

WORKING PAPER 368

THE CHANGING RETAIL STRUCTURE IN LEEDS 1961-1982 :
INITIAL EXPLORATIONS WITH THE Q-ANALYSTS ALGORITHM

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January 1984

THE CHANGING RETAIL STRUCTURE IN LEEDS 1961-1982: INITIAL EXPLORATIONS WITH THE Q-ANALYSIS ALGORITHM

Introduction

As part of a wider study into changing retail patterns in Leeds over the last twenty years, a large data set has been collected recording the incidence of particular types of retailing activity at particular shopping centre locations. Data collection for this study has resulted in records being available for around 33 centre locations and 140 retailing or service activities for each of the six years 1961, 1966, 1971, 1975, 1979 and 1982. In this paper guidelines suggested by the standard conventions and algorithm of Q-analysis will be used to distil from this data set some of the significant features of retail change in Leeds over the last twenty years.

The choice of the Q-analysis algorithm for present purposes derives from its apparent ability to filter out key features of a data set without crushing or distorting the data in any way. A useful comparison can perhaps be made between the Q-analysis algorithm and other more conventional clustering and factor analysis procedures which might be considered for similar data interpretation purposes. Many of these other methods involve transformations of the original data and subsequent interpretations are then based on these transformations rather than the original data.

Q-analysis was introduced into the Social Sciences by R.H. Atkin about a decade ago (see Atkin, 1974, 1977, 1981) and various introductions to aspects of the approach are now available (see Gould, 1980; Chapman, 1981; Beaumont and Gatrell, 1982; Macgill, 1982). Only relatively simple aspects of the method will be invoked in the present paper and it is to be noted that much of the benefit of the analysis to be reported has been found to lie in the data analysis process rather than in the complexion of anything that might be called an end result.

The Data Set

Preliminary knowledge suggested that the last twenty years have seen particularly important changes in retailing structure, ownership

and organisation: something of a marketing revolution. To analyse every shop unit for each year in Leeds since 1960 would clearly have been impossible, but a suitable compromise was to choose six individual years between 1961 and 1982 and around 33 centre locations, or shopping centres.

The selection procedure for the identification of centre locations was necessarily subjective, using the criterion that a centre had to have at least ten shops in a continuous frontage or in the form of a nucleated cluster. Around 30 centres were thus identified, variably arising from the disappearance and new development of particular centres over time (see Figure 1).

The time periods selected reflected the availability or non-availability of data sources. Several such sources were used and six time periods were chosen.

The first data sources were the shopping centre plans published by Charles E. Goad Ltd. These plans show all the individual buildings within a particular centre and include information on the retail or service function and the current occupier. The locations in Leeds covered by Goad plans are the city centre, Seacroft, Crossgates, Armley, Pudsey and Harehills, available for the years between 1971 and 1981. All these plans were used and provided a comprehensive data set for these larger centres. It is interesting that Goad plans have not been used extensively by geographers in the past. Indeed Shepherd and Rowley (1978) note: "The biennial revision of the Goad shopping centre plan may provide an excellent opportunity for cross time comparisons".

Secondly, a variety of planning surveys were used. In 1971 Leeds City Planning Authority conducted a detailed survey of retail land-use across the whole of the city. Data for all the 30 or so centres identified was thus readily available. Similarly in 1979 the same body undertook a detailed suburban shopping survey and this was used in conjunction with the Goad shopping plan of the city centre to obtain a comprehensive picture. Also a detailed land-use survey of the city centre was available for 1975.

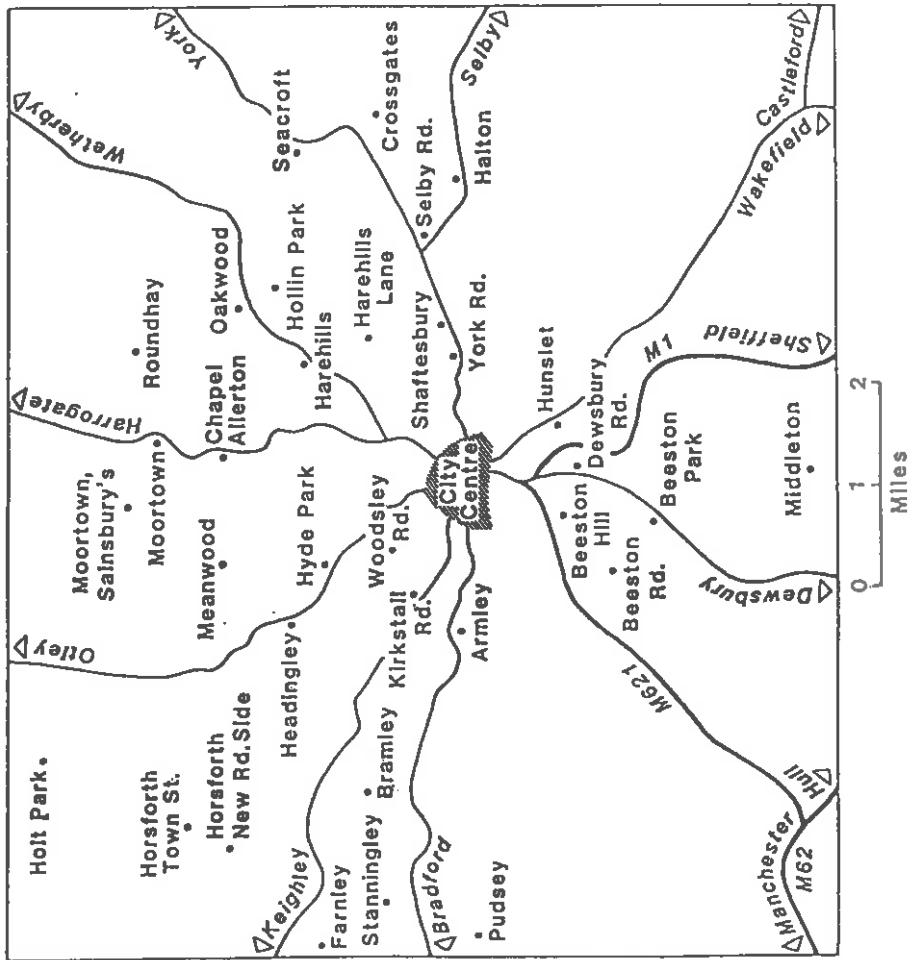


Figure 1. The shopping centres of Leeds

Thirdly, a comprehensive retail survey was undertaken in 1982 in order to provide more up-to-date information. This involved visiting all the centres identified in the study, providing not only the necessary data but also, importantly, a familiarity for the locations themselves.

Fourthly, for the earlier periods, trade and street directories were used. 1966 and 1961 were chosen to represent the 1960s with 'Barretts' being the main directory source.

Finally, because some gaps were present for 1975, 1966 and 1961 an infilling process had to be undertaken using Yellow Pages (and its fore-runner the Classified Trades Directory) and the standard telephone directories. This was by far the most painstaking process of the whole data gathering procedure but enabled a more complex picture of retail change since 1960 to be compiled.

Thus, through these various sources, detailed information was built up for 1982, 1979, 1975, 1971, 1966 and 1961.

The derivation of the activity-type classification came from a blend of the 1971 Leeds Planning Survey and an author's own study of Leeds (Clarke). The 1971 retail survey was based on the classifications incorporated into the Census of Distribution whilst several newer activities were identified in the 1982 survey. Between these two surveys some 140 different activities were identified. As with any survey of this size some ambiguities are bound to arise although in all cases activities were classified by the most dominant function present. The full list of functions selected is given in Section 3 when considering the distribution of activities. By selecting the most dominant activity to build up the classification it is appreciated that some information on the character of a particular shop will be lost. Davies (1968) for example showed that although Middleton and Street Lane in Leeds had very similar numbers of different functional establishments the shops of Middleton tended to carry a far wider range of goods within them. More recently Dawson (1983a) has noted: "Scrambled merchandising is common in small as well as large stores. Not only do supermarkets sell children's toys, ladies' tights, magazines and light bulbs, but the same products may be found in a small chemist shop.

A similar expansion of product mix is occurring in all types and organisation forms of shops and the traditional delimitation of shop types no longer has meaning" (p. 116).

Whilst accepting Dawson's point no real problems were encountered in delimiting shop types for Leeds since 1960 - a chemist shop can still be counted as a chemist shop even if it sells ladies' tights! Where a 50:50 mix of activities were present then these were recorded as such, i.e. driving school and car accessories, seeds and pets, beds and bedding, etc. It is at the same time recognised, however, that a more thoroughbred utilisation of the framework of Q-analysis would have entailed more exacting consideration of the cover-set hierarchies underlying these observations.

Q-analysis: Algorithm and Conventions

Given data on the incidence of retail activities in particular centres, the q-analysis algorithm will produce a ranking of retail centres according to the number of different retailing activities that are found there. This is standard information - not distinctive to q-analysis - and is useful for identifying the relative orders of centres. Each level in the ranking, corresponds to a given number of activities, and - moving towards more distinctive aspects of q-analysis - any two centres that have that number of the same activities in common with others are grouped together. One consequence of this is that any two centres that are found in a given group (when the grouping procedure has been completed) may either have the relevant number and combination of activities in common with each other, or they may share that number and combination with some third activity (or through a further set of appropriately linked activities). So-called q-nearness graphs may be drawn to reveal these linkages explicitly. An intermediate step in producing the ranking and grouping is the derivation of a similarity matrix (a so-called shared face matrix) whose ij th cell reveals how many activities centre i has in common with centre j . The various stages of this standard q-analysis procedure are given in the context of hypothetical data in Figures 2, 3, 5, 6 and 7. An alternative (pictorial) representation of the information in Figure 5 is given in Figure 7. Figure 4 is the counterpart to Figure 3 which would be used to generate a ranking

and grouping of retail activities in terms of the number of locations they are found in. This would be called a conjugate analysis. Other standard q-analysis conventions are so-called structure sectors and eccentricities.

A structure vector summarises the number of clusters at each level of the listing in Figure 5. In the case of the example from Figures 2-7 it is given by:

$$\begin{matrix} 5 & 4 & 3 & 2 & 1 \\ \{2 & 3 & 4 & 3 & 1\} \end{matrix}$$

Thus there are two clusters at the 5 activity levels, 3 at the 4 activity level, and so on down to 1 at the one activity level. It should be recognised that if it had happened that at this lowest level there were two clusters, then there would be at least one centre that did not even share a single activity with others.

The concept of eccentricity has been devised to capture the distinctiveness, or otherwise, of given (in this case) centres. The eccentricity for each centre has a numerical value given by:

$$\text{eccentricity } e = \frac{\hat{q} - \check{q}}{\check{q} + 1}$$

where \hat{q} is the number of activities provided by the centre under consideration and \check{q} is the level at which that centre becomes grouped or clustered with some other centre. The values of the eccentricities for the present example are given in Figure 8.

In theory, eccentricity values can range from 0 to ∞ . A centre which had no activities in common with any other would have a very high eccentricity (∞). At the other extreme, a centre that had no activities that are distinctive or unique to itself will have low (zero) eccentricity. The interpretation of intermediate values between these extremes follows from this. From Figure 8 it is seen that Zone 2 is the most eccentric (distinctive) and Zone 5 the least so; indeed the activities provided by the latter are more than covered by those in Zone 1.

Figure 2 Incidence Matrix for Activities in Centre Locations
(Hypothetical Data)

Centre Locations	Activities											
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
X1			1	1						1	1	
X2	1	1										
X3		1		1			1		1			1
X4				1	1							1
X5				1						1		
X6								1	1	1		
X7				1		1	1	1	1			

Figure 3 Similarity Matrix for Centre Locations*

	X1	X2	X3	X4	X5	X6	X7
X1	4	0	1	1	2	1	1
X2	0	2	1	0	0	0	0
X3	1	1	5	2	1	1	3
X4	1	0	2	3	1	0	1
X5	2	0	1	1	2	1	1
X6	1	0	1	0	1	3	2
X7	1	0	3	1	1	2	5

*Cells in this array are derived immediately from Figure 2. It can be seen for instance that centre X3 has five activities in all (cell (3,3)=5), of which it has one in common with X6 (cell (3,6)=1) and three in common with X7 (cell (3,7)=3).

Figure 4 Similarity Matrix for Activities

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1	1	0	0	0	0	0	0	0	0	0	0
A2		2	0	1	0	0	1	0	1	0	0	1
A3			1	1	0	0	0	0	0	1	1	0
A4				5	1	1	2	1	2	1	2	2
A5					1	0	0	0	0	0	1	0
A6						1	1	1	1	0	0	0
A7							1	0	2	0	0	1
A8								2	2	0	1	0
A9									3	0	1	1
A10										1	1	0
A11											3	0
A12												2

Figure 5 Ranking and Grouping of Centre Locations*

Level 5	{X3} {X7}
Level 4	{X1} {X3} {X7}
Level 3	{X1} {X4} {X6} {X3 X7}
Level 2	{X1 X5} {X2} {X3 X4 X6 X7}
Level 1	{X1 X2 X3 X4 X5 X6 X7}

*The groupings follow directly from Figure 3; it can be seen, for instance, that of level, 3 X3 and X7 have three activities in common with each other, and at level 2, X3, X4, X6 and X7 all pairwise show at least two activities with each other, though not necessarily the same two in each case. The nature of this pairwise similarity is brought out in the q-nearness graphs in the next figure.

Figure 6 Q-Nearness Graphs

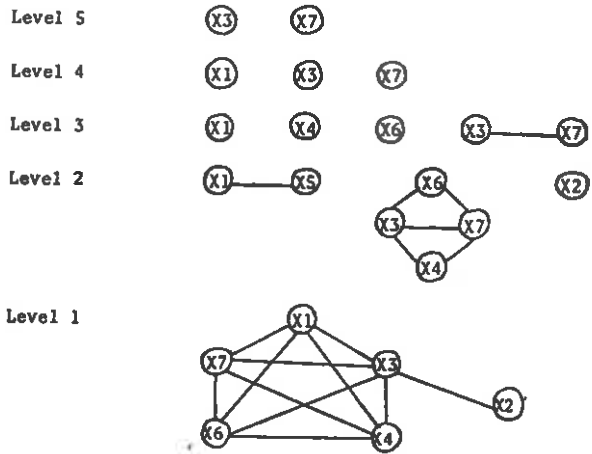
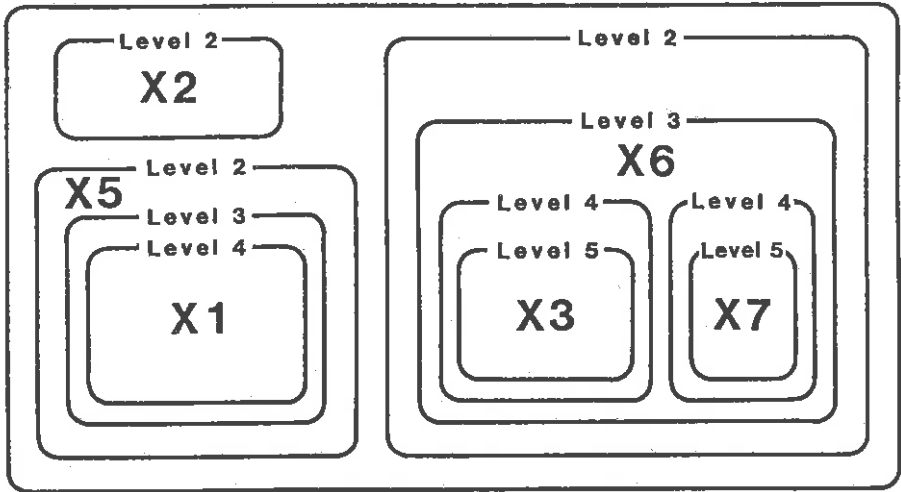


Figure 7 : Pictorial representations of the ranking and grouping of centre locations

7a. Contour representation



7b. Tree representation

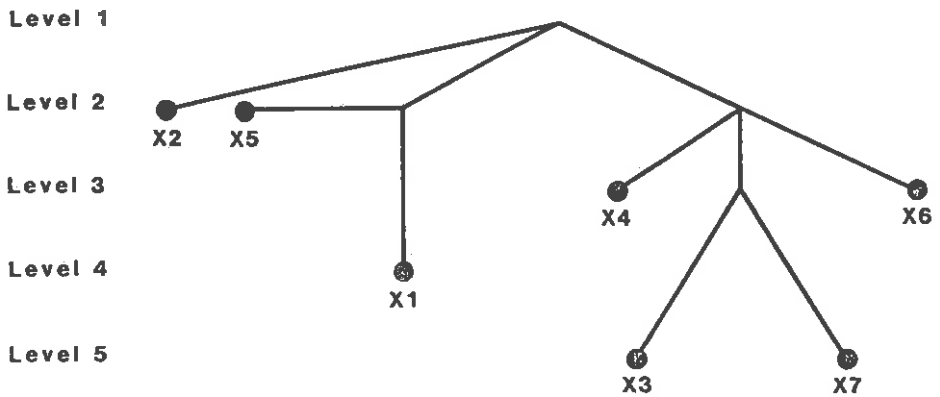


Figure 8 Eccentricities

	\hat{q}	\check{q}	$e = \frac{\hat{q} - \check{q}}{\check{q} + 1}$
X1	3	1	1
X2	1	0	1
X3	4	2	0.666
X4	2	1	0.5
X5	1	1	0
X6	2	1	0.5
X7	4	2	0.666

2. The Changing Retail Structure: Relative Importance of Centres

Given six matrices from the data gathering exercise, each roughly of dimension 130x33, it is intended to rank the retailing centres into a hierarchy for each year and examine specific changes in this hierarchy over time. As noted above one of the uses of the q-analysis algorithm is to indicate the importance of each centre in terms of the number of different activities it provides; those with many functions appearing at high q-levels, those with relatively fewer appearing much lower down. In Table 1, the ranking of retail centres on this basis for each of the six years is given. This particular type of ranking is not, of course, distinctive to q-analysis, though is one of the key outputs from an application of the algorithm en route to more detailed analysis.

