towards or away from the orientation node. Secondly, their use of regression analysis, upon the x and y co-ordinates of the search set, as a means of obtaining the angle of orientation in the distribution with regard to the principal axis is faulty, as is their designation of low angles as representing sectoral bias. The reason for these criticisms are:

- (i) That under regression, the decision as to which set of co-ordinates is the dependent variable affects the position of the regression line (that is if r is not equal to ± 1.0), hence the question raised is, what basis did they use for selecting the dependent variable?
- (ii) By using the radial axis as the dependent variable, the angle of the regression line depends upon the pattern of radial bias in the lateral dispersion of search nodes, and not whether the distribution was inside a sector based upon the CBD.
- (iii) The position of the estimate line at 0 degrees can be obtained under many different patterns of lateral dispersion, and not as claimed, when the search nodes are positioned along the principal axis (p. 12).
- (iv) Their attempt to give some indication to the degree of dispersal about the regression line, the measure of standard error, achieves nothing for they give no figures to compare it with.
- (v) As with the 'directional bias segment analysis', the use of rotated and translated data destroys the spatial inter-relationship between sets, in that they have mixed the related node sets of persons' searching

inwards of their origin but within the southeast sector, with those who searched upon the other side of the city.

Therefore, regression analysis cannot be used to accurately measure sectoral search space.

Criticisms of the second set of analyses, those based upon the standard ellipse analysis, have already been discussed under Brown and Holmes' (1971) usage. As with that study, the results from this research are faulty and cannot be used to examine the concept of sectoral search space.

Three additional and important criticisms are:

- (i) Their choice of a population moving into dwellings within a peripheral city of Melbourne does not provide an accurate test upon a mover's search space, in that they excluded from the study those movers who moved out of the area. Nor did they give any measure of the search spaces of other movers within Melbourne's southeast sector. Therefore the population studied was very biased.
- (ii) They assumed as the orientation node of the movers' the downtown centre of Melbourne and did not consider that of the peripheral city of Dandenong.
- (iii) As they state, the migratory movement of respondents has a degree of built-in bias, but no attempt has been made to account for the role of this factor. In their study they still assume as the null hypothesis, a pattern of random search space represented by a uniform distribution of search in all directions. The importance of this criticism is that under a state of random search a high degree of sectoral search would result, due to the relationship between the position of the peripheral city to the shape of the metropolitan area and the selection of the orientation node as the downtown centre of Melbourne.

Therefore, although apparent from their diagrams that this populations' search space was sectoral, it must be concluded that their findings are not accurate, due to the use of faulty systems of analysis and the selection of a very biased population.

This paper followed exactly the same procedure of analysis as used by Adams; that is they measured directional bias, interpreted it as sectoral movement, and tested the degree of directional bias against a random distribution of moves represented by a straight line. The previous criticisms directed at Adams' analysis design apply to this research, therefore, the results are viewed as faulty.

f:1 Donaldson (1973)

The principal criticisms of Donaldson's study have already been stated (Chapter 1: Section B), however, in terms of his analysis design criticisms are levelled at each of the study's three sections. The first topic, the familiarity image, is left to the discussion of Donaldson and Johnston's paper.

From his study of search space, the first criticism centres upon why he did not explain the finding that the intra-urban group whose origins were outside of the northwest sector, had unbiased search spaces. Under Adams' hypothesis all persons have restricted images, therefore, that population should have searched within their home sector. Nor did he study the search space of movers who moved outside of the northwest sector. Therefore, his findings on the relationship between mental images and search space and movement relate only to that population which stayed within the northwest sector. Secondly, his finding that "the respondents within each group evidently searched in practically the same area" (p. 27), based upon results from standard ellipse analysis, is criticized, for after rotation the data have no remaining spatial properties between individual sets of observations, except their lateral distance of the search nodes from the principal axis and their radial distance from the orientation node. Finally, as with Brown and Holmes' research, his statements upon the mean centre of the search space and move distributions are erroneous. But support is given to his use of 'rotated only' data and a 30 degree unsigned sector in the measurement of sectoral search and movement.

B. Restricted Sectoral Image

f:2 Donaldson and Johnston (1973)

The first criticism with this study relates to the fact that

their definition of familiarity, 'as how well they knew their way around both minor and major streets in suburbs', is full of problems, of which three of the most important are:

- (i) That definition of familiarity emphasizes the importance of direct activity space within the source of information used, as opposed to the use of formal information sources. But in doing so, there is no evidence to support Adams' claim that the use of formal information sources is limited to the area of a person's direct activity space. Therefore, as direct activity space tends to be highly localized about the home origin, it is not surprising that images obtained were highly localized. Also, the use of the term 'streets' probably emphasizes a localized image, in that a person's knowledge of the names of street is likely to be very localized and limited (Lynch, 1960; Orleans, 1966; Adams, 1969). However, it could be argued that to know an area a person does not necessarily have to know the streets by name.
- (ii) There is no theoretical link between the knowledge of minor and major streets and the familiarity image required to make use of formal information sources. Within New Zealand, the spatial unit by which almost all housing is advertised is the suburb. Very rarely is the street name given, and if the area is not well known its name is usually linked with, or replaced by, an area that is.
- (iii) There is the lack of a comparative base between individual's familiarity assessments, as there is no quantitative measure of how much the person does know. Most likely, ratings on familiarity given by each individual reflect a comparative assessment based upon an unknown area.

Secondly, they did not examine the images in terms of an individual's image, but rather localized images of locational aggregates. The criticisms of that approach are:

- (i) The localized image cannot be directly equated with a restricted image, in that the former does not set a quantitative limit upon the degree of knowledge that

a person must have to know an area, whereas the latter does.

- (ii) Although not limited to this study, a major criticism is levelled at their use of aggregated familiarity as representative of an individual's familiarity. The argument favouring locational aggregations is that the general behaviour of a group cannot be predicted from an individual member's, but the converse also holds true in attempting to use the group's behaviour to examine that of the individual's. Therefore, unless the individual's images within a locational group are the same, two major problems arise from using that group's mean scores as representative of an individual's image:

1. The mean scores do not include the variability within the group.
2. Aggregations by location makes the location an important variable within the image, in that the probability of common high scoring within the group is greatest in the local areas. Therefore, the mean scores falsely highlight the sectoral form of the image.

As a result, Donaldson's (1973) use of locational aggregations and mean scores makes his interpretation of the localized images suspect. The only acceptable tests of the sectoral image concept appear to involve either one of two methods; the first is to follow Johnston's (1972a) research design of aggregating the population by common images and then to examine if those images are related to the origins of the movers, or secondly, to examine individually each mover's image. The latter approach is the better but more complex method, as the former still involves the problem of the groups' mean scores destroying some of the variability in the images, although to a much lesser degree than for locational aggregates.

Finally, there are three additional criticisms of their research methods which are important in considering the strength of their findings:

- (i) No statistical tests of the difference within or between groups familiarity were conducted.
- (ii) The intra-urban movers previously living outside the

northwest sector were not examined in terms of their home sectors. Nor did they examine the images of movers who moved outside the northwest sector.

Therefore, the findings presented are very biased, in that they only relate to the population that moved within the northwest sector.

- (iii) It is not possible for them to compare the scores between groups, in that the groups do not have the same underlying factor structure.

In conclusion Donaldson's (1973), and Donaldson and Johnston's (1973) research is faulty, primarily in terms of the fact that they did not examine an individual's restricted familiarity image, nor in the case of Donaldson (1973) that the explanation of sectoral movement was the restricted image. It was concluded in Chapter 1: section B that all Donaldson (1973) established was that localized familiarity images were associated with sectoral search space and movement. Furthermore, counter explanations suggested are that the pattern of sectoral movement was the result of urban structure, in that the study area included the main high class sector of Christchurch, or that it was the result of a mover's preference to stay within its home sector. The foregoing examination of the systems of analysis alters the generality of those conclusions, in that it established that the findings upon the mover's image related only to those moving within the northwest sector. In fact, all that has been found between these two studies is that a large proportion of those households which purchased a new residence within the northwest sector were movers from within that sector, who searched primarily within that sector, and at an aggregate level were highly familiar with their home area and surrounding areas. Finally, the developments of Horton and Reynolds' system of analysis are seen as incomplete. Therefore, in total these two studies cannot be considered as giving evidence for or against the restricted image hypothesis.

G. Horton and Reynolds (1971a, 1971b)

Because they did not set out to examine the concept of restricted images, but rather 'action space', no major criticisms are raised with their research. However, their results cannot be directly equated with Adams' concept of individual's possessing a restricted image based upon their home sector, for firstly their

images are localized familiarity and preference images, and secondly they are those of locational aggregates.

h:1 Johnston (1971)

The first of three criticisms with this paper, is based upon his introductory statement that "the purpose of the present paper is to inquire whether Christchurch residents do indeed possess such sectoral maps (i.e. Adams' limited images)" (p. 64). Rather his study examines desirability images and the finding of sectoral images in effect is a challenge to Adams' hypothesis of the cause of sectoral movement and not support for him. Secondly, the use of locational aggregates to examine an individual's image is not supported as a test of Adams' hypothesis. Thirdly, excluding the southern hills group, the pattern of residuals for the nine locational groups do not give 'clear support' to a sectoral pattern, but rather a dominant localized image.

h:2 Johnston (1972a)

A major criticism of this paper relates to his definition of 'activity space' as the mental image examined. Horton and Reynolds (1971a, p. 37) define activity space as "the sub-set of all urban locations with which the individual has direct contact as a result of day to day activities", and Brown and Moore (1970, p. 8) define it as "the households day to day activities which yields information from direct contact". But Johnston (p. 210) changes the concept to "the districts more preferred as living areas than their perceived social standing would suggest", which is more the concept of the preference or desirability set. Therefore, he has not examined activity space as such.

His definition of the relevant 'action space' of an individual's search for a new dwelling as, a person's perception of housing quality in terms of an area's social standing (pp. 201-202), is also suspect, for there does not appear to be any conceptual reason behind this definition. Horton and Reynolds (1971a, p. 37) more accurately define action space as, "the collection of all urban locations about which an individual has information and the subjective utility or preference associated with these locations". In effect their definition is a selected portion of a person's awareness space, which is a more complex concept than Johnston's 'social standing'.

