A PERSONAL CONSTRUCT APPROACH TO URBAN NEIGHBOURHOOD COGNITION

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by

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The importance of neighbourhood identification as part of the overall urban image is outlined. The manner in which individuals cognitively structure neighbourhood is examined along two major lines of enquiry. Firstly, differences in the spatial extent of neighbourhood with which respondents identify, are related to their socio-economic and role profiles. The second section of the study uses the methodology of Personal Construct Theory, in particular, the repertory grid test, to elicit the constructs or attributes which individuals use in deciding that certain segments of the surrounding district are within their cognitive neighbourhood while other segments are felt to be outside. The findings indicate that statements about social class and surrogates for this variable, are the primary discriminator between neighbourhood and non-neighbourhood.

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CHAPTER I

INTRODUCTION

During the last decade and a half, researchers in urban planning and related disciplines have been concerned with the manner in which urban residents perceive their environment, and in the cognitive representations they erect of cities and their sub-areas. The impetus for most of these studies comes from the work of Lynch[1]. Lynch searched for physical qualities in the urban environment which relate to the attributes of identity and structure in the mental image of the city. He discovered the major element influencing the way people experience and mentally organise their surroundings to be paths (generally highways or major streets). This he attributed to their visual and use dominance. The other elements found important in urban imagery were edges (linear elements not used or considered as paths by the individual, such as shores, railways, etc.), nodes, landmarks and districts.

1.1 Neighbourhood Cognition

The recognition that city-dwellers recognise and differentiate between sub-areas of a city in cognitively structuring the urban

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[1] K. Lynch, The Image of the City, Cambridge, 1960, M.I.T. Press.

environment, prompted studies by Everitt[2], Metton[3], Sanoff[4], and Zannaras[5], which were more explicitly concerned with the cognitive structuring of the urban neighbourhood. The problem of the existence or non-existence of identifiable neighbourhood areas in cities, has recurred several times over the last fifty years in the literature of sociology and urban studies. In the last two decades, the existence, on the part of urban residents, of identification with spatially defined neighbourhoods and patterns of neighbouring activity, has been more generally accepted. Some evidence now exists on the type of feature people use when selecting the boundaries of their neighbourhood. For example, Everitt, Metton, Wilmott[6], and Zannaras all find that major roads are the elements most often selected as boundary indicators, with railroads, rivers and other marked physical features used as secondary indicators. However, little evidence has been brought forward to explain how city dwellers decide that particular areas are within their cognitive neighbourhood, while other locations are felt to be outside their neighbourhood.

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[2] J.C. Everitt, Community and Propinquity: Questions on the structure of, and the conduct and behaviour within, a neighbourhood area, Ph.D. dissertation, University of California, Los Angeles, 1972.

[3] A. Metton, 'Le quartier, etude geographique et psychosociologique', Canadian Geographer, 15, 1969, pp. 289-316.

[4] M. Sanoff, 'Social perception of the ecological neighbourhood', Ekistics, 30, 1970, pp. 130-132.

[5] G. Zannaras, An Empirical Analysis of Urban Neighbourhood Perception, M.A. dissertation, The Ohio State University, Columbus, 1968.

[6] P. Wilmott, 'Social research and new communities', Journal of the American Institute of Planners, 33, 1967, pp. 387-398.

1.2 Spatial Variability in Neighbourhood Cognition

Studies to date on the topic of neighbourhood cognition have focussed on the spatial variability of the 'neighbourhood' identified by respondents. Variations in the size of cognitive neighbourhood have been explained as a function of differences in the demographic and role profiles of the city dwellers concerned. The findings of these various studies are collated here and used in the construction of hypotheses, which have been tested in a study area in the city of Hamilton.

1.3 Personal Constructs

The second and most important section of the present study focusses on the question of which environmental attributes people use to distinguish places construed as being within the neighbourhood from those construed as being outside the neighbourhood. The use of Personal Construct Theory[7], a theory first developed in the field of clinical and social psychology, is suggested, and its theoretical and methodological position outlined. The Repertory Grid technique, developed in this field, is used to elicit the environmental attributes.

This part of the study can be regarded as largely exploratory for two reasons. Firstly, with the exception of that by Lowenthal and Riel[8], no research has been conducted into the manner in which people mentally organise and discriminate between environmental stimulii in urban areas.

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[7] G.A. Kelly, The Psychology of Personal Constructs, New York, 1955, W.W. Norton., & D. Bannister and J.M.M. Mair, The Evaluation of Personal Constructs, London, 1968, Academic Press.

[8] D. Lowenthal and M. Riel, Publications in Environmental Perception, a series of eight reports prepared for the American Geographical Society, in particular Report #8, 'Environmental Structures: Semantic and Experiential Components', New York, 1972, American Geographical Society.

Secondly, this is the first known attempt to apply Personal Construct Theory in a task of this sort. The results which are presented are therefore largely tentative. Some suggestions for future studies are made, and while cautious use of the methodology is advised, the validity of the approach is upheld.

CHAPTER II

URBAN AND NEIGHBOURHOOD COGNITION

As previously indicated, it was the pioneering work of Lynch[9] which generated studies into the manner in which urban residents perceive their environments, and their cognitive representations of cities and their sub-areas. Although not primarily concerned with neighbourhood identification or differentiation, Lynch did refer to the manner in which districts were cognitively structured in the urban image. The series of neighbourhood cognition studies, which appeared in the decade after publication of his work, succeeded to some extent in integrating his findings, and those of other urban imagery studies, to the findings of the older body of sociological and planning literature on neighbourhoods. The following material discusses these efforts.

2.1 The District as part of the Urban Image

Lynch reported that the physical characteristics that distinguish districts are thematic continuities. These may consist of an endless variety of components; texture, space, form, detail, symbol, building type, use, activity, inhabitants, degree of maintenance, topography, etc.

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[9]Lynch, op. cit.

In a British study, Goodey[10] found that districts were distinguished because of historical value, aesthetic considerations, or economic activities. Harrison and Howard[11] state that districts were most often described by their respondents in terms of their functions or the atmosphere that prevailed within them. The majority of descriptions of districts involved non-physical components. Appleyard[12] points out that the power of conventional naming systems in differentiating districts or neighbourhoods should not be ignored, a point which is also made by Keller[13]. These characteristics, then, are the ones used by observers to divide their mental image of the city into sub-areas. Whether they are the characteristics used by a resident of one particular sub-area in deciding that his/her neighbourhood differs from surrounding neighbourhoods is a quite different question. This aspect of the urban neighbourhood question has received little investigation, even in those studies to be discussed which deal explicitly with neighbourhood cognition. It is an aspect which is a central concern of the present study.

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[10] B. Goodey, et. al., An Exploration into the Image of Central Birmingham as seen by Area Residents, University of Birmingham, Centre for Urban and Regional Studies, Research Memo 10, 1971.

[11] J.D. Harrison and W.A. Howard, 'The Role of Meaning in the Urban Image', Environment and Behavior, 4, 1972, pp. 389-411.

[12] D. Appleyard, 'Styles and methods of structuring a city', Environment and Behavior, 2, 1970, pp. 110-117.

[13] S. Keller, The Urban Neighborhood: a Sociological Perspective, New York, 1960, Random House.

2.2 The Concept of Neighbourhood

The concept of 'neighbourhood' has received considerable attention over the last fifty years in the literature of sociology and urban studies. At the beginning of this century the 'New Town' movement in the Anglo-Saxon countries espoused the principle of planning for self-contained neighbourhoods[14]. A number of writers, notably Louis Wirth[15] and Reginald Isaacs[16] were extremely critical of this principle. They pointed out that urban residents, being highly mobile, do not identify with particular locales, and that their behaviour is based on shared interests, not on local affiliation. In contrast to this stance, some defenders of the neighbourhood concept, in the absence of substantive evidence, postulated, almost as an act of faith that such a concept had a meaningful existence for urban residents. For example, Mumford[17] stated that 'neighbourhoods exist as a fact of nature, whether or not we recognise them'.

In the last two decades the existence of neighbourhood identification and patterns of neighbouring activity has been more generally accepted.

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[14] See for example Ebenezer Howard, Garden Cities of Tomorrow, London, 1902, Faber and Faber.

[15] L. Wirth, 'Urbanism as a way of life', American Journal of Sociology, 44, 1938, pp. 1-24.

[16] R. Isaacs, 'The Neighborhood Theory' Journal of the American Institute of Planners, 14, 1948, pp. 15-23.

[17] L. Mumford, 'The neighbourhood and the neighbourhood unit', Town Planning Review, 24, 1954, pp. 256-270.

This has been the result of more comprehensive sociological studies[18], which have demonstrated the existence of considerable territorial attachment and locally based behaviours among urban populations.

2.3 Neighbourhood; A Surrogate for Action Space ?

In almost all the sociological studies the distinction between the social and spatial aspects of neighbourhood has been poorly drawn. There is a tendency to view or define 'neighbourhood' as a surrogate for the spatial bounds of particular activity patterns. For example, Foley[19] made the rather trite suggestion that identification with a neighbourhood can be inferred from use of local facilities. More recently Zannaras[20] tried to determine if a common spatial area, designated as a neighbourhood, could be derived from the spatial extent of the residents' action spaces[21]. Sanoff[22] claims that the ecological neighbourhood of residents can be established by mapping

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[18] M. Fried and P. Gleicher, 'Some sources of residential satisfaction in an urban slum', Journal of the American Institute of Planners, 27, 1961., H. Gans, The Levittowners, London, 1967, Allen Lane, The Penguin Press, P. Wilmott and M. Young, Family and Class in a London Suburb, London, 1960, Routledge and Kegan Paul.

[19] D.L. Foley, 'The use of local facilities in a metropolis', American Journal of Sociology, 56, 1950, pp. 238-246.

[20] Zannaras, op. cit.

[21] Action space is defined as the collection of all urban locations about which the individual has information and the subjective utility associated with these locations.

[22] Sanoff, op. cit.

the activity patterns of a sample of households. Buttimer[23], in a slight modification of this stance, suggests that territorial attachment in old, established working-class communities is created by shared interaction with kin and friends. However, for those working-class groups who have been relocated to housing estates on the urban periphery, territorial attachment is created by local facility use and interaction around services.

Studies of shopping behaviour[24] and other service and facility use in urban areas have satisfactorily demonstrated that laws of distance minimization operate for urban residents, and that, ceteris paribus, people will prefer to use facilities immediately adjacent to them. Whether one can infer territorial attachment from use of local facilities, as has been done in the studies referred to above, seems questionable and requires further evidence. While it is true that these behaviours may be important in helping to create a territorial attachment to a local area, it is also true that the totality of behaviours important to a city-dweller take place at many varied and spatially discrete locales throughout an urban area. In addition, the city-dwellers' friendship and acquaintance networks are likely to be similarly scattered. More than just the spatial patterns of certain forms of behaviour, or the limits of social acquaintance networks, must be taken into account if 'neighbourhood' is to be regarded as a clearly defined spatial entity.

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[23] A. Buttimer, 'Social space and the planning of residential areas', Environment and Behavior, 4, 1972, pp. 279-318.

[24] See for example, B.J.L. Berry, H.G. Barnum and R.J. Tennant, 'Retail location and consumer behavior', Papers and Proceedings of the Regional Science Association, 9, 1962, pp. 62-105.

2.4 Identification with Neighbourhood as a spatially defined area

Some of the recent neighbourhood cognition studies, referred to above, have commenced by asking respondents if they identified with a spatially defined neighbourhood. The replies, in such diverse cities as Paris, Glasgow, and Los Angeles, were overwhelmingly in the affirmative. In Metton's[25] study 97.2% of respondents answered the question, 'Avez vous l'impression d'etre du quartier?' affirmatively. When asked to define what they meant by 'quartier' (neighbourhood) the majority referred to a spatial area which they knew and felt at home in. For a small minority of the respondents, this however meant a short stretch of street rather than a spatially delimited area. The evidence from all these studies, then, suggests that identification with a spatially defined neighbourhood exists independently of the existence of activity spaces or social acquaintance networks. Wilmott[26], in fact, demonstrated the lack of concordance between the cognitive neighbourhoods of his respondents and their social acquaintance networks and activity spaces, which were both spatially more extensive.

The most sophisticated of the studies in the field of neighbourhood cognition has been that by Lee[27]. He did not simply relate gross spatial extent of neighbourhood delimited to the demographic profile of the

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[25] Metton, op. cit., the question, freely translated, means 'Do you feel you belong to the neighbourhood?'

[26] Wilmott, op. cit., Chapter 1.

[27] T. Lee, 'Urban neighbourhood as a socio-spatial schema', Human Relations, 21, 1968, pp. 241-268.

respondents, as did the other studies. Lee regards 'neighbourhood' as a socio-spatial schema which is a synthesis of physical objects, social relationships and space. Using the terminology of the Gestaltist theorists of perception, he describes the process by which people become cognitively aware of the neighbourhood socio-spatial schema:

> 'People, buildings and space are articulated into a figure which is well defined and stands out from the ground which is vague and formless. The figure has boundaries and the space within it is continuous; it appears different from the remainder; it has familiarity and meaning'[28]

Lee constructed a measure, termed the 'neighbourhood quotient', which compares the ratio of the accepted (i.e. cognitively mapped) to presented environment. In this case, the presented environment refers to the buildings, shops, residences, and other structures within one half-mile of the respondent's home. This quotient is used to partial out those aspects of the physical environment, which give rise to pronounced appearances of differences in the neighbourhood schemata of differing social classes. For example, if proximity to acquaintances and facilities are important factors in creating neighbourhood identification, then a finding that working class people delimit smaller neighbourhoods than middle class may simply reflect the fact that the working class live at greater densities than the middle class, and are more likely to have facilities such as corner stores and pubs closer at hand (at least in the British case). Such refinement of the cognitive map data was however more necessary in the Lee study than in the other studies, since his respondents were not referring to a common area (he interviewed in several different

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[28] Lee, op. cit., p.250.

residential areas of Cambridge), and are thus referring to differing environmental stimulii.

Lee has recognised three different types of 'neighbourhood' schemata (or ways of cognitively structuring neighbourhoods), each representing an increased spatial extent and characteristic of different areas of the city. These types are referred to as: 'the social acquaintance neighbourhood', 'the homogeneous neighbourhood', and 'the unit neighbourhood'. The social acquaintance neighbourhood is characteristic of old, established, working-class areas, i.e. the boundaries delimited by inhabitants reflect their patterns of social interaction. The homogeneous neighbourhood is based more on dwelling structure similarities. In this case the pervading social relationship is one of 'mutual awareness', rather than acquaintance. Lower middle-class and upper working-class families most clearly identify this type of schemata. The unit neighbourhood is characterized by heterogeneity, and contains a wide range of facilities and services. Such a neighbourhood unit is probably closest to the planner's conception of a neighbourhood unit.

2.5 Variations in Size of Cognitive Neighbourhood

The other studies[29] concerned with neighbourhood cognition or 'neighbourhood' perception (a singularly inappropriate use of the term 'perception'), are principally concerned with the size of neighbourhoods

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[29] F.W. Boal, 'Territoriality and Class: A Study of two Residential Areas in Belfast', Irish Geography, 6, 1971, pp. 229-248, Everitt, op. cit., Metton, op. cit., and Zannaras, op. cit.

which residents cognitively structure. Attempts are made in these studies to explain variation in the size of cognitive neighbourhoods as a function of variations in socio-economic status, age, sex, length of residence, life style, and other variables.

In most of these studies, the investigators ask the respondents to delimit, on a city map, that area which they consider to be their neighbourhood, (or 'home area', in the case of Everitt's study). Zannaras asked for both a 'social neighbourhood' and a 'physical neighbourhood' to be delimited. Areas delimited in this manner are then assumed to be the perceived or cognized neighbourhood.

The findings, with respect to the manner in which cognitive maps of neighbourhoods vary as a function of demographic variables, are inconclusive and sometimes contradictory. For example, with regard to social class variations, Metton finds that working class respondents draw larger neighbourhood maps than executive and middle class groups. Boal finds the reverse. Lee reports a weak positive relationship between social class and neighbourhood quotients. Putting aside Metton's findings, which may be an artifact of the peculiar social geography of the industrial suburb of Boulogne-Billancourt (Paris), there appears to be agreement between these studies and urban sociological studies by Fried and Gleicher[30], Webber[31], and Wilmott and Young[32], that the working class

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[30]Fried and Gleicher, op. cit.