Table 1 shows the hierarchy of shopping centres in Leeds since 1961 with the number of different functions provided at the centre identified in parenthesis. Before examining each year in more detail a number of general trends can be noted immediately. As expected, the city centre has dominated the retail hierarchy throughout the chosen time period, although the gap has narrowed substantially since 1961. The number of different functions offered in the majority of other centres has shown a marked increase since 1961. This has undoubtedly been done to the expansion of service outlets, bringing a whole new variety of functional forms, which will be examined in more detail later.

In 1961 then, the city centre is followed by the three leading suburban centres, Armley, Harehills and Crossgates. Of primary interest in 1961 however, is the prominent positions in the hierarchy of Chapeltown, Kirkstall Road and Hunslet Road, reflecting the importance of ribbon developments at this time. All three centres in 1961 were classic ribbon developments stretching along main roads which radiated from the city centre, surrounded by back to back and terraced housing. Most of the literature on ribbon developments emanates from the U.S.A. (e.g. Berry, 1959, 1963) where they are associated with a passing motorised trade and hence are seen as a mixture of retail and service activities strung out along major roads. For Britain, Davies (1974, p. 94) notes:

Table 1 The Hierarchy of Shopping Centres in Leeds, 1961-1982

1961	1966	1971	1975	1979	1982
CITY CENTRE (100)	CITY CENTRE (97)	CITY CENTRE (104)	CITY CENTRE (105)	CITY CENTRE (112)	CITY CENTRE (112)
ARMLEY (46)	HEADINGLEY (53)	CROSSGATES (65)	CROSSGATES (65)	HEADINGLEY (64)	HEADINGLEY (70)
HAREHILLS (46)	CROSSGATES (50)	HEADINGLEY (58)	HEADINGLEY (66)	CROSSGATES (61)	CROSSGATES (67)
CROSSGATES (46)	ARMLEY (46)	ARMLEY (53)	ARMLEY (51)	HAREHILLS (56)	PUDSEY (57)
(CHAPELTOWN) (45)	HAREHILLS (46)	HAREHILLS (53)	PUDSEY (51)	PUDSEY (53)	ARMLEY (55)
HEADINGLEY (45)	PUDSEY (46)	HAREHILLS LN (51)	HAREHILLS LN (51)	HAREHILLS LN (53)	HAREHILLS (55)
PUDSEY (41)	SEACROFT (43)	HORSFORTH TOWN ST (46)	HORSFORTH TOWN ST (48)	ARMLEY (51)	HAREHILLS LN (49)
DENSBURY RD (40)	(CHAPELTOWN) (41)	PUDSEY (45)	HAREHILLS (48)	HORSFORTH TOWN ST (48)	HORSFORTH TOWN ST (48)
HORSFORTH TOWN ST (39)	DENSBURY RD (40)	SEACROFT (43)	HORSFORTH NEW ROAD SIDE (44)	HORSFORTH NEW ROAD SIDE (42)	SEACROFT (45)
HORSFORTH NEW ROAD SIDE (38)	HORSFORTH TOWN ST (40)	CHAPEL ALLERTON (43)	SEACROFT (43)	SEACROFT (41)	HORSFORTH NEW ROAD SIDE (43)
HAREHILLS LN (38)	HORSFORTH NEW ROAD SIDE (39)	HORSFORTH NEW ROAD SIDE (42)	CHAPEL ALLERTON (42)	CHAPEL ALLERTON (38)	CHAPEL ALLERTON (39)
KIRKSTALL RD (37)	HAREHILLS LN (38)	KIRKSTALL RD (41)	DENSBURY RD (38)	DENSBURY RD (35)	DENSBURY RD (37)
HUNSLEY RD (36)	KIRKSTALL RD (38)	(CHAPELTOWN) (40)	OAKWOOD (33)	MEANWOOD (32)	MEANWOOD (34)
HYDE PARK (31)	HUNSLEY RD (32)	DENSBURY RD (34)	BRANLEY (32)	HALTON (32)	ROUNDHAY (33)
BRANLEY (29)	HYDE PARK (32)	MEANWOOD (32)	MEANWOOD (30)	OAKWOOD (31)	OAKWOOD (32)
CHAPEL ALLERTON (28)	CHAPEL ALLERTON (32)	HYDE PARK (32)	HALTON (30)	BRANLEY (31)	HALTON (32)
MEANWOOD (26)	BRANLEY (31)	BRANLEY (32)	HYDE PARK (29)	ROUNDHAY (30)	BRANLEY (31)
HALTON (26)	MEANWOOD (28)	HALTON (31)	FARLEY (29)	STANNINGLEY (28)	FARLEY (28)
FARLEY (25)	HALTON (26)	ROUNDHAY (29)	KIRKSTALL RD (29)	HYDE PARK (28)	YORK RD (27)
ROUNDHAY (24)	FARLEY (26)	STANNINGLEY (29)	STANNINGLEY (28)	FARLEY (28)	HYDE PARK (27)
STANNINGLEY (24)	STANNINGLEY (25)	FARLEY (28)	ROUNDHAY (27)	KIRKSTALL RD (28)	STANNINGLEY (26)
MOORTOWN (23)	YORK RD (24)	OAKWOOD (23)	MOORTOWN (24)	YORK RD (24)	KIRKSTALL RD (26)
OAKWOOD (23)	ROUNDHAY (23)	MOORTOWN (24)	YORK RD (24)	MOORTOWN (23)	MOORTOWN (24)
YORK RD (23)	MOORTOWN (22)	YORK RD (24)	BEESTON PARK (20)	BEESTON HILL (22)	WOODSLEY RD (23)
BEESTON HILL (19)	OAKWOOD (22)	BEESTON HILL (21)	WOODSLEY RD (20)	BEESTON PARK (22)	BEESTON HILL (22)
BEESTON PARK (19)	BEESTON HILL (20)	WOODSLEY RD (19)	BEESTON HILL (19)	HUNSLEY (20)	BEESTON RD (21)
WOODSLEY RD (19)	BEESTON PARK (19)	MIDDLETON (19)	MIDDLETON (18)	WOODSLEY RD (20)	BEESTON PARK (21)
MIDDLETON (17)	WOODSLEY RD (19)	BEESTON PARK (19)	BEESTON RD (17)	BEESTON RD (19)	HUNSLEY (20)
BEESTON RD (16)	MIDDLETON (17)	BEESTON RD (18)	SHAFTESBURY (16)	MIDDLETON (18)	MIDDLETON (18)
SHAFTESBURY (14)	BEESTON RD (15)	SHAFTESBURY (17)	HOLT PARK (15)	HOLT PARK (16)	HOLLIN PARK (17)
SELBY RD (12)	SHAFTESBURY (16)	HOLLIN PARK (14)	HOLLIN PARK (14)	SHAFTESBURY (16)	SHAFTESBURY (16)
HOLLIN PARK (11)	SELBY RD (11)	SELBY RD (12)	SELBY RD (13)	HOLLIN PARK (16)	HOLT PARK (15)
	HOLLIN PARK (11)			SELBY RD (13)	SELBY RD (13)

"For the most part, ribbons in British cities constitute the oldest and most blighted retail configurations to be found, and they reflect mainly on a former, uncontrolled marketing response to public transport stage points with only relatively little recent adaptation to the needs of consumers using private vehicles ...".

In Leeds the ribbon developments constitute some of the oldest and most blighted retail configurations and have little to do with the needs of consumers using private vehicles. They have built up in areas of intense housing in inner city areas where a large local population provides the clientele. Such was the shortage of space in these areas that often the only locations for retailing activities were the end terraces on the main access routes, sometimes interspersed with longer parades.

For the purposes of this study it was fairly easy to identify cut-off points for the centres of Kirkstall Road and Hunslet Road. Chapeltown was more of a problem however being more a series of parades rather than a long continuous one, hence its inclusion in paranthesis. The Chapeltown location in this study refers to a collection of outlets running over a quarter mile stretch of Chapeltown Road, and when all the outlets were included offered a total of 44 different functions. However, as stated earlier, by classifying the centres by the number of goods they provide we have undoubtedly over-emphasised Chapeltown's importance in the hierarchy. The shops were generally of poor quality and would have been far less attractive to consumers than the centres of Crossgates, Headingley, Pudsey etc. As Davies (1974) again notes: "high quality stores tend to serve mainly higher social classes of consumers scattered over a wide area; low quality stores tend to be oriented to lower social classes concentrated in an adjacent locale" (p. 96). However these outlets would have been extremely important to the inner city dwellers on low incomes and with little access to transport, providing a back-up stock of facilities to the nearby city centre.

By 1966 there has been little change to the hierarchy except for the emergence of Seacroft and the start of the rise of Crossgates. Both of these centres benefited from the emergence of the latest retail phenomenon, the planned shopping centre. The Arndale

development at Crossgates was the earliest such development in Britain and introduced the covered or pedestrianised shopping parade to Leeds. The history of shopping centre development is neatly summarised by Dawson (1983).

Seacroft was a completely new, purpose-built shopping centre constructed by the Local Authority in 1965 providing over 40 retailing activities under a completely covered environment, incorporating two public houses and a bus station. Seacroft was constructed under the guidelines of a 'district centre plan' in Leeds which identified growth in 11 centres across the city. The concept of the district centre was becoming widespread in planning circles following the publication of 'British Shopping Centres' by Burns in 1959.

The idea of the district centre in Leeds has been to serve major suburban areas in key strategic locations. By 1971 we see this policy beginning to have an important effect on the overall hierarchy of centres, with new developments also at Armley, Pudsey, Chapel Allerton, Beeston and Headingley. Indeed the Local Authority could be seen as imposing its own hierarchy of centres with its plans of consolidation for the city centre, improvement and development at 11 district centres, the introduction of local centres, and finally shopping parades to supplement the district and local centres. The emergence of the superstore adds another dimension to the notion of the district centre as will be discussed shortly.

Thus by 1971 the effects of positive planning intervention on the retail structure of Leeds are clearly reflected in Table 1. By 1971 Hunslet Road had become a far more obsolete trading area having undergone drastic surgery mainly due to inner city clearance programmes. Temporarily Hunslet could not be identified as having a continuous centre and so does not appear in the 1971 classification.

Similarly by 1975 Chapeltown had become too broken-up to merit inclusion as a shopping centre, and Kirkstall Road was beginning to feel the impact of massive slum clearance projects and later, road widening schemes. The decline of these traditional ribbon, inner city,

developments may be seen as beneficial to the majority of the population but could cause severe problems to those remaining in these areas.

As Davies (1974, p. 109) points out:

"However, many of the more substantial ribbon developments contain functions, ... , such as second-hand stores and junk shops, which cannot easily find alternative locations available in the city but may fulfil an essential role for poorer members of the community and special interest groups of consumers".

Also by 1975 we can see the emergence of the second phase of planned shopping centre or district centre. Thus Table 1 shows the arrival of Holt Park Centre, a scheme of co-development between the Local Authority and ASDA. ASDA was generally seen as the pioneer of such schemes, incorporating a hypermarket or superstore within a district centre. This is of paramount importance to superstore development in Leeds. The rise of hypermarkets and superstores has been well documented (see Parker, 1975) being large stores basically marketing food products and a limited selection of non-food products. Throughout the 1970s Leeds Planning Department were inundated with requests for planning permission for such stores normally for free standing locations on good access routes. Following the guidelines of the Department of the Environment (in policy note 13) Leeds City Planning Authority decided upon a strict rule of no free standing superstores in Leeds. Thus the only way the superstore operators could impose their form of retailing within Leeds was to develop district centres, where other forms of retailing could exist alongside their stores.

Holt Park was the first such scheme (outside the city centre: Morrisons had developed a superstore within the Merriem Centre in 1972), combining a superstore (ASDA) with 13 other retail activities and a community/sports centre. Good parking facilities as well as local bus links were provided. Also at this time Morrison's Ltd were developing similar schemes at Bramley (replacing much of the former shopping area of Town Street) and Horsforth Town Street.

By 1979 a further new purpose built centre appeared at Hunslet (Morrison s) bridging a gap left by the decline of traditional outlets in Hunslet Road.

The final hierarchy for 1982, presented in Table 1, perhaps under-estimates the importance of these new superstore district centres, because the superstore was simply taken (along with the supermarket) as one of the 137 functions identified in the matrices. To emphasise this point it is worth considering the latest retail development in Leeds at Moortown on the northern outer ring road (see Figure 1). Here, Sainsburys have recently built a large superstore and garden centre on a green-field site. In order to comply to the policy of the Planning Authority it had to be able to offer other retail outlets, that is, to make the development into a shopping centre rather than simply a superstore. Thus by 1982 we have,

- superstore
- a garden centre with some D.I.Y. products
- a Wimpey restaurant/take-away
- a newsagents
- a shoe repairers
- a TV/electrical outlet

and two currently vacant properties.

Clearly under the definitions of the shopping centre given earlier, this development with only six retail outlets would not qualify for inclusion. This obviously under-estimates its position in fulfilling an important role in shopping in Leeds. Thus we can split the functions of the superstore to incorporate, butcher, baker, fruit and vegetable and fish, clothing (a limited line of gents, ladies and childrenswear), grocer, hardware, paint and wallpaper, television and electrical, bank (in most instances), delicatessen, records, car accessories, cards and stationery, kitchen accessories, household goods, toiletries, sweets and tobacco, wine merchants, meats/diary produce and frozen food. (All of these being counted as separate functions in the main data matrix).

All these additional functions were added to those currently on offer in all of the centres which currently has a superstore incorporated within it, and re-fed into the q-analysis algorithm. Table 2 shows the resultant hierarchy. Quite clearly these are important changes to the hierarchy and one might argue, a more realistic picture.

The discussion so far has been couched in terms of hierarchies of centres and as NEDO (190) note, this has been the starting point for a large number of shopping studies, mainly those concerned with the notion of intra-urban central place theory (see Berry, 1963; Carol, 1960, for example). Berry (1965) points out that the central theme of central place theory is the notion that shop locations are endogenously determined by the prior allocation of consumers and their characteristics.

Clearly we have seen this to be important here, for example with the large concentration of facilities in the densely packed inner city areas in the 1960s supplemented by the larger suburban centres and the city centre offering higher-order goods and services. Moreover we have also emphasised the importance of other variables in producing a hierarchy of centres. For example the importance of communications and road networks (seen through the ribbon developments of the 1960s and the locations of hypermarkets in the 1970s), the importance of changes in the organisation of retailing (the economies of scale seen in supermarkets and superstores) and the impact of local government intervention (through planned centres and the incorporation of 'District Plans' which may impose a hierarchy in its own right). These factors then have been seen as equally important and our hierarchies have been identified not just in terms of consumers and their characteristics.

Again unlike more traditional central place hierarchical studies, we also intend to emphasise the differences between centres of similar size and levels within the defined hierarchies, using the various outputs from the q-clustering algorithm.

Thus although we have used the term hierarchy to draw on similarities between centres and the relative importance of centres over time we have also started to go beyond the traditional confines of central place theory.

Table 2 The Hierarchy of Centres in 1982 with the Additional Functions of the Superstore

<u>Previous Hierarchy</u>		<u>New Hierarchy</u>	
City centre	(111)	City centre	(111)
Headingley	(69)	<u>Crossgates</u>	(73) ASDA
<u>Crossgates</u>	(66)	Headingley	(69)
Pudsey	(56)	<u>Horsforth T. St.</u>	(58) Morrisons
Armley	(54)	Pudsey	(56)
Harehills	(54)	Armley	(54)
Harehills Lane	(48)	Harehills	(54)
<u>Horsforth T. St.</u>	(47)	Harehills Ln.	(48)
Seacroft	(44)	Seacroft	(44)
Horsforth N. Rd. Side	(42)	<u>Bramley</u>	(44)
Chapel Allerton	(38)	Horsforth N. Rd. Side	(42)
Dewsbury Rd	(36)	Chapel Allerton	(38)
Meanwood	(33)	<u>Hunslet</u>	(37) Morrisons
Roundhay	(32)	Dewsbury Rd.	(36)
Oakwood	(31)	<u>Holt Park</u>	(35) ASDA
Halton	(31)	Meanwood	(33)
<u>Bramley</u>	(30)	Halton	(31)
Farsley	(27)	Roundhay	(32)
York Rd.	(26)	Oakwood	(31)
Hyde Park	(26)	<u>Sainsbury's, Moortown</u>	(28) Sainsbury's
Stanningley	(25)	Farsley	(27)
Kirkstall Rd.	(25)	York Rd.	(26)
Moortown	(23)	Hyde Park	(26)
Woodsley Rd.	(22)	Stanningley	(25)
Beeston Hill	(21)	Kirkstall Rd.	(25)
Beeston Rd.	(20)	Moortown	(23)
Beeston Park	(20)	Woodsley Rd.	(22)
<u>Hunslet</u>	(19)	Beeston Hill	(21)
Middleton	(17)	Beeston Rd.	(20)
Hollin Park	(16)	Beeston Park	(20)
Shaftesbury	(15)	Middleton	(17)
<u>Holt Park</u>	(14)	Hollin Park	(16)
Selby Rd.	(12)	Shaftesbury	(15)
<u>Sainsbury's, Moortown</u>	(--)	Selby Rd.	(12)

3. The Changing Retail Structure: Distribution of Activities

As well as the hierarchical structures of centres described above, it is also interesting for the purposes of examining retail change to consider the distributions of retailing activity type according to the number of shopping centre locations they can be found in. In q-analysis terms this is called the conjugate analysis and the results are presented in Table 3. (Thus a butcher was present in 31 of the centres in 1961, etc.)

Two of the most important processes operating on the High Street over recent years have been the rise of retail multiple groups (normally defined as having ten or more outlets, see Hedderwick et.al., 1979), and the rise of services or quasi-retail outlets. Whilst it is not possible to pick up the former process from Table 3 (though see Clarke, 1983b) the rise of service outlets is very evident.

The period 1961-1971 is particularly interesting since it is a time when many service outlets are first beginning to appear yet the majority of the more traditional retail functions are still important. As Table 3 shows, hardware shops, drapery (or soft-furnishing) stores, grocers and tobacconists were still high in the overall hierarchy of functions. However, scanning down the columns of Table 3 shows that travel agents, estate agents, building societies and gas showrooms were well established on the High Street as early as 1961. By far the most important service outlets in these early years were banks, opticians and bookmakers. Indeed the pattern of bank location was virtually rooted by 1961. The early growth of bookmakers was the result of changes to the Betting and Gaming Legislation which first allowed bookmakers to operate outside the confines of the race-course. Many front and back street bookmakers appeared on the scene especially in inner city areas where there were greater numbers of working class males. It is interesting that the number of betting shops have expanded across suburbia with the branch location programmes of the multiple firms which have come to dominate the industry (via mergers, take-overs and rationalisation procedures).