The third criticism with this paper is that it is not possible to establish untested links between attitudes and behaviour as Johnston tends to do, for even in the very advanced studies into the much simpler field of consumer research that link has been found to be very tenuous. This must be more so when the population is that of students who are not home purchasers, and are unlikely to have ever experienced the complexity of a housing decision. Furthermore, this use of desirability ratings can be criticized in that the underlying assumption is complete freedom of choice. His conclusion, "that activity spaces ... are constrained by distance and directional influence to produce sectoral mental maps based around the resident's homes" (p. 210), is also questioned in light of the evidence produced within that study, to the extent that the conclusion is seen to be not a correct interpretation of the results. Rather support is given to an earlier conclusion, "that the hypothesis of sectoral patterns has not been proven false, though it may be presumptuous to pronounce its validity" (p. 206). Finally, his limitation within the grouping system of two or three groups is seen as an unfortunate restriction upon the use of the technique of aggregating common images, in that it forces localized desirability groupings to amalgamate and in so doing lose their locational identity. This is particularly important when within the data set there will exist deviant images whose inclusion works towards destroying the locational groupings.

In conclusion, only the second of these two studies has an analysis design which could provide an accurate study of the notion of localized images. However, the population studied were not movers and they were given an unrealistic freedom of choice. Furthermore, the grouping system greatly restricted the testing of localized images. Most importantly for the study of Adams' concept, the localized images examined were not activity or action space, but desirability images, which suggest that the relocation decisions may be based upon a mover's preference for staying within the home sector.

Appendix 2. Computing of Relative Dispersion

'Relative dispersion' is a standardized measure based upon the ratio of the observed distribution of mover's origins or destinations and an expected distribution of origins or destinations. The expected distribution is that all movers origins or destinations are uniformly dispersed about the orientation node. Thus the ratio is a measure of clustering which takes into account each sub-sets own spatial position within the city, and thus allows for meaningful comparisons between the sub-sets patterns of dispersion.

Method of Computation

a. Generate a uniform distribution of related nodes for each sub-set.

- (i) The computations are based upon a quarter of the theoretical circular form of a city (figure A2).
- (ii) The radial distances of the related nodes from the orientation node for each sub-set were grouped into 400 metre zones (1, 2, 3), and then the proportion of movers in each zone computed.
- (iii) A series of 400 metre lateral distance groups from the orientation node were established (A, B, C).
- (iv) To establish the proportion of related nodes (i.e. origins or destinations) within each lateral distance group:

- (1) The angle is measured between the principal axis and the mid-point intercept, formed by the mid-point of each radial zone with the outer limit of the lateral distance group (A1, A2, A3, B1, B2, C1). The proportion of radial zone's destinations within each lateral group is that angle divided by the maximum angle. Given the total city, this would be 360 degrees, but here unsigned movement either side of the principal axis is used, hence that angle is 180 degrees.

To display this system the following example is presented based on figure A2.

$$A1 = 90 \text{ degrees} / 180 \text{ degrees} = .50 \text{ or } 50 \text{ percent}$$

of the related nodes of radial group 1

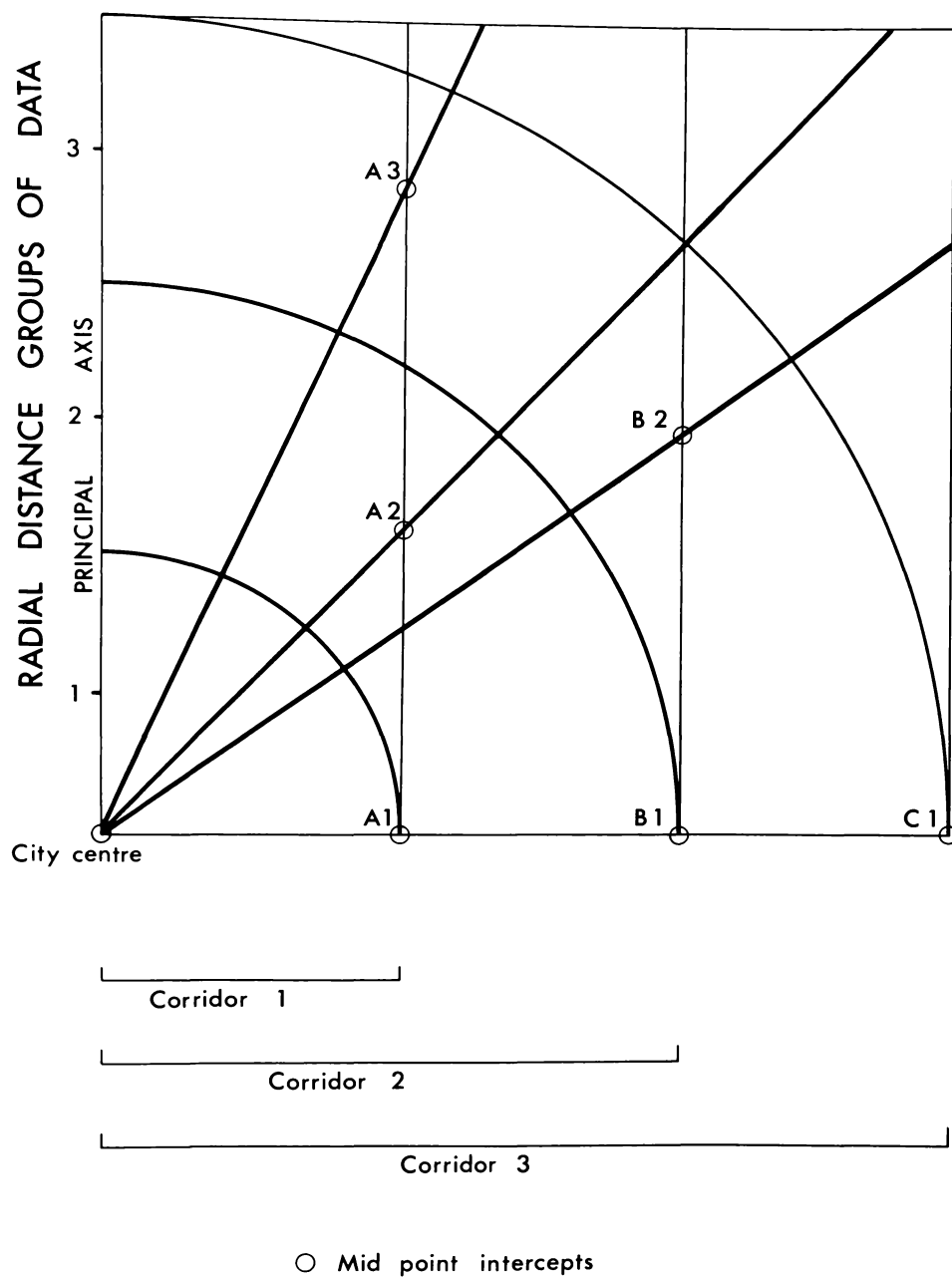


Figure A2 System For The Dispersion Of A Uniform Distribution Of Nodes.

will be distributed in lateral distance group A.

A2 = $42 \text{ degrees} / 180 \text{ degrees} = .233$ or 23.3 percent of the related nodes of radial group 2 will be distributed in lateral distance group A.

A3 = $24 \text{ degrees} / 180 \text{ degrees} = .133$ or 13.3 percent of the related nodes of radial group 3 will be distributed in lateral distance group A.

- (2) The total number of related nodes expected in each lateral distance group is obtained by multiplying and summing the proportion expected in each lateral zone and the number of related nodes in each radial group (table A2).

Having computed these figures for all lateral distance groups the frequency of related nodes at each lateral distance from the orientation node under a uniform distribution design is known. These figures are also used for the distribution of related nodes in a radial direction under a uniform distribution design.

b. Computing the expected distributions dispersion.

This is computed in the same way as for the observed data; that is the standard deviation of the related node set along both the X and Y axes from the centroids of each area. Note that the figures for the expected distribution are repeated on both sides of the orientation node for both X and Y axes.

c. Ratio of relative dispersion.

Simply the observed standard deviation divided by the expected standard deviation.

Table A2Computing Expected Frequency of Related Nodes In Lateral Distance
Group A

Lateral Distance Group/Zone	Radial Distance Groups Frequency	Expected Proportion Lateral Distance Group	Expected Frequency
	(a)	(b)	(a x b)
A1	50	.50	25.00
A2	33	.23	7.59
A3	17	.13	2.21
			<u>34.80</u>

Appendix 3. Computing the Degree of Expected Corridor Movement

In sectoral measurement each sector is an equal sub-division of 360 degrees and has the same probability of receiving the same proportion of movers under a random movement design (figure A3, C). As a result the expected pattern is a uniform distribution of moves in each sector. But this assumption does not hold for corridor measurement, for under that design each increment to the corridor's width has proportionately less of the city due to (1) the circular form of the urban area, and (2) that corridors cut across the density pattern of an urban area (figure A3, D). The result of that is each corridor width has its own expected proportion of moves, which varies according to its distance from the orientation node and the sub-sets density pattern (figure A3, A and B).

Method of Computation

To compute the expected degree of corridor movement within each corridor, under the assumption of random movement from origins or to destinations invariantly distributed about the orientation node upon an isotropic surface, the following system was used.

- (i) The origin half of the city was divided up into 400 meter radial and lateral distance zones.
- (ii) The proportional distribution of each sub-sets related nodes (i.e. origins and destinations) within each lateral distance zone was computed following the system presented in Appendix 2a. Here the maximum angle was 180 degrees.
- (iii) The total frequency of related nodes in each lateral distance group were successively cumulated outward from the orientation node, giving the expected number of movers in each successive home corridor (figure A2).

The resulting figures are used in the tests for corridor bias in the same way uniform angles of movement are used in the tests for sectoral bias.