[31]M. Webber, 'Culture, Territoriality and the Elastic Mile', Papers of the Regional Science Association, 13, 1964, pp. 59-69.

[32]Wilmott and Young, op. cit.

identify with and feel at home in, a much smaller concentrated area around the dwelling than do the middle class. Such a finding is certainly consistent with Rainwater's[33] evidence regarding the 'house as haven' for low income groups. Boal also noted that the working class were much more likely to be in agreement about the boundaries of their 'neighbourhood' than were the middle class.

Everitt reports that females (wives) delimit larger 'home areas' than do males (husbands). It may be surmised that this difference is due to role requirements, which lead wives to spend more time in the local area. This is supported by Metton, who, in a predominantly female sample, reported that house-wives had larger cognitive neighbourhoods than had professional and working women. Boal and Lee did not investigate such differences.

In general, it is agreed that neighbourhood size increases with length of residence, although Metton and Lee disagree about the sequence of such growth. Lee reports that growth in neighbourhood size is most significant after five years residence, whereas Metton finds that almost all such growth takes place in the first year of residence. Independent of the length of residence factor, there is agreement that size of neighbourhood delimited increases with age up to late middle age, after which there is a decrease. Zannaras attributes this decrease to the contraction of the spatial extent of involvement among elderly people.

Keller[34] is critical of any form of neighbourhood planning which

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[33] L. Rainwater, 'Fear and house as haven in the lower class', Journal of the American Institute of Planners, 32, 1966, pp. 23-30.

[34] Keller, op. cit.

uses boundaries subjectively defined by residents of areas. She feels that such boundaries will be extremely variable. However, the evidence from the neighbourhood mapping studies shows considerable concurrence in the spatial areas delimited. For example, in both Everitt's and Metton's studies over 50% of the respondents recognise a common neighbourhood core area, while 79% of Zannaras' respondents agree on a social neighbourhood core. There is, however, considerable variation in the size of such areas, ranging from a core of 0.12 square miles in Metton's Paris study to 1 square mile in the Los Angeles study area used by Everitt. This probably reflects the differing environments concerned, industrial working class Boulogne-Billancourt, ultra-suburban middle class West Los Angeles. In unpublished research conducted in Green Bay, Wisconsin, Knowles[35] finds that suburbanites draw neighbourhood maps four to five times the size of those drawn by inner-city residents. Similer findings are noted by Zannaras for Columbus, Ohio.

2.6 Selection of Boundaries for Cognitive Neighbourhoods

In addition to dealing with size of neighbourhoods, the studies referred to above have produced some evidence as to the environmental features which people use in selecting boundaries for their cognitive neighbourhood. Everitt, Metton, Wilmott, and Zannaras all find major roads to be most commonly selected as boundary indicators. Secondary indicators are such features as railroads, rivers and other marked physical features. One partial explanation for such findings may reside

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[35] Personal communication of 14 February 1973 from E.S. Knowles of the Department of Psychology, University of Wisconsin-Green Bay.

in Bowden's[36] suggestion that any attempt to draw the geographic boundaries of a neighbourhood may best use the territorial limits of pre-adolescent males as a data source. Barriers, such as busy traffic arteries, are rarely crossed by young children. As a result they become, by common consent, territorial boundaries for the group. Bowden also considers facilities such as churches and schools to be boundary indicators, since one travels frequently from the home to these facilities, but rarely beyond them. Metton provides some support for this latter suggestion.

2.7 Summary

In summary, the studies which are principally concerned with neighbourhood cognition are limited almost entirely to attempts to explain variation in the size of cognitively structured neighbourhoods. A number of role profile and life cycle variables have been used, with some success, to explain such variations. The list of such variables is by no means exhaustive[37], and the findings are thereby incomplete. It seems entirely appropriate now to begin asking which environmental attributes individuals use to distinguish places construed as being within the neighbourhood, from those construed as being outside the neighbourhood. In the next chapter, attention is turned to specifying some hypotheses about neighbourhood cognition which may begin to provide evidence regarding this issue.

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[36] L.W. Bowden, 'How to define neighbourhood', Professional Geographer, 24, 1972, pp. 227-8.

[37] For example, no measurement of the respondents' attitudinal or dispositional characteristics has been taken in any of these studies. Metton suggests that some of the extremely small neighbourhoods in the cognitive schemas of respondents may have been the result of feelings of alienation or non-integration in the life of the neighbourhood.

CHAPTER III

THE HYPOTHESES AND METHODOLOGY OF THE STUDY

The objective of this study is to build on what has already been descovered regarding neighbourhood cognition, as well as to investigate some uncharted waters. Thus, the cognitive organisation of neighbourhood schemata is investigated in two ways. Firstly, a set of hypotheses is specified regarding variations in the size of cognitive neighbourhoods, as delimited by respondents on a city map, with respect to such variables as socio-economic status, sex, age, etc. Secondly, a set of hypotheses is specified regarding the environmental attributes used to construe 'within' and 'without' neighbourhood identification.

3.1 The Hypotheses

The first set of hypotheses comes principally from the literature reviewed in the preceding chapter, and is intended to retest the findings of the studies reported there. The hypotheses are readily set out in the following manner.

H_1 : The size of the cognitive neighbourhood is positively related to socio-economic status.

H_2 : The size of the cognitive neighbourhood is inversely related to 'external' roles[38].

Corollary

H_{2a}: The size of the cognitive neighbourhood is positively related to 'internal' roles.

Since roles are often sex specific:

H_{2b}: Females will have larger cognitive neighbourhoods than males.

H_3 : The size of the cognitive neighbourhood is positively related to length of residence in the sub-area.

H_4 : The size of the cognitive neighbourhood is an inverted 'U'[39] function of the respondents' ages.

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[38] 'External' refers to those roles, which are of necessity performed away from the domicile, in particular outside employment. 'Internal', by contrast, refers to roles performed mainly at, or near, the domicile, for instance that of the homemaker.

[39] Drawing upon the Lee, Metton and Zannaras studies, the expected form of the 'U' function is an increase up to sixty years of age, with a decrease thereafter.

H_5 : The size of cognitive neighbourhoods of individuals who are locally oriented in life style is greater than those of individuals who are cosmopolitan in life style[40].

Generation of the second set of hypotheses regarding environmental attributes within and without neighbourhoods poses somewhat more problems, since this attempt to investigate the cognition of environmental elements in the neighbourhood context is essentially a pioneering one. Among the goals of this study is the quest to discover which, if any, attributes of the environment serve as aggregate constraints on individuals in developing a cognitive schema of 'neighbourhood'.

In constructing hypotheses about the attributes of the environment used to cognitively organise the neighbourhood, one is essentially confined to using the evidence from Lynch[41] and Harrison and Howard[42] regarding urban imagery. Their work suggests that the attributes, or constructs related to them, are arrayed along a small number of underlying dimensions. Using their findings, some very general hypotheses are proposed regarding the importance or salience of these underlying dimensions. Specifically.

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[40]W. Michelson in Man and his Urban Environment, Reading, Mass., 1970, Addison Wesley., has suggested that there are important differences in the use of local facilities, and in behaviour in the local area, between those individuals who are locally oriented, who emphasise on such features as friendly neighbours, and those who are cosmopolitan in their orientation, who value accessibility to non-local facilities. This hypothesis seeks to discover if greater attachment to the local area results in larger cognitive neighbourhoods.

[41]Lynch, op.cit.

[42]Harrison and Howard, op. cit.

H_6 : The primary constructs for distinguishing neighbourhood from non-neighbourhood are social and functional.

Corollary:

H_7 : Constructs dealing with the physical environment are secondary in differentiating between neighbourhood and non-neighbourhood.

Drawing also on the study by Lowenthal and Riel[43], which uses the Semantic Differential technique to characterize the terms in which people identify the everyday outdoor urban milieu and the connections between various environmental attributes, we may posit:

H_8 : Neighbourhood structure will be viewed along three factors.

H_{8a}: Neighbourhood structure will be primarily viewed along an emotive and evaluative factor.

H_{8b}: Neighbourhood structure will be secondarily viewed along an activity oriented factor.

H_{8c}: Neighbourhood structure will be viewed tertiarily along analytic and descriptive statements about the general structure of the neighbourhood environment.

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[43] Lowenthal and Riel, op. cit.

The data required to test these hypotheses were gathered by interviewing residents in a subarea of the city of Hamilton. The method of sample selection and interview procedure are discussed in the fourth chapter of this thesis. Before discussing these, it is appropriate to discuss the theoretical and methodological position adopted in this study of urban neighbourhood cognition.

3.2 The Study of Cognition

Since geographers first became interested in the behavioural processes affecting man's knowledge of, and reaction to, the environment, the terms 'perception', 'image' and 'cognition' have been used loosely and inappropriately in the field. The term 'perception', in particular, has been grossly misapplied in what is called the environmental perception literature. Writers such as Sonnenfeld[44], and most of the so-called hazard perception studies, have discussed almost purely conceptual processes under the heading of 'perception'.

In discussing the manner in which knowledge of the environment is acquired and mentally arranged, geographers are concerned essentially with macro-spatial phenomena. Knowledge of such a large scale environment is rarely, if ever, obtained from the activities of one sensory mode only, but rather is a synthesis of the inputs from several sensory modes (visual, auditory, etc.). Our concern, therefore, is more with the

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[44] J. Sonnenfeld, 'Environmental perception and adaptation level in the Arctic' in D. Lowenthal (Ed), Environmental Perception and Bahavior, University of Chicago, Department of Geography, Research Paper No. 109, 1967, pp. 43-59.

conceptualization which results from sensations in various modes, gathered over various time periods, than with the processes of sensation itself. This is in contrast with the psychologist, whose interest in spatial phenomena is usually limited to the perception, through the visual mode only, of these phenomena at a micro-level.

While not negating the importance of perceptual processes per se, our interest can best be labelled a cognitive one. Cognition, to quote Neisser[45], 'refers to all the processes by which sensory input is transformed, stored, elaborated and used'. Such terms as sensation, perception, imagery, and thinking all refer to aspects of cognition. The research methodology, to be adopted in attempting to measure the 'images' which man holds of segments of his environment, ought to reflect this concern.

3.3 Personal Construct Theory

In the present study, we are concerned with the manner in which urban residents cognitively organise areas of lived-in space into neighbourhood schemata, and more particularly, on the cues used in delimiting boundaries of cognitive neighbourhoods. The viewpoint is taken, that for urban residents, cognitive organisation of a neighbourhood schema occurs on the basis of discrimination between perceived attributes in the surrounding environment. We wish to extract these attributes.

The problem confronted is not easily solved by any of the more

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[45] U. Neisser, Cognitive Psychology, New York, 1967, Appleton.

customary research methods into cognitive structure. It was for this reason that recourse was made to the clinical psychology literature. More particularly, we looked to the Personal Construct Theory approach of Kelly[46], which has received subsequent refinement and application by a number of researchers in clinical and social psychology, psychiatry, and environmental design[47].

Kelly's theory defies easy categorization into any conventional niche. In reaction against behaviouristic views which see man as essentially inert until 'motivated' in some way by an external force, Kelly takes the position that every individual is somewhat of an amateur scientist, one who anticipates rather than simply responds to external forces. Individuals are seen to observe the world and set up conceptual models which are used in deciding future actions; in Kelly's words[48]: 'man creates his own ways of seeing the world, in which he lives, the world doesn't create them for him'.

The theory is expounded by means of a basic postulate and eleven corollaries. The following brief discussion covers the ones more important for our purposes. The Fundamental Postulate states that a

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[46] G.A. Kelly, The Psychology of Personal Constructs, New York, 1955, W.W. Norton.

[47] See for example, D. Bannister and J.M.M. Mair, The Evaluation of Personal Constructs, London, 1968, Academic Press; D.N. Hinkle, The Change of Personal Constructs from the Viewpoint of a Theory of Construct Implications, Ph.D. dissertation, The Ohio State University, 1965, Columbus, Ohio; H.S. Leff and P.S. Deutsch, 'Construing the physical environment: differences between environmental professionals and lay persons' in W.F.E. Preiser (Ed), Environmental Design Research, Stroudsburg, Pa., 1973, Dowden, Hutchinson and Ross.

[48] Kelly, op. cit.

person's processes are psychologically channeled by the ways in which he/she anticipates them. The first of the corollaries to this statement, the Construction Corollary, states that a person anticipates events by construing their replications. Elaborating on this, Kelly states that, in construing, the person notes features in a series of elements which characterise some of the elements and are particularly uncharacteristic of others. Thus, the person erects constructs of similarity and contrast. Both the similarity and the contrast are inherent in the same construct. Continuing this theme, the Dichotomy Corollary states that a person's construction system is composed of a finite number of dichotomous constructs. To illustrate, if we choose an aspect in which A and B are similar, but in contrast to C, it is the same aspect of all three, A, B and C that forms the construct. It is not that there is one aspect of A and B that makes them similar to each other, and another aspect which makes them in contrast to C. Rather, there is one aspect of A, B and C, call it z, with respect to which A and B are similar, and C stands in contrast. This is a very important point, as will become clear later when we discuss construct elicitation.

Also important at this stage is the Range Corollary. This states that a construct is convenient for the anticipation of a finite range of activities only. For example, the construct 'religious-irreligious' is clearly inappropriate in evaluating the urban environment. The Individuality Corollary states that persons differ from each other in their construction of events. Qualifying this is the Commonality Corollary. This states that to the extent that one person employs a construction of experience which is similar to that employed by another, his/her psychological processes (and presumably, experience) are similar to those of the other person.

The Repertory Grid technique, developed by Kelly for the measurement of personal construct dimensions, is essentially concerned with the interweave between elements ('other people' in the clinical psychology usage; environmental elements in our usage) and constructs. Presented with a number of elements, which may be either of his/her own, or of the experimenter's choosing, a subject is asked to provide the constructs which he/she uses in mentally categorizing and distinguishing between these elements. Construct refers to the nature of the distinction drawn, by which two of the elements are construed as being similar to each other, and different to the third. The methods available for eliciting, scoring and analysing Repertory Grids are discussed in detail in the following chapter.

3.4 The Relevance of the Personal Construct Approach

Personal construct theory, to a large degree, grew out of Kelly's disagreement with the explanations of human behaviour offered by the stimulus-response theorists of the behaviourist school in psychology. Many resemblances are present in the theory to the Functionalist views of writers such as Carr[49]. Hudson[50], in a comprehensive review of the relationship between personal construct theory and other psychological

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[49] H. Carr, An Introduction to Space Perception, New York, 1935, Longmans Green.

[50] R. Hudson, 'Personal Construct Theory, Learning Theories, and Consumer Behaviour', University of Bristol, Department of Geography, Seminar Paper Series A, No. 21, 1970.

theories, has pointed also to the similarities with aspects of Tolman's[51] theory of sign-learning. Given, however, the many nuances present in Kelly's work, one may have to agree with Bannister and Mair[52], who state that other existing theories may be more readily subsumed within the context of personal construct theory, than vice-versa.

The wide ranging nature of the theory seems well suited to the problems of measurement encountered in geographical research into environmental cognition and image formation. Personal construct theory embraces aspects of perception, conceptualization, learning and cognition. Kelly deliberately blurs the distinctions between perception, conceptualization, and the development of cognition. He states that 'even perception, long thought to be something quite different from conceptualization, is assumed to be an act of construing'[53]. But his constructs differ from the traditional view of 'percepts', in that they involve abstraction, and in that sense bear a resemblance to the traditional usage of 'concept'. One might notice, however, that at least one theorist, Bruner,[54] views perception as involving an act of categorization, this characteristic being also true of cognition generally. Also, writing on cognition, Neisser[55] asserts that most cognitive processes are acts of construction. Given the nature of the behavioural geographer's concern with the manner in which aspects of the

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[51] E.C. Tolman, Purposive Behavior in Animals and Man, New York, 1932, Appleton.

[52] Bannister and Mair, op. cit.

[53] Kelly, op. cit.

[54] J.S. Bruner, 'On perceptual readiness', Psychological Review, 64, 1957, pp. 123-153.

[55] Neisser, op. cit.

environment are cognitively structured on the bases of different types of sense perception, personal construct theory and its associated measurement techniques appear to offer a theoretical and methodological position which may be profitably adopted.

