CHAPTER VII- TN 10: ANALYSIS OF CORD STUDY NATIONAL SURVEYS ON PARTICIPATION IN OUTDOOR ACTIVITIES TO DEFINE (1) CLUSTER OF ACTIVITIES AND
(2) AGGREGATES OF PEOPLE WITH SIMILAR PARTICIPATION PATTERNS: SIMILAR ACTIVITY PACKAGES

By R. Gillespie, J. Beaman, G. Romsa

Note re authorship:

Authorship of parts of this TN has been by a number of people and it is for this reason that the following notes are provided. The material presents two rather disparate points of view. Therefore the reader should note that the material on the Burton approach to analysis, which was written by Gillespie, is not necessarily accepted or condemned by other people who wrote material for other parts. Beaman wrote some of the material on cluster analysis and edited additional material on other writings by Romsa, Currie, Peebles and White. Beaman takes responsibility for his interpretation of the writings of these other authors in editing parts of their report "Recreation Activity Packages Derived From the '1969 Household Data'" into this article. However, by indicating these persons as authors, their substantial research work in deriving clusters and reporting on the derivation of these clusters is acknowledged. Peebles' work in arranging for the computer analysis to derive aggregates of people using cluster analysis is further acknowledged by presenting his discussion of cluster analysis programs only slightly edited from the way that it appeared in the original report to Parks Canada.

ABSTRACT

This TN is a straight forward document. Background information about two strategies for analyzing National Survey information are presented. In the one strategy proposed by Burton, factor analysis is used to define groups of activities. The other methodology is one for defining clusters of people with which activity packages can be associated. The paper presents the results of applying these two analysis approaches to the 1969 Canadian Outdoor Recreation Demand Study National Survey data on people's participation in outdoor activities. Results of "clusterings" by the use of the cluster analysis technique based on the information statistic are presented. The results are for Canadian residents based on their participation in 26 outdoor recreation pursuits. The *information statistic* analysis indicates that when individuals were broken into groups based on the activities in which they participated, eight activity packages can be determined. In contrast to the results of the *information statistic* analysis, factor analysis produced a number of "clusterings of activities". The clusters found allowing six factors in an oblique solution when participation in activities was analyzed were described as:
(1)physically active activities requiring little equipment,
(2)physically passive activities with attractiveness of "general" destination areas but develops a site specific measure.

PURPOSE

The purpose of this paper is to present the results obtained when data on people's participation in activities is analyzed in two different ways, both of which have been described as giving useful information about the interrelationship between recreation activities as these relate to planning. Some would say that two methodologies that can be used to study substitutability between activities are presented.

INTRODUCTION BURTON METHOD OF CLUSTERING

A general review need not be presented here of the issues that arise in relation to the

analyses of peoples recreation regarding (1) substitutability, (2) equity of access to recreation opportunities, (3) the need to consider groups of people in making projections of future participation, and some other matters. These are covered in articles by Burton (1971), Beaman (TN 37), Hendee and Burdge (1974), Romsa (1973), Beaman and Lindsay (TN 32) and in literature cited in these papers. Here, all that is important are some details about the tee methods of studying substitutability actually discussed. Many of the views of Burton introduced in the following paragraphs are questioned in other works (TN 32, 37) so their presentation should not be taken as an endorsement of using the factor analysis method: the dispute is not over the general ideas but over the appropriateness of the factor analysis methodology.

Burton's (1971) analysis method may be considered to be founded on the technique of defining hierarchical groups of activities based on the participation patterns of individuals, a technique first introduced by Proctor, then extended and refined by Burton. Taking results from 1,056 respondents, Burton applied R-mode factor analysis to their scores of participation or non-participation in various activities, thus combining the activities in question into groups based on correlations between activity ratings. According to this theoretical approach, once the groups of activities have been established and the underlying roots or characteristics of the activity group identified, a "recreation type" has been described. Burton suggests that all individuals who are closely related by their participation pattern to a certain group of activities belong to the recreation type. As an extension of the process, he suggests that the socio-economic characteristics of various individuals could be analyzed to reveal any relationships between certain variables and the recreation types of individuals.

He maintains that the definition of "recreation types" is an important step towards overcoming some of the problems associated with attempts to measure and express recreation demand in a manner which can be truly useful to the planner concerned with recreation policy, investment and facility provision. He also states that it is the kind of approach to analysis which he proposes is a basic prerequisite to any attempt to relate motivation or any other variables (as socio-economic) directly to activities.