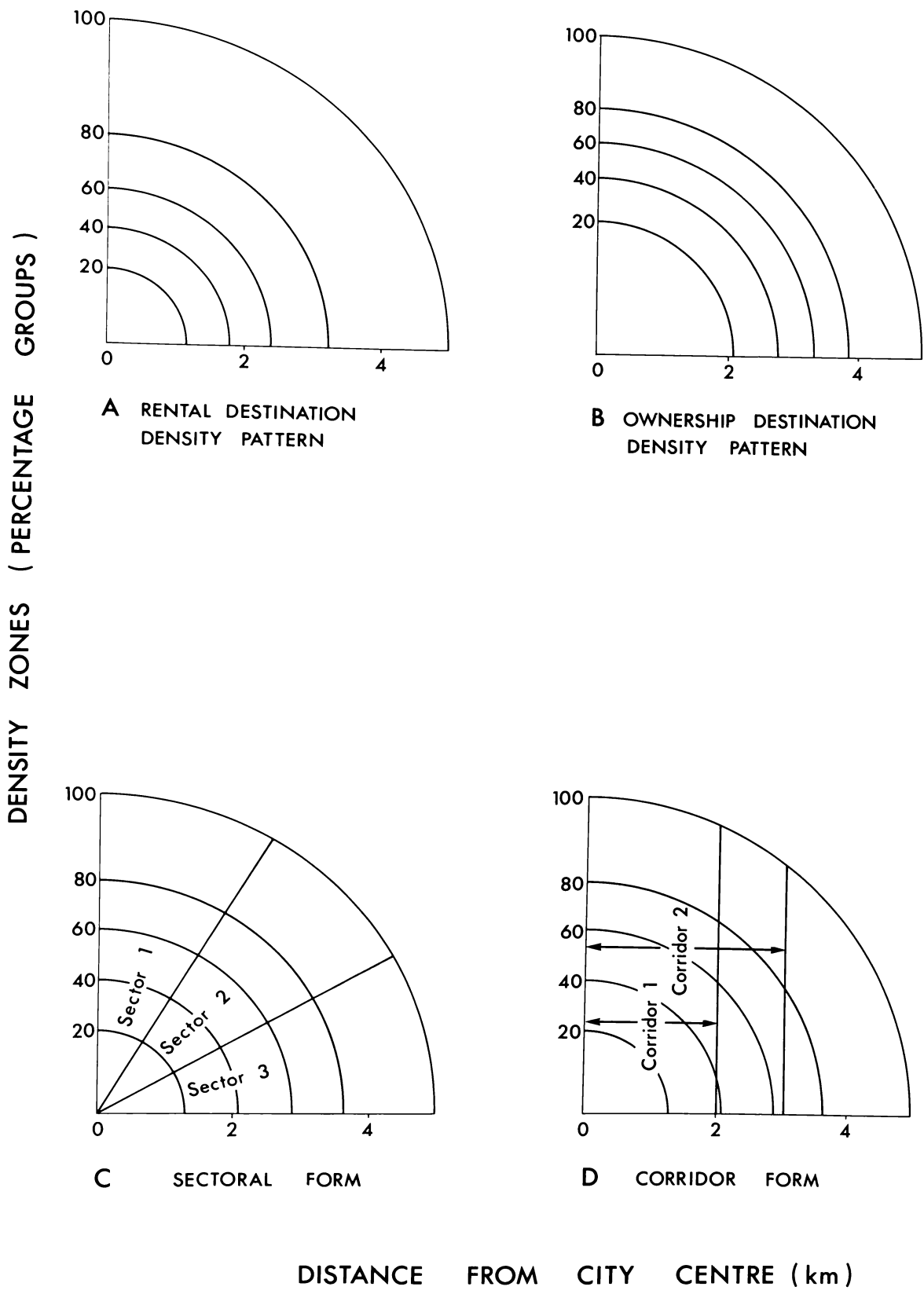


Figure A3 Differences Between The Sectoral And Corridor Forms Of Measurement.

Appendix 4. Interconnectivity Matrix Analysis

As an example of this system of analysis a matrix based upon four areas was developed giving the proportion of moves directly between areas (table A4:1). For this example 20 movers from Area A are taken as the base population and the interconnectivity matrix is generated for three moves. The object is to establish what proportion of movers from Area A will move through the inter-area movement matrix and arrive at Area C by the end of three moves.

On the first move 40 percent (8) of movers from Area A will stay within Area A, 15 percent (3) will go to Area B, 21 percent (4.2) will go to Area C, and 24 percent (4.8) will go to Area D. Therefore, the 4.2 movers to Area C are stored as they have reached the destination after one move.

On the second generation the movers to destinations are redistributed according to the individual area profiles of table A4:1. The results are presented in table A4:2a. After this second move the numbers are totalled by destination areas and those for the selected destination are added to the total already in that area. In this case the 3.41 for the second move are added to the 4.2 for the first move, giving a total of 7.61 movers in that area. For the third and any subsequent generations the same process of redistribution is conducted. For this example the third generation is presented in table A4:2b.

In total for three generations 10.39 movers from Area A would have arrived in Area C or 51.96 percent of the movers.

Note that in the situation where the origin and destination were the same the same procedure was followed.

For the actual analysis within this study this procedure was conducted for each of the 27 areas, with each of the areas as a destination. In otherwords $27 \times 27 \times 5$ times. Also the number of moves which arrived at the destination area after the 5 generations were calculated as the proportion of movers from that area so that different area profiles could be compared.

Table A4:1

Proportional Distribution of Moves

Origin Areas	Proportional Distribution of Moves (Percentages)			
	Destination Areas			
	Area A	Area B	Area C	Area D
Area A	40	15	21	24
Area B	26	18	29	27
Area C	35	26	23	16
Area D	24	38	18	20

Table A4:2Interconnectivity Matrix After Two and Three Generations

Origin Areas	N	Number of Movers			
		Destination Areas			
		Area A	Area B	Area C	Area D
<u>a. After Two Generations</u>					
Area A	8	3.20	1.20	1.68	1.92
Area B	3	0.78	0.54	0.87	0.81
Area D	<u>4.8</u>	<u>1.15</u>	<u>1.82</u>	<u>0.86</u>	<u>0.96</u>
Totals	15.8	5.13	3.56	3.41	3.69
<u>b. After Three Generations</u>					
Area A	5.13	2.05	0.77	1.08	1.23
Area B	3.56	0.93	0.64	1.04	0.96
Area D	<u>3.69</u>	<u>0.89</u>	<u>1.40</u>	<u>0.66</u>	<u>0.74</u>
Totals	12.39	3.87	2.81	2.78	2.93

Appendix 5. Desirability Images

As stated previously (Chapter 7), desirability ratings cannot be directly equated with awareness space in that they are a combination of the mover's preferences, familiarity, and social status ratings. However, awareness space is probably a major element behind a person's desirability ratings and because of this the results of the analysis of movers' desirability ratings over the 26 areas are presented briefly here, following the same general schema as used in the study of preference, social-status, and familiarity ratings.

The question asked was:

According to whether you consider the area to be desirable in which to live would you please place the area cards upon the given scale;

1. Highly desirable.
2. Desirable.
3. Satisfactory.
4. Undesirable.
5. Highly undesirable.

a. General Image.

The mean scores of desirability over the 26 areas (figure A5:1) established a pattern similar to that of the economic typology grouping of areas. This relationship was supported by a one-way analysis of variance upon that data, with the expected trend of the decline in mean values of desirability down through the typology levels (table A5:1).

b. Localized Image.

In testing for a localized image the t-tests upon the locationally aggregated groups' scores over the 26 areas (figure A5:2) compared with the scores of the total population established no clear pattern of heightened desirability with the origin corridor. However, by destination, a localized image was established for Corridors 1, 2, 3, 5, and 6.

From the principal axis-factor analysis seven factors were extracted, which accounted for 58.56 percent of the total variance in the data. When mapped the factor loadings greater than .4 displayed a spatial grouping of factors, which indicated that the

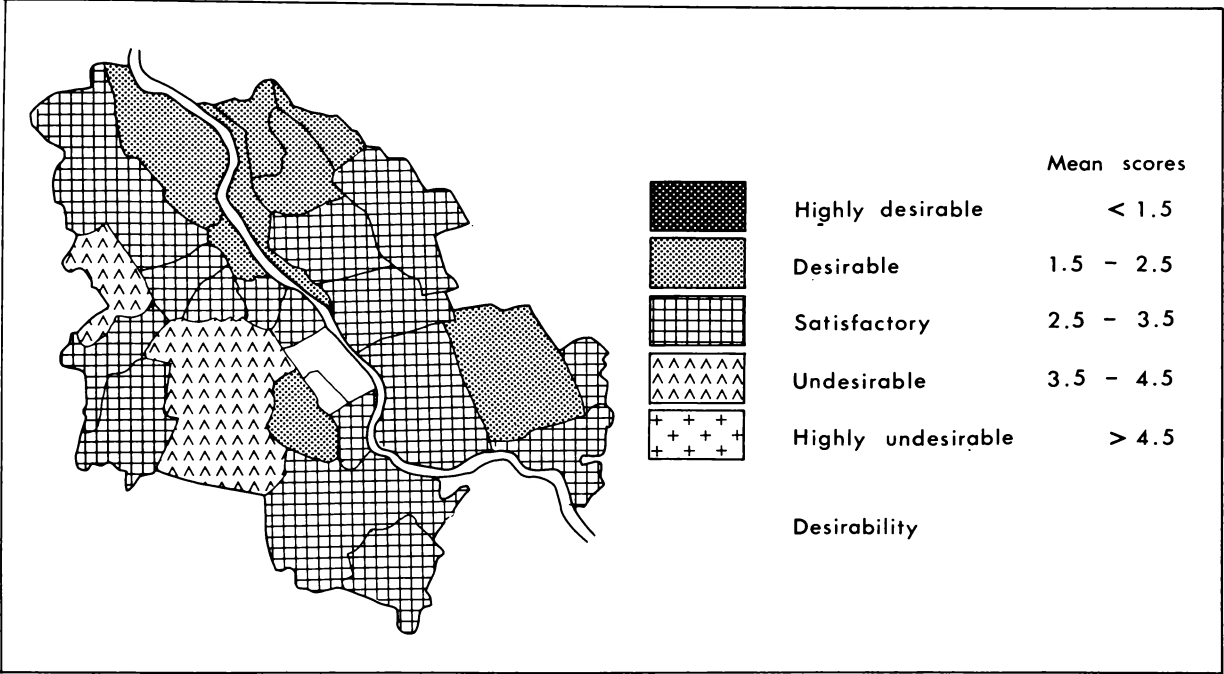


Figure A5:1 Distribution Of Mean Desirability Scores.

Table A5:1Desirability, Comparison Between Typology Groups Mean Desirability Scores

Typology Groups	Mean Desirability Scores Total Population
<u>High Economic Level Old</u>	
Beerescourt	2.18
Hamilton Lake	2.16
River Road	1.94
Group Mean	2.093
<u>High Economic Level New</u>	
Dinsdale	3.17
Glenview	2.80
Chedworth	1.81
Chartwell	1.95
Queenwood	1.88
Riverlea	2.60
Group Mean	2.368
<u>Medium Economic Level New</u>	
Te Rapa	3.29
St Andrews	2.00
Livingston	3.17
Melville	3.29
Enderley	3.07
Hillcrest	1.98
Silverdale	3.20
Group Mean	2.857
<u>Medium Economic Level Old</u>	
Forest Lake	
Norton	
Maeroa	
Fairfield	
Hamilton East	
Group Mean	3.106
<u>Rental Old</u>	
Whitiora	3.34
Hamilton North	3.34
Frankton	4.17
Hamilton West	3.31
Claudlands	3.22
Group Mean	3.476

Analysis of Variance F Ratio $5.91 > 2.84$
at .05 level, 4 and 21 d.f.