By 1971, then, a mixture of traditional retail functions and service outlets is depicted, with the latter growing at a far greater rate. The rise of supermarkets on the High Street is clearly visible from Table 3 and this begins to have an important impact on the traditional High Street grocer. Kirby (1978) notes that only about 23% of local grocers felt profitability to be a cause of their failure but this, through competition, must surely account for the loss of many High Street grocers. How could one expect to survive on the same block of units as Safeways, Tesco etc? Where the grocer has survived it is often through voluntary group membership (i.e. Mace, Spar, V.G. etc.) where greater economies of scale can be met or through the ability to offer an additional service, such as free home delivery.

Also apparent by 1971 is the demise of 'Timothy Whites'. From a position of strength in Leeds these stores were wiped out by the merger/take-over of Boots who only decided to take control of three of the units. The others were closed down and the property put on to the market.

Between 1971 and 1975 the expansion of services continued especially within the financial institutions. The rise of building society branches is perhaps the most widely covered service expansion in the literature (see URPI, 1980; Samuels, 1979; Clarke, 1983a). since it has been the most important in terms of actual numbers. Thus by 1982 it has become a feature of some 22 centres in Leeds with Horsforth Town Street having nine different branches and Crossgates eight. The rise of the two local firms (Leeds Permanent and Leeds and Holbeck) has been particularly important here (see Clarke, 1983a).

Also by 1975 the eating out food sector or take-away food sector has become widely represented on the High Street; note the rapid rise of Chinese take-aways, restaurants and fast-food or 'burger bars'. So important has this sector of the services become that it formed the agenda of a URPI Conference in 1980 (URPI, 1980b).

By 1982 we can add to the list of service expansions; job centres, video hire shops, film processors or instant print shops and amusement arcades. For a detailed report of the rise of service outlets see Clarke (1983a).

The overall effect of service expansion on the hierarchy of functions by 1982 is clear from Table 3. Those traditional retail functions that have suffered the most have been grocers, drapery stores, tobacconists, hardware stores and fishmongers. Butchers, bakers, chemists and greengrocers have been able to retain their importance on the High Street satisfying daily demands for perishable goods which are often felt by consumers to be of fresher and better quality than supermarket products.

Several retail or non-service functions have also done well over the last ten years or so. A greater increase in home car maintenance has led to the steady growth of car accessory shops whilst the increasing rates of freezer ownership has resulted in a rise of frozen food outlets. Several of these have almost become supermarkets within frozen foods such as Iceland and Jack Fulton's. The number of wine merchants also greatly increased between 1961 and 1971 possibly at the expense of many off-licence sections of traditional grocers.

So far attention has focused on the dominant High Street functions yet as Table 3 shows there are a vast number of functions which are only represented in one or two centres. The majority of these, including bridalwear, Army/Navy stores, cosmetics, kitchen accessories, furs/leather etc., can be found in the city centre where one would expect a greater number of activities. However there are and have been some notable exceptions.

Tailor's shops between 1961 and 1971 were concentrated in only three areas, notably North Street Leeds and Chapeltown. These outlets were often synonymous with Jewish entrepreneurs, many of whom have progressed to larger concerns. Many of these tailor's shops were lost to the bulldozer whilst increasing pressure from multiple groups also affected trade.

More detail on specific retailing activities can obviously be elicited from the original data set. One aspect of this - multiple incidence of activities in a given centre - is considered later in this paper. However if specific activities were to be the main focus then a different approach to data collection, let alone analytical procedure, would probably be desirable. For present purposes we continue our analysis of general trends in retailing change.

Also connected with the Jewish population have been outlets concerned with Kosher products. In 1961 Chapeltown was the only area identified as having a Kosher butcher but by 1966 the migration of Jews further north had led to a new shop in Roundhay, Street Lane. Although Chapeltown had been discarded from the survey by 1982 one or two Kosher shops remain, supplemented by more isolated stores in north Leeds including another Kosher butcher at Moortown which comes into our survey.

In 1982 we can also pick out several non-city centre solitary functions. The first High Street computer outlet appeared at Headingley whilst Stanningley can boast a 'wood-care' outlet and a CB radio equipment shop. These so-called solitary functions will clearly show up in the eccentricity of a particular centre (that is the degree to which a centre is unique in the functions it offers) as will be seen below. Finally it should also be remembered that some of these solitary functions may well also appear outside the main shopping centres.

4. Discrimination Between Centres

It is now appropriate to look beneath the summary of hierarchies of centres given in Table 1 to elicit more detail on the similarities and differences between centres. The complete results of the q-analysis algorithm are too extensive to report in full so a sample will be given. The choice of features to be probed will be limited and necessarily subjective though hopefully sufficient to illustrate both the utility of the particular style of data interpretation afforded by q-analysis and a reasonably representative picture of retail change in Leeds.

Table 3 Analysis of the Conjugate

-24-

	1961			1966			1971			1975			1979			1982		
	BUTCHER	(32)	(33)	BUTCHER	(33)	(32)	BAKER	(32)	(32)	BAKER	(32)	(32)	NEWSAGENT	(33)	(32)	NEWSAGENT	(33)	(32)
BAKER		(31)	(32)	BAKER	(32)	(32)	HAIR SALON	(32)	(32)	NEWSAGENT	(31)	(32)	BAKER	(32)	(32)	BAKER	(32)	(32)
FRUIT AND VEG		(31)	(32)	FRUIT AND VEG	(32)	(30)	BUTCHER	(30)	(30)	HAIR SALON	(30)	(30)	CHEMIST	(32)	(31)	HAIR SALON	(31)	(31)
HAIR SALON		(31)	(32)	HAIR SALON	(32)	(30)	NEWSAGENT	(30)	(30)	CHEMIST	(30)	(30)	HAIR SALON	(31)	(31)	CHEMIST	(31)	(31)
GROCER		(29)	(31)	CHEMIST	(31)	(30)	CHEMIST	(30)	(30)	BUTCHER	(29)	(29)	BUTCHER	(30)	(30)	BUTCHER	(30)	(30)
NEWSAGENT		(28)	(31)	NEWSAGENT	(31)	(29)	FRUIT AND VEG	(29)	(29)	FRUIT AND VEG	(29)	(29)	BOOKMAKER	(30)	(29)	BOOKMAKER	(29)	(29)
CHEMIST		(28)	(29)	GROCER	(29)	(27)	DRAPERY	(27)	(27)	BOOKMAKER	(29)	(27)	BANK	(27)	(27)	FRUIT AND VEG	(27)	(27)
BANK		(24)	(25)	BANK	(25)	(26)	BANK	(26)	(26)	BANK	(26)	(26)	FRUIT AND VEG	(26)	(26)	BANK	(26)	(26)
DRAPERY		(24)	(24)	HARDWARE	(24)	(25)	GROCER	(25)	(25)	LAUNDERETTE	(23)	(23)	OPTICIAN	(24)	(24)	FISH AND CHIPS	(24)	(24)
HARDWARE		(23)	(23)	PAINT/WALLPAPER	(23)	(23)	PAINT/WALLPAPER	(23)	(23)	FISH AND CHIPS	(23)	(23)	LADIESWEAR	(24)	(24)	OPTICIAN	(24)	(24)
SWEETS/TOBACCO		(23)	(23)	DRAPERY	(23)	(21)	BOOKMAKER	(21)	(21)	MENSWEAR	(21)	(21)	FISH AND CHIPS	(23)	(23)	LADIESWEAR	(23)	(23)
LADIESWEAR		(21)	(21)	MENSWEAR	(21)	(22)	LAUNDERETTE	(22)	(22)	OPTICIANS	(21)	(21)	POST OFFICE	(22)	(22)	BUILDING SOC	(23)	(23)
FISH AND CHIPS		(20)	(21)	LADIESWEAR	(21)	(22)	FISH AND CHIPS	(22)	(22)	POST OFFICE	(21)	(21)	LAUNDERETTE	(21)	(21)	POST OFFICE	(22)	(22)
PUBLIC HOUSES		(20)	(21)	PUBLIC HOUSE	(21)	(21)	LADIESWEAR	(21)	(21)	LADIESWEAR	(21)	(21)	PUBLIC HOUSES	(20)	(20)	PUBLIC HOUSE	(20)	(20)
PAINT/WALLPAPER		(19)	(21)	SWEETS/TOBACCO	(21)	(21)	HARDWARE	(21)	(21)	HARDWARE	(20)	(20)	DRY CLEANERS	(20)	(20)	DRY CLEANERS	(20)	(20)
BOOKMAKER		(19)	(20)	CHIP SHOP	(20)	(21)	ELECTRICAL	(21)	(21)	DRAPERY	(20)	(20)	BUILDING SOC	(19)	(19)	LAUNDERETTE	(19)	(19)
POST OFFICE		(19)	(20)	BOOKMAKER	(20)	(20)	MENSWEAR	(20)	(20)	GROCER	(19)	(19)	PAINT/WALLPAPER	(19)	(19)	PAINT/WALLPAPER	(18)	(18)
MENSWEAR		(18)	(20)	POST OFFICE	(20)	(20)	PUBLIC HOUSE	(20)	(20)	PAINT/WALLPAPER	(19)	(19)	ELECTRICAL	(19)	(18)	ELECTRICAL	(18)	(18)
DRY CLEANERS		(18)	(19)	ELECTRICAL	(19)	(19)	DRY CLEANERS	(19)	(19)	PUBLIC HOUSE	(19)	(19)	CHINESE T-AWAY	(19)	(18)	CHINESE T-AWAY	(18)	(18)
FRUIT AND FISH		(17)	(19)	LAUNDERETTE	(19)	(19)	OPTICIANS	(19)	(19)	DRY CLEANERS	(19)	(19)	MENSWEAR	(17)	(17)	ESTATE AGENT	(17)	(17)
ELECTRICAL		(17)	(18)	DRY CLEANERS	(18)	(19)	POST OFFICE	(19)	(19)	ELECTRICAL	(18)	(18)	DRAPERY	(17)	(17)	HOUSEHOLD	(16)	(16)
PLUMBERS		(17)	(17)	TV/ELECTRICAL	(17)	(18)	SWEETS/TOBACCO	(18)	(18)	TV/ELECTRICAL	(16)	(16)	HARDWARE	(16)	(16)	FANCY GOODS	(16)	(16)
TV/ELECTRICAL		(16)	(16)	SHOE SHOP	(16)	(17)	SHOE SHOP	(17)	(17)	WINE MERCHANT	(16)	(16)	TV/ELECTRICAL	(16)	(16)	WINE MERCHANT	(16)	(16)
SHOE SHOP		(16)	(15)	PLUMBER	(15)	(17)	WINE MERCHANT	(17)	(17)	SHOE SHOP	(15)	(15)	ESTATE AGENT	(16)	(16)	CHILDRENSWEAR	(16)	(16)
LAUNDERETTE		(14)	(15)	OPTICIAN	(15)	(16)	TV/ELECTRICAL	(16)	(16)	PLUMBER	(15)	(15)	JEWELLERS	(16)	(15)	MENSWEAR	(15)	(15)
FURNITURE		(14)	(14)	FRUIT/FISH	(14)	(15)	SUPERMARKET	(15)	(15)	SUPERMARKET	(15)	(15)	WINE MERCHANT	(16)	(16)	HARDWARE	(15)	(15)
OPTICIAN		(13)	(14)	FURNITURE	(14)	(14)	CAFE	(14)	(14)	RESTAURANT	(14)	(14)	CHILDRENSWEAR	(16)	(15)	TV/ELECTRICAL	(15)	(15)
CHILDRENSWEAR		(13)	(13)	JEWELLER	(13)	(14)	FURNITURE	(14)	(14)	BUILDING SOC	(14)	(14)	ASSURANCE	(15)	(15)	JEWELLER	(15)	(15)
TIMOTHY WHITES		(13)	(13)	WINE MERCHANT	(13)	(14)	JEWELLER	(14)	(14)	CHILDRENSWEAR	(14)	(14)	RESTAURANT	(14)	(14)	TRAVEL AGENT	(15)	(15)

'CO-OP'	(12)	CAFE	(12)	PLUMBER	(14)	INSURANCE	(13)	SHOE SHOPS	(14)	FROZEN FOODS	(15)
CAFE	(11)	CHILDRENSWEAR	(12)	CARPETS	(13)	JEWELLER	(13)	WOOL	(14)	RESTAURANT	(14)
JEWELLER	(10)	CYCLES	(12)	CHILDRENSWEAR	(13)	SWEETS/TOBACCO	(12)	SUPERMARKET	(14)	DRAPERY	(14)
WINE MERCHANT	(10)	'TIMOTHY. WHITES'	(12)	RESTAURANT	(12)	FLOWERS	(12)	GROCE	(13)	SHOE SHOP	(14)
ASSURANCE	(10)	'CO-OP'	(12)	SHOE REPAIRS	(12)	CARPETS	(12)	FANCY GOODS	(13)	SUPERMARKET	(14)
SHOE REPAIRS	(10)	SHOE REPAIRS	(11)	WOOL	(12)	HOUSEHOLD	(12)	TRAVEL AGENT	(12)	GROCE	(13)
CYCLES	(10)	ASSURANCE	(10)	HOUSEHOLD	(12)	'CO-OP'	(12)	SWEETS/TOBACCO	(12)	ASSURANCE	(13)
CARPETS	(9)	CARPETS	(10)	'CO-OP'	(12)	CHINESE T-AWAY	(12)	FROZEN FOODS	(12)	MIXED CLOTHING	(12)
MEATS/DAIRY	(9)	LEATHER/LUGGAGE	(9)	FRUIT/FISH	(11)	FROZEN FOODS	(11)	'CO-OP'	(12)	CAR ACCESSORIES	(12)
LEATHER/LUGGAGE	(8)	MEATS/DAIRY	(9)	ASSURANCE	(11)	CAFE	(10)	FLOWERS	(11)	FLOWERS	(11)
FISHONGER	(8)	TV RENTAL	(9)	FROZEN FOODS	(11)	FAST FOOD	(10)	CAR ACCESSORIES	(11)	FAST FOOD	(11)
CLOTHING (MIXED)	(7)	FISHONGER	(9)	BUILDING SOC	(10)	ESTATE AGENT	(10)	HOUSEHOLD	(11)	FURNITURE	(11)
BUILDING SOC	(7)	CLOTHING(MIXED)	(8)	CAR ACCESSORIES	(10)	FURNITURE	(10)	TV RENTAL	(11)	WOOL	(11)
ESTATE AGENT	(7)	BUILDING SOC	(8)	TV RENTAL	(10)	WOOL	(10)	MIXED CLOTHING	(10)	VIDEO HIRE	(11)
PHOTOGRAPHER	(7)	ESTATE AGENT	(8)	CHINESE T-AWAY	(10)	TV RENTAL	(10)	CAFE	(10)	'CO-OP'	(11)
CARDS/STATIONERY	(7)	WOOL	(8)	FLOWERS	(9)	FRUIT/FISH	(9)	FURNITURE	(10)	PETS	(10)
WOOL	(7)	SEEDS/PETS	(8)	ESTATE AGENT	(9)	MIXED CLOTHING	(9)	PLUMBER	(10)	TV RENTAL	(10)
FLOWERS	(6)	CHINESE T-AWAY	(8)	DRIVING SCHOOL	(9)	CAR ACCESSORIES	(9)	PETS	(10)	CAFE	(9)
SPORTSWEAR	(6)	RESTAURANT	(7)	CARDS/STATIONERY	(9)	TRAVEL AGENT	(9)	FAST FOODS	(9)	SPORTS GOODS	(9)
CAR ACCESSORIES	(6)	CAR ACCESSORIES	(7)	FANCY GOODS	(9)	SHOE REPAIRS	(8)	FRUIT/FISH	(8)	SOLICITORS	(9)
HOUSEHOLD	(6)	TRAVEL AGENT	(7)	PETS	(9)	DRIVING SCHOOL	(8)	SPORTS GOODS	(8)	CARDS/STATIONERY	(8)
FANCY GOODS	(6)	FANCY GOODS	(7)	CYCLES	(9)	FANCY GOODS	(8)	SOLICITOR	(8)	KITCHEN/B-ROOM	(8)
TOYS	(6)	FLOWERS	(6)	MIXED CLOTHING	(8)	PETS	(8)	DRIVING SCHOOL	(8)	SWEETS/TOBACCO	(8)
SEEDS/PETS	(6)	SPORTSWEAR	(6)	TOYS	(8)	SPORTS	(7)	CARDS/STATIONERY	(8)	CHARITY SHOPS	(8)
TV RENTAL	(6)	GAS SHOWROOM	(6)	SEEDS/PETS	(8)	GAS SHOWROOM	(7)	DELICATESSEN	(7)	FRUIT/FISH	(7)
FROZEN FOODS	(6)	CARDS/STAT	(6)	MEATS/DAIRY	(8)	CARDS/STATIONERY	(7)	CARPETS	(7)	DELICATESSEN	(7)
DELICATESSEN	(5)	HOUSEHOLD	(6)	FISHONGER	(8)	MEATS/DAIRY	(7)	GAS SHOWROOM	(7)	ANTIQUES	(7)
ANTIQUES	(5)	TOYS	(6)	'BOOTS'	(8)	CYCLES	(7)	SHOE REPAIRS	(7)	CARPETS	(7)
GAS SHOWROOM	(5)	FROZEN FOODS	(6)	ANTIQUES	(7)	'BOOTS'	(7)	TOILETRIES	(7)	GAS SHOWROOM	(7)