Burton defends the view that from a practical perspective activity groupings derived from the analysis of participation data are a useful tool for planners responsible for making decisions related to the supply of facilities. He states that decision-makers can be provided with a hierarchical list of activities, with all members of a group being the most viable substitutes for other group members. Furthermore, he indicates that by comparing the groups with an inventory of existing facilities, deficiencies in the supply for certain "recreation types" can be recognized, resulting in the provision of a more satisfactory mix of facilities and activities to accommodate a wider range of participants.

It is his view that the identification of "recreation types" may facilitate the prediction of future demand for various recreation facilities. "If participation in any particular pursuit can be linked to participation in other pursuits, and to certain socio-economic characteristics, then, as the socio-economic characteristics of a given population change, it should become possible to predict, at least in general terms, how participation in given pursuits and groups of pursuits will change" (Burton 1971). The use of activity groups is defended because "these groups serve as a more stable base for forecasting" than individual activities. This is because participation in a group is less subject to fluctuation due to change in the influential factors. If, for example, due to a change in personal disposable income, an individual changes his participation from one activity to another, it is highly probable that one will change to another activity in the same group as the first. This change then, would not affect forecasts based on activity groups as much as it would

those based on individual activities, leaving the activity group method the more stable of the two. (See similar points made in TN 13, 32.) Burton describes the activity participation approach to "recreation types" as valuable in drawing out the critical factors underlying participation in certain activities. Analysis of characteristics of campers, for example, will result in a description of campers but it will do little to explain why the people are participants in the camping activity instead of another, and how campers differ consistently and significantly from participants in other activities.

It is argued that the use of analytical techniques to form activity groups identifies the critical characteristics which make people choose among activities. The groups being established on the basis of being common choices of many individuals, the characteristics most prominent in all activities in a group are those which identify the nature of the group: that which binds it together and makes it a choice distinctive from other types of pursuits.

Table 1 is an example of the results obtained by Burton in applying factor analysis to British participation data.

TABLE 1: SOME RELATIVELY STABLE RECREATION GROUPS

Group I: Soccer, Cricket, Table Tennis, Tennis	Group II: ========== Roller Skating, Ice Skating, Youth Club, Horse riding
Group III: Rugby, Athletics, Cycling, Basketball, Keep Fit, Badminton	Group IV Picnicking, Driving in the countryside, Gardening Dining out

The clustering of Individuals: A Second Analysis Approach

The preceding has introduced the reader to one perspective on how the inter-relationship between activities can be considered quantitatively so that results obtained allow one to take into account the inter-relationships between activities when one plans for facilities, programs etc. The perspective concentrates on activities and intercorrelations between participation rates in different activities. A different approach to the problem concentrates on a similarity between people. In the remainder of this paper the work by Burton is referred to as defining clusters of activities whereas the use of cluster analysis (as described below) is referred to as producing groups or aggregates of people. It is said that these groups are defined on the basis of the activities in which members of an aggregate participate.

The conceptual model behind this second perspective is that people naturally divide into groups on the basis of the activities in which they participate. The focus of attention is not on the interrelationship between activities but rather on defining which people are alike according to the activities in which they participate.

From a practical point of view one may consider that if there is information about an individual that gives the number of times someone participated in each one of a number of activities during a given year, this person can be compared with other people. Let us say that for each activity a person categorizes the participation information to indicate that he/she did not participate, participated a little bit, was a fairly regular participant or was a frequent participant.

One may proceed to define a way in which a person's "status" in terms of these categories of participation in various activities may be used to compute a "distance" between individuals. Obviously one of the simplest ways is to give the level of participation categories a value between 1 and 5 and then simply compute distance by taking differences between category values, between two individuals on an activity, by activity basis, squaring these differences and adding them up as indicated below:

$D_{x,y}$= Distance X to Y = Σ_a ((score for X for activity a) - (score for Y for acitvity a))^2

Though there are numerous reasons to criticize such an ad hoc approach to defining a distance function (or metric), the reader is asked to consider that something like this is what could be done in defining distances between individuals. Then, with a measure of distance computed between every individual, the clustering of individuals problem becomes putting those individuals who are "close" together into groups. This is what one may visualize cluster analysis programs as being about (the reader interested in a more sophisticated discussion should see the appendix to this Note or in 2006 see discussions in SAS Stat or SPSS Professional Statistics manuals).