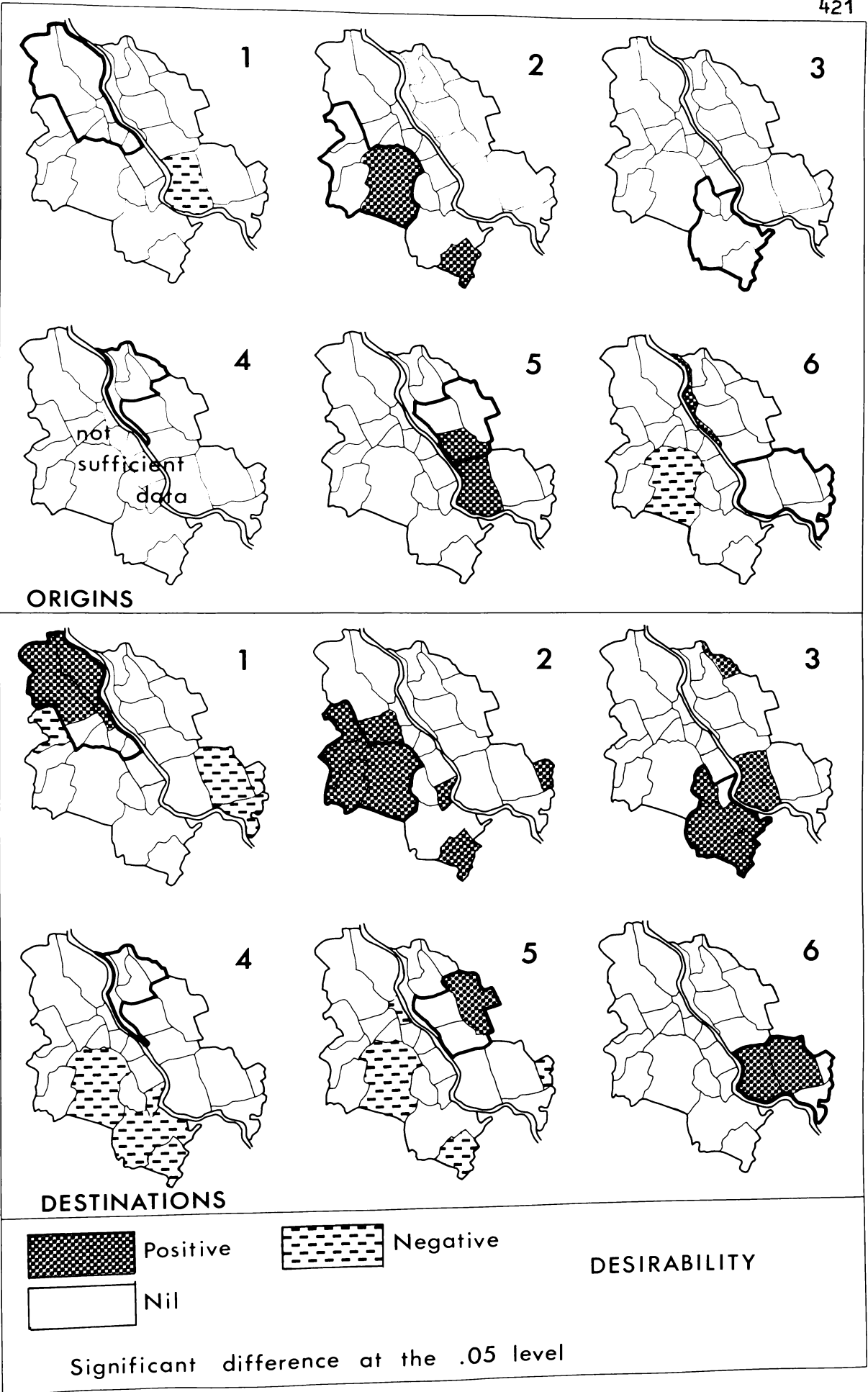


Figure A5:2 Statistical Tests For A Localized Desirability Image.

dimensions were localized, although a secondary feature is the mixing of factors (figure A5:3). Using the factor scores to test for localized images, by comparing those of each aggregated corridor grouping and the total populations, no general support for a localized image based upon the movers' origin was found (table A5:2). But by destinations localized images were found in Corridors 1 and 3 (table A5:3), although even this does not lend strong support to the concept of localized images.

c. Individual's Image.

The hierarchical profile grouping analysis of individual's desirability profiles established the following groupings of images (figure A5:4a and b);

- Group 1. The factor profile suggests a very mixed image based upon Corridors 2, 3, and 4. Also Corridor 1 could be included, except for scores upon factor 4. Therefore, the identified image includes all four corridors. However, the mean scores profile does not support a restricted image or a biased localized image outside of Corridors 1 and 4.
- Group 2. High mean scores on Corridor 6 and factor 5, plus that factors association with Corridor 4, suggest that this image is biased upon Corridors 6 and 4. However, the mean scores profile only loads highly on Corridor 4, which tends to support a localized image centred upon Corridor 4 and not upon Corridor 6. The rest of the image is seen to be restricted, therefore, it is concluded that this image is a restricted image for those with origins or destinations in Corridor 4.
- Group 3. Clearly the factor profile indicates that this image is not related to any positive structure, but appears to be based upon low scores on Corridors 1 and 6. Therefore, this group's image cannot be classified as either a restricted or a localized image.
- Group 4. Similar to Group 3 this image is biased towards low scores upon Corridor 4 and cannot be

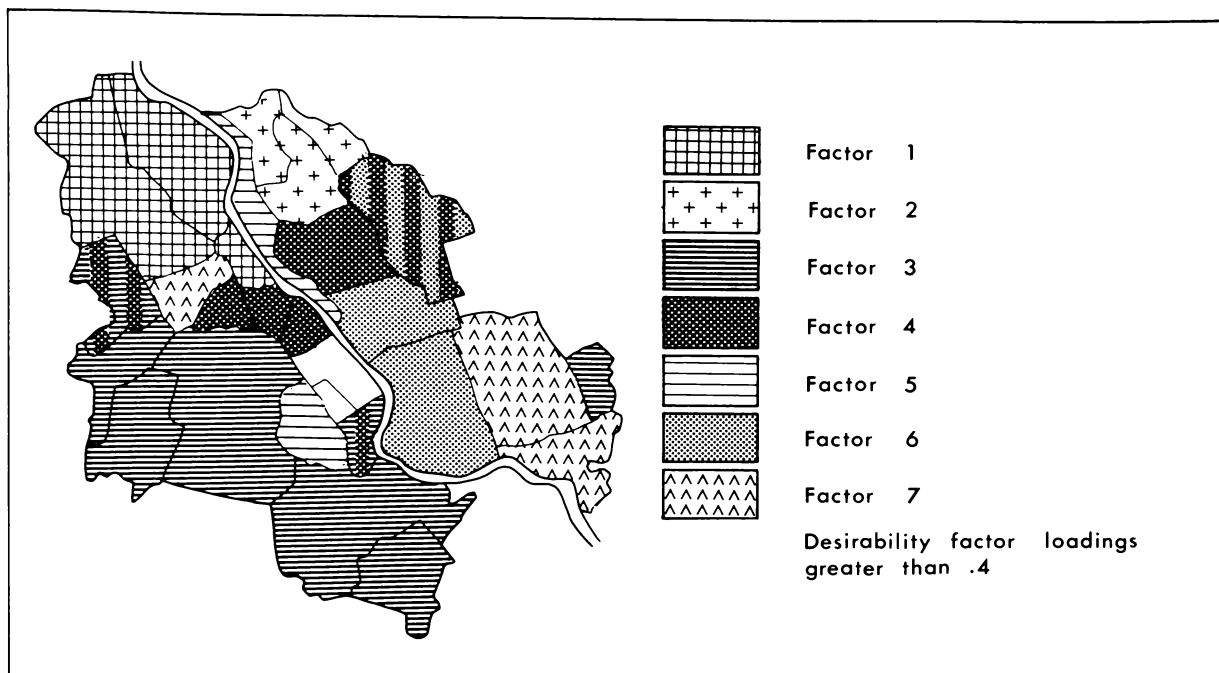


Figure A5:3 Distribution Of Desirability Factors.

Table A5:2

Tests Between Origin Groups and the Total Populations Mean
Desirability Scores Upon Each Factor Corridor

Origin Groups		Significant t-test Values					
		1.	2.	3.	4. ¹	5.	6.
Factor Corridors							
	Factor Number						
1	1	---*	1.69				
1	4	---*					
2 3	3		---*	---*			
4	2				---*		
5	6					2.75*	
6	7						---*

* Expected Significant Results
 Significance Level .05, t-tests.

1 Not sufficient observations.

Table A5:3

Tests Between Destination Groups and the Total Populations Mean
Desirability Scores Upon Each Factor Corridor

Destination Groups		Significant t-Test Values					
		1.	2.	3.	4.	5.	6.
Factor Corridors							
	Factor Number						
1	1	3.53*					
1	4	-----*					
2 3	3		4.80*	2.99*	-2.71	-3.04	-1.69
4	2				-----*		
5	6					-----*	
6	7						-----*

* Expected significant results

Significance level .05, t-tests

- Group 5. classified as a restricted or localized image. Following the same pattern as the previous group except that here the group has high positive scores upon all corridors, which is reflected by the mean scores profile, no localized image is apparent.
- Group 6. This group's image has high mean factor scores upon the westside corridors plus factor 5. However, the mean scores profile in no way supports that image as a restricted or localized image.
- Group 7. The factor scores profile suggests an image based upon Corridors 1, 4, and 6, which possibly could be extended to include Corridor 5. Marginal support for this image as a localized image is given by the mean scores profile.
- Group 8. With an extreme bias towards Corridor 5 and against all but Corridor 1 this grouping was too small to establish any localized image.
- Group 9. Biased towards Corridor 4 the spatial location of the observations tend to suggest that this group like the previous one is a feature of a pattern of extreme values and no basic pattern of desirability.