MOTOR CYCLES	(5)	SUPERMARKET	(6)	GAS SHOWROOM	(7)	DELICATESSEN	(6)	TOYS	(7)	SHOE REPAIRS	(7)
'BOOTS'	(5)	DELICATESSEN	(5)	CAMERAS	(7)	CAMERAS	(6)	RECORDS	(6)	PLUMBER	(7)
CUT PRICE SHOP	(5)	ANTIQUES	(5)	TRAVEL AGENT	(7)	TOYS/STATIONERY	(6)	CAMERAS	(6)	TOYS/STATIONERY	(7)
UPHOLSTERER	(5)	ELEC SHOWROOM	(5)	FAST FOOD	(6)	'WOOLWORTHS'	(6)	MEATS/DAIRY	(6)	MEATS/DAIRY	(7)
RESTAURANT	(4)	PHOTOGRAPHERS	(5)	SPORTS GOODS	(6)	CHARITY SHOP	(6)	CYCLES	(6)	FURN/CARPETS	(6)
SOLICITOR	(4)	PETS	(5)	LEATHER/LUGGAGE	(6)	BOULIQUE	(5)	'BOOTS'	(6)	RECORDS	(6)
CAMERAS	(4)	'WOOLWORTHS'	(5)	'WOOLWORTHS'	(6)	SOLICITOR	(5)	SUPERSTORE	(6)	FILM PROCESSORS	(6)
DRIVING SCHOOL	(4)	'BOOTS'	(5)	DELICATESSEN	(5)	ANTIQUES	(5)	CHARITY SHOP	(6)	DRIVING SCHOOL	(6)
TRAVEL AGENT	(3)	UPHOLSTERER	(4)	SOLICITOR	(5)	ELEC SHOWROOM	(5)	BOULIQUE	(5)	TOILETRIES	(6)
BEDS/BEDDING	(3)	SOLICITOR	(4)	FURN/CARPETS	(5)	RECORDS	(5)	ANTIQUES	(5)	HEALTH FOODS	(6)
PET SHOP	(3)	DRIVING SCHOOL	(4)	ELEC SHOWROOM	(5)	JOB CENTRE	(5)	FURN/CARPETS	(5)	JOB CENTRES	(6)
HEALTH FOODS	(3)	BEDS/BEDDING	(3)	RECORDS	(4)	FISHMONGER	(5)	JOB CENTRE	(5)	BOOTS	(6)
2ND-HAND CLOTHES	(3)	HEALTH FOODS	(3)	CUT-PRICE STORE	(4)	SUPERSTORE	(5)	'WOOLWORTHS'	(5)	SUPERSTORE	(6)
TAILORS	(3)	MOTOR CYCLES	(3)	HEALTH FOODS	(4)	FURN/CARPETS	(4)	ELEC SHOWROOM	(4)	BOULIQUE	(5)
ELEC SHOWROOM	(3)	2ND-HAND CLOTHES	(3)	UPHOLSTERER	(4)	PHOTOGRAPHER	(4)	PHOTOGRAPHER	(4)	CAMERAS	(5)
'WOOLWORTHS'	(2)	TAILORS	(3)	TAILOR	(4)	LEATHER/LUGGAGE	(4)	LEATHER/LUGGAGE	(4)	'WOOLWORTHS'	(5)
BOOKS	(2)	CUT-PRICE STORE	(3)	BOULIQUE	(3)	TOILETRIES	(3)	KITCHEN/B-ROOM	(3)	ELEC SHOWROOM	(4)
FURN/CARPETS	(2)	BOOKS	(2)	BOOKS	(3)	HEALTH FOODS	(3)	HEALTH FOODS	(3)	CUT-PRICE STORE	(4)
LINGERIE	(2)	FURN/CARPETS	(2)	TOILETRIES	(3)	2ND-HAND CLOTHES	(3)	MOTOR CYCLES	(3)	PHOTOGRAPHER	(3)
ART MATERIALS	(2)	CAMERAS	(2)	2ND-HAND CLOTHES	(3)	UPHOLSTERER	(3)	2ND-HAND CLOTHES	(3)	LEATHER/LUGGAGE	(3)
PAINTBROKER	(2)	KOSHER BUTCHER	(2)	JOB CENTRE	(2)	CUT-PRICE STORE	(3)	CUT-PRICE STORE	(3)	ART MATERIALS	(3)
MUS INSTRUMENTS	(1)	LINGERIE	(2)	STAMPS/COINS	(2)	BOOKS	(3)	BOOKS	(2)	FISHING TACKLE	(3)
ARMY AND NAVY	(1)	BOULIQUE	(2)	PHOTOGRAPHER	(2)	MUSIC INSTRUMENT	(2)	MUS INSTRUMENTS	(2)	MOTOR CYCLES	(3)
CAMPING EQUIP	(1)	MUS INSTRUMENTS	(1)	CAMPING EQUIP	(2)	KITCHEN/B-ROOM	(2)	SEWING EQUIP	(2)	CYCLES	(3)
SEWING EQUIP	(1)	RECORDS	(1)	KOSHER BUTCHER	(2)	LINGERIE	(2)	SEEDS/PETS	(2)	MODELS	(3)
KOSHER BUTCHER	(1)	SANDWICH BAR	(1)	LINGERIE	(2)	SEEDS/PETS	(2)	BEDS/BEDDING	(2)	BOOKS	(3)
OFFICE EQUIP	(1)	DRIVING SCHOOL	(1)	BEDS/BEDDING	(2)	BEDS/BEDDING	(2)	ART MATERIALS	(2)	AMUSEMENTS	(2)
FURS/LEATHER	(1)	CAR ACCESSORIES	(1)	ART MATERIALS	(2)	ART MATERIALS	(2)	FISHING TACKLE	(2)	SANDWICH BAR	(2)
WINDOWS	(1)	ARMY AND NAVY	(1)	PRINT/PHOTOCOP	(2)	PRINT/PHOTOCOP	(2)	TROPICAL FISH	(2)	FOREIGN BANK	(2)

PRINT/PHOTOCOPIER	(1)	SEWING EQUIP	(1)	TROPICAL FISH	(2)	FISHING TACKLE	(2)	FISHMONGERS	(2)	LINGERIE	(2)
FISHING TACKLE	(1)	TOILETRIES	(1)	MOTOR CYCLES	(2)	TROPICAL FISH	(2)	UPHOLSTERERS	(2)	SEEDS/PETS	(2)
SUPERMARKET	(1)	OFFICE EQUIP	(1)	LOANS	(2)	MOTOR CYCLES	(2)	KOSHER BUTCHER	(2)	BEDS/BEDDING	(2)
BOUQUET	(1)	FURS/LEATHER	(1)	SUPERSTORES	(2)	TAILORS	(2)	SANDWICH BAR	(1)	PRINT/PHOTOCOPIER	(2)
STAMPS/COINS	(1)	ART MATERIALS	(1)	CHARITY SHOP	(2)	KOSHER BUTCHER	(2)	BRIDALWEAR	(1)	TILES	(2)
RECORDS	(1)	WINDOWS	(1)	MUS INSTRUMENTS	(1)	STAMPS/COINS	(1)	SURVEY EQUIP	(1)	KOSHER BUTCHER	(2)
OVERALLS	(1)	PRINT/PHOTOCOPIER	(1)	SANDWICH BAR	(1)	SANDWICH BAR	(1)	CAR RENTAL	(1)	CB EQUIP	(2)
RUBBER GOODS	(1)	PAINTBROKER	(1)	DRIVING SCHOOL/CAR ACCESSORIES	(1)	BRIDALWEAR	(1)	MODELS	(1)	FISHMONGERS	(2)
TOILETRIES	(1)	STAMPS/COINS	(1)	ARMY AND NAVY	(1)	DRIVING SCHOOL/CAR ACCESSORIES	(1)	CAR ACCESSORIES	(1)	2ND-HAND CLOTHES	(2)
DEPT STORES	(1)	BRIDALWEAR	(1)	KITCHEN/B-Room	(1)	CAMPING EQUIP	(1)	HEALTH STUDIO	(1)	MUS INSTRUMENTS	(1)
'SMITHS'	(1)	OVERALLS	(1)	AMUSEMENTS	(1)	SEWING EQUIP	(1)	LINGERIE	(1)	SURVEY EQUIP	(1)
MODELS	(1)	RUBBER GOODS	(1)	BRIDALWEAR	(1)	FUR/LEATHER	(1)	FUR/LEATHER	(1)	CAR RENTAL	(1)
HEARING AIDS	(1)	FISHING TACKLE	(1)	SEWING EQUIP	(1)	HOME BREW	(1)	PRINT/PHOTOCOPIER	(1)	TROPHIES	(1)
BRIDALWEAR	(1)	DEPT STORE	(1)	OVERALLS	(1)	BLINDS	(1)	HOME BREW	(1)	TROPICAL FISH	(1)
TROPHIES	(1)	'SMITHS'	(1)	RUBBER GOODS	(1)	FIN SERVICES	(1)	TILES	(1)	GOLF EQUIP	(1)
		MODELS	(1)	BASKETWEAR	(1)	MODELS	(1)	LOANS	(1)	LOANS	(1)
		CHARITY SHOP	(1)	OFFICE EQUIP	(1)	MACHINE HIRE	(1)	FOREIGN BANK	(1)	MACHINE HIRE	(1)
		HEARING AIDS	(1)	FURS/LEATHER	(1)	ARMY AND NAVY	(1)	MACHINE HIRE	(1)	STAMPS/COINS	(1)
		TROPICAL FISH	(1)	WINDOWS	(1)	KITCHEN ACCESS	(1)	STAMPS/COINS	(1)	WOOD CARE	(1)
		TROPHIES	(1)	FISHING TACKLE	(1)	OVERALLS	(1)	WOOD CARE	(1)	HOME INSULATION	(1)
				COSMETICS	(1)	RUBBER GOODS	(1)	ARMY AND NAVY	(1)	BRIDALWEAR	(1)
				HOME BREW	(1)	HEALTH STUDIO	(1)	CAMPING EQUIP	(1)	DRIVING SCHOOL/CAR ACCESSORIES	(1)
				REM OFFICE	(1)	OFFICE EQUIP	(1)	KITCHEN AIDS	(1)	ARMY AND NAVY	(1)
				DEPT STORE	(1)	AMUSEMENTS	(1)	OVERALLS	(1)	CAMPING EQUIP	(1)
				'SMITHS'	(1)	WINDOWS	(1)	BASKETWEAR	(1)	KITCHEN ACCESS	(1)
				CAT, STORE	(1)	WIGS	(1)	RUBBER GOODS	(1)	SEWING	(1)
				EMPLOY AGENCY	(1)	COSMETICS	(1)	OFFICE EQUIP	(1)	OVERALLS	(1)
				MODELS	(1)	TROPHIES	(1)	AMUSEMENTS	(1)	HEALTH STUDIO	(1)
				HEARING AIDS	(1)	REM OFFICE	(1)	VIDEO HIRE	(1)	BASKETWEAR	(1)
				TROPHIES	(1)	POSTERS	(1)	ORIENTAL FOODS	(1)	OFFICE EQUIP	(1)

LOANS	(1)	WINDOWS	(1)	FUR/LEATHER
DEPT STORE	(1)	WIGS	(1)	ORIENTAL FOODS
'SMITHS'	(1)	COSMETICS	(1)	WINDOWS
CAT. STORE	(1)	BLINDS	(1)	WIGS
EMPLOY AGENCY	(1)	TROPHIES	(1)	COSMETICS
HEARING AIDS	(1)	REM OFFICE	(1)	HOME BREW
		CB EQUIPMENT	(1)	BLINDS
		POSTERS	(1)	REM OFFICE
		FIN SERVICES	(1)	ORIENTAL FASHION
		DEPT STORE	(1)	POSTERS
		'SMITHS'	(1)	FIN SERVICES
		CAT. STORE	(1)	DEPT STORE
		EMPLOY AGENCY	(1)	'SMITHS'
		HEARING AIDS	(1)	CAT STORE
				EMPLOY AGENCY
				HEARING AIDS
				COMPUTERS
				RUBBER GOODS

As introduced above the q-analysis algorithm groups retail centres together at a given level in a hierarchy whenever they have the relevant number and combination of retail activities in common with each other. A vertical structure and a horizontal structure of retail centres emerges from this process for each year and aspects of the vertical structure are given in Figure 9 and of the horizontal structure in the q-nearness graphs in Figures 10-15.

The vertical structure of the highest order centres is shown in Figure 9, for 1961, 1971 and 1982. In each case the centres with the greatest number of activities are listed first. For 1961 we see that at $q=99$ the city centre emerges as the top centre. At $q=45$ the three leading suburban centres have appeared in the structure yet are not inter-linked at this stage. That is although all four centres have at least 45 different functions no centre has the same 45 in common with any other. At $q=42$, however, this situation has changed. The grouping together of city centre, Harehills and Chapeltown is due to the fact that they have 42 functions in common with each other. It is interesting that Harehills and Chapeltown are the first centres to merge with the city centre rather than the higher order suburban centres of Armley, Headingley and Crossgates. This is because the higher order suburban centres at this time were beginning to acquire functions which were not present in small centres or the city centre (to a lesser degree). Thus the first supermarkets were in the larger suburban centres as well as new service activities such as insurance/assurance, solicitors and gas showrooms which were not yet present as retail units in the city centre.

As Figure 9b shows however, by 1971 the situation has changed as the pattern of retailing within the top suburban centres becomes more akin to the patterns within the city centre especially with the widespread adoption of service outlets such as building societies, betting offices, restaurants and take-aways etc. Thus Crossgates becomes the first centre to merge with the city centre closely followed by Headingley. In 1982 (Figure 9c) we also see a similar pattern, with the higher order suburban centres even more prominent at the higher q-levels.

Fig. 9a The vertical structure of the highest order retail centres, 1961

q = 99-46	(C)
q = 45	(C) (A) (H) (CG)
q = 44, 43	(C) (A) (H) (CG) (Ha)
q = 42, 41	(C, Ha, CH) (A) (CG) (H)
q = 40	(C, Ha, CH) (A) (CG) (H) (P)
q = 39	(C, Ha, CH, CG) (A) (H) (P) (Dr)
q = 38	(C, A, Ha, CH, CG, H) (P) (Dr) (HT)
q = 37, 36	(C, A, Ha, CH, CG, H, Dr, HN) (P) (HT) (HL)
q = 35	(C, A, Ha, CH, CG, H, Dr, HN) (P) (HT) (HL) (HU) (KR)
q = 34	(C, A, Ha, CH, CG, H, Dr, HN, P, HL) (HT) (HU) (KR)
q = 33	(C, A, Ha, CH, CG, H, Dr, HN, P, HL, HT, HU, KR)

Fig. 9b The vertical structure of the highest order retail centres, 1971

q = 103-65	(C)
q = 64-59	(C) (CG)
q = 58-56	(C, CG) (H)
q = 54-53	(C, CG, H)
q = 52-51	(C, CG, H) (A) (Ha)
q = 50-47	(C, CG, H) (A) (Ha) (HL)
q = 46	(C, CG, H, Ha, HL, A)
q = 45	(C, CG, H, Ha, HL, A) (HT)
q = 44-43	(C, CG, H, Ha, HL, A) (HT) (P)
q = 42	(C, CG, H, Ha, HL, A) (HT) (P) (S) (CA)
q = 41	(C, CG, H, Ha, HL, A, HT, P) (S) (HN) (CA)
q = 40	(C, CG, H, Ha, HL, A, HT, P) (S) (HN) (CA) (KR)
q = 39	(C, CG, H, Ha, HL, A, HT, P) (S) (HN) (CA) (KR) (CH)
q = 38	(C, CG, H, Ha, HL, A, HT, P, S, HN, CA) (KR) (CH)

Fig. 9c The vertical structure of the highest order retail centres, 1982

q = 111-70	(C)
q = 69-67	(C) (H)
q = 66-63	(C) (H) (CG)
q = 62	(C, CG) (H)
q = 59	(C, CG, H)
q = 56	(C, CG, H) (P)
q = 54	(C, CG, H) (P) (A) (Ha)
q = 49	(C, CG, H, P) (A) (Ha)
q = 48	(C, CG, H, P) (A) (Ha) (HL)
q = 47	(C, CG, H, P, A) (Ha) (HL)
q = 45	(C, CG, H, P, A, Ha) (HL) (HT)
q = 44	(C, CG, H, P, A, Ha) (HL) (HT) (S)
q = 42	(C, CG, H, P, A, Ha, HT) (HL) (S) (HN)
q = 41	(C, CG, H, P, A, Ha, HT, HL) (S) (HN)
q = 40, 39	(C, CG, H, P, A, Ha, HT, HL, S) (HN)

KEY

C	CITY CENTRE	P	PUDSEY
A	ARMLEY	Dr	DEWSBURY ROAD
H	HEADINGLEY	HT	HORSFORTH TOWN STREET
CG	CROSSGATES	HN	HORSFORTH NEW ROAD SIDE
CH	CHAPELTOWN	HU	HUNSLET
Ha	HAREHILLS	KR	KIRKSTALL ROAD
HL	HAREHILLS LANE	S	SEACROFT

On the subject of the vertical structure we should note that the so-called structure vectors could also be plotted to summarise the number of clusters at each level listed in Figures 9a-c. Thus the structure vector for Figure 9a would be

⁴⁵	⁴⁴	⁴³	⁴²	⁴¹	⁴⁰	³⁹	³⁸	³⁷	³⁶	³⁵	³⁴	³³
{4	6	6	4	4	5	5	4	4	4	6	4	1}

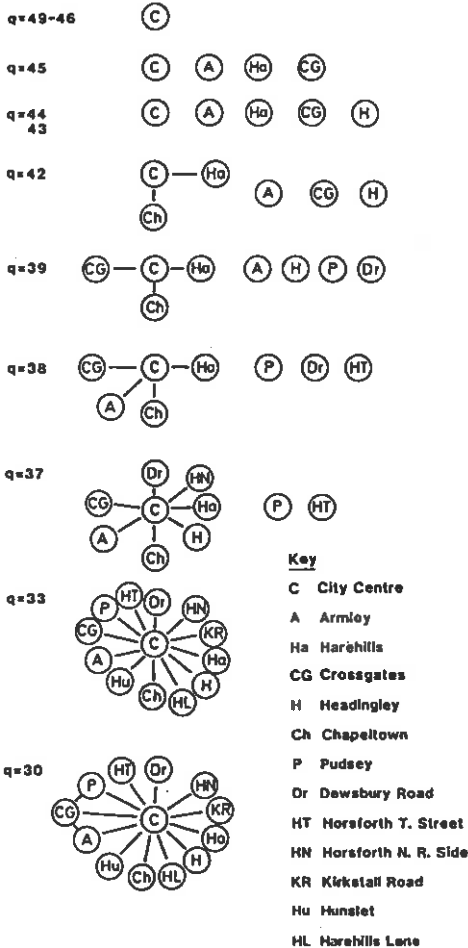
This is a neat summary of the number of components at each level but obviously tells us little of the underlying structure.