When a person has either manually (Greig-Smith 1964) or by a computer sorted out the people in a universe into clusters (aggregates), one can see from the way that the clustering has been done that clusters are aggregates of people who are relatively homogeneous in their behaviour in terms of the activities in which they participate. Of course this is homogeneous in relation to the way that the distance between individuals was defined. When using this type of clustering, rather than obtaining a group of intercorrelated activities (activities with a high factor loading on a given factor) as the first analysis output, cluster analysis as described here produces groups of people with whom a collection of activity may be associated. It is this collection of activities in which these people in a particular aggregate participate that here is called the activity package of the people in a particular aggregate.

THE DATA

The data used in this study were the 1969 CORD Study data on Canadian's participation in outdoor activities. Details on the data collection, editing etc. are given in the CORD Study Data Documentation Volume (Vol. 3). In summary, 3000 interviews were carried out with people resident in Canada. The data shown in Table 1 were collected with information on participation for the year December 1968 to November 1969, which is when the interviews were carried out.

It would be nice to be able to claim that the sample was a random sample of Canadians 18 and over, but this is not quite the case. Sampling proceeded in such a way as to yield a random sample until an interview location was selected. The manner of choosing an interview location and the manner of selecting individuals after that (including the use of replacements for nonresponse and sampling quotas, and not at home weighting) result in a sample that, at least technically, is not a random sample.

One paper has been written (see TN 24) commenting on the reliability and validity of the data collected in the survey of 1969 and similar surveys in 1967 and 1972. The reader may find the results presented there to be of some interest as they show possible large discrepancies between independent studies. One may also wish to compare the similar survey of 1972 with Ontario Household Survey (Policy Coordination Secretariat 1975) results. This shows good agreement between a much better designed and executed survey.

DEFINITION OF ACTIVITY PACKAGES USING FACTOR ANALYSIS

Factor analysis can be used in data analysis for a variety of purposes but in this application, the object is to identify an underlying pattern of relationships suggested by the correlations between a collection of variables. Veldman (1969) explained how, "in some situations, factor analysis may be considered a procedure for exposing the essential, determining constructs behind a set of observable behaviours", but here factor suggests an abstract "form" of recreation behaviour (Bishop 1970).

TABLE 2: FACTOR ANALYSIS GROUPS BASED UPON 26 ACTIVITIES AND 5 ORTHOGONALLY ROTATED FACTORS

Factor I (Group I)	**Factor Loading**
Sightseeing	.63
Other Park Use	.61
Historic Sites Use	.59
Picnics	.47
Pleasure Driving	.41
Swimming	.30
Photography	.28
Snowmobiling	-.03
Snow Skiing	-.01
Hunting	0.01

Factor II (Group II)	**Factor Loading**
Water Skiing	.57
Snow Skiing	.47
Power Boating	.46
Canoeing	.41
Tennis	.40
Sailing	.38
Golfing	.31
Swimming	.31
Horseback Riding	.20
Pickup Camping	-.01
Picnics	-.01

Factor III (Group III)	**Factor Loading**
Ice Skating	.51
Snow Sledding	.49
Bicycling	.46
Swimming	.31
Horseback Riding	.28
Sightseeing	.01
Nature Study	.01
Sailing	.02

Factor IV (Group IV)	**Factor Loading**
Snowmobiling	.43
Hunting	.32
Tent Camping	.25
Trailer Camping	.29
Pickup Camping	.16
Tennis	-.07
Sailing	-.00

Factor V (Group V)	**Factor Loading**
Nature Study	.43
Pleasure Walking	.35
Climbing	.34
Photography	.27
Ice Skating	-.05
Water Skiing	-.04
Snowmobiling	-.02
Power Boating	-.02

Notes: Weakly or negatively associated activities are below a line. Factor Loading rank in parentheses for activities listed in more than one group.

The explanation of the mathematical principles and operations on which factor analysis is based is a fairly complex task, and it is not really appropriate or feasible in this paper (see Reference 29). However, it is necessary to comment on the technique of rotation. The factors extracted initially by most factor analysis programs are orthogonal: that is, they are uncorrelated or, represented graphically, they are at ninety degrees to each other. The first factor defines the most important underlying dimension (in terms of the percentage of variance explained); the second factor is the next most important dimension orthogonal to the first, and so on. However, the resulting structure of factors is not statistically unique and can be transformed, rotated, into many equivalent definitions of the underlying dimensions all of which explain just as much variance. Infact, sometimes it is desirable to depart from an orthogonal solution to an oblique one. Such a solution often has factors which are composed of more closely-correlated variables, although 6 factors are no longer totally independent from each other.