In summary, only two of the nine groups were found to have an image profile which approximated a localized image. A total of 27 of the 123 movers (22 percent) were found to hold a localized image and to be correctly located by either their origins and destinations. For intra-urban movers 11 (13 percent) were correctly located by their origins and 21 (25 percent) by their destinations. One of those groups' images can also be viewed as a restricted image with 6 of the intra-urban movers correctly located by destination. Therefore, from both the analyses at the aggregate and individuals level the general conclusion is the lack of a clearly localized desirability image. This is seen to be the result of the movers high level of agreement upon the general level of desirability of all the areas of Hamilton, which suggests again that movers held a high level of knowledge of all areas of Hamilton. As a result movers were not restricted by their knowledge of the city from making an accurate assessment of all possible areas for relocation

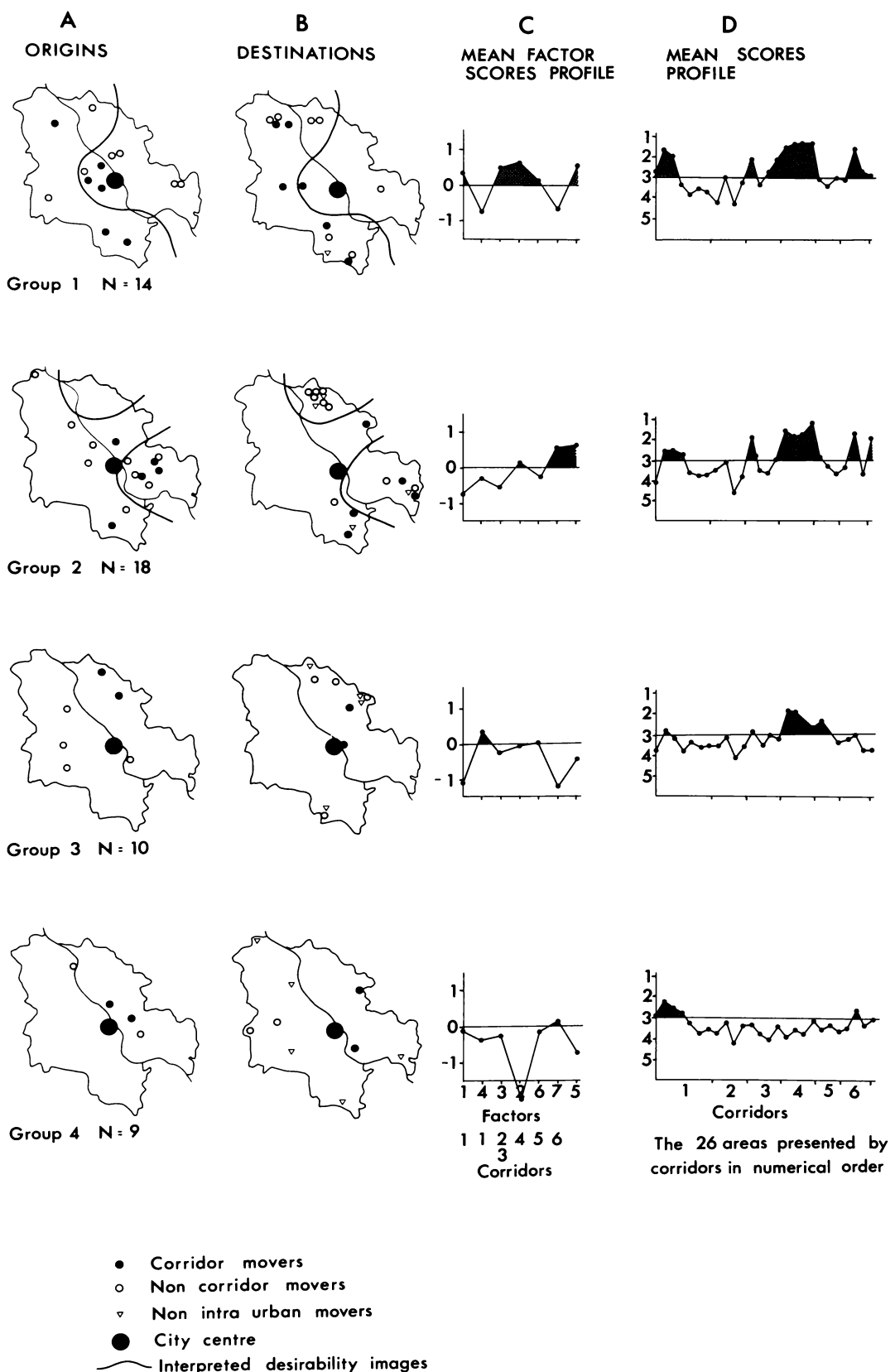


Figure A5:4a Analysis Of Individual's Desirability Images.

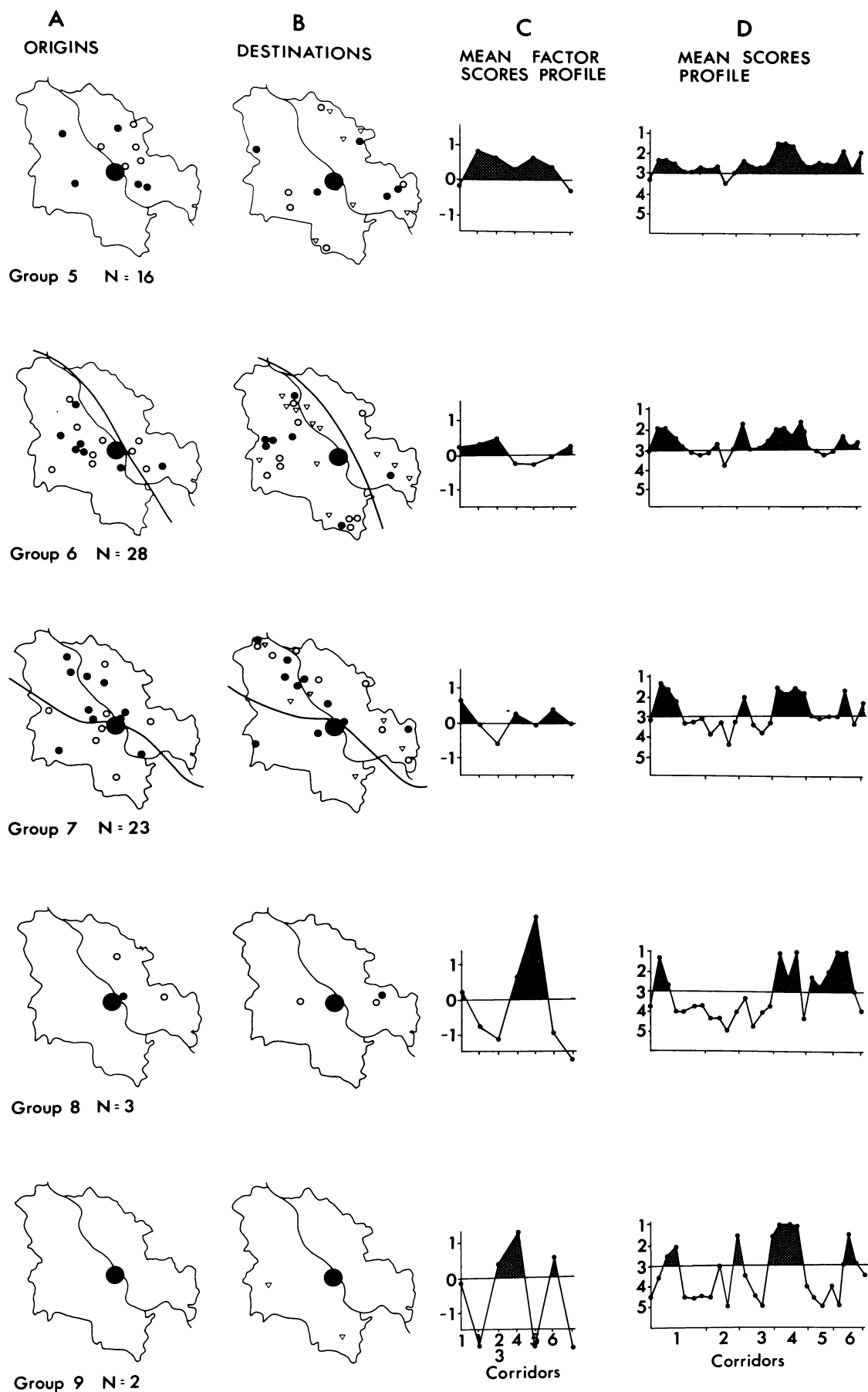


Figure A5:4b

Analysis Of Individual's Desirability Images.

throughout the city.

d. Corridor and Non-Corridor Images.

In comparing the desirability scores between the corridor and non-corridor sub-sets a statistical difference was found by origin corridors, in which the corridor population had the highest mean desirability score (table A5:4). However, by destinations no significant differences were found, although the mean score for corridor movers was higher. These findings further suggest that corridor movers held a higher degree of attachment to their origin home corridor, and as a result moved within their home corridor.

Table A5:4**Comparative Tests Between Sub-sets Desirability Factor Scores**

Sub-sets	Origin Home Corridor	Destination Home Corridor
a. <u>Mean Factor Scores</u>		
Corridor ¹	0.52	0.40
Non-Corridor	0.14	0.32
Non-Intra-Urban		0.34
b. <u>t-Test Values</u>		
Corridor/Non-Corridor	2.02*	0.44
Corridor/Non-Intra-Urban		0.32
Non-Corridor/Non-Intra-Urban		0.15

* Significantly different at the .05 level
t-Test (unsigned)

1 Difference in Corridor mean scores relates to corridor
movers moving across physical corridor boundaries.

Appendix 6.The Questionnaire

1. Who is being interviewed _____.
2.
 - a. Are you the first owner of this house?
 - b. If Yes: Did you have this house built for you?
3. How many people live permanently within this dwelling?

Infants (less than 5 years).
Primary school children.
Secondary school children.
University or Teachers' College students.
Working dependents.
Adults.
4. Is the wife employed externally to the household?
5. What were the reasons you had for leaving your previous dwelling (i.e. your last permanent dwelling)? Would you please rank those factors from the most to the least important.
6. During the majority of the period within which you lived at your previous dwelling, was your attitude of living within that house one of being:

1. Extremely satisfied with the dwelling.
 2. Very satisfied.
 3. Just satisfied.
 4. Slightly dissatisfied.
 5. Very dissatisfied.
 6. Extremely dissatisfied.
7. What other locations within Hamilton have you lived at? Give order, address, dates and tenure (specifying if parents' home, homes while single, and homes since marriage).
8. Have you previously owned a dwelling?
9. After having decided to move from your previous dwelling what were the factors you considered as important in your search for a new dwelling? Would you please rank those factors from the most to the least important.
10.
 - a. Draw a quick sketch map of Hamilton City giving as much detail as possible of the street patterns.

10. b. Interviewer's observations:

11. What were the factors which were of critical importance in why you selected this area within Hamilton in which to purchase a dwelling? Would you please rank those factors from the most important to the least important.

12. What were the factors which were of critical importance in why you selected this dwelling? Would you please rank those factors from the most to the least important.

13. a. While living at your previous dwelling within the area of _____ did you hold any feelings of association with that area?

For example (read out the list)

1. Association with schools in the area.
2. Friends living in the area.
3. Membership of clubs.
4. Groups or associations within the area.
5. Relations living in the area.
6. A strong identity of living in that area.
7. Lived in that area for a number of years.
8. Ownership of property in that area.
9. Location of employment within that area.

b. How strong were those feelings of association with this suburb or area?

1. Extremely Strong.
2. Very Strong.
3. Strong.
4. Weak.
5. Very Weak.

c. What types or kinds of association did you have with that suburb or area of _____ while living in your previous dwelling?