3.5 Personal Construct Studies in Geography

Personal construct theory has attracted the attention of a number of geographers in the last couple of years, but as yet geographical applications of the technique are at an elementary stage. Downs and Horsfall[56], and Demko[57], among others, have suggested the potentialities of the technique, but as yet only Hudson[58], Sarre[59], and Silzer[60] report applications. Hudson, in his ongoing doctoral research, uses the technique in the field of consumer behaviour. He is concerned with measuring distances between elements (in his case, shops) in construct space. He then uses these distances to explain

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[56] R.M. Downs and R. Horsfall, 'Methodological approaches to urban cognition', Paper presented at the 67th Annual Conference of the American Association of Geographers, Boston, 1971.

[57] D. Demko, 'The structure of common urban constructs', *International Geography: Proceedings of the 22nd I.G.U. Congress, Vol. 2*, 1972, Montreal, pp. 854-856.

[58] R. Hudson, *Measurement of environmental images and their relationship to behaviour: an example of the use of the repertory grid methodology*, unpublished paper read to a meeting of the I.B.G. Quantitative methods group, Coventry, 1972.

[59] For an interim report on this research see pp. 35-40 of P. Sarre and G. Edge, *Channels of synthesis: Perception and Diffusion*, Bletchley, Bucks., 1972, The Open University Press.

[60] V.J. Silzer, *Personal Construct elicitation in space preference research*, York University, Toronto, Dept. of Geography, Discussion paper series No. 1, 1972.

shopping behaviour, postulating that this is a function of the images held of the various shops in question. Sarre elicited the constructs which residents of the city of Bath, England used in mentally categorizing the places which they considered important in their daily lives. Some of his findings have relevance to the topic of this study, and are discussed and compared when we describe the results of our analysis. Silzer's application is concerned with the dimensions along which potential residential locations in Métropolitan Toronto are evaluated.

3.6 Summary

In this chapter we specify the hypotheses and outline the methodology adopted in the study. The personal construct theory approach has been examined and its potential usefulness for the present study has been shown. Personal construct theory offers an explicit model of mental structure and process, something which has been lacking in most geographical investigations of environmental cognition to date. Further, it offers an associated measurement technique, which can profitably be used in this and similar studies.

CHAPTER IV

THE DATA COLLECTION AND REPERTORY GRID TEST

Having generated a set of hypotheses, the next task was to select a study area and a sample of respondents with which to test them. The most suitable area, for purposes of this research, proved to be located in the city of Hamilton, about one mile southwest of the Central Business District. A random sample was taken of all the adult Canadian citizens resident in one city block in this area. This group provided the sample respondents for the study. A set of questions was designed for the interview schedule which falls basically into three parts. One part elicits the map of the respondent's 'neighbourhood'. The second part elicits the constructs or dimensions which the respondent uses to distinguish locales construed as 'within-neighbourhood' from those which are 'without-neighbourhood'. The third part elicits the standard demographic, etc., data necessary for testing the first set of hypotheses, and for control purposes. The Repertory grid test, which is used to elicit and score the constructs, bears some resemblance to the more widely used Semantic Differential technique, but the underlying differences are profound. In the final section of this chapter, the principal components analysis of Repertory grids is discussed.

4.1 Selection of a Study Area

The selection of a study area was determined by a number of constraints. Hamilton was chosen as the city to work in, primarily for reasons of convenience. Since most interviews would have to be conducted at night or on the weekends, a study site within the Hamilton area seemed highly desirable. Nevertheless, this choice did provide some problems which will be discussed below.

Regardless of the city chosen, it was necessary to select a sub-area comprised of pre-1950 construction. This would allow sufficient time to have elapsed for the creation of an identity with the district.

A number of previous studies[61] have shown that such features as major routeways, rivers, abrupt changes in topography, etc., where they exist, almost always serve as boundaries to neighbourhood cognitive schemata. Since our concern is to uncover what other environmental attributes are used in deciding upon cognitive boundaries, it was decided to select an area not immediately bounded by such a major physical feature. In addition, a compact area is required to ensure that respondents are referring to a common set of environmental elements. These requirements created some difficulties in the Hamilton context. The situation is also compounded by the requirement for pre-1950 construction.

To test the hypotheses about social class and life cycle differences, and their effect on the size of neighbourhood schemata,

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[61] Everitt, op. cit., Metton, op. cit., and Zannaras, op. cit.

an area with some mix of social classes and age groups was required. To maximize returns from interviewing, census tracts where more than 5% of the population could not speak English were omitted from consideration.

Satisfaction of all these requirements left a choice of three potential study areas in the city. After closer examination the city block, enclosing the north side of Stanley Avenue, south side of Homewood Avenue, bounded on the east by the west side of Queen Street South, and on the west by the east side of Kent Street, was selected. The block contains a population of 242 adult Canadian citizens. It is very compact and thus satisfies the condition that all respondents should be referring to a common set of surrounding environmental elements. However, it does have the disadvantage of being adjacent to Queen Street South, a major traffic artery providing access to the 'Hamilton Mountain' area. In addition, the Niagara Escarpment (the edge of Hamilton Mountain) is nearby.

The sample area is located on the east side of Hamilton census tract number 40. This tract has a demographic profile which is similar to the city as a whole, particularly in its mix of social classes. The percentage of dwellings that are apartments was higher (67% vs 36%), and the percentage of owner-occupiers (36% vs 58%) lower than the city as a whole in 1971. Likewise, the population is somewhat older than in Hamilton on the average, with 30.1% under 20 years (Hamilton 35.3%) and 10.5% over 65 years (Hamilton 9.5%). Average annual male wage and the percentage in managerial and professional occupations was slightly lower than for the city as a whole in 1961[62]. The ethnic breakdown of the

[62] Results of the 1971 Census for these categories were not available at time of writing.

population in the census tract was very similar to that of Hamilton in general, with just over 60% of the population being of British Isles origin, and Germans, Italians, and Poles being most prominent among the other nationalities. In the study area itself, however, almost 30% of those in the sample were post-1940 immigrants from Eastern Europe. Lack of fluency in the English language among this group caused some problems when interviewing.

Most of the characteristics above are probably due to the comparatively inner-city position of the tract selected, it being located just one mile southwest of the C.B.D. The tract is almost entirely residential and practically all the dwellings are of pre-1920 construction. Formerly, this was one of the most prestigeous residential areas of Hamilton. Although many of the dwellings have been converted to flats and multiple occupancy, a substantial number of very well kept single family homes remain in the area.

4.2. The Sample

The most current data source on the occupants of the block proved to be the Register of Electors, prepared for the Federal Parliamentary election held in Canada in October 1972. The 242 electors on the block were each assigned a number, and a fifty per cent sample (121) was taken, using a table of random numbers. Each member of the sample was then sent a covering letter (See Appendix I), in which the broad purpose of the study was outlined. Following receipt of the letter, the sample member was contacted, usually by telephone, by a member of the interview team. The purposes of the study were again explained, and, if the respondent was willing to cooperate, an interview was arranged. Interviewing took place between November, 1972 and February, 1973. Table IV - I shows the sample response.

TABLE IV - I

SAMPLE RESPONSE

Completed Interviews	59 (48.6%)
No longer residing in area	19 (15.7%)
Could not be contacted	15 (12.4%)
Did not speak English	6 (4.4%)
Refusals	22 (18.9%)

The completed sample consisted of thirty-two female respondents and twenty-seven male respondents. While all age groups (except children) were represented, there was a considerable concentration of young adults (twenty respondents being under 30 years of age) and of elderly people (eight respondents being over 70 years old). There was a considerable spread of occupations, ranging from upper professional to manual worker. The life cycle, socio-economic, and other characteristics of the respondents are discussed in greater detail during the data analysis in the following chapter.

4.3 The Pretest

The questionnaire, which is discussed below, was first tested on a group of pre-test subjects. This pretest was undertaken for a number of reasons. Firstly, it was necessary to discover whether people could spontaneously delimit their cognitive neighbourhood on a map presented to them. Secondly, the phrasing and comprehensibility of the questions needed to be tested in an interview situation. Thirdly, interviewers needed to be given some practice and experience in administering the Repertory grid test. Finally, it was undertaken to assess the speed at which interviews could be carried out.

The pretest was carried out on eight volunteer respondents, who varied considerably in life cycle and occupational characteristics. Four of the respondents resided immediately adjacent to the study area, while the other four resided in two different locations in the Hamilton Metropolitan Area. The applicability of the questionnaire was confirmed by the pretest procedure. Following upon suggestions made by the respondents, some questions were slightly rephrased, and two of the questions in Section B of the completed questionnaire (See Appendix II) were added.

4.4 The Questionnaire

The questionnaire, which was administered to all fifty-nine members of the final sample, is reproduced in Appendix II. This questionnaire is divided into four parts. In Section A, the respondents are presented with a map of the city of Hamilton (Figure 1). They are asked to record on this map the location of such features in their activity spaces as place of work, homes of friends and relatives, shopping areas frequented, schools attended by their children, etc. These data are collected to test for any biases in the shape of cognitive maps towards locations which feature prominently in the activity space of

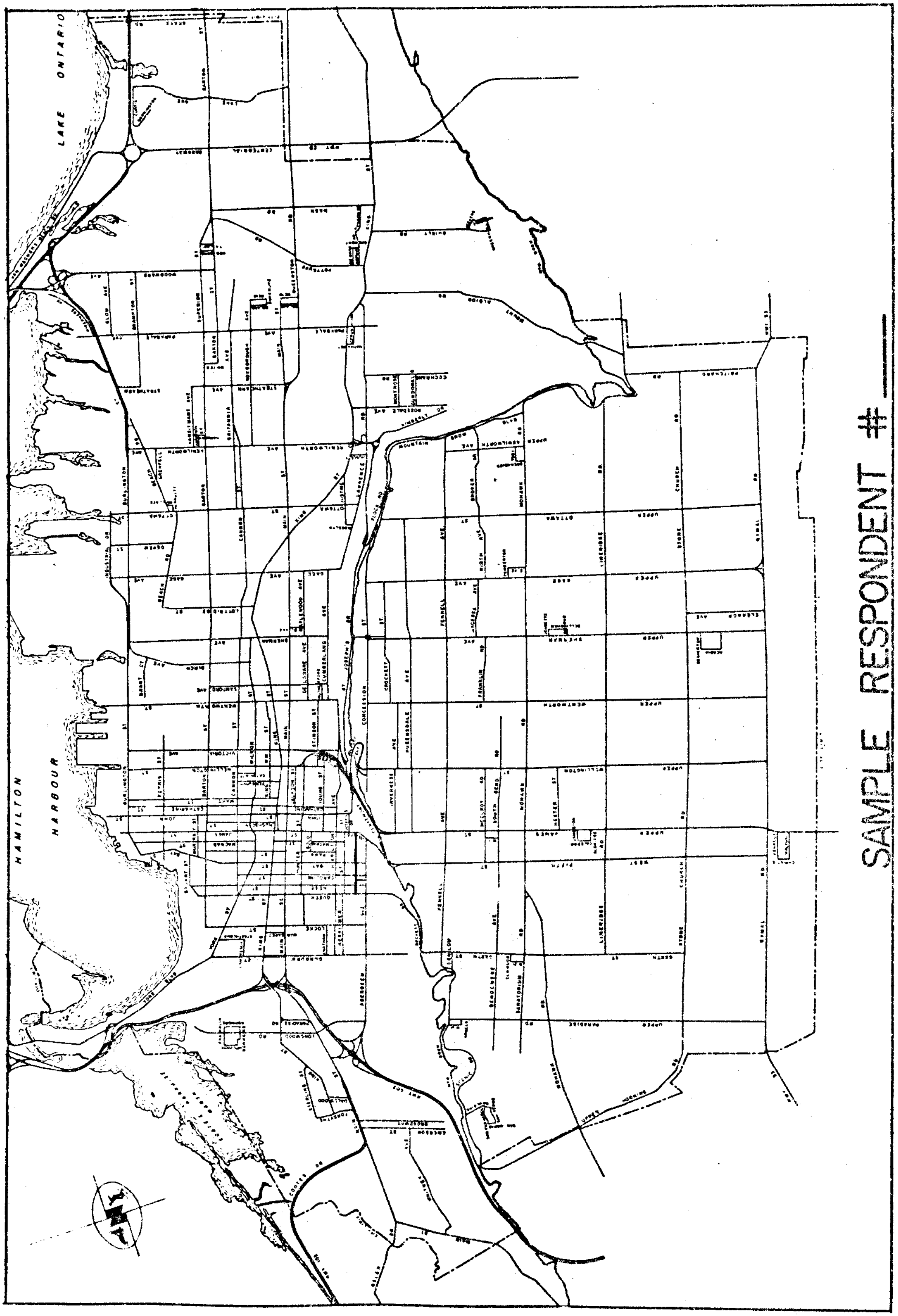

FIGURE 1

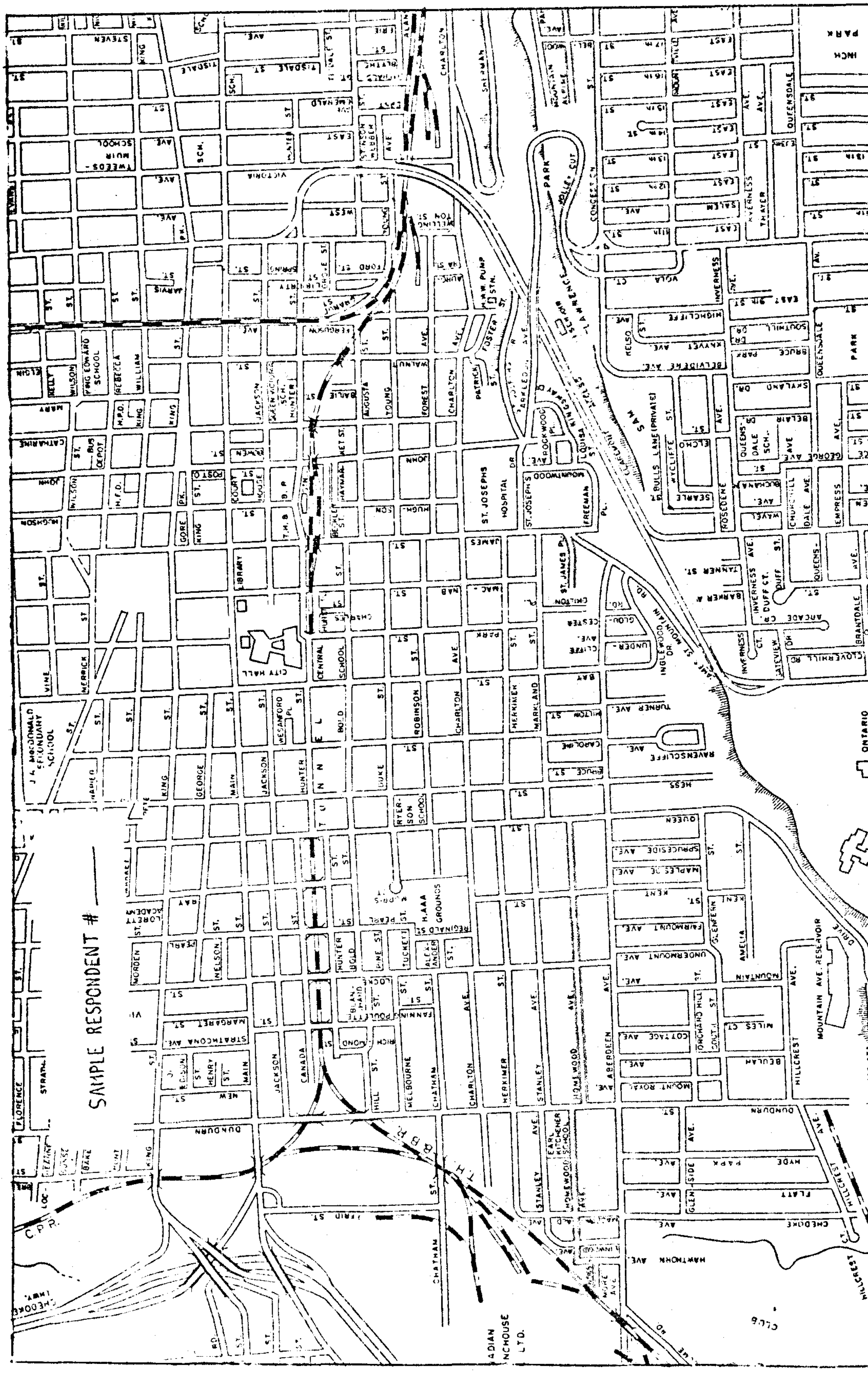
SAMPLE RESPONDENT #
CITY HALL
CENTRAL SCHOOL
LIBRARY
ST. JOSEPHS HOSPITAL
RYERSON SCHOOL
H.A.A.A. GROUNDS
MOUNTAIN AVE. RESERVOIR
EARL KITCHENER SCHOOL
HOMEWOOD SCHOOL
KING EDWARD SCHOOL
C.P.R.
T.H.&B.R.
ONTARIO
INCH PARK
DUNDURN
CHARLTON
JAMES
JOHN
MAIN
KING
BAY
HESS
QUEEN
GARTH
HILLCREST
JAMES MOUNTAIN RD.
CLAREMONT

FIGURE 2

respondents. Spatial elongation of neighbourhood maps in the direction of features such as workplace, shopping areas, and schools has been reported in the literature[63].