TABLE 3: FACTOR ANALYSIS GROUPS BASED UPON 26 ACTIVITIES AND 6 ORTHOGONALLY ROTATED FACTORS

Factor I (Group I)	**Factor Loading**
Sightseeing	.63
Other Park Use	.60
Historic Sites Use	.58
Picnics	.47
Pleasure Driving	.43
Swimming	.33
Photography	.29
Snowmobiling	-.01
Snow Skiing	-.00
Canoeing	.02
Horseback Riding	.03
Playing Tennis	.03

Factor II (Group II)	**Factor Loading**
Water Skiing	.55
Snow Skiing	.47
Playing Tennis	.44
Power Boating	.41
Canoeing	.40
Sailing	.37
Golfing	.32
Horseback Riding	.30
Swimming	.28
Picnics	-.01
Pickup Camping	-.01
Pleasure Driving	-.00
Trailer Camping	-.04
Nature Study	-.04

Factor III (Group III)	**Factor Loading**
Ice Skatin[g]	.50
Snow Sledding	.49
Bicycling	.47
Swimming	.32
Horseback Riding	.28
Sailing	.00
Sightseeing	.01
Nature Study	.02
Trailer Camping	.02
Pickup Camping	.03

Factor IV (Group IV)	**Factor Loading**
Power Boating	.47
Snowmobiling	.45
Hunting	.29
Playing Tennis	-.09
Other Park Use	-.06
Sightseeing	-.03
Historic Sites Use	-.03
Climbing	-.01

Factor V (Group V)	**Factor Loading**
Nature Study	.44
Pleasure Walking	.36
Climbing	.33
Photography	.27
Ice Skating	-.05
Water Skiing	-.03
Golfing	.00
Pickup Camping	.00
Snowmobiling	.01

Factor VI (Group VI)	**Factor Loading**
Pickup Camping	.38
Trailer Camping	.31
Tent Camping	.26
Sailing	-.73
Swimming	.00
Pleasure Walking	.00
Nature Study	.01
Ice Skating	.02

Note: Weakly or negatively associated factors are below lines. Factor loading rank in parentheses for activities listed in more than one group.

When the factor analysis procedure proposed by Burton was applied to the Canadian Outdoor Recreation Demand Study data described above, activity packages such as those presented in Tables 2 through 7 were derived. The selected results summarized here represent 5 and 6 factor orthogonal solutions to the 26 activity set (Tables 2 and 3), a 6-factor obliquely rotated solution based on 26 activities (Table 4), and a 16-factor orthogonal solution based on 78 activities representing different levels of participation in the original 26 activities (Table 6). In the 78-activity set, for example, "swimming No. 1" represents the "0-5" level of frequency of

participation while "swimming No. 2" represents the "6-10" level of frequency of participation, and "swimming No. 3" represents the "more than 10" level.

TABLE 4: FACTOR ANALYSIS GROUPS BASED UPON 26 ACTIVITIES AND 6 OBLIQUELY ROTATED FACTORS

Factor I (Group I)	**Factor Loading**
Ice Skating	-.59
Snow Sledding	-.54
Bicycling	-.49
Playing Tennis	-.47
Swimming	-.45
Horseback Riding	-.39
Pickup Camping	-.04
Trailer Camping	-.06
Nature Study	-.07

Factor II (Group II)	**Factor Loading**
Sightseeing	.64
Other Park Use	.62
Historic Sites Use	.61
Picnics	.51
Pleasure Driving	.44
Swimming	.37
Photography	.33
Snowmobiling	.02
Hunting	.04
Snow Skiing	.05
Canoeing	.06

Factor IV (Group IV)	**Factor Loading**
Snowmobiling	.43
Power Boating	.36
Hunting	.26
Playing Tennis	-.12
Sailing	-.03
Climbing	-.01
Other Park Use	.00
Golfing	.01
Historic Park Use	.01

Factor V (Group V)	**Factor Loading**
Pleasure Walking	.47
Nature Study	.46
Climbing	.41
Photography	.38
Pickup Camping	.03
Hunting	.07
Snowmobiling	.07
Trailer Camping	.07

Factor VI (Group VI)	**Factor Loading**
Pickup Camping	-.37
Tent Camping	-.34
Trailer Camping	-.33
Hunting	-.23
Sailing	-.01
Nature Study	-.07
Pleasure Walking	-.11

Factor III (Group III)	**Factor Loading**
Water Skiing	-.60
Power Boating	-.57
Snow Skiing	-.49
Canoeing	-.45
Swimming	-.39
Sailing	-.37
Golfing	-.32
Hunting	-.24
Picnics	.09
Pleasure Driving	.09
Other Park Use	.08
Trailer Camping	.07
Pickup Camping	.01

Note: Weakly or negatively associated activities are below lines. All negative is a positive association. Factor loading rank in parentheses for activities listed in more than one group.