(for this question repeat the list given above and add additional associations).

14. a. Looking now on a larger scale, while you were living in your previous dwelling in the area of _____ did you feel any associations with the larger areas of:

(give only the local divisions).

1. a. North Hamilton, West of the River.
- b. North Hamilton, East of the River.
- c. South Hamilton, West of the River.
- d. South Hamilton, East of the River.
- e. The west side of Frankton Railway Line.

OR

2. a. The West Side of the River.
- b. The East Side of the River.

- b. How strong were those feelings of association with this larger area?

1. Extremely Strong.
2. Very Strong.
3. Strong.
4. Weak.
5. Very Weak.

- c. What types of association did you have with that larger area while living in your previous dwelling?

(Repeat list given above and add additional associations).

15. a. Did you have any type or kind of association with this suburb or area of _____ before you decided to move from your previous home?

- b. How strong were those feelings of association with the suburb or area?

1. Extremely Strong.
2. Very Strong.
3. Strong.
4. Weak.
5. Very Weak.

- c. What types or kinds of association did you have with this suburb or area while living in your previous home?

(Repeat list given above and add additional associations).

16. a. Were there any other areas or suburbs within Hamilton with which you held associations prior to deciding to move from your previous home. Give name of area _____.

- b. How strong were those feelings of association with the suburb or area of _____?

1. Extremely Strong.
2. Very Strong.
3. Strong.
4. Weak.
5. Very Weak.

- c. What types or kinds of association did you have with that suburb or area of _____ while living in your previous home?

(Repeat list given above and add additional associations).

17. During the majority of the period within which you were living at your previous address was your attitude to living within that area one of being:
1. Extremely Satisfied with the area.
 2. Very Satisfied.
 3. Just Satisfied.
 4. Slightly Dissatisfied.
 5. Very Dissatisfied.
 6. Extremely Dissatisfied.
18. Would you have preferred to have stayed within your previous area if you could have found a house which met with what you wanted?
19. Which of the following statements is closest to how you feel about living in this area?
1. Extremely Satisfied with this area.
 2. Very Satisfied.
 3. Just Satisfied.
 4. Slightly Dissatisfied.
 5. Very Dissatisfied.
 6. Extremely Dissatisfied.
20. Would you please assess how friendly people were to each other in your previous area or neighbourhood?
1. Extremely friendly.
 2. Very friendly.
 3. Just friendly.
 4. Indifferent.
 5. Unfriendly.
 6. Hostile.
21. How much friendly contact did you have with your immediate next door neighbours at your previous address?
1. A very large amount.
 2. A large amount.
 3. A little.
 4. Very little.
 5. None at all.
22. How much friendly contact did you have with other people within your area while living at your previous address?
1. A very large amount.
 2. A large amount.
 3. A little.
 4. Very little.
 5. None at all.

23. What types of dwellings did you look at during your search for a new residence?
1. Ownership homes.
 2. Rented houses.
 3. Flats.
 4. Others (Specify).
24. Which area or areas within Hamilton did you wish to purchase a house in when you began your search?
25. What price range were you looking for a home in when you began your search?
26. What were the locations of homes you looked at with respect to buying them (address)?
27. Of those dwellings you viewed which ones did you consider very seriously?
28. Did you continue looking at houses after you found this house?
29. Did you concentrate your search in this area after finding this house?
30. Did you feel that you had an adequate selection of houses to choose from?
31. Which information sources did you use in your search for a new home?
1. Newspapers.
 2. Personal Contacts.
 3. Walking or driving around looking for houses which were for sale.
 4. Real Estate Agents.
 5. Other (Specify).
32. Which were the best information sources? Would you please rank those information sources from most to the least important.
33. How did you find this house?
34. Which of the following list of suburbs do you know something about (i.e. simply just where the area is)? Remove cards for areas not known.

35. According to whether you consider the area to be desirable in which to live would you please place the area cards upon the given scale:
1. Highly desirable.
 2. Desirable.
 3. Satisfactory.
 4. Undesirable.
 5. Highly undesirable.
36. According to your preference to live in them would you please place the area cards upon the scale: (Preference is seen to differ from desirability in that one may consider an area to be desirable but would not prefer to live in it whereas it is unlikely that one would prefer to live in an undesirable area)
1. Would prefer to live in.
 2. Wouldn't mind living in.
 3. Would live in if necessary.
 4. Would prefer not to live in.
 5. Would definitely not live in.
37. Here are a number of photographs of houses - Would you please place them in order of the preference you hold with regard to living in them. (Make your decisions as much as possible on the dwelling external appearance in these photographs).
38. According to how familiar you are now with the areas of Hamilton please place the cards upon the scale:
- (Areas not known are given the rating of 6.)
1. Knew the area very well.
 2. Knew the area quite well.
 3. Knew the area.
 4. Knew little about the area.
 5. Knew very little about the area.
39. Would you please place the area cards upon the given scale according to your assessment of their social status.
1. Upper.
 2. Upper middle.
 3. Lower middle.
 4. Upper lower.
 5. Lower lower.
- (Note that there are three social status groupings of which the lower two are sub-divided into Upper and Lower levels.)
40. Here are a series of photographs of shopping centres within Hamilton. I am interested in establishing which ones you recognise, therefore will you please attempt to name them.

2. 1 - 5 years.
3. 5 - 10 years.
4. > 10 years.

48. What is the largest town or city you have lived in for a period longer than six months?
49. When living in your parents home how many times did your family change address?
50. Since leaving your parental home how many times would you have changed residence?
51. If an existing dwelling, why did you not purchase or build a new home?
52. If a new dwelling, why did you not purchase an existing home?
53. In terms of the date when you purchased this dwelling when did you decide to look for a new home?
1. < 3 months before.
 2. 3 - 6 months before.
 3. 6 months - 1 year before.
 4. > 1 year before.
54. When you began looking for a new dwelling how long did you spend searching?
1. < 3 months.
 2. 3 - 6 months.
 3. 6 months - 1 year.
 4. > 1 year.
55. Was there any restriction upon the time you had available to look for your new dwelling? For example, you had to be out of your house by a set date. If so please specify the restriction.
56. How satisfied are you with this residence in terms of the following scale.
1. Extremely satisfied with the dwelling.
 2. Very satisfied.
 3. Just satisfied.
 4. Slightly dissatisfied.
 5. Very dissatisfied.
 6. Extremely dissatisfied.

41. Respondents race.

1. European.
2. Maori.
3. Other (Specify).

42. Would you please indicate which annual income group you (the head of household) is in.

1. < \$2,000
2. \$2,000 - \$4,000
3. \$4,000 - \$6,000
4. \$6,000 - \$10,000
5. > \$10,000

43. What was the highest level of formal education you (the head of household) obtained.

1. Primary School.
2. Secondary School:
 - a. Up to 3 years.
 - b. Greater than 3 years.
3. Technical Institute.
4. Teachers' College.
5. University.

44. Would you please indicate which age group you (the head of household) are in:

1. 15 - 20
2. 20 - 25
3. 25 - 30
4. 30 - 40
5. 40 - 50
6. 50 - 60
7. > 60

45. Who decided to purchase a dwelling within this area?

1. The husband only.
2. The wife only.
3. Both husband and wife together.
4. Other.

46. Who searched for a new residence or section?

1. The husband only.
2. The wife only.
3. Both husband and wife together.
4. Other.

47. How long have you lived in Hamilton?

1. < 1 year.

57. How long do you think you will remain living within this dwelling?

1. < 5 years.
2. 5 - 10 years.
3. > 10 years.
4. Don't know.

58. How long do you think you will remain living within Hamilton?

1. < 5 years.
2. 5 - 10 years.
3. > 10 years.
4. Don't know.

59. What are the aspects you like about Hamilton in order of importance?

60. What are the aspects you dislike about Hamilton in order of importance?

Appendix 7. Data

Data set used in the corridor/non-corridor and locational association/non-locational association discriminant analyses

Variables

1. Co-ordinates of mover's origin.

First two figures are the eastings

Second two figures are the northings

Third two figures are the area number

- | | |
|-------------------|-------------------|
| 1. Te Rapa | 14. Melville |
| 2. St Andrews | 15. Glenview |
| 3. Beerescourt | 16. Chedworth |
| 4. Forest Lake | 17. Queenwood |
| 5. Norton | 18. Chartwell |
| 6. Maeroa | 19. Fairfield |
| 7. Livingstone | 20. Enderley |
| 8. Whitiora | 21. River Road |
| 9. Hamilton North | 22. Claudelands |
| 10. Frankton | 23. Hamilton East |
| 11. Dinsdale | 24. Hillcrest |
| 12. Hamilton Lake | 25. Silverdale |
| 13. Hamilton West | 26. Riverlea |
| | 27. CBD |

The downtown centre having the co-ordinates 2825, with that system of co-ordinates numbered by a 200 meter grid from the north-^{west}~~east~~ origin.

2. Co-ordinates of mover's destination

Same system as for origins

Variables 3 to 15 are given as standardized 't' scores, with a mean of 50 and a standard deviation of 10.

3. Satisfaction with origin home area.

4. Friendliness of origin home area.

5. Preference with origin home corridor.

6. Familiarity with origin home corridor.
7. Desirability of origin home corridor.
8. Satisfaction with origin dwelling.
9. Social Status of household.
10. Family Status of household.
11. Career Status of household.
12. Mobility Status of household.
13. Housing Cost preferences.
14. Housing Details preferences.
15. Age of housing.
16. Locational association held with origin area = 1.