The questions in Section B are designed to discover what commonality exists among respondents in the understanding they hold of concepts such as 'neighbour' and 'neighbourhood'. The answers to these open-ended questions can be later compared with the constructs of 'neighbourhood' elicited from respondents when using the Repertory grid test. These questions also provide some crude measures of interaction with neighbours and involvement with the local area.

The respondents are next presented with a map of the western half of the city, where all streets and major buildings are clearly shown. The area covered by this map is approximately 4.0 square miles. (The 'home area' maps of 81% of Everitt's Los Angeles sample encompassed an area of less than 5 square miles. In all other studies previously cited, the areas were considerably less.) On this map the respondents are asked to indicate the boundaries of their neighbourhood. Each respondent is told to define 'neighbourhood' as the limits of the area in which he/she begins to feel at home when returning from another part of the city. This is very similar to the definition of 'home area' which Everitt supplied to his respondents. In terms of Lee's[64] subcategories, this area appears to approximate the 'homogeneous neighbourhood' because it takes more than local social acquaintance networks into account. This

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[63]Everitt, op. cit., Metton, op. cit., and Sanoff, op. cit.

[64]Lee, op. cit.

definition is used in an attempt to elicit the respondents' cognition of, and identification with, environmental elements, rather than simply the dimensions of local social acquaintance networks. These networks have been shown by a number of studies, most recently that by Athanasiou and Yoshioka[65], to be usually restricted to immediately adjacent dwelling units.

The penultimate question in Section B inquires about travel mode utilized by the respondents. This variable has been found by Appleyard[66], to account for differences in the spatial extent of the urban image. The final question in this section is a crude measure at differentiating among locally-oriented individuals and cosmopolitan individuals. Michelson[67] suggests important differences in the use of local facilities, and in behaviour in the local area between the two groups. H_5 above postulates that the locally-oriented group should have larger cognitive neighbourhoods than the cosmopolitan group. Section D of the questionnaire collects information on the socio-economic status characteristics and demographic role profiles of the respondents.

4.5 The Repertory Grid Test

In Section C, using the cognitive neighbourhood map drawn by the respondent in Section A, the researcher proceeds to elicit the

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[65] R. Athanasiou and G.A. Yoshioka, 'The spatial character of friendship formation', Environment and Behavior, 5, 1973, pp. 43-65.

[66] Appleyard, op. cit.

[67] Michelson, op. cit.

constructs to be used in the repertory grid analysis. The interviewer chooses a set of twelve streets (or sections thereof), the names of which provide the element inputs for the repertory grid. The twelve street names (elements) are chosen such that three come from each of the four main compass coordinates of the respondent's cognitive neighbourhood area. Two of the streets are immediately inside the delimited boundary, and one immediately outside. Three-element sorts are then named by the interviewer (in each case, two within-neighbourhood elements and one without-neighbourhood element). The respondent is asked if there is anything about any two of the streets (elements) which make them similar, and thereby different from the third. If the respondent asks for further guidance, he/she is told that any aspect of the physical construction of the streets, life or people on the street, or subjective reactions felt when travelling upon the street, may be used as the basis for distinction. Following from the Dichotomy Corollary, which was outlined above, both the similarity and the contrast must be inherent in the basis for distinction (the construct).

Construct elicitation proceeds until the respondent is no longer able to provide any new constructs. The decision to terminate is usually taken after three successive element-sorts fail to provide a new construct. When all possible constructs are elicited, the respondent is next required to score each element on each construct in terms of a seven-point rating scale, where those elements most characterised by the emergent pole (the basis of similarity of two elements) of the construct are given the higher scores.

It is appropriate, at this juncture, to discuss some of the assumptions inherent in using the repertory grid to elicit the mental constructs used by people in differentiating within-neighbourhood environmental elements from elements outside the cognitive neighbourhood. Firstly, it is assumed that 'neighbourhood' is a spatially continuous area around a person's residence, with sharp recognizable boundaries in his/her cognitive schema. Lee[68] made a similar assumption, which has been subsequently criticized[69]. While the assumption has never been rigorously tested in the literature, partial justification for its use may be made by referring to the forms of cognitive maps produced by respondents in this and other studies[70]. In all cases in this study, respondents drew a spatially continuous area about their residence in delimiting their 'neighbourhood'. No attempts were made to delimit spatially discontinuous areas, although the request to delimit 'neighbourhood' could be interpreted to allow that. The assumption of sharp, recognizable boundaries is made in the absence of any definitive evidence to support or negate the proposition. Some evidence regarding the validity of this assumption may be provided by the manner in which the within-neighbourhood elements are scored on the constructs compared to the scores of without-neighbourhood elements on the same constructs.

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[68]Lee, op. cit.

[69]Sarre, op. cit.

[70]Everitt, op. cit., Lee, op. cit., Zannaras, op. cit.

The triads used to elicit constructs consist in each case of two elements from within the cognitive neighbourhood, and one from outside. However, since the order of presentation of the elements is random, and the respondent is no longer able to see the map which he/she has drawn, no constraints are placed on the individual to force a pair of within-neighbourhood elements to be chosen as similar and at the emergent pole of the construct. It is, indeed, possible to allot one within-neighbourhood and one without-neighbourhood element to the emergent pole, thus leaving the other within-neighbourhood element at the implicit (or contrasting) pole. The degree of consistency with which within-neighbourhood elements are allotted to one pole of a construct, while without-neighbourhood elements are allotted to the contrasting pole, serves as a check of the efficacy of the use of that construct as a basis for distinguishing between neighbourhood and non-neighbourhood features.

The method of eliciting and scoring repertory grids used here, is only one of several possible methods. Epting, et al.[71] compare the efficiency of the Difference Method versus the Opposite Method of eliciting constructs. In the Difference Method, the individual is asked to give the word or short phrase that describes how the third element is different from the other two. In the Opposite Method, the individual is asked to give what he/she considers to be the opposite

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[71] F.R. Epting, D.I. Suchman, and C.J. Nickeson, 'An evaluation of elicitation procedures for personal constructs', British Journal of Psychology, 62, 1971, pp. 513-517.

of the characteristic he/she listed for the likeness end. In test-retest situations, the Opposite Method is found to be the more efficient and consistent of the two. The Opposite Method is used in this study.

There is also a considerable variety of scoring procedures available for scoring all the elements on all the constructs. The elements may be ranked in terms of each construct, or a rating scale may be used. In this study a seven-point rating scale was used.

4.6 Repertory Grid and Semantic Differential

The use of the seven-point rating scale inevitably calls to mind the Semantic Differential technique. It is perhaps opportune now to discuss the profound differences which underly the superficial similarities between the two techniques.

The Semantic Differential was developed by Osgood and his associates[72] as an operational measure for a theory of meaning. The theory is cast in a behaviousistic learning theory framework. Words, it is stated, 'represent things because they produce in organisms some replica of the actual behavior towards these things'[73]. This deterministic behaviouristic viewpoint is in contrast to Kelly's view that each man creates his own way of seeing and interpreting the world.

In the general form of the Semantic Differential, the subject is provided with a number of concepts to be differentiated, and a set of bipolar adjectival scales against which to do so; his/her task being to indicate for each item (pairing of a concept with a scale),

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[72] C.E. Osgood, G.J. Suci, and P.H. Tannenbaum, The Measurement of Meaning, Urbana, 1957, University of Illinois Press.

[73] Ibid., p. 7.

the direction of association and its intensity on a seven-point scale. On the basis of studies where a large number of subjects evaluated concepts upon an exhaustive set of scales, Osgood concludes that the structure of meaning is three-dimensional. He finds that the complete range of adjectival scales reduce essentially to three orthogonal dimensions of meaning, Evaluation, Potency, and Activity. The insistence on these three dimensions comes despite the fact that he has earlier acknowledged that meaning is essentially multi-dimensional[74]. Bannister and Mair[75] have aptly pointed out that Osgood comes to his conclusion only on a pooling basis which effectively conceals individual variance. The Semantic Differential assumes generality of meaning in the words used to label scales and concepts, which is indeed a strange assumption for a measure of meaning.

Bannister and Mair also note that the orthogonality of Osgood's three major dimensions of meaning has been queried by a number of later studies, which severely criticize the process of pooling scale correlations across concepts for factor-analytic purposes, in view of the massive scale-concept interaction present in grids. The factors of Potency and Activity tend also to merge in a number of studies, while Nunalley[76] states that even the best scales for measuring these two dimensions also correlate with the dimension of Evaluation.

In contrast to these formulations, Personal Construct Theory

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[74] Osgood, et al., op. cit., pp. 25-26.

[75] Bannister and Mair, op. cit.

[76] J.C. Nunalley, An Introduction to Psychological Measurement, New York, 1970, Mc Graw Hill.

argues that meaning, as expressed in a person's psychological space, is multidimensional. Accordingly in the Repertory grid, all constructs are compared with all other constructs, and they are not matched against any universal axes.

Construct theory also recognizes that each construct has its own range of convenience, that it is applicable to a finite range of elements only. For instance, the element 'mountain' usually lies outside the range of convenience of the construct 'cheap-expensive'. Osgood, by contrast, implies that all concepts (i.e. elements) can be applied to all scales (i.e. constructs).

Slater[77] claims that the essential differences between the two techniques are not in their form, but in the uses for which they are intended. He states that grid technique is especially adapted for studying individual cases, while the Semantic Differential is appropriate for studying representative samples of populations, i.e., the grid is primarily idiographic and the Semantic Differential nomothetic in application. However, considerable doubt surrounds the validity of the aggregative processes involved in the Semantic Differential technique. If ways are found to extract some groupings among the variety of construction systems which emerge from the repertory grids of individuals, one may have achieved a partial aggregation of greater validity than the crude aggregation of the Semantic Differential.

4.7 The Interpretation of Repertory Grids

Some preliminary attempts to group the types of construction

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[77] P. Slater, 'Theory and technique of the repertory grid', British Journal of Psychiatry, 115, 1969, pp. 1287-1296.

systems, which emerge in sample populations, have been made by Sarre[78] and Leff and Deutsch[79]. The dimension of Evaluation, noted in Semantic Differential studies, has been found, along with dimensions of Affectation, Description, and Emotion. Leff and Deutsch have further tried to relate particular types of construction systems to the socio-economic and occupation characteristics of their respondents. If we are to stick to the tenets of Kelly's original formulation, then such generalisations must be made with extreme caution. Kelly's Fragmentation Corollary which states that 'a person may successively employ a variety of construction systems which are inferentially incompatible with each other'[80], seems to imply that construction systems are instable over time. It seems possible, therefore, that different groupings of construct dimensions may perhaps be explained by the subjects being at different stages of a learning or development sequence, and not by their role profiles, as Leff and Deutsch suggest.

A central argument of construct theory is that personal construct systems are hierarchically organized, that certain constructs are superordinate to other constructs and may subsume the meanings of these subordinate constructs. The basic form of the Repartory grid, as developed by Kelly, elicits generally subordinate constructs, but hopes to identify the superordinate constructs by later statistical analyses.

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[78] Sarre, op. cit.

[79] Leff and Deutsch, op. cit.

[80] Kelly, op. cit., p. 82.

Hinkle[81] elaborated and refined the personal construct methodology to allow elicitation of a construct hierarchy during the actual questionnaire procedure, but his methods are rather detailed and were beyond the scope and time-budget of the present study. It is important to note that the possibility of deriving any hierarchy of scales or concepts is not allowed for in Semantic Differential technique.

Bannister and Mair[82] suggest that experimenters could supply their subjects with a number of preselected constructs to be scored along with the ones elicited, to determine what meaning such common supplied constructs had in terms of the individual meaning systems of differing subjects, and to allow for some comparability across subjects. This procedure has been followed in a number of studies in both the psychological[83] and the geographical and environmental design literature[84]. In supplying common constructs one must make the tenuous assumption that they have an identical meaning for all subjects. Such an assumption is one of the major weaknesses of the Semantic Differential

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[81] Hinkle, op. cit.

[82] Bannister and Mair, op. cit.

[83] See for example F. Fransella and B. Adams, 'An illustration of the use of the repertory grid technique in a clinical setting', British Journal of Social and Clinical Psychology, 5, 1966, pp. 51-62, & A. Ryle and D. Breen, 'Some differences in the personal constructs of neurotic and normal subjects', British Journal of Psychiatry, 120, 1972, pp. 483-489.

[84] See for example Hudson, op. cit., Sarre, op. cit., and Leff and Deutsch, op. cit.

technique. For this reason, and also because evidence[85] exists to suggest that subjects are able to make finer discriminations on personal, as against supplied, constructs, repertory grids consisting only of personal (i.e. elicited) constructs are used in this study.

Kelly devised a form of non-parametric factor analysis for the interpretation of Repertory grids. Fransella and Adams[86] and Ryle and Lunchi[87], among others, have illustrated modifications of this technique. More recently, Slater[88] has provided a sophisticated algorithm for the analysis of Repertory grids. This algorithm, while basically a principal component analytic procedure, provides considerable information and analysis not available through more standard forms of component analysis.

4.8 Principal Components Analysis

Principal components analysis is related to the realm of multivariate statistical techniques known as Factor Analysis, which

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[85] See for example J.C.J. Bonarius, 'Research in the personal construct theory of George A. Kelly: role construct repertory test and basic theory' in B.A. Maher (Ed.) Progress in Experimental Personality Research, New York, 1965, Academic Press., & Hinkle, op. cit.

[86] Fransella and Adams, op. cit.

[87] A. Ryle and M.E. Lunchi, 'The dyad grid: a modification of repertory grid technique', British Journal of Psychiatry, 117, 1970, pp. 323-327.

[88] An outline of the algorithm is given in P. Slater, Notes on Ingrid 72, London, 1972, Institute of Psychiatry (mimeographed). An earlier version of the algorithm is discussed in more detail in P. Slater, The Principal Components of a Repertory Grid, London, 1964, Vincent Andrews.

are well documented in the literature[89]. There are, nonetheless, important differences between the principal components model and the factor analysis model. In the latter case, given a matrix X with data for n variables on m cases, it is postulated that the n variables can be represented in terms of several underlying factors. Factor analysts seek to maximally reproduce the correlations between the variables in the matrix. Each of the n observed variables is described linearly in terms of m common factors (where m is normally less than n) and a unique factor. The data for a standardized variable z_j are thus reproduced

Eq. 4.1 $$z_j = a_{j1}F_1 + a_{j2}F_2 + \dots\dots + a_{jm}F_m + d_jU_j \qquad (j = 1,2,\dots,n)$$

Principal components analysis, however, as King[90] points out, essentially involves an orthogonal transformation of the set of variables $(x_1, x_2, \dots, x_n)$ into a new set $(y_1, y_2, \dots, y_n)$. The transformation results in $(y_1, y_2, \dots, y_n)$ being uncorrelated one with another, notwithstanding the fact that the original variables $(x_1, x_2, \dots, x_n)$ may have been quite highly intercorrelated. Unlike the situation in factor analysis, there are as many components derived as there are variables,

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[89] H.H. Harman, Modern Factor Analysis, Chicago, 1967, University of Chicago Press., M.G. Kendall, A Course in Multivariate Analysis, London, 1958, Charles Griffin., & D.N. Lawley and A.E. Maxwell, Factor Analysis as a Statistical Method, London, 1963, Butterworth.