.

The method of determining which groups an activity should belong to was necessarily fairly subjective. In the formation of activity packages, each variable or activity was placed in the group (factor) on which it had its highest loading. Not all activities, however, loaded strongly on only one factor. Because some activities are associated with the underlying dimensions of more than one activity group, they loaded moderately on the factor for all these particular

groups. In order to give recognition to all the dimensions of all activities, those which are "closely" related to more than one factor were placed in all those groups. In the tables, activities with multiple group membership have the rank of their loading indicated in parentheses. For example, see Swimming in groups I, II and III in Table 4. In rare cases, where an activity loaded very high on a factor to the point where it would be an important group member, but loaded much higher still on another factor, it was placed in both groups. See, for example, Power Boating in groups III and IV in Table 4.

TABLE 5: CORRELATIONS AMONG 6 OBLIQUELY ROTATED FACTORS BASED UPON 26 ACTIVITIES

Factor (Group)	I	II	III	IV	V	VI
I	1.0					
II	- .20	1.0				
III	- .43	- .11	1.0			
IV	- .18	.11	- .15	1.0		
V	- .32	.36	- .20	.05	1.0	
VI	.23	- .22	.21	- .23	- .17	1.0

Just as the highest loading activities on each factor can be used to describe the characteristics of that group, so can the lowest loading activities. These most weakly associated or even negatively associated activities may be thought of as not possessing the characteristics represented by the activities included in the factor or, if loaded negatively, they represent the antithesis of what the people who score positively on the factor like. In the case of the 78-activity set described subsequently, where each of the original 26 activities is represented at three different levels of participation, each individual can only participate at one level (3 x 26 = 78). If one is recorded as participating at the Swimming-3 level, for example, he cannot be a participant in Swimming-1 or Swimming-2. Therefore, for any given activity of the 78, the most negatively associated activities will be the other two levels of the same activity. In interpreting the group characteristics through the lowest or negatively loaded activities, the other levels of any group member are, therefore, ignored.

As stated above, many alternative "solutions" to the problem of extracting the underlying dimensions in the data were developed for both the 26 and 78 activity data sets. Only a summary of results is presented in this paper. The choices of the type of analysis applied (othogonal or oblique), and the number of factors in the accepted solution, were based on an attempt to derive activity groupings which were both statistically viable and analytically meaningful.

To determine the most acceptable solution, then, for each activity set, all solutions for that set were compared on the basis of four tests. First the "reasonableness" of each activity grouping in the solution was considered to determine in which solution the activities of each group were most closely related in terms of associated characteristics such as cost of participation and relationship to nature. The second test, which was also subjective, involved a consideration of which solution was most representative of all the solutions for the particular activity set.

The final two tests concerned the statistical properties of the solutions. Test three was a consideration of the eigen value of each factor in a solution, or the amount of variance explained by a factor relative to the original variables. A factor with an eigen value of less than 1.0 has weaker power of explanation than one of the original variables. The final test was the percentage of total variance explained by the various solutions.

Of all the different factor analyses performed on the 26 activity set, the obliquely rotated 6

factor solution (Table 4) was the most acceptable. Strictly on the basis of reasonable groupings, all solutions were fairly acceptable. Indeed, the groupings were so stable throughout the various solutions that there were only minor distinctions between solutions on both criteria of reasonableness and representativeness. The 5 and 6 factor orthogonal solutions (Tables 2 and 3) were almost identical except for the combination, almost intact, of two groupings. Because both groups consistently appeared separately through all solutions of more than 5 factors, a 6 factor solution was considered preferable. In a 7 factor orthogonal solution, (not shown in this paper) the groupings again remained almost unchanged. The extra factor extracted was very similar to one of the other factors, and was, therefore, deemed unnecessary. A 7 factor oblique solution (not shown in this paper) only showed increased similarity between two factors, making them more redundant and reinforcing the acceptance of a 6 factor solution.