The analysis of this vertical structure has been kept extremely brief because of the rather limited nature of the 'results' it presents. In Figure 9a for example, we see that at the q=33 level all the high order centres have merged or become connected within one component. When only two centres are involved we can conclude that when they merge together at a particular q-level then they not only share the same number of functions but also the same common functions. In Figure 9a however, it is not possible to state that all the centres linked at the q=33 level have the same number of functions in common. Providing that a centre shares the same common functions with only one other centre then it becomes connected within the existing chain, even if it may not share the same common functions as all the others. Thus by examining the vertical structures within Figure 9 it is only possible to get a rough guideline of connectivity (or more accurately an overall guideline of the global structure) and not possible to determine which centres are most related.

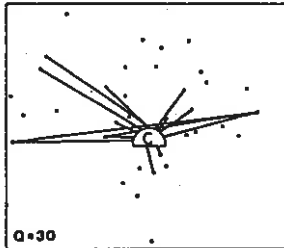
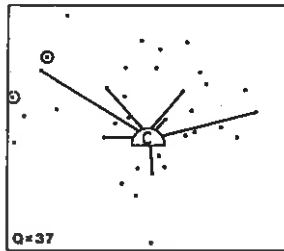
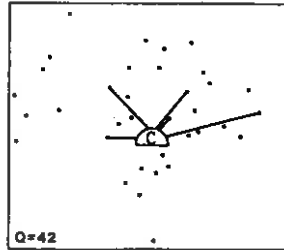
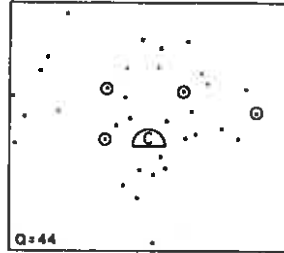
In order to overcome this limitation it is necessary to examine the horizontal structure, through q-nearness graphs, and for 1961 this is shown in Figure 10. It can be seen that an examination of this local structure illustrates the point made above in that at q=33 level all the centres are connected only through the city centre. That is, whilst they all have at least 33 functions to offer the consumer the city centre is the only location with which other locations share 33 functions. Thus if we removed the city centre from Figure 9a then all the remaining centres would be unrelated and we would have 12 components rather than one.

Figure 10

Q-nearness graphs : 1961 highest order retail centres



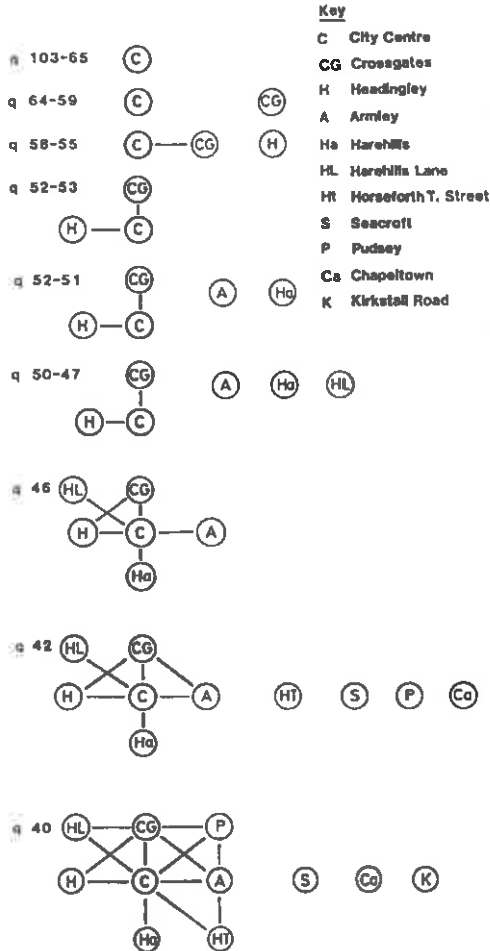
Spatial plots for the retail structure of the highest order centres 1961



In all plots those centres which are linked share the same common retail activities

Figure 11

Q-nearness graphs : 1971 highest order retail centres



Spatial plots for the retail structure of the highest order centres 1971

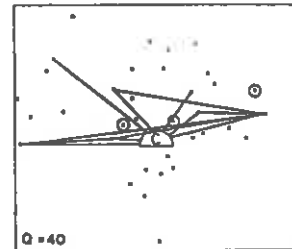
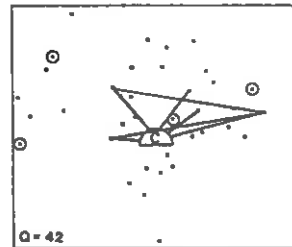
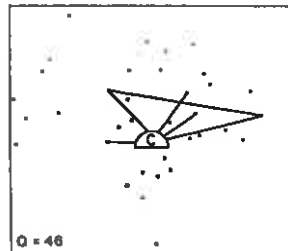
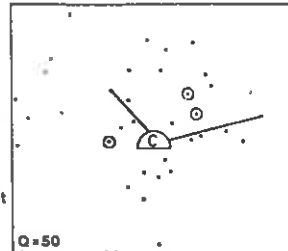
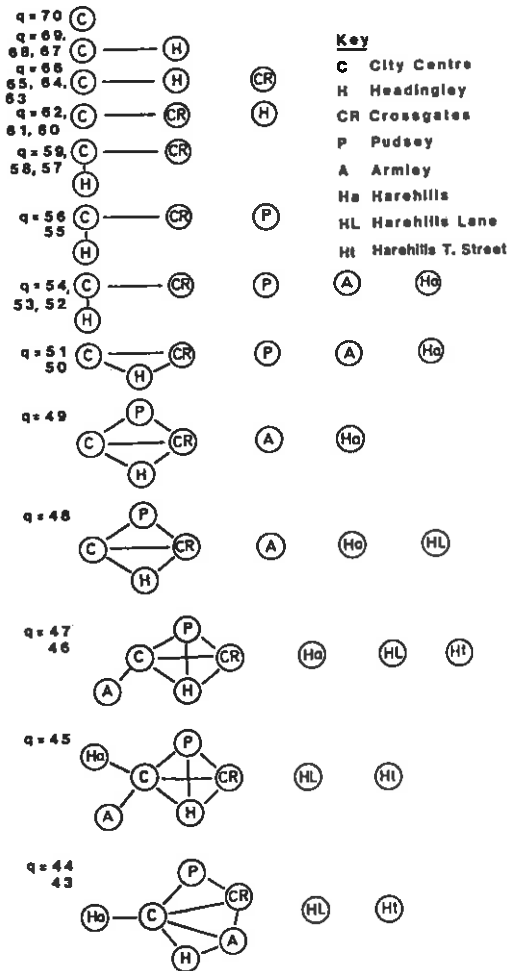


Figure 12

O-nearness graphs : 1982 highest order retail centres



Spatial plots for the retail structure of the highest order retail centres

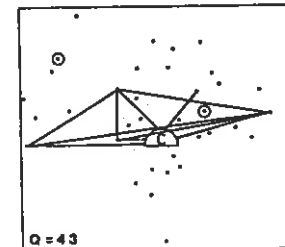
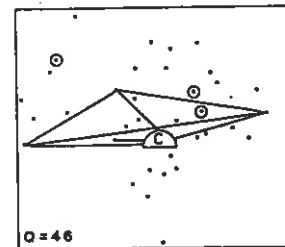
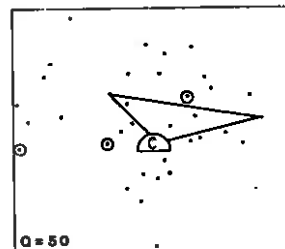
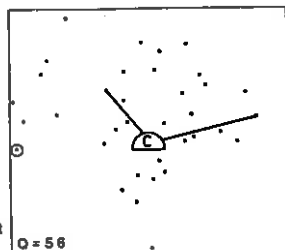


Figure 10 thus highlights the dominance of the city centre, offering all the basic functions plus a vast number of unique ones. It is not until the $q=30$ level that other connections become evident with Crossgates becoming linked to Pudsey and Armley. This also emphasises the unique character of many of the higher order suburban centres, before 1971 and the onset of the rapid service outlet expansion, with a wider variety of functions offered at each centre.

Again for the purpose of more detail Figure 11 shows the local horizontal structure for the high order centres in 1971. At the $q=54$ level we see that although the top three centres are linked together in Figure 9b they are again only linked through the city centre. However, at the $q=46$ level the high order centres are already becoming inter-linked with Headingley and Crossgates the first pair to be connected. This illustrates the growing uniformity amongst the suburban centres with the basic set of retail functions and the standard crop of quasi-retail functions such as building societies and bookmakers, although it is interesting that some centres retain their individuality until a much lower q -level, (i.e. Armley, Harehills). With stricter regulations on the growth of service outlets Seacroft also retains a higher degree of independence. Figure 12 shows the final pattern for 1982. As in 1971 the highest order centres are fairly similar whilst one or two remain more independent offering several more unique functions. Harehills for example, by 1982, has acquired a foreign bank (catering for a large Asian community), two removal offices/shops, an amusement arcade and a tropical fish aquarium which all add to its independence from the other centres.

Whilst these q -nearness graphs throw more light onto the underlying structures of the higher order centres it is perhaps more interesting to examine similar sized lower order centres which may have a more varied pattern on offer. Figure 13 shows the local horizontal structure for a selection of smaller centres in 1961. Here the q -nearness graphs have been plotted down to $q=5$, the level at which the connectivity pattern between the selected centres is complete. Thus by the $q=5$ level all centres have become connected to all other centres.

Figure 13

Q-nearness graphs : selected centres 1961

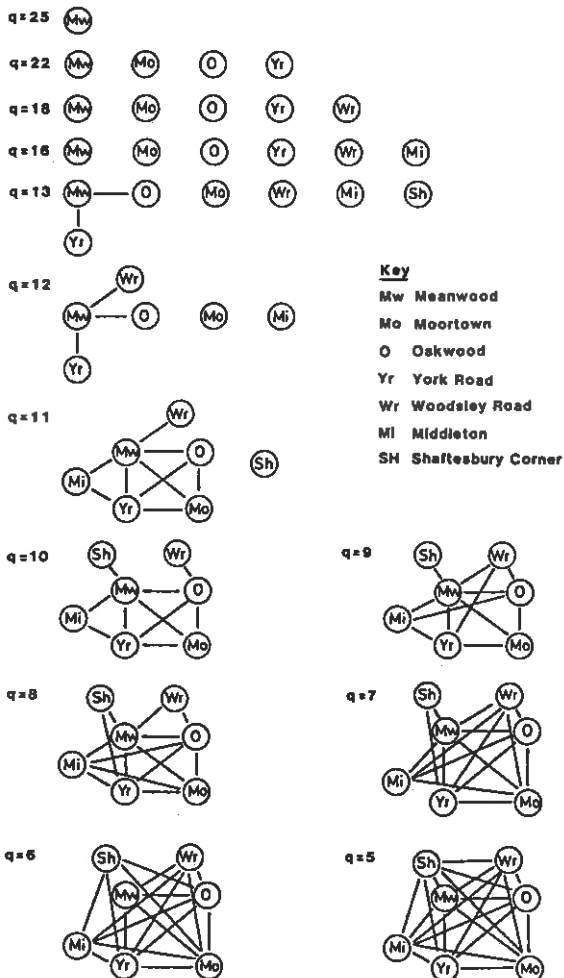


Figure 14

Q-nearness graphs : selected centres 1971

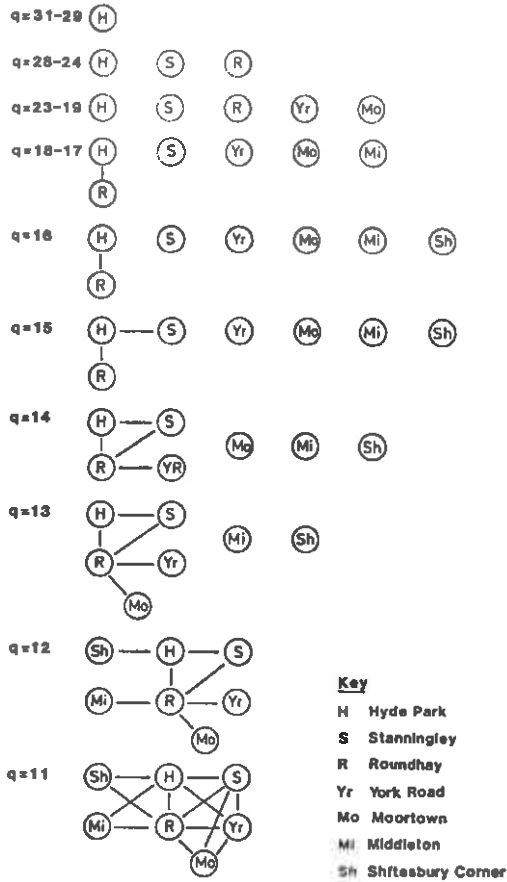
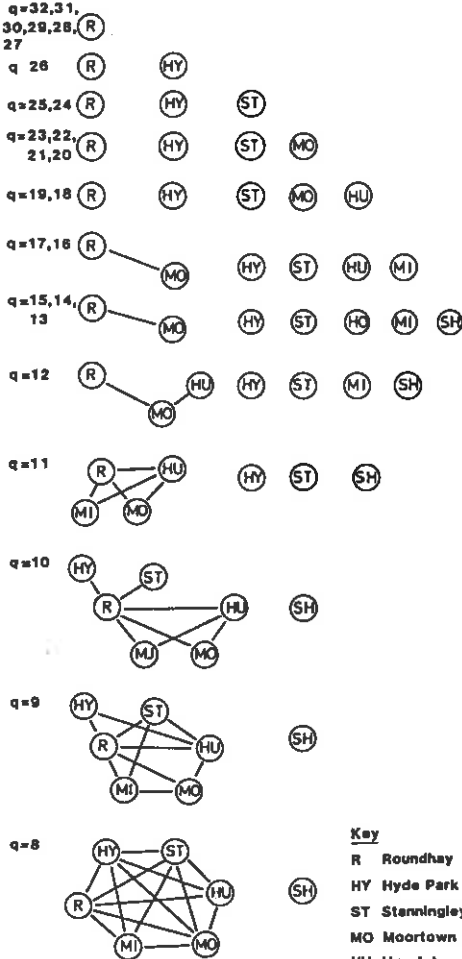


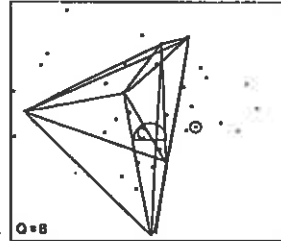
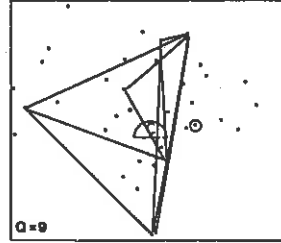
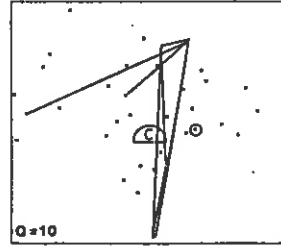
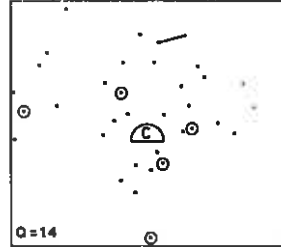
Figure 15

Q-nearness graphs : selected centres 1982



Key
R Roundhay
HY Hyde Park
ST Stanningley
MO Moortown
HU Hunslet
MI Middleton
SH Shaftesbury Corner

Spatial plots for the retail structure
of selected retail centres



At the $q=16$ level no connectivity shows up (i.e. none of the five centres at this level have 16 functions in common with any other). However, by the $q=13$ level York Road and Oakwood have both joined with Meanwood since they each offer 13 functions that are also to be found in Meanwood. The larger centre of Moortown remains isolated until the $q=11$ level whilst Shaftesbury Corner is the last centre to become linked to all the others, and then at first only through Meanwood ($q=10$ level).

Those centres such as Moortown and Shaftesbury Corner clearly have a larger set of unique functions which separate them from the rest of the connectivity chain. Moortown, for example, as early as 1961 was one of the first centres to acquire service outlets, being in an area of generally higher socio-economic status, and also had a delicatessen and Kosher butcher to satisfy local demands from a growing Jewish population. Shaftesbury Corner at this time also had a set of more unique activities including assurance and a cycle shop.

Figure 14 depicts a similar pattern for a selection of smaller centres in 1971, this time only down to the $q=11$ level by when the pattern of connectivity is already apparent. Once again Moortown and Shaftesbury Corner are quite distinctive as also is Middleton which offers a wide range of activities than other centres of its size; possibly because of its distance from any other centre of substantial size.

A comparison of Figure 14 and Figure 15, which plots q -nearness graphs for selected centres in 1982, shows the changing fortunes of several centres over the decade including Hyde Park and Stanningley. Both centres suffered during the 1970s with population losses and changes and the expansion of shopping centres in close proximity. Thus Stanningley has become overshadowed by nearby Pudsey and Brahamley and has consequently obtained a large share of antique and second-hand furniture shops, fancy goods and discount stores as well as the more unique functions of a CB radio accessories outlet and a so-called 'wood-care' facility. Hyde Park has also suffered with the relatively rapid growth of nearby Headingley and

substantial population changes which has left an aged population interspersed with students and Asian immigrants. It lost its only bank between 1979 and 1982 and today is characterised by a large number of bookshops, antique and second-hand furniture stores and a sportshop and record shop to cater for the local students.