Variables	1.	2.	3.	4.	5.	6.	7.
Observation Number	<u>Non-Corridor Movers</u>						
1	304124	092117	47.9	37.6	50.9	39.4	42.5
3	320811	090902	47.9	47.5	47.1	46.5	50.5
6	303323	270307	47.9	47.5	67.0	55.3	46.1
13	251710	081102	47.9	37.6	36.5	34.8	50.8
15	252209	320611	56.5	57.3	37.1	36.3	36.8
16	232008	082118	47.9	37.6	55.2	44.4	47.4
18	321912	051521	56.5	57.3	38.2	53.8	53.8
19	332923	102716	47.9	47.5	37.5	45.1	60.5
21	212719	472815	47.9	57.3	41.2	34.8	54.2
23	153120	351310	56.5	57.3	50.7	41.0	66.2
26	263222	472114	56.5	47.5	50.2	49.3	61.1
27	292110	163520	47.9	47.5	44.7	45.3	50.2
28	221204	092218	47.9	37.6	50.5	54.7	52.0
30	222108	311310	47.9	37.6	41.1	44.4	70.3
31	281910	323824	47.9	67.1	56.7	51.3	49.0
33	292923	472815	39.2	27.8	33.5	26.2	34.2
35	272822	072318	56.5	47.5	36.0	40.9	51.0
38	273724	072017	47.9	47.5	54.7	52.7	54.2
45	282923	372413	65.1	37.6	50.3	49.2	55.6
48	131402	281010	47.9	57.3	47.7	17.9	48.2
50	082118	293724	56.5	57.3	45.6	50.2	50.5
51	162619	293724	39.2	57.3	41.8	47.9	73.6
54	292010	181601	47.9	37.6	55.2	47.3	58.0
59	353423	072218	47.9	47.5	44.3	57.1	34.7
66	252209	384526	39.2	37.6	51.7	36.2	57.7
67	223122	304324	56.5	57.3	50.0	55.3	59.1
69	112318	071002	21.9	57.3	35.1	51.3	33.1
73	211504	301011	65.1	67.1	63.5	63.7	59.8
76	283424	142218	30.6	37.6	46.6	32.4	48.7
77	323123	082117	47.9	37.6	39.7	41.3	38.4
82	010101	072017	47.9	47.5	35.4	40.2	46.8
83	341310	153520	47.9	47.5	44.6	49.8	41.3
86	171503	354526	39.2	47.5	39.2	58.1	37.6
87	432414	030701	47.9	57.3	38.0	45.0	48.2
93	343323	163320	47.9	47.5	38.2	47.2	35.5
98	283824	133120	47.9	57.3	48.6	58.5	26.8
103	330811	131502	39.2	37.6	53.0	43.6	51.2

Variables	1.	2.	3.	4.	5.	6.	7.
Observation Number							
104	263222	492715	47.9	57.3	43.7	45.4	54.2
106	412714	102418	39.2	37.6	41.8	35.2	46.0
109	304124	061917	47.9	47.5	52.5	45.9	42.3
110	181404	472114	47.9	47.5	43.0	42.1	48.4
112	252109	422214	21.9	57.3	52.7	31.6	49.8
117	291910	462915	65.1	57.3	40.9	47.1	47.3
121	230805	293824	39.2	37.6	46.0	45.3	11.4
122	111602	251007	65.1	37.6	49.9	52.3	45.1

Corridor Movers

4	111102	091002	47.9	37.6	51.9	40.2	59.1
8	232209	101302	56.5	67.1	70.9	69.6	64.5
10	141502	101502	65.1	47.5	42.7	55.6	50.2
11	301410	180505	47.9	47.5	62.2	59.1	58.4
12	141821	151602	56.5	47.5	54.6	54.5	43.6
14	333323	333924	56.5	57.3	54.2	53.6	47.4
17	081302	081402	56.5	57.3	50.5	49.3	59.2
20	162719	173420	47.9	57.3	52.6	50.5	55.9
22	171201	312012	47.9	57.3	57.8	47.8	58.0
24	222519	183220	47.9	57.3	61.5	63.3	49.0
36	363123	364524	47.9	57.3	40.9	41.9	37.1
37	283624	294024	39.2	67.1	58.7	68.7	43.1
39	340911	310411	65.1	47.5	52.9	61.9	63.8
41	241808	020602	56.5	67.1	63.1	50.9	60.3
43	332713	482515	47.9	57.3	51.9	66.3	45.5
49	272722	273724	21.9	27.8	49.2	47.8	64.2
58	261910	292110	65.1	47.5	66.8	61.1	58.7
62	262722	262822	56.5	27.8	49.9	53.2	45.4
63	323123	324224	56.5	47.5	52.2	71.3	34.4
64	373123	294525	47.9	37.6	40.2	45.4	40.3
65	082418	17020	65.1	67.1	57.6	64.2	44.6
70	323223	314224	56.5	47.5	30.0	47.8	48.4
75	452314	462715	47.9	47.5	57.3	63.3	52.0
81	291310	220805	47.9	57.3	91.6	55.9	55.4
84	452715	492615	21.9	37.6	49.0	66.0	57.0
85	333724	343924	65.1	57.3	51.5	55.7	44.7
88	162319	212419	56.5	57.3	49.2	56.7	39.6

Variables	1.	2.	3.	4.	5.	6.	7.
Observation Number							
90	263122	342923	47.9	67.1	34.3	47.8	65.7
91	261610	230805	56.5	67.1	60.6	62.4	46.1
92	272522	141821	56.5	67.1	42.0	44.9	46.8
95	152820	282722	47.9	57.3	53.1	55.7	52.9
97	271810	271610	56.5	47.5	59.9	54.1	65.4
105	222622	163320	39.2	47.5	60.7	68.0	56.5
111	422214	382214	65.1	47.5	52.8	57.4	45.7
113	302227	271110	47.9	47.5	59.4	44.7	58.5
114	231104	230705	47.9	57.3	64.0	44.8	61.9
118	121402	131302	65.1	47.5	58.9	56.0	56.0
123	281710	221404	65.1	47.5	61.8	55.0	48.7

Variables	8.	9.	10.	11.	12.	13.	14.	15.	16.
Observation Number	<u>Non-Corridor Movers</u>								
1	47.8	44.9	38.3	47.8	43.9	47.6	49.9	42.3	0
3	55.8	40.8	38.3	41.8	42.6	46.6	63.6	50.1	0
6	47.8	43.0	56.7	39.3	48.9	45.2	30.1	50.9	1
13	47.8	42.7	56.1	46.1	45.3	57.9	57.2	46.6	0
15	63.8	52.3	40.9	51.3	78.3	53.8	32.1	58.2	1
16	47.8	44.7	65.8	49.3	51.2	44.6	49.7	42.5	0
18	63.8	72.1	58.0	35.2	38.7	31.8	46.3	51.7	0
19	39.8	65.1	49.5	66.5	54.7	37.8	42.9	71.0	0
21	47.8	49.2	37.3	49.8	53.3	56.9	41.8	38.6	0
23	55.8	41.7	43.7	50.1	80.5	63.9	48.8	65.6	0
26	23.9	39.3	56.2	58.9	48.9	62.1	67.8	60.5	1
27	47.8	45.0	56.9	52.8	55.3	37.9	44.6	52.3	1
28	55.8	36.1	56.7	62.8	56.5	37.9	41.0	47.0	0
30	47.8	41.9	42.8	43.8	51.3	76.2	42.0	78.1	0
31	47.8	63.4	53.6	59.0	52.0	51.8	46.4	40.4	1
33	47.8	39.0	37.3	51.6	42.6	64.7	41.7	45.4	0
35	39.8	44.3	65.6	44.8	50.4	52.5	58.7	45.4	0
38	47.8	47.0	57.8	57.1	69.8	46.5	44.5	37.9	1
45	47.8	47.9	38.0	57.4	47.8	35.9	39.7	56.3	0
48	47.8	30.0	55.9	51.2	46.8	58.9	53.9	44.1	1
50	55.8	59.4	40.2	46.9	83.2	69.0	42.3	43.5	0

Variables	8.	9.	10.	11.	12.	13.	14.	15.	16.
Observation Number									
51	63.8	49.6	52.7	40.7	57.5	68.4	46.4	52.1	1
54	39.8	45.9	52.5	49.9	63.5	46.1	56.9	42.4	0
59	47.8	48.4	39.1	69.0	43.8	51.4	35.2	60.9	0
66	55.8	51.5	39.4	43.5	57.3	67.4	37.4	50.5	0
67	47.8	44.7	38.3	39.3	43.8	47.2	51.3	51.4	1
69	31.9	42.5	56.3	41.3	39.5	41.1	54.4	58.9	0
73	55.8	62.1	39.2	44.4	64.7	67.8	27.8	75.4	1
76	31.9	43.6	65.9	37.2	56.9	46.4	45.3	38.6	0
77	39.8	44.5	38.2	69.7	33.2	42.3	47.7	44.9	0
82	55.8	49.4	48.1	50.6	38.2	37.5	53.7	53.5	0
83	55.8	47.6	65.3	38.5	39.1	47.3	70.0	51.8	0
86	63.8	62.7	48.9	46.5	49.6	34.5	30.7	66.2	1
87	55.8	49.5	47.6	54.2	42.2	51.3	49.3	40.3	1
93	55.8	38.8	38.6	56.0	62.7	61.5	61.2	48.6	0
98	55.8	55.2	43.6	35.6	46.8	62.0	42.1	47.2	1
103	63.8	56.4	39.1	42.7	52.7	51.8	35.6	40.0	0
104	47.8	49.6	39.2	72.5	45.1	24.9	20.7	101.7	1
106	31.9	41.1	56.5	47.1	53.7	41.3	57.1	50.1	1
109	47.8	55.0	65.9	42.9	37.5	51.8	56.2	41.6	0
110	47.8	45.3	47.3	58.0	52.9	49.3	54.2	53.7	0
112	23.9	43.3	37.4	51.3	34.0	39.4	48.7	46.6	0
117	55.8	40.6	56.1	45.8	31.5	61.7	53.5	50.1	1
121	39.8	45.6	38.7	56.5	54.2	67.1	45.9	53.8	1
122	63.8	40.9	37.1	51.3	38.2	52.6	34.5	44.0	1

Corridor Movers

4	55.8	37.6	56.1	56.2	54.2	58.8	56.6	45.2	1
8	55.8	70.4	40.2	44.1	55.8	51.7	54.8	47.9	1
10	47.8	77.7	63.3	56.9	46.6	41.6	48.2	55.8	1
11	47.8	48.6	56.1	43.0	58.1	52.5	52.0	41.1	1
12	55.8	73.3	45.2	56.7	46.5	41.7	47.6	44.5	1
14	55.8	56.7	57.1	35.6	47.4	55.9	55.2	39.6	1
17	39.8	54.0	57.2	38.7	44.2	38.1	55.3	58.1	1
20	47.8	46.4	62.3	70.3	66.6	61.3	57.3	57.8	0
22	55.8	62.9	45.0	61.4	51.0	37.5	55.1	50.8	0
24	47.8	45.9	56.9	47.7	56.8	48.3	59.8	61.3	1
36	47.8	45.2	38.7	46.2	47.8	54.1	52.1	40.3	0