[90] L.J. King, Statistical Analysis in Geography, Englewood Cliffs, 1969, Prentice Hall.

and the original total variance is preserved exactly in the total variance of the new components. The solution is such that y_1 accounts for the highest proportion of this total variance, y_2 for the second largest share, and so on. We may therefore write the model for component analysis thus

Eq. 4.2 $$z_j = a_{j1}F_1 + a_{j2}F_2 + \ldots\ldots\ldots + a_{jn}F_n \qquad (j = 1,2,\ldots\ldots,n)$$

There is no unique factor and each of the n observed variables is described linearly in terms of n uncorrelated components $F_1, F_2, \ldots\ldots, F_n$. The coefficient terms $a_{j1}, a_{j2}, \ldots\ldots, a_{jn}$ represent the correlations of the variable with the components and are often referred to as component 'loadings'. In the case of uncorrelated factors or components, as is the case in principal components analysis, Equation 4.2 also shows the linear composition of a variable in terms of components. The coefficients $a_{j1}, a_{j2}, \ldots\ldots, a_{jn}$ then may be regarded as having the form of regression coefficients.

Most reported principal component analyses standardize the variables concerned and then extract the correlation matrix R, which is equivalent to the variance-covariance matrix of the standardized variables. The correlation matrix is then used for the extraction of latent roots or eigenvalues (λ), each of which corresponds to a component, and is equal to the sum of squared loadings for that component. In the notation employed above

Eq. 4.3 $$\lambda_1 = a^2_{11} + a^2_{21} + \ldots\ldots + a^2_{n1}$$

The eigenvalues are obtained by solving the characteristic equation

Eq. 4.4 $$\left| R - \lambda I \right| = 0$$

Corresponding to the first root or eigenvalue of this question is a column vector or eigenvector $(f_{11}, f_{21}, \ldots, f_{n1})$ which, when scaled by the square root of the eigenvalue, yields the loadings $(a_{11}, a_{21}, \ldots a_{n1})$. The principal components solution is such that it is desired to maximize λ_1, i.e., make the first component account for the greatest possible proportion of the total variance.

The Slater algorithm, however, does not use the correlation matrix R, but rather operates on the covariance matrix $D'D$. D is obtained by differences of the form $d_{ij} = x_{ij} - x_i$, x_i being the mean for any particular construct (variable) in the original repertory grid. Hope[91], in a very lucid exposition of principal components analysis, also uses the sums of squares and sums of products matrix derived from deviation scores, rather than the correlation matrix, to extract eigenvalues.

In general, principal component analyses, as well as factor analyses, are divided into those which seek to delineate which variables possess common patterns of variation over the set of cases, commonly called R-mode analysis, and those concerned with delineating the cases which possess common patterns of variation over the set of variables, commonly called Q-mode analysis. Most applications of the

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[91] K. Hope, Methods of Multivariate Analysis, London, 1968, University Press.

technique in Geography have used the R-mode form.

It is possible however to perform an analysis whereby both the conventional R-mode and the Q-mode results are obtained together. Saunders[92] first demonstrated this possibility, using what he called the direct factor method. Use of this method has subsequently been made in the geography literature by Berry and Barnum[93]. The Slater algorithm follows a procedure very similar to the Saunders method.

The program written by Slater extracts a series of eigenvalues λ_c, where each eigenvalue is equal to the sum of the column of squared construct loadings and also to the sum of squared element loadings. The use of the two kinds of loadings for each component combines the advantages of Q and R techniques. A typical component c is specified by its latent root λ_c, its construct vector L_c, and its element vector I_c. The two vectors are taken to be column vectors and normalized. The program also calculates the construct loadings $\lambda^{\frac{1}{2}}L_c$ and the element loadings $\lambda^{\frac{1}{2}}I_c$. After the first component is extracted, successive components are obtained by an iterative procedure which operates on the matrix of residual differences at each stage.

Slater states that principal component analysis is consistent with both Q and R views of the data. It provides a common coordinate

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[92] D.R. Saunders, Practical Methods in the Direct Factor Analysis of Psychological Score Matrices, Ph.D. dissertation, Department of Psychology, University of Illinois, Urbana, 1950.

[93] B.J.L. Berry and H.G. Barnum, 'Aggregate relations and elemental components of central place systems', Journal of Regional Science, 4, 1962, pp. 35-68.

system for the two dispersions and thus establishes the connection between the two techniques. This leads to every element and every construct having an axis in the component space. Therefore an angular relationship must exist between every pair of them. For instance, the relationship between any two constructs can be expressed as an angular or circumferential distance, i.e. the angle that they subtend at the centre of the component space. The algorithm obtains the direction cosine, which is mathematically equivalent to the correlation coefficient, between each pair of constructs, each pair of elements, and between all the constructs and all the elements in the data. The output also includes measures of linear distance between elements in the component space. A complete discussion on how these statistics may be obtained is provided by Hope[94].

In any principal components analysis, one must decide how many of the components can be meaningfully interpreted. Bartlett has developed a test to decide whether the remaining variation, after a given number of the major components have been extracted, is scattered at random over the remaining dimensions. In such a case the remaining vectors would presumably not be worth defining. Despite its shortcomings, which are briefly discussed by Lawley and Maxwell[95], the Bartlett test is incorporated in the Slater algorithm.

In deciding upon the use of Repertory grid, rather than Semantic Differential technique, it was realised that the potentialities

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[94] Hope, <u>op. cit.</u>

[95] Lawley and Maxwell, <u>op. cit.</u>

for aggregation of results were considerably diminished. This shortcoming has been previously referred to above. Each grid essentially describes the variation unique to one individual's view of the world, and group components, derived from the aggregation of all the grids, can not be obtained, as in Semantic Differential technique. Nonetheless, where similar constructs and elements occur in more than one grid, some aggregative procedures are available, and these are briefly discussed.

We have already noted that the output includes measures of angular relationships between the constructs. Slater points out that the average of a set of angles is itself an angle, whereas the average of a set of correlations is not itself a correlation. This can be used for comparing grids. Average angular distance between similar constructs can be calculated for a set of grids without necessarily using a standard set of elements for every grid or keeping the other constructs the same. Likewise, when identical elements occur in more than one grid, average distances between them can also be calculated.

4.9 Summary

This chapter has outlined the methods of sample selection and questionnaire design adopted in this study. The use of the Repertory grid test for eliciting personal constructs is discussed. The Repertory grid test is shown to be more suitable for a study of this type than the Semantic Differential technique. The method of analysing Repertory grids, using a principal component analytic algorithm, is outlined. Methods for aggregating some of the results from the grids of differing individuals are discussed. These methods are applied in the analysis section of the study, which follows.

CHAPTER V

ANALYSIS OF COGNITIVE NEIGHBOURHOOD SIZE

Analysis of the data obtained from the fifty-nine completed interviews commences with an investigation of the sizes of the cognitive neighbourhoods delimited by respondents. Differences in the size of cognitive neighbourhood are related to certain demographic and role-profile variables. The hypotheses, outlined in Chapter Three, which specified the direction of such relationships, are supported or rejected after the application of appropriate statistical tests.

5.1 Boundaries and Size of Neighbourhoods

The size of neighbourhoods delimited displayed considerable variability, ranging from those respondents who considered that their neighbourhood consisted solely of the block on which they resided, to those whose neighbourhood comprised much of the western half of the inner city of Hamilton. Physical boundaries and main traffic arteries provided strong constraints, and cognitive neighbourhoods rarely crossed these barriers. No respondent extended his/her cognitive neighbourhood above the limestone escarpment which runs east-west across the city of Hamilton, and is, at its nearest, a mere six hundred yards to the south of the sample area. Similarly, only one cognitive neighbourhood (1.7%) extended west of Highway 403, a major six-lane freeway which runs north-south, less than three-quarters of a mile to the west of the sample area[96]. Only two cognitive neighbourhoods (3.4%) extended north of Main Street West, a busy five-lane one way street which carries the bulk of the traffic between the western suburbs of the city and downtown Hamilton. This street runs in an east-west direction, one half-mile north of the sample area.

There was greatest agreement in the choice of boundaries to cognitive neighbourhood on the southern and eastern sides of the area. Aberdeen Avenue was chosen as the southern limit of the neighbourhood by 66.1% of the respondents. Although Queen Street South abuts immediately onto the block used as sample area, 61.1% of respondents chose this street as the eastern boundary. Dundurn Street South was chosen as the western limit by 55.9% of the respondents. Boundaries on the northern edge of the neighbourhood were least clearly defined, with no single street being used as boundary by more than 35% of the respondents. The lack of concordance on a northern limit to the cognitive neighbourhood probably reflects the fact that the nearest major traffic artery to the north is one half-mile away, which is considerably greater than the distance from the sample area to the three previously named streets.

The considerable variability present in the sizes of cognitive neighbourhood delimited is seen in the figures in Table V-1.

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[96] Owing to a fault in the duplication of the local area maps (Figure 2), given to respondents for the neighbourhood delimitation task, both Highway 403 and the escarpment were very close to the edge of the map. Therein lies one possible explanation for the failure to extend cognitive neighbourhood beyond these limits.

TABLE V-1

SIZE OF COGNITIVE NEIGHBOURHOOD

Mean	0.224	Sq. Miles
S.D.	0.253	Sq. Miles
Range	0.01-1.18	Sq. Miles

It may be noted that the mean size of neighbourhood delimited by the respondents is less than that found in any of the earlier studies. These previous studies, however, used predominantly suburban sample areas. Knowles[97] has reported that cognitive neighbourhood size in inner-city areas is considerably smaller than in suburban areas. The results obtained here appear to substantiate his findings.

5.2 The Personal Variables

The hypotheses set out in Chapter Two postulate that size of cognitive neighbourhood should vary as a function of five variables. These variables are Socio-Economic Status (SES), Role (External/ Internal), Length of Residence, Age, and Lifestyle Orientation. In the case of the Length of Residence and SES variables it is possible to obtain interval data (Number of Months and SES scores respectively). Only nominal or ordinal data is available for the other variables. The form of the data, therefore, allows the use of the Pearson

[97]Knowles, op. cit.

correlation coefficient to test the first and third hypotheses. Non-parametric correlation[98] and the Chi-squared test are used for the remaining hypotheses. Hypotheses are accepted if the level of significance of the statistic computed reached the 5% level ($p < .05$), otherwise they are rejected.

5.2.1 Socio-Economic Status (H_1)

The adoption of a procedure for measuring SES is necessary to test the hypothesis that size of neighbourhood map is positively related to this variable. The measure of SES, devised by Warner, Meeker and Eeels[99] is chosen as being most suitable for this study. These authors calculate SES scores using a combination of Occupation, Income source and Housing type categories. Scores can range from a maximum of 12 (Highest SES) to a minimum of 84 (Lowest SES). The distribution of SES scores in our sample is indicated below.

TABLE V-2

DISTRIBUTION OF SES SCORES

Mean	45.85
S.D.	10.62
Range	19.0-63.0

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[98] All correlation coefficients were calculated using the procedures available in the Statistical Package for the Social Sciences library of computer programs.

[99] W. Warner, M. Meeker, and K. Eeels, Social Class in America: A Manual of Procedure for the Measurement of Social Status, Chicago, 1949, Science Research Associates, pp. 121-159.

When the Pearson product-moment correlation coefficient between Map Size and SES is calculated for the fifty-nine cases present in the sample, a coefficient of -.219[100] is obtained. This is significant at the 0.048 level ($p < .048$). The hypothesis is accordingly supported.

5.2.2 Internal and External Roles (H_2)

The division of labour generally present in western society assigns females most frequently to the role of homemaker, while the male performs the role of breadwinner. The performance of these respective roles usually entails considerable differences in the amount of time[101] spent in the local area, the homemaker usually spending substantially longer periods there than the breadwinner. This difference might be expected to allow females become familiar with, and identify with, a greater extent of the locality around the home, than males.

It is hypothesized that females have larger cognitive neighbourhoods than males. The most suitable statistical test available for this purpose is the Chi-squared test. The sample

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[100] The negative sign of the correlation coefficient is accounted for by the fact that the scale for measuring SES assigns its minimum scores to those respondents with highest SES.

[101] Question B.4. in the interview (See Appendix 2) asked respondents to give the daily average number of waking hours that they spent in their neighbourhood, but most respondents had difficulty in giving anything more than the vaguest estimate. As the answers to this question were felt to be somewhat unreliable, they were not used in the analysis.

consists of thirty-two female and twenty-seven male respondents. For purposes of the test neighbourhood sizes are arbitrarily divided into four classes, each of which has an approximately equal number of cases. The resulting four by two contingency table has three degrees of freedom. With three degrees of freedom and a significance level of 0.05, a chi-squared value of 6.25 or greater is required to substantiate the hypothesis. Although the relationship is in the predicted direction, the chi-squared value did not reach the required level of significance, as can be seen from Table V-3. The hypothesis, therefore, can not be supported.

TABLE V-3

CHI-SQUARED TEST FOR SEX DIFFERENCES[102]

D.f.	Chi-squared	p <
3	4.75	.10

It can be pointed out that not all of the thirty-two female respondents are homemakers, and that this may account for the inconclusive result. Accordingly, ignoring sex differences, the sample was divided between the forty respondents who worked outside the home, and the nineteen who did not. Contrary to the hypothesis, the sizes of cognitive neighbourhood delimited by the respondents working outside the home (those with 'external' roles) are larger than those delimited by those who remain at home. However, the smaller neighbourhoods delimited by the latter group can be partially accounted

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[102] Since directionality has been specified, the test is one-tailed.

for by the fact that seven of the nineteen members are over seventy years of age. A finding that elderly respondents delimit very small cognitive neighbourhoods is reported below.

Everitt[103] has reported that wives delimit larger neighbourhoods than their husbands. His finding is not repeated in this study. Of the twenty-one husband and wife couples, the husbands' neighbourhoods are larger in ten cases, the wives' in eight cases, and in three cases, both husband and wife delimit a cognitive neighbourhood of the same size.

5.2.3 Length of Residence (H_3)

The hypothesis states that size of cognitive neighbourhood increases with length of residence in the sub-area. Since interval data are available for both variables, it is possible to use the Pearson correlation coefficient to test the hypothesis. A coefficient of 0.211 is obtained, which just fails to reach significance at the 0.05 level. Therefore, although the relationship is in the predicted direction, the hypothesis cannot be supported. This variable is, however, highly intercorrelated with the Age variable, which we now proceed to discuss.

5.2.4 Age (H_4)

The hypothesis states that size of cognitive neighbourhood is

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[103] Everitt, op. cit.

an inverted 'U' function of the respondents' ages. Data for this variable were collected on the ordinal scale only.

TABLE V-4

NEIGHBOURHOOD SIZE BY AGE GROUP

Neighbourhood Size	Age Group					
	Under 29	30-39	40-49	50-59	60-69	Over 70
< .05 Sq. Miles	8	1	1	2	0	2
.05-.09 Sq. Miles	3	1	3	0	0	4
.10-.15 Sq. Miles	4	1	1	2	1	1
.16-.39 Sq. Miles	2	1	3	2	3	0
≥ .40 Sq. Miles	3	0	3	3	3	1
TOTALS	20	4	11	9	7	8

An examination of Table V-4, which shows the distribution of neighbhourhood size, by age group, in the sample, demonstrates the tendency for size of cognitive neighbourhood to increase up to late middle age and thereafter decrease. Since a linear relationship is not posited, the use of non-parametric correlation to test the hypothesis is not entirely appropriate. Nonetheless, since no other statistic was readily available, the non-parametric Kendall correlation coefficient (tau) was calculated between the two variables, firstly for all fifty-nine respondents, and then for the fifty-one respondents under 70 years of age. Values of 0.281 ($p < .016$) and 0.426 ($p < .001$), respectively, are obtained. The increased significance of the linear relationship when the eight oldest respondents are excluded from the analysis lends support to the hypothesis.

The Age and Length of Residence variables are highly intercorrelated, having a tau coefficient of 0.771 ($p < .001$). If the partial correlation coefficient between Map Size and Age is computed, controlling for Length of Residence, a value of only 0.157 ($p < .120$) is obtained. If Age is held constant, the partial correlation coefficient between Map Size and Length of Residence drops to 0.028 ($p < .415$). Neither variable, then, can on its own significantly account for increases in Map Size.