Figure 15 also shows Shaftesbury Corner to be very distinctive and indeed it seems to have become a more specialist, small shopping area. Surrounded by larger centres at York Road, Halton and Harehills Lane it has acquired a large gas appliance store, a CB radio accessory shop, a golf equipment store, a tile and floor centre and a bed/bedding shop.

Q-nearness graphs, then, clearly offer a much more detailed picture of the local structure of the shopping centres although if a large number of centres are examined in this way the amount of information presented obviously becomes increasingly difficult to assimilate.

Another method of examining the distinctiveness of particular centres is through the concept of eccentricity. As explained earlier, the concept of eccentricity in this case, is a measure of the relative distinctiveness of a given shopping centre within the rest of the hierarchy of centres. Thus a centre which is completely distinctive will have a high eccentricity value whilst a centre that has no functions that are distinctive or unique to itself will have zero or very low eccentricity. Table 4 gives the eccentricity values for all the centres since 1961. The advantage of this procedure is that an immediate picture of the local structure is obtained although the disadvantage is that the precise nature of connectivity is lost. Because eccentricity values are measuring the degree of uniqueness we would expect similar results to the analysis of the q-nearness graphs. Thus those centres isolated or distinct in the q-nearness graphs will have high eccentricity values.

As Table 4 shows the city centre will always have a high eccentricity value because of the vast number of functions unique to itself, (many of the solitary functions identified in Table 3

Table 4 Eccentricity Values (EV) and the Hierarchy of Shopping Centres in Leeds, 1961-1982

<u>1961</u>		<u>1966</u>		<u>1971</u>	
	EV		EV		EV
CITY CENTRE	(99) 1.33	CITY CENTRE	(96) 1.16	CITY CENTRE	(103) 0.76
ARMLEY	(45) 0.18	HEADINGLEY	(52) 0.18	CROSSGATES	(64) 0.10
HAREHILLS	(45) 0.07	CROSSGATES	(49) 0.11	HEADINGLEY	(58) 0.07
CROSSGATES	(45) 0.15	ARMLEY	(45) 0.15	ARMLEY	(52) 0.13
(CHAPELTOWN)	(44) 0.15	HAREHILLS	(45) 0.12	HAREHILLS	(52) 0.13
HEADINGLEY	(44) 0.15	PUDSEY	(43) 0.16	HAREHILLS LANE	(50) 0.09
PUDSEY	(40) 0.17	SEACROFT	(42) 0.23	HORSFORTH TOWN ST	(45) 0.10
DEWSBURY RD	(39) 0.05	(CHAPELTOWN)	(40) 0.08	PUDSEY	(44) 0.07
HORSFORTH TOWN ST	(38) 0.15	DEWSBURY RD	(39) 0.08	SEACROFT	(42) 0.10
HORSFORTH NEW RD SIDE	(37) 0.00	HORSFORTH TOWN ST	(39) 0.18	CHAPEL ALLERTON	(42) 0.10
HAREHILLS LANE	(37) 0.09	HORSFORTH NEW RD SIDE	(38) 0.03	HORSFORTH NEW RD SIDE	(41) 0.08
KIRKSTALL RD	(36) 0.09	HAREHILLS LANE	(37) 0.12	(CHAPELTOWN)	(39) 0.08
HUNSLET RD	(35) 0.06	KIRKSTALL RD	(37) 0.12	(CHAPELTOWN)	(39) 0.08
HYDE PARK	(30) 0.11	HUNSLET RD	(31) 0.07	DEWSBURY RD	(33) 0.10
BRAMLEY	(28) 0.02	HYDE PARK	(31) 0.10	MEANWOOD	(31) 0.07
CHAPEL ALLERTON	(27) 0.08	CHAPEL ALLERTON	(31) 0.04	HYDE PARK	(31) 0.10
MEANWOOD	(25) 0.03	BRAMLEY	(30) 0.05	BRAMLEY	(31) 0.03
HALTON	(25) 0.08	MEANWOOD	(27) 0.12	HALTON	(30) 0.15
FARSLEY	(24) 0.04	HALTON	(25) 0.13	ROUNDHAY	(28) 0.26
ROUNDHAY	(23) 0.04	FARSLEY	(25) 0.04	STANNINGLEY	(28) 0.12
STANNINGLEY	(23) 0.04	STANNINGLEY	(24) 0.09	FARSLEY	(28) 0.07
MOORTOWN	(22) 0.10	YORK RD	(23) 0.04	OAKWOOD	(24) 0.00
OAKWOOD	(22) 0.05	ROUNDHAY	(22) 0.10	MOORTOWN	(23) 0.14
YORK RD	(22) 0.05	MOORTOWN	(21) 0.16	YORK RD	(23) 0.20
BEESTON HILL	(18) 0.06	OAKWOOD	(21) 0.05	BEESTON HILL	(20) 0.10
BEESTON PARK	(18) 0.06	BEESTON HILL	(19) 0.05	WOODSLEY RD	(18) 0.00
WOODSLEY RD	(18) 0.02	BEESTON PARK	(18) 0.00	MIDDLETON	(18) 0.12
MIDDLETON	(16) 0.13	WOODSLEY RD	(18) 0.06	BEESTON PARK	(18) 0.12
BEESTON RD	(15) 0.00	MIDDLETON	(16) 0.13	BEESTON RD	(17) 0.13
SHAFTESBURY	(13) 0.07	BEESTON RD	(14) 0.00	SHAFTESBURY	(16) 0.21
SELBY RD	(11) 0.00	SHAFTESBURY	(13) 0.17	HOLLIN PARK	(13) 0.00
HOLLIN PARK	(10) 0.00	SELBY RD	(10) 0.00	SELBY RD	(11) 0.09
		HOLLIN PARK	(10) 0.00		

<u>1975</u>		<u>1979</u>		<u>1982</u>	
	EV		EV		EV
CITY CENTRE	(104) 0.81	CITY CENTRE	(111) 0.86	CITY CENTRE	(111) 0.77
CROSSGATES	(65) 0.14	HEADINGLEY	(68) 0.15	HEADINGLEY	(69) 0.17
HEADINGLEY	(65) 0.14	CROSSGATES	(60) 0.11	CROSSGATES	(66) 0.06
ARMLEY	(50) 0.19	HAREHILLS	(55) 0.17	PUDSEY	(56) 0.14
PUDSEY	(50) 0.11	PUDSEY	(52) 0.10	ARMLEY	(54) 0.15
HAREHILLS LANE	(50) 0.16	HAREHILLS LANE	(52) 0.15	HAREHILLS	(52) 0.20
HORSFORTH TOWN ST	(48) 0.17	ARMLEY	(50) 0.19	HAREHILLS LANE	(42) 0.17
HAREHILLS	(47) 0.14	HORSFORTH TOWN ST	(47) 0.07	HORSFORTH TOWN ST	(47) 0.12
HORSFORTH NEW RD SIDE	(43) 0.13	HORSFORTH NEW RD SIDE	(41) 0.14	SEACROFT	(44) 0.10
SEACROFT	(42) 0.13	SEACROFT	(40) 0.14	HORSFORTH NEW RD SIDE	(42) 0.13
CHAPEL ALLERTON	(41) 0.14	CHAPEL ALLERTON	(27) 0.15	CHAPEL ALLERTON	(38) 0.18
DEWSBURY RD	(37) 0.19	DEWSBURY RD	(34) 0.09	DEWSBURY RD	(36) 0.12
OAKWOOD	(32) 0.06	MEANWOOD	(31) 0.14	MEANWOOD	(33) 0.01
BRAMLEY	(31) 0.10	HALTON	(31) 0.07	ROUNDHAY	(32) 0.22
MEANWOOD	(29) 0.11	OAKWOOD	(30) 0.11	OAKWOOD	(31) 0.10
HALTON	(29) 0.07	BRAMLEY	(30) 0.07	HALTON	(31) 0.10
HYDE PARK	(28) 0.12	ROUNDHAY	(29) 0.25	BRAMLEY	(30) 0.03
FARSLEY	(28) 0.12	STANNINGLEY	(27) 0.22	FARSLEY	(27) 0.12
KIRKSTALL RD	(28) 0.12	HYDE PARK	(27) 0.22	YORK RD	(26) 0.13
STANNINGLEY	(27) 0.17	FARSLEY	(27) 0.12	HYDE PARK	(26) 0.17
ROUNDHAY	(26) 0.17	KIRKSTALL RD	(27) 0.04	STANNINGLEY	(25) 0.18
MOORTOWN	(23) 0.09	YORK RD	(23) 0.09	KIRKSTALL RD	(25) 0.04
YORK RD	(23) 0.14	MOORTOWN	(22) 0.15	MOORTOWN	(23) 0.01
BEESTON PARK	(19) 0.05	BEESTON HILL	(21) 0.10	WOODSLEY RD	(22) 0.05
WOODSLEY RD	(19) 0.05	BEESTON PARK	(21) 0.16	BEESTON HILL	(21) 0.05
BEESTON HILL	(18) 0.12	HUNSLET	(19) 0.05	BEESTON ROAD	(20) 0.24
MIDDLETON	(17) 0.13	WOODSLEY RD	(19) 0.05	BEESTON PARK	(20) 0.17
BEESTON RD	(16) 0.13	BEESTON RD	(18) 0.19	HUNSLET	(19) 0.00
SHAFTESBURY	(15) 0.07	MIDDLETON	(17) 0.13	MIDDLETON	(17) 0.00
HOLT PARK	(14) 0.15	HOLT PARK	(15) 0.14	HOLLIN PARK	(16) 0.06
HOLLIN PARK	(13) 0.00	SHAFTESBURY	(15) 0.14	SHAFTESBURY	(15) 0.33
SELBY RD	(12) 0.00	HOLLIN PARK	(15) 0.07	HOLT PARK	(14) 0.07
		SELBY RD	(12) 0.08	SELBY RD	(12) 0.09

for example). Between 1961 and 1966 we see the larger suburban centres as having quite high eccentricity values, backing up the findings of Figure 9a and Figure 10 where these centres were seen as rather distinct, whilst Harehills and Chapelton (the first centres to become connected with the city centre in Figure 9a) have very much lower values. At the lower end of the scale we can again see the distinctive nature of Shaftesbury Corner, Middleton and Moortown.

By 1971 the value of eccentricity for the city centre has been reduced by the growing number of higher order functions to be found in the larger suburban centres. The medium sized centre of Roundhay has a high value and this can be traced to the presence of a freezer centre, a Kosher butcher and Kosher grocer, several restaurants, a delicatessen and a large number of service outlets. Again, as in Figure 14 and the subsequent explanation, Moortown and Shaftesbury Corner are quite distinctive.

By 1982 we see high eccentricity values in those centres identified as distinct in Figure 15, that is Hyde Park, Stanningley and Shaftesbury Corner, as well as Beeston Road and Roundhay. Beeston Road has a money lending shop, a traditional grocer and a photographers whilst Roundhay with its local Jewish population has kept its degree of distinctiveness. Harehills too appears with a high eccentricity value, its uniqueness explained above. Moortown, on the other hand, has become less distinctive with the dramatic rise of service outlets elsewhere.

With regard to eccentricity Macgill (1982) in an earlier paper noted

"An urban re-development scheme which removes retailing activities from a zone with zero or very low eccentricity would have a very different effect than one with high eccentricity because in the former case the type of retail outlet concerned can be found elsewhere."

This is clearly important here, especially in the earlier years for centres like Middleton and Moortown, although more recently high eccentricity values outside the city centre seem to have

become associated more with leisure activities and might be less missed. In terms of provision elsewhere for example the closing of the parade of shops at Shaftesbury Corner would hit the golfer and CB radio enthusiast the hardest! Nevertheless, even today, the money lending service in the less affluent area of Beeston might be a facility for which local residents could not find an alternative.

The table of eccentricity values clearly then adds to the analysis by presenting a guide to the distinctiveness of particular centres.

5. Discrimination Between Activities

A corresponding set of vertical and horizontal graphs could in principle be produced from the conjugate analysis in order to discriminate between the retail activities in terms of the locations in which they are found.

The case of revealing a vertical structure is of limited utility however, because certain functions are present in all centres (e.g. newsagents in 1982 in Table 3). These then, will provide a pivot for the grouping of all other functions at all levels in the hierarchy with the exception of the very top of that hierarchy. Thus there will only be one component at all levels (or 1's throughout the structure vectors). For a similar reason eccentricity values are of limited significance having a value of zero for most activities.

The most appropriate indicator of functional variance is the horizontal structure and the corresponding q-nearness graphs. Here it is seen that because of the large number of common functions they quickly become linked together. Figure 16 plots q-nearness graphs for nine different functions in 1982 which are each present in six locations. Clearly this shows how inter-related various functions are. Thus it seems in 1982 in Leeds one does not associate a record shop in the same centre as a superstore (except in the case of the city centre which links the two functions

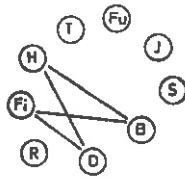
Figure 16

Q-nearness graphs : selected centres 1982

q=6 (Fu) (R) (Fi) (D) (T) (H) (J) (B) (S)

q=5 (Fi) — (D) (B) — (H) (Fu) (R) (T) (J) (S)

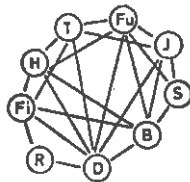
q=4



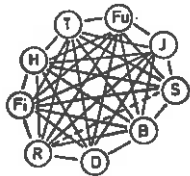
Key

- Fu Furniture and Carpets
- R Records
- Fi Film Processes
- D Driving School
- T Toiletries
- H Health foods
- J Job Centre
- B 'Boots'
- S Superstore

q=3



q=2



[q=1 (---) dashed line completes the hierarchy]

at the $q=1$ level), whereas film processors have tended to locate in the same centres as driving school offices, those being the larger suburban centres or the city centre.

Clearly an almost infinite variety of such graphs could be produced for different activities and for different time periods. These will not be explored further in the present paper. However it should be noted that this kind of analysis may be useful for a retail company assessing the nature of competition with various functions or activities that may be similar in nature within particular centres. Similarly retailers might be interested in the relationships between different activities when considering locational policy. A chain of record retailers might be interested to know, for example, of the current lack of facilities within centres which incorporate a superstore, bearing in mind that the superstore would itself carry a limited line of records and tapes!

6. The Multiple Incidence of Activities

In our analysis so far, we have defined our hierarchy of centres and activities through the number of different activities which each centre offers. In order to determine this hierarchy the presence of at least one outlet of a particular activity in a particular location has been sufficient. Thus the presence of seven butchers in a particular centre has been treated in the same way as the presence of one, in order to concentrate on the variety of activities within a particular centre. In order not to neglect the importance of multiple incidence, and for completeness, a brief analysis now follows.

Table 5 shows the hierarchy of centres defined as before (i.e. the number of different activities per centre) and now also by the total number of outlets per centre. A comparison of the two sets of figures shows one or two differences.

Between 1961 and 1966 for example, Harehills Lane could be identified as the seventh largest centre in terms of its total number of outlets whereas in our previous ranking its position was eleventh. Similarly, Bramley and Chapel Allerton had more

Table 5 The Hierarchy of Shopping Centres in Leeds, 1961-1982, By Number of Different Activities Per Centre and by Total Number of Outlets Per Centre