Variables	8.	9.	10.	11.	12.	13.	14.	15.	16.
Observation Number									
37	63.8	59.2	49.8	62.8	67.4	34.3	50.2	52.8	1
39	63.8	64.7	35.1	42.5	58.7	54.3	50.4	40.7	1
41	63.8	41.4	37.9	52.0	40.4	46.5	53.3	44.7	1
43	47.8	46.6	55.5	44.8	36.4	43.4	64.3	50.3	1
49	47.8	40.9	43.0	51.7	61.1	52.0	56.6	38.7	0
58	47.8	46.4	39.0	51.2	53.9	54.7	56.1	44.2	1
62	55.8	46.9	47.4	45.4	50.3	53.5	72.7	43.6	1
63	55.8	42.8	48.3	79.5	55.2	40.1	46.1	54.2	0
64	47.8	58.1	43.5	70.6	42.9	46.1	46.8	40.8	0
65	63.8	52.4	74.8	50.0	55.8	49.4	38.8	40.5	1
70	39.8	57.9	52.3	43.2	44.2	50.7	32.3	39.7	1
75	39.8	50.2	57.2	72.8	50.5	51.4	58.5	44.8	1
81	47.8	40.7	42.6	44.8	41.2	56.0	66.1	48.5	1
84	23.9	51.4	56.8	57.8	45.0	40.7	46.7	42.8	0
85	55.8	78.5	40.0	33.5	44.9	52.0	48.6	39.8	1
88	55.8	48.5	60.6	38.6	40.3	47.2	55.8	45.0	1
90	47.8	52.4	57.8	58.6	42.3	40.6	65.5	56.6	1
91	47.8	44.6	56.4	38.0	47.6	44.4	58.3	52.9	0
92	63.8	75.4	45.0	36.5	53.7	53.1	49.1	46.9	1
95	55.8	66.0	76.6	62.2	45.6	44.3	39.0	53.3	1
97	63.8	37.7	37.8	48.1	44.2	34.6	49.2	55.7	1
105	23.9	48.3	56.4	46.9	37.7	51.0	65.1	51.2	0
111	63.8	48.2	47.3	41.7	41.4	37.6	47.6	49.6	1
113	31.9	45.7	64.9	43.5	45.1	65.1	52.0	48.6	0
114	47.8	40.2	56.0	46.1	47.2	65.9	59.4	52.5	1
118	55.8	53.8	42.7	40.2	41.0	51.1	63.2	46.7	1
123	55.8	44.7	66.2	37.8	55.7	53.2	58.6	45.5	0

Hamilton Urban Residential Areas Preference and Desirability Ratings

	Preference		Desirability	
	Mean Score	Standard Deviation	Mean Score	Standard Deviation
Te Rapa	3.569	1.095	3.298	1.074
St Andrews	2.089	.958	2.000	.865
Beerescourt	2.300	.991	2.185	.830
Forest Lake	2.854	1.038	2.718	.870
Norton	3.789	.926	3.524	.801
Maeroa	3.431	.924	3.290	.814
Livingstone	3.244	.899	3.040	.748
Whitiora	3.569	.860	3.347	.787
Hamilton North	3.675	.844	3.347	.787
Frankton	4.341	.885	4.177	.807
Dinsdale	3.423	1.079	3.177	.856
Hamilton Lake	2.293	1.084	2.161	.999
Hamilton West	2.447	.851	3.315	.800
Melville	3.520	1.011	3.298	.901
Glenview	2.951	1.130	2.806	.934
Chedworth	2.081	.883	1.815	.949
Queenwood	2.154	.839	1.887	.828
Chartwell	2.106	.939	1.960	.905
Fairfield	3.057	1.043	2.960	.949
Enderley	3.317	.978	3.273	.848
River Road	2.171	1.084	1.944	.103
Claudlands	3.366	.917	3.226	.753
Hamilton East	3.236	.924	3.065	.814
Hillcrest	2.065	1.014	1.984	.937
Silverdale	3.431	.959	3.207	.855
Riverlea	2.724	1.081	2.605	.935

N = 123

Hamilton Urban Residential Areas Social Status and Familiarity Ratings

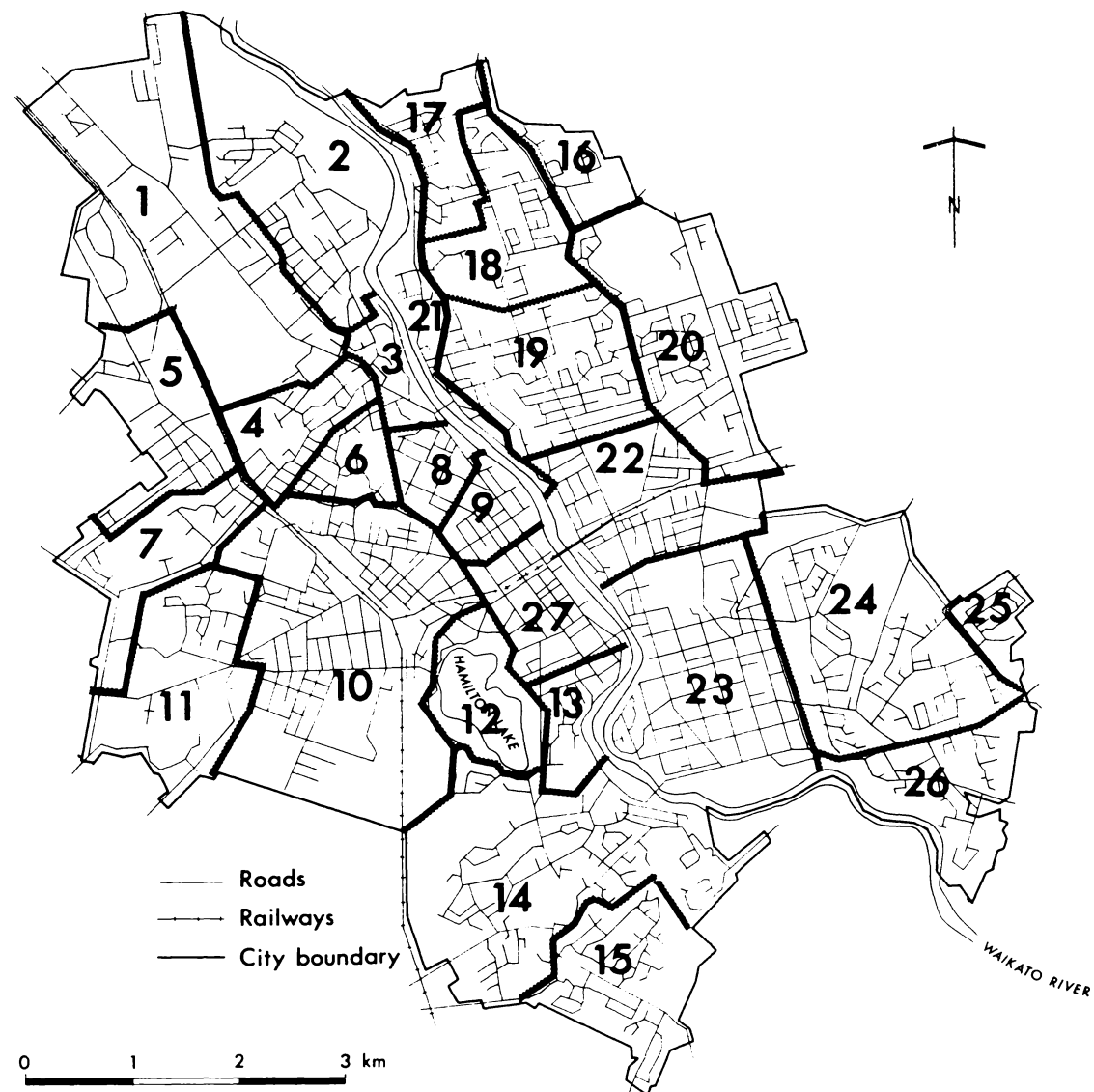
	Social Status		Familiarity	
	Mean Score	Standard Deviation	Mean Score	Standard Deviation
Te Rapa	2.844	.927	2.935	1.347
St Andrews	1.615	.710	2.740	1.311
Beerescourt	1.852	.676	2.609	1.310
Forest Lake	2.525	.795	2.756	1.270
Norton	3.566	.738	3.756	1.416
Maeroa	3.221	.818	3.203	1.482
Livingstone	3.082	.788	4.154	1.515
Whitiora	3.221	.777	3.024	1.440
Hamilton North	3.123	.858	3.089	1.293
Frankton	4.320	.707	2.617	1.284
Dinsdale	3.205	.852	3.195	1.341
Hamilton Lake	1.418	.614	2.219	.963
Hamilton West	3.066	.665	3.186	1.276
Melville	3.238	.814	2.796	1.086
Glenview	2.639	.761	3.089	1.228
Chedworth	1.615	.721	3.203	1.578
Queenwood	1.836	.708	2.984	1.448
Chartwell	1.770	.665	2.626	1.277
Fairfield	3.098	.866	2.463	1.154
Enderley	2.910	.771	3.560	1.455
River Road	1.336	.676	2.122	1.098
Claudeland	3.156	.727	2.536	1.089
Hamilton East	3.041	.732	2.382	1.075
Hillcrest	1.836	.720	2.235	1.048
Silverdale	3.049	.691	3.374	1.375
Riverlea	2.221	.744	3.528	1.404

N = 123

Hamilton Urban Residential Areas Factor Scores

Areas	Factor Scores		
	1	2	3
Te Rapa	.537	-1.239	-.555
St Andrews	.559	-.307	-.513
Beerescourt	-2.264	1.471	-1.395
Forest Lake	-.994	-.358	-.011
Norton	-.466	-.611	.082
Maeroa	-1.243	-.864	-.102
Livingstone	.277	-.431	-.250
Whitiora	-.395	-.299	1.589
Frankton	-.345	-.091	1.727
Dinsdale	1.431	.119	-.482
Hamilton Lake	-.731	1.798	.593
Hamilton West	-.083	-.289	1.436
Melville	.094	-.921	-.644
Glenview	1.430	-.615	-.370
Chedworth	1.264	1.442	-.453
Queenwood	.884	.793	-.756
Chartwell	.747	.175	-.706
Fairfield	-1.646	-.499	-.807
Enderley	.040	-1.073	-.495
River Road	.158	2.165	.392
Claudlands	.228	.002	2.617
Hamilton East	-1.014	-.464	.683
Hillcrest	-.051	.085	-.668
Silverdale	.659	-.931	-.446
Riverlea	.924	.942	-.461

Data is from the principal-axis factor analysis presented in Chapter 2.



- 1 TE RAPA
- 2 ST ANDREWS
- 3 BEERESCOURT
- 4 FOREST LAKE
- 5 NAWTON
- 6 MAEROA
- 7 LIVINGSTONE
- 8 WHITIORA
- 9 HAMILTON NORTH
- 10 FRANKTON
- 11 DINSDALE
- 12 HAMILTON LAKE
- 13 HAMILTON WEST

- 14 MELVILLE
- 15 GLENVIEW
- 16 CHEDWORTH
- 17 QUEENWOOD
- 18 CHARTWELL
- 19 FAIRFIELD
- 20 ENDERLEY
- 21 RIVER ROAD
- 22 CLAUDELANDS
- 23 HAMILTON EAST
- 24 HILLCREST
- 25 SILVERVDALE
- 26 RIVERLEA
- 27 C.B.D.