5.2.5 Life Style Orientation (H_5)

On the basis of their answers to Question B.9. in the interview (See Appendix 2), respondents are divided into those who are locally oriented (or those who value friendly neighbours) and those who are cosmopolitan (value accessibility). The two classes have thirty-one and twenty-eight members respectively. The four neighbourhood size classes previously used in testing H_2, are again used in the Chi-squared test here. The resulting four by two contingency table has three degrees of freedom. Results of the Chi-squared test are given below.

TABLE V-5

CHI-SQUARED TEST FOR LIFESTYLE DIFFERENCES

D.f.	Chi-squared	p<
3	6.98	.05

Since the Chi-squared value reaches the required level of significance, we may support the hypothesis that individuals whose life-styles are locally oriented delimit larger cognitive neighbourhoods than those who are cosmopolitan in orientation.

5.3 Other Factors Influencing Size of Cognitive Neighbourhood

The variables used above to account for differences among respondents in the size of cognitive neighbourhood are by no means an exhaustive list of the factors which may influence such differences. We have simply used the variables found to be important in previous studies. Data were collected during the interviews on a number of other factors, which, it was felt, might influence the size and shape of the cognitive neighbourhoods delimited.

On the city-wide map (Figure 1) respondents were asked to indicate location of place of work. This question was designed to find if any noticeable elongation of the cognitive neighbourhood in the direction of the work place emerged. It was assumed that respondents ought to be very familiar with the segment of the city between home and work-place, since their daily activity patterns entailed travelling through this area. In this context, respondents were asked to denote on Figure 2 (the local area map), the two routes which they most frequently used when leaving the home area. In the case of 53.7% of the forty-one working respondents, place of work was located to the north-east of the home area, most often in the C.B.D. centered on the intersection of King and James Streets, or in the industrial North End of the city. The road along Herkimer Street eastbound from Queen Street to Bay Street was the single most popular route, being used by

74.6% of all respondents. Nonetheless, the spatial extent of cognitive neighbourhoods was very restricted on the eastern side of the sample area, so the suggestion that cognitive neighbourhoods are spatially elongated in the direction of work place does not hold true in this case.

Cognitive neighbourhood showed very little correspondence with the spatial extent of friendship or visiting patterns. Forty-five of the fifty-nine respondents (76.3%) did not locate any of their three best friends within their cognitive neighbourhood, seven (11.9%) located one friend inside their neighbourhood boundary, and another seven respondents located two within. No respondent located all three best friends within his/her cognitive neighbourhood.

In the case of the shopping area used for weekly grocery purchases, thirty respondents (50.8%) located this within, or at, the boundaries of the cognitive neighbourhood. Many of those respondents who are church-goers have to travel outside the local area to the church of their choice (mainly to ethnic Catholic churches or to the chapels of smaller Protestant sects). Accordingly, churches rarely served as boundary indicators. Transport mode used had little impact on the size or shape of cognitive neighbourhood delimited.

5.4 Summary

Using variables found to be significant in previous studies, a number of hypotheses, which relate size of cognitive neighbourhood delimited by respondents to their socio-economic and role profiles, were tested. Size of cognitive neighbourhood is found to be positively related to higher socio-economic status and to local life-style orientation. An increase in neighbourhood size with age is reported but the relationship is not significant if length of residence is held constant. The relationship between role performed (external/internal) and neighbourhood size is not significant.

CHAPTER VI

THE REPERTORY GRID ANALYSIS

The major concern of the present research is to elicit the attributes of the environment which respondents use to cognitively organize 'neighbourhood'. The personal construct methodology and repertory grid test are used in this task. After the verbal concepts held by respondents of terms such as 'neighbourhood' are examined, attention turns to the repertory grid analysis. The dimensions, along which differentiation of neighbourhood from non-neighbourhood takes place, are extracted and related to the hypotheses specified previously. The groupings of personal constructs used in such differentiation are examined, and the validity of their use in such a task is appraised. Finally, some suggestions are made for the improvement and refinement of the instrument in future applications of the personal construct methodology in the area of environmental cognition.

6.1 The Concept of Neighbourhood Held by Respondents

Before subjecting respondents to the repertory grid test, they were asked a number of open-ended questions[104] to discover what they understood by terms such as 'neighbour', 'neighbourhood', etc. The

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[104] The questions are listed in Section B of the interview schedule.

TABLE VI-1

RESPONDENTS' DEFINITION OF THE TERM 'NEIGHBOUR'

A person who lives close by	40
Source of mutual help	18
Acquaintance	10
Friend	13
One who minds own business	4
Could not define	3
TOTAL	88

TABLE VI-2

RESPONDENTS' DEFINITION OF THE TERM 'NEIGHBOURHOOD'

Area around house, street, or block	17
The place one lives in	15
Area containing a group with common interests	13
Area containing certain (specified)[105] facilities	5
Area one is most at home in	6
Area of specified spatial extent[106]	3
Could not define	6
TOTAL	65

TABLE VI-3

THE LOCALES AT WHICH NEIGHBOURS MEET

In street or apartment lobby	38
In backyard	15
In homes	11
At social gatherings	3
Shopping	2
In course of business	3
No reply	6
TOTAL	78

[105] Respondents cited such facilities as shops, schools, churches, and recreation.

[106] Respondents answered with replies such as 'the area for a few hundred yards around'.

responses to these questions are tabulated below. The totals in all cases sum to more than fifty-nine, since some respondents gave more than one definition in response to the various questions.

Questions B.4 and B.5 were not utilised in the analysis, since the interviewers felt that not all respondents understood or answered them in a uniform manner. The responses to questions B.1 and B.3 (Tables VI-1 and VI-2) clearly indicate the paramount role of distance decay in the respondents' understanding of neighbourhood and neighbouring. They provide rather little other information on the factors creating identification with a neighbourhood. It is noteworthy that some eighteen respondents understood by the term 'neighbour', a source of mutual help, and that thirteen considered 'neighbourhood' as the area in which a group of people with common interests resided. This emphasis on the social component of neighbourhood emerges when we proceed to discuss the personal constructs that respondents used in construing the neighbourhood environment.

6.2 Groupings of Personal Constructs

After cognitive neighbourhood maps were delimited by respondents, personal constructs were elicited using the repertory grid test. The method of application of the test is described in Chapter Four. It was impossible to obtain constructs from a number of respondents, because the small size or irregular shape of the neighbourhood they delimited did not provide enough within-neighbourhood elements (streets) for elicitation purposes. A further number of respondents were unable to comprehend the task, or lacked the necessary fluency in the English language, or gave the impression that their willingness to cooperate had reached its limit. The remaining thirty-six respondents provided some forty-nine distinct constructs, with a grand total of one hundred and eighty-eight occurrences.

The constructs are listed in Table VI-4, where they are arbitrarily divided into three categories; those which are *Social*, those which are *Functional*, and those which refer to the *Physical Environment*. A number of constructs do not readily fall into any one of these three classes, and the allocation is highly subjective. Another problem arises in that some constructs which ostensibly deal with the physical environment are probably surrogates for statements about the social component of the elements (streets) being construed; this is particularly so in the case of constructs dealing with housing quality. For this reason, constructs dealing with the physical environment are subdivided into those which refer to the built environment and those which do not. A secondary classification of constructs is also made which distinguishes those which are *Emotive* or *Evaluative* in nature, from those which are *Activity Oriented*, and from those which are *Analytic* or *Descriptive*. A more objective grouping of constructs is obtained when we discuss the analysis of the repertory grid tests below.

When constructs are divided into *Social*, *Functional*, and *Physical Environment* categories, it emerges that the latter category is the most numerous. This is at variance with the postulates of the hypotheses (H_6 and H_7) outlined above in Chapter Three. However, it has been already noted that there is a social component to many of the *Physical Environment* constructs.

Assignment of constructs to one or other of the classes in the secondary classification is not as difficult as in the previous division. A total of sixty-one constructs are assigned to the *Emotive/Evaluative* category, forty-six to the *Activity Oriented* category, and eighty-one to the *Analytic/Descriptive* category. This again is contrary to the order of importance anticipated from H_8, in that descriptive and analytic constructs outnumber those which are emotive or evaluative.

Sarre[107], in a personal construct study dealing with the images of the urban environment held by residents of Bath, England, used a four-fold division for the constructs elicited. Constructs which he termed *Relational* (i.e., they describe the way a person comes into contact with a place, and/or the role played by each) were almost twice as numerous as those he termed *Descriptive*, and these in turn outnumbered those he termed *Evaluative*, with *Affective* constructs being least common of all. The finding that *Descriptive* constructs outnumber those which are *Evaluative* is repeated in this study. Sarre tends to

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[107] Sarre, op. cit. The constructs elicited by this author are those which his respondents use in differentiating those places in Bath 'which are important to you in your daily life'. Although Sarre elicited a total of seventy-three constructs used in the cognition of the urban environment, only six of those constructs also emerge in this study. These are 'Lower Class-Upper Class', 'Spacious-Crowded', 'Larger-Smaller Homes', 'Older-Newer Homes', 'Busy-Quiet', and 'Dirty-Clean'. This minimal overlap seems to suggest that constructs used for the neighbourhood or local area are distinct from those used for the overall urban environment. It may also be explicable by the fact that the elements in Sarre's case are 'places', whereas in this study they are streets.

use the *Relational* category as a catch-all for those constructs which are not readily classifiable under his other categories, and therefore we cannot readily compare its importance with any of the classes used in our study.

The importance of constructs concerned either with traffic and road activity, or with the nature and condition of the built environment, is evident from a cursory examination of Table VI-4. Eleven constructs, with sixty-two occurrences, refer either totally or partially to road or traffic conditions. In addition to the constructs in Category IIIa, the constructs 'Residential-Commercial', and 'Homely-Less Homely Atmosphere' refer very largely to the built environment. This gives a total of fourteen constructs with seventy-four occurrences referring to the built environment. The importance of these two groupings will emerge more clearly below when the results of analysis of individual repertory grids are discussed.

6.3 Analysis of Individual Repertory Grids

A total of thirty-six respondents were subjected to repertory grid testing. Completed grids, which had five or more constructs scored on all twelve elements, were obtained from fifteen of the respondents. The remaining respondents were either unable to produce as many as five constructs, or could not score all twelve elements on the constructs they supplied.

TABLE VI-4

FREQUENCY OF CHOICE OF CONSTRUCTS

CATEGORY I (SOCIAL)

Name of Construct	Classification	Number of occurrences Male	Female	Total
Populated-Unpopulated	ANALYTIC/DESCRIPTIVE	1	2	3
Spacious-Crowded	" "	2	0	2
Impersonal-Friendly	EMOTIVE/EVALUATIVE	1	0	1
Homely-Less Homely Atmosphere	" "	1	1	2
More-Less Prestigious	" "	1	1	2
Richer-Poorer	" "	1	1	2
Lower Class-Upper Class	" "	0	3	3
Not so Good-Better to Live In	" "	4	1	5
Welcoming-Unwelcoming	" "	0	1	1
Do not Identify-Identify with	" "	1	0	1
Few-Many Animals	ANALYTIC/DESCRIPTIVE	1	0	1
Absence-Presence of Children	" "	0	1	1
Few-More People Strolling	ACTIVITY ORIENTED	1	1	2
More-Less Desirable People	EMOTIVE/EVALUATIVE	0	1	1
	Total Social Constructs	14	13	27

CATEGORY II (FUNCTIONAL)

Residential-Commercial	ANALYTIC/DESCRIPTIVE	11	13	24
Busy-Quiet	ACTIVITY ORIENTED	8	14	22
Little-More Traffic	" "	4	9	13
Local-Through Traffic	" "	2	4	6
Slow-Fast Traffic	" "	0	1	1
More-Less Car Oriented	EMOTIVE/EVALUATIVE	2	1	3
Safer-Less Safe to Drive On	" "	0	1	1
Main Thoroughfare-Side Street	ANALYTIC/DESCRIPTIVE	0	1	1
Recreational-Built Up	" "	0	1	1
Few-Many Buses	" "	1	0	1
	Total Functional Constructs	28	45	73

TABLE VI-4 (cont'd.)

CATEGORY IIIa (BUILT ENVIRONMENT)

Name of Construct	Classification	Number of occurrences Male	Female	Total
Deteriorating-Not Deteriorating	EMOTIVE/EVALUATIVE	3	3	6
Badly-Better kept buildings	" "	2	2	4
Larger-Smaller Homes	ANALYTIC/DESCRIPTIVE	3	4	7
Lower-Better Quality Houses	EMOTIVE/EVALUATIVE	1	1	2
Nice-Not so Nice Homes	" "	2	2	4
Single Family Houses-Apartments	ANALYTIC/DESCRIPTIVE	5	9	14
Older-Newer Homes	" "	2	4	6
Transient-Permanent Homes	" "	1	0	1
Less-More Crowded Houses	" "	1	0	1
Better-Worse Houses	EMOTIVE/EVALUATIVE	1	0	1
Poor-Better Appearance (Homes)	" "	0	1	1
Nondescript-Distinctive Architecture	" "	1	0	1
Total Built Environment Constructs		22	26	48

CATEGORY IIIb (PHYSICAL ENVIRONMENT)

Name of Construct	Classification	Male	Female	Total
Clean-Dirty	EMOTIVE/EVALUATIVE	5	8	13
No Trees-Treelined	ANALYTIC/DESCRIPTIVE	2	2	4
Little-More Vegetation	" "	1	0	1
Wide-Narrow Roads	" "	0	7	7
Bad-Better Roads	" "	2	4	6
Good-Bad Sidewalks	" "	0	1	1
Little-More Garbage	" "	1	0	1
Spooky-Normal	EMOTIVE/EVALUATIVE	1	3	4
Nice-Ugly	" "	1	0	1
Respectable-Shabby	" "	0	1	1
Remnants of Glory-Not so Pretentious	" "	1	0	1
City Street-Highway Atmosphere	ACTIVITY ORIENTED	0	1	1
Total Physical Environment Constructs		14	27	41
GRAND TOTAL		78	111	189

TABLE VI-5

NUMBER OF CONSTRUCTS IN COMPLETED REPERTORY GRIDS

Number of Constructs	5	6	7	8	9	10
Number of Respondents Supplying This Number	2	4	2	4	1	2

These fifteen grids were each subjected to a principal component analysis, using the Slater algorithm described in Chapter Four.

No two grids contained an identical set of elements or constructs, and therefore aggregation can only proceed in a very restricted fashion. A relatively small group of elements and of constructs recurred in the grids of most respondents, and some aggregative procedures are later applied to these elements and constructs. Space limitations prohibit an exhaustive analysis covering each individual grid, but the generalised patterns present in the grids are discussed.

6.3.1 Dimensions of the Component Spaces

The Bartlett test to determine number of significant components is applied in each grid analysis. A negative result from the test is obtained in seven grids, two significant components are found in four grids, in three of the grids there are three significant components, while one grid has four significant components. There are considerable variations in the contributions made by successive components to the overall variation of each grid. Table VI-6 shows the percentages contributed by the latent roots (eigenvalues) of the first three components to the total variance of each of the fifteen grids.

TABLE VI-6

PERCENT OF VARIATION ATTRIBUTABLE TO FIRST THREE COMPONENTS

Number of Constructs In Grid	λ_1	λ_2	λ_3	Number of Significant Components
5	79.3	10.3	5.6	-
5	77.3	16.5	4.8	3
6	73.3	16.5	5.7	2
6	56.3	19.2	12.9	-
6	55.0	20.4	11.5	-
6	47.8	30.1	10.2	4
7	62.1	16.7	14.1	3
7	44.1	23.4	18.3	2
7	35.0	28.5	19.4	-
8	67.3	20.4	5.9	2
8	55.6	24.2	10.8	-
9	53.8	18.1	15.6	3
9	53.2	23.7	10.1	2
10	66.8	19.3	3.9	-
10	56.8	19.9	11.6	-

The arbitrary decision to analyse only those grids with a minimum of five scored constructs was taken because it was felt that five was the absolute minimum number of constructs (variables) which would yield meaningful components. Examination of the pattern which emerges suggests that a minimum of six may have been a better choice. The first root contributes the vast proportion of the variance in the two grids with only five components, and the resultant imbalance means that the components derived are not particularly distinctive or easily interpretable.

6.3.2 The First Component

The importance of the first component, which accounts for over 50% of the variance in twelve of the grids, is clear from Table VI-6. As a result of its disproportionate contribution to the overall pattern of variance, it is quite common to find the majority of the constructs in a grid having heavy loadings on this component.