1961	1966	1971	1975	1979	1982
CITY CENTRE	(100)(100) CITY CENTRE	(87)(48) CITY CENTRE	(104)(103) CITY CENTRE	(105)(75) CITY CENTRE	(112)(72) CITY CENTRE
ARMLEY	(46)(46) ARMLEY	(33)(12) CROSSGATES	(65)(46) CROSSGATES	(63)(57) HEADINGLEY	(64)(46) HEADINGLEY
HAREHILLS	(46)(46) CROSSGATES	(39)(11) HEADINGLEY	(39)(11) HEADINGLEY	(66)(137) CROSSGATES	(61)(57) CROSSGATES
CROSSGATES	(46)(46) ARMLEY	(46)(107) ARMLEY	(53)(115) ARMLEY	(51)(115) HAREHILLS	(56)(107) PURSEY
(CHAPELTOWN)	(45)(104) HAREHILLS	(46)(113) HAREHILLS	(53)(106) PURSEY	(51)(111) PURSEY	(53)(107) ARMLEY
HEADINGLEY	(45)(104) PURSEY	(46)(86) HAREHILLS LN	(51)(106) HAREHILLS LN	(51)(100) HAREHILLS LN	(53)(106) HAREHILLS
PURSEY	(41)(16) SEACROFT	(43)(68) HORSFORTH TOWN ST	(46)(74) HORSFORTH TOWN ST	(48)(81) ARMLEY	(51)(113) HAREHILLS LN
DEWSBURY RD	(40)(74) (CHAPELTOWN)	(41)(89) PURSEY	(45)(46) HAREHILLS	(48)(43) HORSFORTH TOWN ST	(46)(86) HORSFORTH TOWN ST
HORSFORTH TOWN ST	(39)(74) DEWSBURY RD	(40)(65) SEACROFT	(43)(67) HORSFORTH NEW ROAD SIDE	(44)(62) HORSFORTH NEW ROAD SIDE	(42)(62) SEACROFT
HORSFORTH NEW ROAD SIDE	(38)(12) HORSFORTH TOWN ST	(40)(72) CHAPEL ALLETON	(43)(80) SEACROFT	(43)(66) SEACROFT	(41)(65) HORSFORTH NEW ROAD SIDE
HAREHILLS LN	(38)(90) HORSFORTH NEW ROAD SIDE	(39)(62) HORSFORTH NEW ROAD SIDE	(42)(68) CHAPEL ALLETON	(42)(75) CHAPEL ALLETON	(38)(69) CHAPEL ALLETON
KIRKSTALL RD	(37)(76) HAREHILLS LN	(38)(90) KIRKSTALL RD	(41)(76) DEWSBURY RD	(38)(55) DEWSBURY RD	(35)(54) DEWSBURY RD
HUNTSLET RD	(36)(47) KIRKSTALL RD	(38)(75) (CHAPELTOWN)	(40)(72) OAKWOOD	(33)(45) MEANWOOD	(32)(55) MEANWOOD
HYDE PARK	(31)(53) HUNTSLET RD	(32)(44) DEWSBURY RD	(34)(56) BRAMLEY	(32)(44) HALTON	(32)(50) ROUNDWAY
BRAMLEY	(29)(17) HYDE PARK	(32)(11) MEANWOOD	(32)(57) MEANWOOD	(30)(57) OAKWOOD	(31)(43) OAKWOOD
CHAPEL ALLETON	(28)(42) CHAPEL ALLETON	(32)(67) HYDE PARK	(32)(69) HALTON	(30)(51) BRAMLEY	(31)(38) HALTON
MEANWOOD	(26)(47) BRAMLEY	(31)(63) BRAMLEY	(32)(56) HYDE PARK	(29)(46) ROUNDWAY	(30)(43) BRAMLEY
HALTON	(26)(44) MEANWOOD	(28)(47) HALTON	(31)(56) FARSLEY	(29)(37) STANNINGLEY	(28)(78) FARSLEY
FARSLEY	(25)(53) HALTON	(26)(44) ROUNDWAY	(29)(44) KIRKSTALL RD	(29)(44) HYDE PARK	(28)(45) YORKE RD
ROUNDWAY	(24)(44) FARSLEY	(26)(53) STANNINGLEY	(28)(64) STANNINGLEY	(28)(44) FARSLEY	(27)(34) HYDE PARK
STANNINGLEY	(24)(34) STANNINGLEY	(25)(31) FARSLEY	(29)(37) ROUNDWAY	(27)(43) KIRKSTALL RD	(28)(38) STANNINGLEY
WOORTOWN	(23)(56) YORKE RD	(24)(34) OAKWOOD	(25)(31) WOORTOWN	(24)(36) YORKE RD	(24)(37) KIRKSTALL RD
OAKWOOD	(23)(31) ROUNDWAY	(23)(37) WOORTOWN	(24)(37) YORKE RD	(24)(37) WOORTOWN	(23)(34) WOORTOWN
YORKE RD	(23)(38) WOORTOWN	(22)(36) YORKE RD	(24)(17) BEESTON PARK	(20)(24) BEESTON HILL	(22)(49) WOODSLEY RD
BEESTON HILL	(19)(28) OAKWOOD	(22)(34) BEESTON HILL	(21)(24) WOODSLEY RD	(20)(27) BEESTON PARK	(22)(44) BEESTON HILL
BEESTON PARK	(19)(15) BEESTON HILL	(20)(28) WOODSLEY RD	(19)(24) BEESTON HILL	(19)(21) HUNSLT	(20)(25) BEESTON RD
WOODSLEY RD	(19)(30) BEESTON PARK	(19)(25) MIDDLETON	(19)(25) MIDDLETON	(18)(25) WOODSLEY RD	(20)(26) BEESTON PARK
MIDDLETON	(17)(25) WOODSLEY RD	(19)(30) BEESTON PARK	(19)(24) BEESTON RD	(17)(24) BEESTON RD	(19)(31) HUNSLT
BEESTON RD	(16)(26) MIDDLETON	(17)(35) BEESTON RD	(18)(27) SHAFTESBURY	(16)(48) MIDDLETON	(18)(25) MIDDLETON
SHAFTESBURY	(14)(15) BEESTON RD	(15)(34) SHAFTESBURY	(17)(68) HOLT PARK	(15)(46) HOLT PARK	(17)(46) HOLLIN PARK
SELY RD	(12)(15) SHAFTESBURY	(16)(75) HOLLIN PARK	(14)(71) HOLLIN PARK	(14)(18) SHAFTESBURY	(16)(18) SHAFTESBURY
HOLLIN PARK	(11)(13) SELLY RD	(11)(65) SELLY RD	(12)(65) SELLY RD	(13)(65) HOLLIN PARK	(16)(18) HOLT PARK
		(11)(13)		SELY RD	(13)(65) SELLY RD

Table 6 The Hierarchies of Retailing Activities by Representation in Different Centres and by Total Number of Outlets in all Centres

1961	1966	1971	1975
OPTICIAN (32) (149)	BUTCHER (33) (147)	BAKER (32) (98)	BAKER (32) (98)
BAKER (31) (92)	BAKER (32) (90)	HAIR SALON (32) (126)	NEWSAGENT (31) (88)
FRUIT/VEG (31) (80)	FRUIT/VEG (32) (79)	BUTCHER (30) (123)	HAIR SALON (30) (115)
HAIR SALON (31) (111)	HAIR SALON (32) (114)	NEWSAGENT (30) (87)	CHEMIST (30) (52)
GROCER (29) (123)	CHEMIST (31) (64)	CHEMIST (30) (58)	BUTCHER (29) (106)
NEWSAGENT (28) (74)	NEWSAGENT (31) (81)	FRUIT/VEG (29) (75)	FRUIT/VEG (29) (61)
CHEMIST (28) (60)	GROCER (29) (111)	DRAPERY (27) (63)	BOOKMAKER (28) (47)
BANK (24) (77)	BANK (25) (85)	BANK (26) (91)	BANK (26) (100)
DRAPERY (24) (65)	HARDWARE (24) (47)	GROCER (25) (64)	LAUNDRETTE (25) (29)
HARDWARE (23) (47)	PAINT/WALLPAPER (23) (53)	PAINT/WALLPAPER (23) (60)	FISH AND CHIPS (23) (42)
SWEETS/TOBACCO (23) (64)	DRAPERY (23) (57)	BOOKMAKER (23) (50)	MENSWEAR (21) (121)
LADIESWEAR (21) (78)	MENSWEAR (21) (82)	LAUNDRETTE (22) (29)	OPTICIAN (21) (46)
FISH AND CHIPS (20) (35)	LADIESWEAR (21) (71)	FISH AND CHIPS (22) (37)	POST OFFICE (21) (25)
PUBLIC HOUSE (20) (68)	PUBLIC HOUSE (21) (66)	LADIESWEAR (21) (89)	LADIESWEAR (21) (80)
PAINT/WALLPAPER (19) (51)	SWEETS/TOBACCO (21) (54)	HARDWARE (21) (44)	HARDWARE (20) (54)
BOOKMAKER (19) (49)	CNIP SHOP (20) (34)	ELECTRICAL (21) (39)	DRAPERY (20) (47)
POST OFFICE (19) (21)	BOOKMAKER (20) (50)	MENSWEAR (20) (107)	GROCER (19) (43)
MENSWEAR (18) (77)	POST OFFICE (20) (23)	PUBLIC HOUSE (20) (68)	PAINT/WALLPAPER (19) (43)
DRY CLEANER (18) (39)	ELECTRICAL (19) (51)	DRY CLEANER (19) (47)	PUBLIC HOUSE (19) (66)
FRUIT/FISH (17) (27)	LAUNDRETTE (19) (22)	OPTICIAN (19) (44)	DRY CLEANER (19) (44)
ELECTRICAL/HOOVER/RADIO (17) (52)	DRY CLEANER (18) (38)	POST OFFICE (19) (22)	ELECTRICAL (18) (53)
PLUMBER (17) (40)	TV/ELECTRICAL (17) (40)	SWEETS/TOBACCO (18) (46)	TV/ELECTRICAL (16) (42)
TV/ELECTRICAL (16) (40)	SHOE SHOP (16) (49)	SHOE SHOP (17) (90)	WINE MERCHANT (16) (22)
SHOE SHOP (16) (58)	PLUMBER (18) (20)	WINE MERCHANT (17) (28)	SHOE SHOP (15) (86)
LAUNDRETTE (14) (16)	OPTICIAN (15) (46)	TV/ELECTRICAL (16) (44)	PLUMBER (15) (18)
FURNITURE (14) (67)	FRUIT/FISH (14) (21)	SUPERMARKET (15) (27)	SUPERMARKET (15) (25)
OPTICIAN (13) (47)	FURNITURE (14) (63)	CAFE (14) (57)	RESTAURANT (14) (40)
CHILDRENSWEAR (13) (21)	JEWELLERS (13) (56)	FURNITURE (14) (42)	BUILDING SOCIETY (14) (58)
"TIMOTHY MITTES" (13) (13)	WINE MERCHANT (13) (21)	JEWELLER (14) (63)	CHILDRENSWEAR (14) (26)
"CO-OP" (12) (12)	CAFE (12) (45)	PLUMBER (14) (20)	INSURANCE (13) (17)
CAFE (11) (41)	CHILDRENSWEAR (12) (20)	CARPETS (13) (28)	JEWELLER (13) (67)
JEWELLER (10) (56)	CYCLES (12) (19)	CHILDRENSWEAR (13) (25)	SWEETS/TOBACCO (12) (34)
WINE MERCHANT (10) (18)	"TIMOTHY MITTES" (12) (12)	RESTAURANT (12) (34)	FLOWERS (12) (13)
ASSURANCE (10) (12)	"CO-OP" (12) (12)	SHOE REPAIRS (12) (22)	CARPETS (12) (28)
SHOE REPAIRS (10) (18)	SHOE REPAIRS (11) (17)	WOOL (12) (17)	HOUSEHOLD (12) (24)
CYCLES (10) (17)	ASSURANCE (10) (12)	HOUSEHOLD (12) (24)	"CO-OP" (12) (12)
CARPETS (9) (18)	CARPETS (10) (18)	"CO-OP" (12) (13)	CHINESE TAKE-AWAY (12) (17)
MEATS/DAIRY (9) (21)	LEATHER/LUGGAGE (9) (11)	FRUIT/FISH (11) (16)	FROZEN FOODS (11) (11)
LEATHER/LUGGAGE (8) (10)	MEATS/DAIRY (9) (20)	ASSURANCE (11) (15)	CAFE (10) (34)
FISHMONGER (8) (11)	TV RENTAL (9) (22)	FROZEN FOODS (11) (11)	PAST FOOD (10) (19)
CLOTHING (MIXED) (7) (33)	FISHMONGER (9) (10)	BUILDING SOCIETY (10) (22)	ESTATE AGENT (10) (21)
BUILDING SOCIETY (7) (18)	CLOTHING (MIXED) (8) (35)	CAR ACCESSORIES (10) (17)	FURNITURE (10) (31)
ESTATE AGENT (7) (17)	BUILDING SOCIETY (8) (20)	TV RENTAL (10) (35)	WOOL (10) (12)
PHOTOGRAPHER (7) (8)	ESTATE AGENT (8) (20)	CHINESE TAKE-AWAY (10) (15)	TV RENTAL (10) (34)
CARDS/STATIONERY (7) (17)	WOOL (8) (14)	FLOWERS (9) (11)	FRUIT/FISH (9) (12)
WOOL (7) (22)	SEEDS/PETS (8) (14)	ESTATE AGENT (9) (18)	CLOTHING (MIXED) (9) (28)
FLOWERS (6) (9)	CHINESE TAKE-AWAY (8) (13)	DRIVING SCHOOL (9) (10)	CAR ACCESSORIES (9) (15)
SPORTSWEAR (6) (14)	RESTAURANT (7) (14)	CARDS/STATIONERY (9) (26)	TRAVEL AGENT (9) (20)
CAR ACCESSORIES (6) (9)	CAR ACCESSORIES (7) (14)	FANCY GOODS (9) (18)	SHOE REPAIRS (8) (15)
HOUSEHOLD (6) (18)	TRAVEL AGENT (7) (13)	PETS (9) (10)	DRIVING SCHOOL (8) (9)
FANCY GOODS (6) (11)	FANCY GOODS (7) (13)	CYCLES (9) (12)	FANCY GOODS (8) (16)
TOYS (6) (11)	FLOWERS (8) (11)	CLOTHING (MIXED) (8) (18)	PETS (8) (12)
SEEDS/PETS (6) (12)	SPORTSWEAR (8) (13)	TOYS (8) (12)	SPORTS (7) (14)
TV RENTAL (6) (10)	GAS SHOWROOM (8) (4)	SEEDS/PETS (8) (12)	GAS SHOWROOM (7) (7)

FROZEN FOODS	(6) (7)	CARDS/STATIONERY	(6) (20)	HEATS/DAIRY	(8) (18)	CARDS/STATIONERY	(7) (18)
DELICATESSEN	(5) (9)	HOUSEHOLD	(6) (15)	FISHMONGER	(8) (9)	HEATS/DAIRY	(7) (13)
ANTIQUES	(5) (11)	TOYS	(6) (10)	BOOKS	(8) (11)	CYCLES	(7) (8)
GAS SHOWROOM	(5) (5)	FROZEN FOODS	(6) (6)	ANTIQUES	(7) (19)	'BOOTS'	(7) (10)
MOTOR CYCLES	(5) (11)	SUPERMARKET	(6) (7)	GAS SHOWROOM	(7) (7)	DELICATESSEN	(6) (6)
'BOOTS'	(5) (7)	DELICATESSEN	(5) (8)	CAMERAS	(7) (13)	CAMERAS	(6) (15)
CUT-PRICE STORE	(5) (9)	ANTIQUES	(5) (10)	TRAVEL AGENT	(7) (21)	TOYS/STATIONERY	(6) (11)
UPHOLSTERERS	(5) (6)	ELEC SHOWROOM	(5) (5)	FAST FOOD	(6) (10)	'WOOLMORTHS'	(6) (6)
RESTAURANT	(4) (13)	PHOTOGRAPHER	(5) (6)	SPORTS GOODS	(6) (12)	CHARITY SHOP	(6) (11)
SOLICITOR	(4) (5)	PETS	(5) (8)	LEATHER/LUGGAGE	(6) (12)	BOUQUET	(5) (33)
CAMERAS	(4) (8)	'WOOLMORTHS'	(5) (5)	'WOOLMORTHS'	(6) (7)	SOLICITOR	(5) (7)
DRIVING SCHOOL	(4) (9)	'BOOTS'	(5) (7)	DELICATESSEN	(5) (5)	ANTIQUES	(5) (10)
TRAVEL AGENT	(3) (12)	UPHOLSTERERS	(4) (6)	SOLICITOR	(5) (6)	ELEC SHOWROOM	(5) (5)
BEDS/BEDDING	(3) (7)	SOLICITOR	(4) (5)	FURN/CARPETS	(5) (10)	RECORDS	(5) (13)
PET SHOP	(3) (6)	DRIVING SCHOOL	(4) (7)	ELEC SHOWROOM	(5) (8)	JOB CENTRE	(5) (5)
HEALTH FOOD	(3) (7)	BEDS/BEDDING	(3) (7)	RECORDS	(4) (14)	FISHMONGER	(5) (5)
2ND-HAND CLOTHES	(3) (4)	HEALTH FOODS	(3) (7)	HEALTH FOODS	(4) (7)	SUPERSTORE	(5) (5)
TAILOR	(3) (57)	MOTOR CYCLES	(3) (9)	CUT-PRICE STORE	(4) (10)	FURN/CARPETS	(4) (8)
ELEC SHOWROOM	(3) (5)	2ND-HAND CLOTHES	(3) (4)	UPHOLSTERERS	(4) (5)	PHOTOGRAPHER	(4) (5)
'WOOLMORTHS'	(2) (2)	TAILOR	(3) (44)	TAILOR	(4) (27)	LEATHER/LUGGAGE	(4) (12)
BOOKS	(2) (14)	CUT-PRICE STORE	(3) (3)	BOUQUET	(3) (19)	TOILETRIES	(3) (5)
FURNITURE/CARPETS	(2) (4)	BOOKS	(2) (13)	BOOKS	(3) (20)	HEALTH FOODS	(3) (4)
LINGERIE	(2) (19)	FURN/CARPETS	(2) (4)	TOILETRIES	(3) (4)	2ND-HAND CLOTHES	(3) (6)
ART MATERIALS	(2) (5)	CAMERAS	(2) (8)	2ND-HAND CLOTHES	(3) (7)	UPHOLSTERERS	(3) (4)
PANBROKER	(2) (3)	KOSHER BUTCHER	(2) (4)	JOB CENTRE	(2) (2)	CUT-PRICE STORE	(3) (7)
MUS INSTRUMENTS	(1) (7)	LINGERIE	(2) (17)	STAMPS/COINS	(2) (5)	BOOKS	(3) (14)
ARMY AND NAVY	(1) (3)	BOUQUET	(2) (12)	PHOTOGRAPHER	(2) (5)	MUS INSTRUMENTS	(2) (7)
CAMPING EQUIP	(1) (3)	MUS INSTRUMENTS	(1) (6)	CAMPING EQUIP	(2) (4)	KITCHEN/B-ROOM	(2) (4)
SEWING EQUIP	(1) (9)	RECORDS	(1) (6)	KOSHER BUTCHER	(2) (3)	LINGERIE	(2) (5)
KOSHER BUTCHER	(1) (3)	SANDWICH BAR	(1) (2)	LINGERIE	(2) (7)	SEEDS/PETS	(2) (4)
OFFICE EQUIP	(1) (7)	DRIVING SCHOOL/	(1) (1)	BEDS/BEDDING	(2) (5)	BEDS/BEDDING	(2) (6)
FURS/LEATHER	(1) (17)	CAR ACCESSORIES	(1) (4)	ART MATERIALS	(2) (4)	ART MATERIALS	(2) (5)
WINDOWS	(1) (3)	CAMPING EQUIP	(1) (2)	PRINT/PHOTOCOP	(2) (6)	PRINT/PHOTOCOP	(2) (6)
PRINT/PHOTOCOP	(1) (7)	SEWING EQUIP	(1) (8)	TROPICAL FISH	(2) (3)	FISHING TACKLE	(2) (1)
FISHING TACKLE	(1) (2)	TOILETRIES	(1) (2)	MOTOR CYCLES	(2) (6)	TROPICAL FISH	(2) (3)
SUPERMARKET	(1) (1)	OFFICE EQUIP	(1) (12)	LOANS	(2) (3)	MOTOR CYCLES	(2) (7)
BOUQUET	(1) (8)	FURS/LEATHER	(1) (15)	SUPERSTORE	(2) (3)	TAILOR	(2) (7)
STAMPS/COINS	(1) (1)	ART MATERIALS	(1) (4)	CHARITY SHOP	(2) (6)	KOSHER BUTCHER	(2) (2)
RECORDS	(1) (5)	WINDOWS	(1) (2)	MUS INSTRUMENTS	(1) (7)	STAMPS/COINS	(1) (2)
OVERALLS	(1) (1)	PRINT/PHOTOCOP	(1) (6)	SANDWICH BAR	(1) (10)	SANDWICH BAR	(1) (14)
RUBBER GOODS	(1) (2)	PANBROKER	(1) (1)	DRIVING SCHOOL/	(1) (1)	BRIDALWEAR	(1) (6)
TOILETRIES	(1) (1)	STAMPS/COINS	(1) (1)	CAR ACCESSORIES	(1) (8)	DRIVING SCHOOL/	(1) (1)
DEPT STORE	(1) (4)	BRIDALWEAR	(1) (2)	KITCHEN/B-ROOM	(1) (2)	CAR ACCESSORIES	(1) (3)
'SKINITS'	(1) (1)	OVERALLS	(1) (1)	AMUSEMENTS	(1) (2)	SEWING EQUIP	(1) (9)
MODELS	(1) (1)	RUBBER GOODS	(1) (2)	BRIDALWEAR	(1) (5)	FURS/LEATHER	(1) (5)
HEARING AIDS	(1) (2)	FISHING TACKLE	(1) (1)	SEWING EQUIP	(1) (9)	HOME BREN	(1) (2)
BRIDALWEAR	(1) (1)	DEPT STORE	(1) (6)	OVERALLS	(1) (1)	BLINDS	(1) (2)
TROPHIES	(1) (1)	'SKINITS'	(1) (1)	RUBBER GOODS	(1) (2)	FIM SERVICES	(1) (2)
		MODELS	(1) (2)	BASKETWEAR	(1) (2)	MODELS	(1) (3)
		CHARITY SHOP	(1) (1)	OFFICE EQUIP	(1) (10)	MACHINE HIRE	(1) (1)
		HEARING AIDS	(1) (2)	FURS/LEATHER	(1) (6)	ARMY AND NAVY	(1) (7)
		TROPICAL FISH	(1) (1)	WINDOWS	(1) (1)	KITCHEN ACCESSOR	(1) (1)
		TROPHIES	(1) (1)	FISHING TACKLE	(1) (3)	OVERALLS	(1) (2)
				COSMETICS	(1) (1)	RUBBER GOODS	(1) (1)
				HOME BREN	(1) (1)	HEALTH STUDIO	(1) (1)
				REN OFFICE	(1) (2)	OFFICE EQUIP	(1) (1)

1979		1982	
NEWSAGENT	(33) (87)	NEWSAGENT	(33) (88)
BAKER	(32) (100)	BAKER	(32) (91)
CHEMIST	(32) (53)	HAIR SALON	(31) (116)
HAIR SALON	(31) (117)	CHEMIST	(31) (54)
BUTCHER	(30) (101)	BUTCHER	(30) (97)
BOOKMAKER	(30) (44)	BOOKMAKER	(29) (44)
BANK	(27) (104)	FRUIT/VEG	(27) (49)
FRUIT/VEG	(26) (49)	BANK	(26) (105)
OPTICIAN	(24) (47)	FISH AND CHIPS	(24) (41)
LADIESWEAR	(24) (71)	OPTICIAN	(24) (49)
FISH AND CHIPS	(23) (38)	LADIESWEAR	(23) (58)
POST OFFICE	(22) (27)	BUILDING SOCIETY	(23) (75)
LAUNDRETTE	(21) (25)	POST OFFICE	(22) (26)
PUBLIC HOUSE	(20) (67)	PUBLIC HOUSE	(20) (68)
DRY CLEANER	(20) (40)	DRY CLEANER	(20) (34)
BUILDING SOCIETY	(19) (60)	LAUNDRETTE	(19) (23)
PAINT/WALLPAPER	(19) (37)	PAINT/WALLPAPER	(18) (34)
ELECTRICAL	(19) (30)	ELECTRICAL	(18) (28)
CHINESE TAKE-AWAY	(19) (23)	CHINESE TAKE-AWAY	(18) (24)
MENSWEAR	(17) (94)	ESTATE AGENT	(17) (42)
DRAPERY	(17) (42)	HOUSEHOLD	(16) (22)
HARDWARE	(16) (26)	FANCY GOODS	(16) (35)
TV/ELECTRICAL	(16) (39)	WINE MERCHANT	(16) (25)
ESTATE AGENT	(16) (26)	CHILDRENSWEAR	(16) (23)
JEWELLER	(16) (73)	MENSWEAR	(15) (78)
WINE MERCHANT	(16) (23)	HARDWARE	(15) (20)
CHILDRENSWEAR	(16) (29)	TV/ELECTRICAL	(15) (41)
ASSURANCE	(15) (21)	JEWELLER	(15) (40)
RESTAURANT	(14) (42)	TRAVEL AGENT	(15) (45)
SHOE SHOP	(14) (64)	FROZEN FOOD	(15) (18)
WOOL	(14) (18)	RESTAURANT	(14) (49)
SUPERMARKET	(14) (20)	DRAPERY	(14) (33)
GROCEA	(13) (18)	SHOE SHOP	(14) (68)
FANCY GOODS	(13) (27)	SUPERMARKET	(14) (21)
TRAVEL AGENT	(12) (35)	GROCEA	(13) (17)
SWEETS/TOBACCO	(12) (31)	ASSURANCE	(13) (17)
FROZEN FOOD	(12) (13)	CLOTHING (MIXED)	(12) (32)
'CO-OP'	(12) (12)	CAR ACCESSORIES	(12) (21)
FLOWERS	(11) (11)	FLOWERS	(11) (10)
CAR ACCESSORIES	(11) (21)	FAST FOOD	(11) (21)
HOUSEHOLD	(11) (16)	FURNITURE	(11) (24)
TV RENTAL	(11) (34)	WOOL	(11) (16)
CLOTHING (MIXED)	(10) (36)	VIDEO HIRE	(11) (14)
CAFE	(10) (20)	'CO-OP'	(11) (11)
FURNITURE	(10) (32)	PETS	(10) (13)
PLUMBERS	(10) (14)	TV RENTAL	(10) (26)
PETS	(10) (13)	CAFE	(9) (31)
FAST FOODS	(9) (19)	SPORTS GOODS	(9) (17)
FRUIT/FISH	(8) (11)	SOLICITOR	(9) (14)
SPORTS GOODS	(8) (15)	CARDS/STATIONERY	(8) (20)
SOLICITOR	(8) (13)	KITCHEN/B-BED	(8) (9)
DRIVING SCHOOL	(8) (9)	SWEETS/TOBACCO	(8) (20)
CARDS/STATIONERY	(8) (25)	CHARITY SHOP	(8) (13)
DELICATESSEN	(7) (7)	FRUIT/FISH	(7) (9)

CARPETS	(7) (17)	DELICATESSEN	(7) (7)
GAS SHOWROOM	(7) (7)	ANTIQUES	(7) (12)
SHOE REPAIRS	(7) (15)	CARPETS	(7) (12)
TOILETRIES	(7) (9)	GAS SHOWROOM	(7) (8)
TOYS	(7) (13)	SHOE REPAIRS	(7) (17)
RECORDS	(6) (15)	PLUMBER	(7) (11)
CAMERAS	(6) (13)	TOYS/SWEETS	(7) (10)
VEATS/DAIRY	(6) (9)	MEATS/DAIRY	(7) (11)
CYCLES	(6) (8)	FURN/CARPETS	(6) (9)
'BOOTS'	(6) (7)	RECORDS	(6) (14)
SUPERSTORE	(6) (6)	FILM PROCESSOR	(6) (19)
CHARITY SHOP	(6) (12)	DRIVING SCHOOL	(6) (8)
BOUTIQUE	(5) (49)	TOILETRIES	(6) (7)
ANTIQUES	(5) (9)	HEALTH FOODS	(6) (8)
FURN/CARPETS	(5) (10)	JOB CENTRE	(6) (6)
JOB CENTRE	(5) (5)	'BOOTS'	(6) (7)
'WOOLWORTHS'	(5) (5)	SUPERSTORE	(6) (6)
ELEC SHOWROOM	(4) (4)	BOUTIQUE	(5) (5)
PHOTOGRAPHERS	(4) (4)	CAMERAS	(5) (10)
LEATHER/LUGGAGE	(4) (13)	'WOOLWORTHS'	(5) (5)
KITCHEN/B-ROOM	(3) (4)	ELEC SHOWROOM	(4) (4)
HEALTH FOODS	(3) (5)	CUT-PRICE STORE	(4) (11)
MOTOR CYCLES	(3) (6)	PHOTOGRAPHERS	(3) (4)
2ND-HAND CLOTHES	(3) (6)	LEATHER/LUGGAGE	(3) (9)
CUT-PRICE STORE	(3) (8)	ART MATERIALS	(3) (8)
BOOKS	(2) (11)	FISHING TACKLE	(3) (7)
MUS INSTRUMENTS	(2) (11)	MOTOR CYCLES	(3) (7)
SEWING EQUIP	(2) (9)	CYCLES	(3) (6)
SEEDS/PETS	(2) (5)	MODELS	(2) (5)
BEDS/BEDDING	(2) (5)	BOOKS	(2) (16)
ART MATERIALS	(2) (6)	AMUSEMENTS	(2) (6)
FISHING TACKLE	(2) (6)	SANDWICH BAR	(2) (18)
TROPICAL FISH	(2) (3)	FOREIGN BANK	(2) (3)
FISHINGGER	(2) (3)	LINGERIE	(2) (7)
UPHOLSTERER	(2) (5)	SEEDS/PETS	(2) (4)
KOSHER BUTCHER	(2) (2)	BEDS/BEDDING	(2) (6)
SANDWICH BAR	(1) (17)	PRINT/PHOTOCOP	(2) (4)
BRIDALWEAR	(1) (7)	TILES	(2) (3)
SURVEY EQUIP	(1) (1)	KOSHER BUTCHER	(2) (2)
CAR RENTAL	(1) (2)	CB EQUIP	(2) (4)
MODELS	(1) (6)	FISHINGGER	(2) (3)
DRIVING SCHOOL/ CAR ACCESSORIES	(1) (1)	2ND-HAND CLOTHES	(2) (5)
HEALTH STUDIO	(1) (4)	MUS INSTRUMENTS	(1) (9)
LINGERIE	(1) (4)	SURVEY EQUIP	(1) (1)
FUR/LEATHER	(1) (5)	CAR RENTAL	(1) (2)
PRINT/PHOTOCOP	(1) (5)	TROPHIES	(1) (2)
HOME BREN	(1) (2)	TROPICAL FISH	(1) (2)
TILES	(1) (2)	GOLF EQUIP	(1) (1)
LOANS	(1) (2)	LOANS	(1) (1)
FOREIGN BANK	(1) (4)	MACHINE HIRE	(1) (1)
MACHINE HIRE	(1) (1)	STAMPS/COINS	(1) (1)
STAMPS/COINS	(1) (1)	WOODCARE	(1) (1)
WOOD CARE	(1) (1)	HOME INSULATION	(1) (1)
ARMY AND NAVY	(1) (6)	BRIDALWEAR	(1) (7)
CAMPING EQUIP	(1) (3)	DRIVING SCHOOL/ CAR ACCESSORIES	(1) (1)
KITCHEN ACCESSORIES	(1) (3)	ARMY AND NAVY	(1) (6)

OVERALLS	(1)	(2)	CAMPING EQUIP	(1)	(2)
BASKETWEAR	(1)	(2)	KITCHEN ACCESSORIES	(1)	(4)
RUBBER GOODS	(1)	(1)	SEWING EQUIPMENT	(1)	(7)
OFFICE EQUIPMENT	(1)	(7)	OVERALLS	(1)	(2)
AMUSEMENTS	(4)	(2)	HEALTHY STUDIO	(1)	(1)
VIDEO HIRE	(1)	(1)	BASKETWEAR	(1)	(2)
ORIENTAL FOODS	(1)	(1)	OFFICE EQUIPMENT	(1)	(8)
WINDOWS	(1)	(1)	FURS/LEATHER	(1)	(9)
WIGS	(1)	(2)	ORIENTAL FOODS	(1)	(1)
COSMETICS	(1)	(3)	WINDOWS	(1)	(1)
BLINDS	(1)	(3)	WIGS	(1)	(2)
TROPHIES	(1)	(1)	COSMETICS	(1)	(2)
REN OFFICE	(1)	(2)	HOME BREW	(1)	(1)
CB EQUIPMENT	(1)	(1)	BLINDS	(1)	(2)
POSTERS	(1)	(1)	REN OFFICE	(1)	(2)
FIN SERVICES	(1)	(2)	ORIENTAL FASHIONS	(1)	(1)
DEPT STORE	(1)	(7)	POSTERS	(1)	(1)
'SMITHS'	(1)	(1)	FIN SERVICES	(1)	(3)
CAT STORE	(1)	(2)	DEPT STORE	(1)	(6)
EMPLOYMENT AGENCY	(1)	(3)	'SMITHS'	(1)	(1)
HEARING AIDS	(1)	(3)	CAT STORE	(1)	(3)
DEPT STORE	(1)	(6)	EMPLOYMENT AGENCY	(1)	(5)
SHITNS	(1)	(1)	HEARING AIDS	(1)	(3)
CAT STORE	(1)	(1)	COMPUTERS	(1)	(1)
EMPLOYMENT AGENCY	(1)	(3)	RUBBER GOODS	(1)	(1)
MODELS	(1)	(3)	AMUSEMENTS	(1)	(3)
HEARING AIDS	(1)	(4)	WINDOWS	(1)	(1)
TROPHIES	(1)	(1)	WIGS	(1)	(2)
			COSMETICS	(1)	(2)
			TROPHIES	(1)	(1)
			REN OFFICE	(1)	(2)
			POSTERS	(1)	(1)
			LOANS	(1)	(1)
			DEPT STORE	(1)	(6)
			SMITHS	(1)	(1)
			CAT STORE	(1)	(2)
			EMPLOYMENT AGENCY	(1)	(3)
			HEARING AIDS	(1)	(3)

outlets in total than the number of different activities they offered might have suggested. Within the inner ring of suburban centres these were particularly important local centres at this time and reflect the multiple incidence of many food outlets such as grocers, greengrocers (fruit and vegetables in Table 6), butchers and bakers (see Table 6).

Between 1971 and 1975 the highest order centres clearly have become more distinguishable under both our definitions of hierarchy. Horsforth Town Street has also grown to a position where it offers a wider variety of activities than other centres of similar size. (Particularly important here is the rise of service outlets in the northern suburbs at this time). By 1982 the highest order centres have become interchangeable at the top, depending on which method of ranking one selects. Lower down the hierarchies Hyde Park stands out as having more outlets than its position in our previous hierarchy might suggest. Again this reflects the multiple incidence of activities such as bookshops, antique shops and sport and leisure outlets.

Despite these exceptions the hierarchies defined in Table 5 are not too dissimilar and either could serve as a useful method of ranking.

However for the retailing activities themselves Table 6 shows a much more varied pattern. Generally, the most widely represented activities are also the most common in terms of total number of outlets for all the centres. Yet there are a number of exceptions. Some activities can only support one or possibly two outlets per centre, especially outside the city centre. For example post offices, laundrettes, 'Co-ops', gas and electric showrooms, assurance/insurance offices, 'Woolworths' and photographers have only a solitary outlet per centre whilst for the earlier period we could also add 'Timothy Whites' and frozen food outlets and more recently film processors, driving schools, kitchen and bathroom centres, video hire, flowers, toiletries and health foods. Clearly with many of these kind of activities two outlets in a particular centre would cause severe competition for a limited local market.

Conversely, those activities which are more associated with the city centre are clearly more likely to be associated with multiple incidence. For example whilst jewellers, shoe shops, men and ladies wear outlets have expanded into smaller suburban centres since 1961 they are still primarily associated with the city centre which draws upon a far larger catchment area. Table 6 shows the importance of multiple incidence for these particular activities. Thus even by 1971 there were more men and ladies outfitters and shoe shops (with jewellers not far behind) than either chemists or grocers.

Also associated with multiple incidence, though not quite as common, came TV and electrical goods, TV rental outlets and cafes and restaurants. Like jewellers, shoe shops and outfitters all these activities show a very competitive market. Perhaps the most striking example of multiple incidence in this category of activities is the large number of traditional tailor's shops in and around the city centre prior to 1975 (see Table 6).

Similarly, at the highest end of the hierarchy of activities, are those functions or activities which are solely present in the city centre. Into this category comes office equipment and furniture, sewing machines and equipment, musical instruments, furs, 'department stores' and more recently sandwich bars and employment agencies. However it should be noted that some of these goods may be found as minor items in other retailing outlets or enjoy presence in this unique way outside our defined shopping centres.

An analysis of the multiple incidence of activities thus highlights the fact that whilst certain activities may be found in many different locations the total number within the whole city may be small and conversely those activities found in few locations may have a large number of total outlets. Whilst this is an important difference to bring out for the retailing activities it still seems that when analysing the status of locations themselves the number of different activities per centre provides the better indicator, giving more importance to the variety of goods on offer not simply the number of shops.

Conclusions.

By exploring elementary concepts from the methodology of Q-analysis we have been able to distil significant features from a large data set depicting retail change in Leeds over a 20 year period. Although much of the literature on Q-analysis appears technically complex and difficult to assimilate no difficulties have been encountered applying what may be recognised as one of the simplest aspects of the approach, namely, the Q-clustering algorithm. The algorithm has probed, explored and sorted the data in such a way as to bring out much of the significance on the order, distribution and distinctiveness of retailing activities and locations.

Thus since 1961 we have been able to depict a hierarchy of shopping centres in Leeds and analyse its change over time. By exploring the kinds of activities present in particular locations we have also been able to say something of the distinctiveness or uniqueness of centres over time, especially for those centres of similar size.

Use of a different methodology would probably paint a somewhat different picture of retail change though Q-analysis is the brush we have chosen. Exploration of the same data set using other techniques may be material for another paper. Further work within a q-analysis framework may usefully be directed towards representation of traffic on the backcloth revealed in the present paper, and towards comparison of representation of dynamic change between other methods.

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Good maps are available from most reference libraries for local areas. If not, they can be obtained from Chas. E. Goad Ltd., 18a, Salisbury Square, Old Hatfield, Hertfordshire, AL9 5BE. A full list of centres covered is available on request.