A classification is made of the first component in each grid, using the constructs which provide the three highest loadings on this component. For example, if all three constructs refer to the built environment, then the component is classified as 'Built Environment'; if two of the constructs refer to the built environment while one is social in nature, the component is referred to as 'Social and Built Environment'. The classification uses the categories of Table VI-4, with some modifications[108].

[108] The modifications are as follows: 'Residential-Commercial' is added to the *Built Environment* category, while the other constructs in the *Functional* category, with the exception of 'Recreation-Built up', which does not occur in a scored grid, are added to 'Busy-Quiet' to form the new *Road/Traffic Conditions* category.

TABLE VI-7

NATURE OF FIRST COMPONENT

	Number of Grids
Built Environment	2
Social	1
Social and Built Environment	5
Road/Traffic Conditions	3
Physical Environment	2
Road/Traffic and Physical Environment	1
Road Traffic and Built Environment	1
Not Interpretable	1

While the *Social* constructs alone are not important, they show a very distinct tendency to associate with constructs referring to the *Built Environment* in loading heavily on the first component. The pattern suggests that many of the constructs referring to the built environment, for example, 'Nice-Not so nice Homes', 'Badly-Better kept Buildings', are simply surrogates for statements about the social class or desirability of the residents. In eight cases the first component is primarily distinguished by constructs dealing with the social or built environment, whereas in six cases it is chiefly distinguished by constructs referring to traffic or the physical environment. This finding, although not conclusive, suggests that the social and built environment is the primary discriminator between neighbourhood and non-neighbourhood.

6.3.3 The Second and Subsequent Components

The second component contributes a substantially smaller proportion of the variance to each grid (ranging from 10.3% to 31.1%) than does the first. In many grids there is substantial overlap between the two components, but where quite distinct groupings of constructs emerge on the two components, the first component is usually characterised by social and built environment constructs, while the second is characterised by traffic and physical environment constructs. The groupings of constructs obtained on the second component are listed below.

TABLE VI-8

NATURE OF SECOND COMPONENT

	Number of Grids
Built Environment	4
Social	1
Social and Built Environment	3
Road/Traffic Conditions	5
Physical Environment	1
Road/Traffic and Built Environment	1

Using the secondary classification of constructs from Table VI-4, constructs which are *Descriptive/Analytic* more frequently load on the second component, whereas those which are *Emotive/Evaluative* are more characteristic of the first component. The differences, however, are not substantial. Subsequent components in the majority of grids tend largely to replicate the patterns found in the first and second components, and are not discussed here.

6.3.4 Correlations and Angular Distances Between Constructs

When discussing repertory grid technique in Chapter Four, it was noted that when similar constructs occurred in the grid of more than one respondent, it is possible to calculate average angular distance between their corresponding vectors in the component space. For this purpose, an identical set of elements in the two or more grids under consideration is not a prerequisite, nor need the remaining constructs in the grids be the same. Each correlation between two constructs has a corresponding angular distance. For example, the vectors of two constructs which are perfectly correlated (coefficient of + 1.0) subtend an angle of 0 degrees with each other. If no relationship exists (coefficient of 0.0) the vectors are at right angles to each other (i.e., they have an angular separation of 90 degrees). Where a perfect inverse relationship pertains (coefficient - 1.0) the vectors subtend an angle of 180 degrees. The average of a set of angles is itself an angle, whereas the average of a group of correlation coefficients is not a correlation coefficient.

Eighteen constructs, which are listed in Table VI-9, occur in the completed grids of two or more respondents. It is possible to construct an 18 by 18 matrix which shows the average angular distance between each construct and every other construct with which it is paired in two or more grids. This matrix (Table VI-10) may be regarded as conceptually equivalent to a correlation matrix. There are several blank entries in the matrix, since a number of construct pairs do not occur on the required minimum two occasions.

TABLE VI-9

COMMON NEIGHBOURHOOD CONSTRUCTS IN SCORED GRIDS[109]

	Name of Construct	Number of Occurrences
A.	Populated-Unpopulated	3
B.	Spacious-Crowded	2
C.	Impersonal-Homely Atmosphere[110]	3
D.	More-Less Presigious	2
E.	Poor-Rich	2
F.	Upper-Lower Class	2
G.	Not so good-Better to live in	3
H.	Deteriorating-Better kept	7
J.	Larger-Smaller Homes	4
K.	Lower Quality-Nicer Houses	5
L.	Residential-Commercial	12
M.	Single family dwellings-Apartments	9
N.	Clean-Dirty	7
P.	Little Vegetation-Treelined	2
Q.	Busy-Little Traffic	11
R.	Local-Through Traffic	3
S.	Wide-Narrow Roads	3
T.	Bad-Better Roads	5

[109] Constructs A through G are *Social*, H through M refer to the *Built Environment*, N and P to the *Physical Environment*, while the last four constructs (Q, R, S, T) refer to *Traffic and Road Conditions*.

[110] In a number of cases, constructs which have very similar meanings are grouped together for purposes of the angular distance analysis. The constructs 'Impersonal-Friendly' and 'Homely-Less Homely Atmosphere' of Table VI-4 above are combined to give the new construct C. Likewise the constructs 'Deteriorating-Not Deteriorating' and 'Badly-Better kept Buildings' are combined in construct H, 'Lower-Better Quality Houses' and 'Nice-Not so Nice Houses' are combined in Construct K; 'Little-More Vegetation' and 'No Trees-Treelined' are grouped in Construct P; 'Busy-Quiet' and 'Little-More Traffic' are combined to form Construct Q.

TABLE VI-10

THE ANGULAR DISTANCE MATRIX

	A	B	C	D	E	F	G	H	J
A	*	-	-	-	-	-	-	98.04	-
B		*	-	-	-	-	138.34	129.05	-
C			*	-	-	-	-	38.88	-
D				*	-	-	-	-	-
E					*	-	-	-	132.79
F						*	-	-	-
G							*	44.46	121.10
H								*	120.70
J									*
K									
L									
M									
N									
P									
Q									
R									
S									
T									

TABLE VI-10 (cont'd.)

	K	L	M	N	P	Q	R	S	T
A	-	102.47	93.49	88.70	-	72.44	-	77.73	109.21
B	-	-	-	-	-	105.82	-	-	-
C	-	27.99	97.65	-	-	38.64	-	-	-
D	-	56.83	-	-	-	102.75	-	-	-
E	-	89.15	-	-	-	-	-	-	-
F	-	35.47	95.66	-	-	-	-	-	-
G	-	128.57	-	-	-	59.86	-	-	-
H	-	127.25	109.26	142.96	-	59.27	-	-	-
J	-	79.11	106.81	-	-	70.06	-	42.11	131.70
K	*	130.62	102.57	130.63	-	83.64	-	-	78.27
L		*	65.57	27.81	120.11	125.79	78.37	110.73	105.39
M			*	76.07	-	120.82	62.16	108.98	91.63
N				*	-	109.26	-	-	-
P					*	52.18	-	-	-
Q						*	162.03	27.87	131.66
R							*	-	-
S								*	148.52
T									*

Since the number of grids used in calculating angular distance varies from construct pair to construct pair, no standard test of statistical significance is available for the angular distances. An arbitrary decision was made to have angular distances of between 0.00 and 60.00 degrees indicate significant positive relationship between the pair of construct vectors in question, while distances of between 120.00 and 180.00 degrees indicate significant negative relationship. These angular distances correspond to correlation coefficients of + .50 or greater, and - .50 or less, respectively. With these distances in mind we now proceed to examine the angular distance matrix.

Only two of the *Social* constructs ('Spacious-Crowded; 'Not so good-Better to live in') are found together in two or more grids, and in their cases a significant negative relationship is found between 'Spacious' and 'Not so good to live in'. Nine of the fifteen relationships between *Social* and *Built Environment* constructs are significant. Of the six which are non-significant, three are with Construct M ('Single Family Dwellings-Apartments'), a construct which has very little discriminant value, since only one of its twelve angular relationships is significant. The evidence supports our earlier contention that constructs referring to the built environment are often surrogates for statements about the social environment. Only one *Social* construct has a significant relationship with a *Physical Environment* or *Traffic Conditions* construct.

When one excludes construct M, three of the four interrelationships in the *Built Environment* category are significant. Construct M has non-significant relationships with each of its four partners in this group. The *Built Environment* constructs also relate significantly in four out of five cases with those dealing with the *Physical Environment*, the exception being accounted for by the non-significant relationship between M and N. Only five of the fourteen relationships between *Built Environment* and *Traffic Conditions* constructs are significant.

There are only two relationships between *Physical Environment* and *Traffic Conditions* constructs, one being significant, the other non-significant. The four interrelationships within the *Traffic-Road Conditions* are all significant.

The a priori groupings of construct dimensions are, in general, validated by the angular distance analysis. The pattern of relationships confirms the separation in the respondents' construction systems between the *Social* and *Built Environment* categories on the one hand, and the *Physical Environment* and *Traffic/Road Conditions* on the other. The constructs dealing with *Traffic/Road Conditions* emerge as the group which stands most separate from the other groupings. Constructs in the *Built Environment* category tend to breach the distinction between the *Social* and *Physical Environment* categories. Although these two latter groups are clearly separate and non-overlapping, constructs in both have significant relationships with constructs in the *Built Environment* category.

6.3.5 Inter-Element Distances

In addition to computing correlations and angular distances between constructs, the algorithm computes the linear distance between elements in the component space. Slater[111] notes that when identical elements occur in more than one grid, it is possible to calculate average linear distance between them. Since there is a considerable amount of concordance in the cognitive neighbourhood maps of the fifteen respondents who provided completed repertory grids, a small number of elements (streets) recur regularly. Although it is possible to use up to one hundred and eighty distinct elements in the fifteen grids, a core group of sixteen streets provide just over two-thirds (121) of the total element occurrences. Each of the streets is listed in Table VI-11, along with the number of grids in which it occurs. Occurrences are further divided into the number of times a street features as a within-neighbourhood element (IN) and the number of occasions it represents a without-neighbourhood element (OUT). Elements A to L inclusive are almost always within-neighbourhood, while elements M to R inclusive are predominantly without-neighbourhood.

The inter-element distance matrix (Table VI-12) is calculated in a manner very similar to the construct angular distance matrix. In this case, however, it was decided to calculate distance between a pair of elements only if they are present together in three or more grids. The unit of expected distance varies from grid to grid, ranging from 0.9535 to 1.4142, with a mean value of 1.135. There is no method

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[111] Slater, op. cit.

TABLE VI-11

COMMON NEIGHBOURHOOD ELEMENTS (STREETS) IN SCORED GRIDS[112]

	Name of Street	Number of Occurrences IN	OUT	TOTAL
A.	CHARLTON EAST (Between Locke and Queen)	6	-	6
B.	HERKIMER EAST (" " " ")	5	-	5
C.	STANLEY EAST (" " " ")	11	-	11
D.	HOMEWOOD EAST (" " " ")	9	-	9
E.	KENT UPTOWN (Between Stanley & Aberdeen)	5	-	5
F.	LOCKE UPTOWN (" " " ")	4	2	6
G.	ABERDEEN EAST (Between Locke & Queen)	8	-	8
H.	ABERDEEN WEST (Between Locke & Dundurn)	5	-	5
K.	DUNDURN UPTOWN (Between Stanley & Aberdeen)	3	2	5
K.	HOMEWOOD WEST (Between Locke & Dundurn)	10	-	10
L.	STANLEY WEST (" " " ")	10	-	10
M.	LOCKE DOWNTOWN (Between Charlton & Hunter)	4	6	10
N.	QUEEN DOWNTOWN (" " " ")	2	4	6
P.	HERKIMER DOWNTOWN (Between Caroline & James)	1	9	10
Q.	MOUNTAIN AVE. (Between Aberdeen & South St.)	3	9	12
R.	HOMEWOOD WEST OF DUNDURN STREET	0	3	3
	GRAND TOTALS	86	35	121

[112]For location of these streets the reader is referred to Figure 2.

TABLE VI-12

THE INTER-ELEMENT LINEAR DISTANCE MATRIX

	A	B	C	D	E	F	G	H	J
A	*	.303	.803	.957	.844	.576	1.116	1.038	–
B		*	.622	.798	–	–	.707	.753	–
C			*	.880	.728	.897	.858	.936	1.023
D				*	.741	1.024	1.042	1.089	1.148
E					*	–	1.058	–	1.085
F						*	–	–	–
G							*	.421	.906
H								*	–
J									*
K									
L									
M									
N									
P									
Q									
R									

TABLE VI-12 (cont'd.)

	K	L	M	N	P	Q	R
A	.632	.619	1.244	–	1.027	1.196	.739
B	.832	.472	1.302	–	.798	1.177	–
C	.729	.673	1.438	1.093	.880	.710	1.008
D	.769	.700	1.569	–	1.019	.648	.953
E	.790	.615	–	1.087	1.116	.823	–
F	.751	–	.739	–	1.031	1.462	–
G	1.077	.888	1.431	.832	.704	1.086	1.259
H	1.012	.758	1.072	–	.603	1.136	1.052
J	1.116	.946	–	.724	.930	1.294	–
K	*	.426	1.445	1.319	1.128	.855	.720
L		*	1.122	.918	1.034	.806	.560
M			*	–	1.351	1.736	1.586
N				*	.761	–	–
P					*	1.121	1.092
Q						*	.683
R							*

available for computing a unit of expected distance for the matrix entries, since in very few cases are any two of these calculated using the same subset of grids. When interpreting the matrix, it was arbitrarily decided to classify inter-element distances less than or equal to 1.00 as being less than expected, with those distances equal to or greater than 1.27 being greater than expected. If the personal constructs supplied by respondents are those which they use for mentally distinguishing 'neighbourhood' from 'non-neighbourhood', then inter-element distances between elements which are within-neighbourhood should be less than those between within-neighbourhood elements compared with without-neighbourhood elements. The 'less than expected' distances should be found predominantly in inter-element distances among the within-neighbourhood group.

Upon examination of the inter-element distances among the first eleven elements in the matrix (A to L inclusive; the overwhelmingly within-neighbourhood elements), it may be noted that thirty-two of the forty-four distances are under 1.0 with none greater than 1.27. Among this group, inter-element distances to F, G, H, and J are somewhat greater than to the other elements, and account for all of the twelve distances greater than 1.0. The streets represented in these elements, Aberdeen Avenue and the uptown sections of Locke and Dundurn Streets, are all characterised by heavy traffic flows. In discussing groupings of environmental constructs above, the salience of those dealing with road and traffic conditions was noted. Differences in construct scores on that category are chiefly responsible for the greater element distances to these four streets than to other elements in the within-neighbourhood group. This is substantiated by the fact that the two distances (G to H and G to J) within the F-G-H-J sub-group are both less than 1.0, demonstrating that streets with similar traffic patterns are construed as being more alike than streets with differing traffic patterns.

When the within-neighbourhood streets (A to L inclusive) are compared with the without-neighbourhood streets (M to R inclusive), only eighteen of the forty-four distances encountered are less than 1.0. However only eight distances in this group are greater than 1.27[113], while the remaining eighteen are between 1.00 and 1.27. Three of the elements in the without-neighbourhood group are heavy traffic streets (M or Locke Downtown, N or Queen Downtown, and P or Herkimer Downtown). Distances between these elements and elements F, G. H. and J (the heavy traffic streets which are within-neighbourhood), account for six of the eighteen distances less than 1.0. The power of naming systems, in causing elements to be mentally construed as similar, shows in that the two sections of Homewood Avenue which are within-neighbourhood have distances of less than 1.0 to the section of the avenue which is without-neighbourhood. This is also the case between the section of Herkimer Street which is without-neighbourhood and the section which is within.

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[113]It is noteworthy that none of the 'greater than expected' distances (1.27 or over) occur between two within-neighbourhood elements. Eight of them occur between a within-neighbourhood element and a without-neighbourhood one. The other three occur between two without-neighbourhood elements.

The number of 'less than expected' distances constitutes only 39.1% of distances from within-neighbourhood elements to without-neighbourhood elements. In constrast, 72.7% of inter-element distances among the within-neighbourhood group are 'less than expected'. Nonetheless this relatively large percentage (39.1) of distances from 'neighbourhood' to 'non-neighbourhood' elements which are 'less than expected' casts some doubt on the efficacy of the constructs used in distinguishing neighbourhood from non-neighbourhood. The inclusion of constructs dealing with traffic and road conditions, is, in large measure, responsible for this weakness. It is suggested that such constructs, in future, be omitted from studies of this type.

6.4 Evaluation and Suggestions for Future Use of the Methodology

In all, a total of forty-nine different constructs, used in cognitively structuring the neighbourhood environment, were elicited in this study. Nonêtheless, most individual respondents had difficulty in spontaneously providing more than a small number of constructs.

The results obtained cast doubt on the usefulness of subjecting grids with a small number of scored constructs to a principal component analysis. In future, it is suggested that grids not be analysed unless they have a minimum of eight constructs. Since respondents find it difficult to spontaneously provide this many, it is suggested that they be supplied with a number of constructs which have been previously found relevant in the subject area.[114] The relationship of supplied constructs

[114] This possibility was considered in Chapter Four when it was decided not to use supplied constructs because of the exploratory nature of the study.

to constructs spontaneously elicited from the individual would increase the aggregative procedures available when comparing grids obtained from different respondents.

Examination of inter-element distances indicates that the constructs elicited in this study discriminate between elements construed as being within-neighbourhood and those construed as being without-neighbourhood. Since no statistical inference procedure is available, it is not possible to obtain anything other than a crude measure of their efficiency in doing so. It is observed that a sizeable minority of inter-element distances are other than should be expected if the constructs are completely efficient in distinguishing neighbourhood from non-neighbourhood. It seems likely that some of the constructs elicited are ones used in construing the urban environment in general, and are not particularly appropriate in cognitively structuring neighbourhood. It is suggested that future studies include a number of dummy triads, where three completely without-neighbourhood elements or three completely within-neighbourhood elements are used to elicit constructs. In that way constructs which are general to the urban environment and not specific to distinguishing neighbourhood from non-neighbourhood, might be eliminated from the analysis.

The group of constructs, which are found to be least useful in the present study, for distinguishing neighbourhood from non-neighbourhood, are those dealing with road and traffic conditions. It is suggested that future studies on this topic avoid using such constructs. It is felt that one reason that such constructs are so often elicited, is that respondents were responding to the stimulus 'street'. The inclusion of other elements, where possible, is recommended in future studies.

6.5 Summary of Results

The personal construct methodology has been used here to uncover the attributes that respondents use in deciding that certain streets are within their cognitive neighbourhood, while others are felt to be outside their neighbourhood. The problem is one which has not been undertaken before, and the approach adopted is new to this area of environmental cognition. It is found that constructs which deal with social characteristics, and with the built environment, where this reflects the social class or aesthetic standards of the occupier, are primary in distinguishing neighbourhood from non-neighbourhood. Constructs dealing with the physical environment perform a secondary role. The study also elicits constructs dealing with road and traffic conditions which respondents use in differentiating streets in the local environment. These latter constructs are found to have a weak discriminant value in allocating elements to cognitive neighbourhood or non-neighbourhood.

CHAPTER VII

CONCLUSIONS

The neighbourhood concept has had varying degrees of popularity in urban studies during the present century. Most recently the phrase "planning for neighbourhoods" has become part of the jargon of municipal politics. The nature of the concept "neighbourhood" in the cognitive schemata of urban residents has nonetheless remained largely uninvestigated.

This study examines the cognitive structuring of neighbourhood along two major lines of enquiry. Firstly, the size of district, which respondents considered to be their neighbourhood or area they felt "at home" in, is related to a number of socio-economic and role-profile variables. The findings indicate that individuals with greater socio-economic status are more likely to delimit large neighbourhoods than those of lower socio-economic status, that older people, with the exception of the very elderly, delimit larger neighbourhoods than younger people, and that the neighbourhoods of individuals who are 'localites' in life-style orientation are larger than of those who are 'cosmopolitans'. With the exception of the latter dichotomous classification of respondents, the variables used in this study are simply those which had been found significant in previous studies dealing with size of cognitive neighbourhood. The levels of explanation achieved are relatively modest and clearly other factors are also operant in determining the size of neighbourhood with which an individual identifies. Attitudinal and dispositional variables are probably important in this regard. It seems unlikely, for instance, that an individual, who feels alienated from local society, will identify with a large neighbourhood.

The more important contribution of this research has been to use the methodology of Personal Construct Theory in a study of neighbourhood cognition. Our concern was to uncover the attributes which individuals use in deciding that a segment of the local area is within their cognitive neighbourhood while other immediately surrounding segments are felt to be outside their cognitive schema of neighbourhood. The personal construct methodology was chosen because it gave the respondents maximum opportunity of expressing their mental representations of the environment in their own terms. It was felt that this outweighed the advantages of the superficially greater aggregative potential of the Semantic Differential Test. The repertory grid technique was used, notwithstanding the fact that aggregation of results from individual grids poses severe problems, and that normal measures of statistical inference can not be used.

The findings indicate that the attributes which individuals use in distinguishing neighbourhood from non-neighbourhood are more likely to be analytic or descriptive than they are to be emotive or evaluative. The constructs or mental representations used in the task of distinguishing neighbourhood more often referred to the physical or built environment than they did to the social characteristics of the inhabitants or the functions of particular locales. Closer examination of construct inter-relationships reveals that the statements about the built environment and particularly the condition thereof are almost always surrogates for statements about the social class or aesthetic standards of the occupiers. The individual construes locales as being within the neighbourhood because the physical appearance of dwellings and other buildings in these locales appears to reflect similar values and social class characteristics on the part of the occupiers. The role of distance decay in determining extent of neighbourhood schemata is, nonetheless, not ignored. It is recognized that the interposition of major traffic arteries also cause individuals to erect mental boundaries to cognitive neighbourhood.

It would be interesting to relate particular types of construction systems to the role profiles of the individuals supplying them. In the present study the small number of completed repertory grids obtained and the overlap among the components derived prevented this. It must also be recognized that Personal Construct Theory does not explicitly take account of the impact of learning upon patterns of construing. Since it is possible that different construct systems may be explicable by the fact that the individuals concerned may be at different stages of a learning or developmental sequence, any relationship of construction systems to role profile or other variables must be made very cautiously.

The limitations of the study have already been noted, and the danger, in particular, of eliciting constructs which are relevant to the urban environment in general, and not specific to the neighbourhood environment, has been discussed. It is suggested that future studies approach neighbourhood cognition in the context of an approach to the wider problem of how the city resident cognitively structures and adapts to his overall urban environment.

APPENDICES

McMASTER UNIVERSITY

HAMILTON, ONTARIO, CANADA

DEPARTMENT OF GEOGRAPHY

November 21st, 1972.

As you are probably aware, Canada is becoming a predominantly urban nation. As more and more people come to live in cities, there is an increasing concern on the part of many individuals about what urban life means to the people who live in the city.

The Department of Geography at McMaster University, as part of a continuing series of Urban Studies, is trying to find out what urban neighbourhood life means to residents of Hamilton. The best way to find out what people think about their residential area is to ask the people themselves.

As a resident of an Hamilton residential area, you have been selected at random to assist us in this research. It will be very much appreciated if you will help us by participating in a short interview. Your answers and information will be held in *strictest confidence* by the research team and used only as aggregated statistical data. The final report will make no reference to individual answers. My assistants, Ms. Rhondda Francis and Mr. Ciaran Tuite, will call you to arrange a convenient time for the interview.

For those participants in this interview, who are interested in the results of this part of our studies, a resume of the findings will be made available. If you are interested in receiving a copy of the resume, please tell my assistants at the time of the interview.

If you have any questions regarding this research, please feel free to contact me at 522-4971, Extension 536.

Thank you very much for your help.

Sincerely,

John F. Betak

JFB/rt

John F. Betak,
Assistant Professor.

DEPARTMENT OF GEOGRAPHY

McMASTER UNIVERSITY

PERSONAL INTERVIEW

CONFIDENTIAL

RESPONDENT'S NAME: Mr.
Ms.
Miss ________________________________
Mrs.

STREET ADDRESS: ________________________________

SAMPLE NUMBER: ________________________________

INTERVIEW OUTCOME:
1. Successful
2. Refused
3. Not at home

____

DATE: ____________________

Hello, I'm ____________________ from the Department of Geography at McMaster University. I'm here to interview you in connection with the survey which we referred to in our letter to you. We are interested in finding out a little about your neighbouring activity as part of a continuing series of urban studies. ALL REPLIES WILL BE KEPT STRICTLY CONFIDENTIAL.

First of all we would like to find out a little about your pattern of activities in the city. To do this I will give you a map of Hamilton and ask you to locate a number of features.

A. CITY-WIDE ACTIVITY:

On the map of Hamilton please locate the following, if applicable.
☐ Tick if n.a. (not applicable).

n.a.

i. ☐ Your place of work (indicate with an A)

ii. ☐ The homes of your three best friends in Hamilton (B)

iii. ☐ The homes of your three closest friends in Hamilton (C)

iv. ☐ The locations of the social organizations or clubs you belong to (D)
Please name these organizations: ____________________
____
____

v. ☐ The major shopping area or plaza you use for your weekly shopping (E)

vi. ☐ The church you attend, if you attend church on a regular basis (F)

vii. ☐ The elementary school(s) attended or formerly attended by your children (G)

viii. ☐ The homes of the people in Hamilton you visited in the last two weeks (H). (If any of these are recorded already under (B) or (C) above, please circle the appropriate letter.)

ix. ☐ Previous residence(s) in the city (J)

Now we would like to ask you a few questions about activity in the neighbourhood.

B. NEIGHBOURING ACTIVITY:

1. Please tell me briefly what you understand by the term "neighbour".

____

____

____

2. Where do you usually meet your neighbours?

___

___

___

3. How do you understand the term "neighbourhood?

___

___

___

4. On the average day approximately how many hours (waking time) do you spend in your neighbourhood?

___

5. What are the important things that go to make up your present neighbourhood?

___

___

6. In the course of a normal two week period, how many neighbours do you

   a. casually greet ___
   (i.e., say hello to)

   b. speak to face-to-face ___

   c. speak to by phone ___

   d. visit ___

   e. help in some way ___

   f. participate with in social activities outside home ___

Next we will give you a map of the local area, which is on a larger scale than the city map. Here also we would like you to point out a number of features.

7. On the map of the local area please indicate

   i. The boundaries of your neighbourhood (use red marker)* [You may define this as the limits of the area in which you begin to feel at home when returning from another part of the city.]

   ii. The homes of the five neighbours you know best (N)

7. iii. The location(s) of shop(s) used for convenience goods (S) (i.e., bread, milk, etc.)

iv. The two routes you most often use when leaving the neighbourhood (use green marker)

*Locates home first 0 or boundary first 1

8. Which means of transport do you most frequently use for

a. going to work ______________________

b. shopping ______________________

c. recreation ______________________

9. Some people consider that having friendly and compatible neighbours is the most important thing about a neighbourhood, whereas, others think that being convenient to shopping facilities, and services and accessibility to other parts of the city is more important. Which of these is more important to you?

____

____

____

C. We would like to know a little bit more about the area around your home. I will name groups of three streets. For these streets, please tell me what similarities there are between any two of these streets, which makes them different from the third.

[SUGGEST TO RESPONDENT THAT HE/SHE MAY USE ANY ASPECT OF THE STREET OR LIFE IN THE STREET AS THE BASIS FOR THE ANSWER, I.E., KNOW MANY PEOPLE, DON'T KNOW MANY, CLEAN/DIRTY, ETC.]

A-N	B-N	C-N	A-E	B-E	C-E	A-S	B-S	C-S	A-W	B-W	C-W	CONSTRUCT-CONTRAST
O	O	O										
			O	O	O							
						O	O	O				
									O	O	O	
O		O					O					
			O		O					O		
	O					O		O				
				O					O		O	
O		O		O								
			O		O		O					
						O		O		O		
	O								O		O	
O		O								O		
	O		O		O							
				O		O		O				
							O		O		O	

Keeping in mind the things you have just described, I would like to rate each street in terms of how much it has of each of these qualities. I would like you to rate it on a scale of one to seven, where seven is the highest and one is the lowest.

												CONSTRUCT-CONTRAST

D. Now a few short questions about yourself.

1. How long have you lived in your present residence? ________
In this part of Hamilton? ________
In Hamilton? ________

2. Do you own (0) or rent (1) your present dwelling? ________
If other please give details. ________

3. Marital status:
1. Single
2. Married
3. Widowed
4. Separated
5. Divorced

4. In terms of the categories on this card, which of the following age groups do you fit into? (CARD ONE)

1. 10-19
2. 20-29
3. 30-39
4. 40-49
5. 50-59
6. 60-69
7. Over 70

5. a. Do you have any children? Yes (0) No (1)

b. If Yes, what are the ages of your children?

____, ____, ____, ____, ____, ____, ____, ____, ____, ____,

6. Education:
On this card (CARD TWO), what is the highest level of school or university attended by you? (Circle the appropriate number.)

1. 1-8 years elementary
2. 1-4 years vocational or secondary, but no diploma
3. 4-5 years secondary diploma
4. professional or technical training beyond secondary
5. some university but no degree
6. university degree or beyond
7. other - please specify ________
8. never attended.

7. Occupation:
a. Are you presently employed? Yes (0) No (1)

b. What is your occupation? (Note: PROBE the respondents to seek a specific response.)

____

8. a. Income:

In terms of the categories on this card, what is your main source of income. Circle the appropriate number.

1. Inheritance
2. Profits or fees
3. Commission
4. Salary (monthly/yearly)
5. Wages (hourly)
6. Unemployed, family/welfare benefits
7. Family or relatives
8. Other (please specify) ______________________

b. On the basis of your last gross annual earnings please state in which gross income category you fit, as listed on this CARD FOUR. Circle the appropriate number.

1. less than $2000
2. $2000 - $2999
3. $3000 - $3999
4. $4000 - $4999
5. $5000 - $5999
6. $6000 - $7999
7. $8000 - $9999
8. $10,000 - $12,999
9. $13,000 - $15,999
10. $16,000 - $19,999
11. $20,000 - $24,999
12. Over $25,000

TO BE COMPLETED AFTER INTERVIEW

I. Total length of interview __________ mins.

II. Sex of respondent: Male (0) Female (1)

III. Was anyone else present during any part of the interview? Yes (0) No (1)

If YES, give details ______________________________

IV. In general, what was the respondent's attitude toward the interview?

Friendly and eager _____

Cooperative but not particularly eager _____

Indifferent and bored _____

Hostile _____

V. Type of housing unit. Circle the appropriate grade of housing.

1. Excellent Housing Unit:
Includes inly single family dwellings in excellent repair, in which both the house and the lot are of a large size, and the house is uniquely styled. Alternatively, refers to penthouses of modern high rise apartment buildings.

2. Very Good Housing Unit:
Includes again single family units with moderate lot size, approximately 3 bedrooms, post-1950 construction, and some distinctive styling. Alternatively refers to large apartment units with 3 bedrooms (i.e., a good deal of internal space) and also extra amenities within the building itself (e.g., "posh" lobby, swimming pool, etc.)

3. Good Housing Unit:
Generally identified by a standard suburban style of detached house with a more conventional and less pretentious appearance on a smaller lot than (2) above; also may include new (post-1960) town and row-houses. For apartments, this grade is identified by smaller units (2 bedrooms) in post-1960 high rise buildings with a less pretentious external and internal appearance.

4. Average Housing Unit:
Standard 2 bedroom house on a small lot, usually without a detached garage, in generally good repair. Also less stylistic, older (pre-1960), town and row houses. Finally, smaller apartment buildings of post-1950 origin.

5. Fair Housing Unit:
Older detached housing (pre-1950) generally of wood-frame or stucco construction in generally good repair. Includes older duplex and triplex apartment buildings without elevators and other modern amenities.

6. Poor Housing Unit:
Evidence of deterioration in terms of foundation (cracking), roof (sagging), chimney (cracking), and paint (peeling and wearing away) identifies this grade for both houses and apartments.

7. Very Poor Housing Unit:
Housing units in this class are beyond repair (roof uneven, foundation crumbling, walls out of plumb) and are considered unhealthy and unsafe.

VI. Occupancy:
Circle the appropriate sub-category of housing unit.

a. Single-family single-detached house
b. Multiple-occupancy single-detached house
c. Single-family row house
d. Multiple-occupancy row house
e. Low-rise apartment building
f. High-rise apartment building

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