The two final tests supported, in their consideration of variance, the acceptance of a 6 factor solution. Only the first 6 factors had an eigen value equal to or greater than 1.0. The acceptance of only a 5 factor solution would mean ignoring an important factor, while the 7 factor solution involved consideration of one factor which had less valuable powers of explanation than each of the original 26 variables. In terms of total variance of the original data explained, the 6 factor solutions explained 44.3%, the 5 factor solution 40.2% and the 7 factor solution 48%.

Little change in the groupings resulted from the application of an oblique rotation to the six factors, although their order, or relative weight in the solution was changed. Factor III became the first and most powerful factor, with Factors I and II becoming II and III respectively. Horseback riding was dropped from Factor II of the orthogonal solution, but remained with Factor III. Tennis was transferred from Factor II to Factor III. The matrix of correlations among factors in the oblique solution (Table 5) shows fairly low correlations in general, the largest being between the two factors between which the exchange of activities took place, indicating that the exchange had little impact as far as changing the essential nature of the factors is concerned.

In the oblique solution (Table 4), Hunting is associated to much the same degree with three factors III, IV and VI, rather than only Factor IV of the orthogonal solution. Swimming is also associated with three factors to a similar degree, an indication that there are distinctly different motivations for participation in Swimming, as well as hunting, which are revealed by the descriptions (which follow shortly) of the different factors with which the activity is associated. The Hunting in Group III for example, may be motivated by the physical activeness of Hunting, while the Hunting in Group IV may be more associated with the desire to establish mastery over nature, and the hunters in Group VI may be attracted by the camping and "outdoorsmanship" elements of Hunting.

An oblique solution is more realistic for the purpose of identifying recreation types as it does not assume that the factors are completely unrelated to one another, and, since there were in this case only a few logical differences from the orthogonal solution, the oblique, 6-factor solution groupings were accepted as the best explanation of the underlying relationships in participation patterns. The next step was to consider the activities in each group to determine their common characteristics (see Table 4).

Group I includes physically active winter activities requiring a minimum of facilities and equipment, and physically active summer activities. All except tennis can be pursued on an individual basis but can also involve groups of individual participants. Very little organization is required and cost is minimal, although tennis and horseback riding can, in some cases, require

both organization and money. All, activities are enhanced by some degree of skill and can be pursued at a competitive level, excepting possibly snow sledding tobogganing-sleighing. The lowest scoring activities are characterized by their passive nature.

TABLE 6

FACTOR ANALYSIS GROUPS BASED UPON 78 ACTIVITIES AND 16 ORTHOGONALLY ROTATED FACTORS

	Factor Loading
Factor I (Group I)	
Snow Sledding-1	.45
Bicycling-1	.40
Snow Skiing-1	.38
Horseback Riding-1	.38
Playing Tennis-1	.38
Power Boating-1	.34
Water Skiing-1	.33
Snowmobiling-1	.32
Ice Skating-1	.30
Climbing-1	.28
Canoeing-1	.28
Golfing-1	.28
Hunting-1	.20
Sailing-2	-.03
Nature Study-2	-.02
Photography-3	-.01
Pleasure Walking-2	-.01
Factor II (Group II)	
Other Park Use-3	.45
Sightseeing-3	.44
Historic Sites Use-2	.40
Nature Study-3	.39
Photography-3	.36
Pleasure Walking-3	.29
Climbing-2	.21
Ice Skating-3	-.08
Snowmobiling-3	-.05

	Factor Loading
Factor III (Group III)	
Snow Sledding-3	.45
Ice Skating-3	.39
Climbing-3	.37
Horseback Riding-3	.29
Bicycling-3	.27
Golfing-3	.12
Pleasure Walking-2	-.09
Pleasure Driving-1	-.09
Water Skiing-2	-.08
Factor IV (Group IV)	
Other Park Use-1	.59
Historic Sites Use-1	.56
Sightseeing-1	.50
Picnics-1	.35
Pleasure Walking-1	.30
Pleasure Driving-1	.30
Pleasure Driving-1	.28
Photography-1	.26
Swimming-1	.20
Nature Study-1	.19
Hunting-3	-.07
Snowmobiling-3	-.05
Factor V (Group V)	
Pleasure Driving-2	.63
Sightseeing-2	.47
Historic Sites Use-3	-.06
Ice Skating-3	-.06
Water Skiing-3	-.05

	Factor Loading
Factor VI (Group VI)	
Power Boating-3	.62
Water Skiing-3	.60
Swimming-3	.37
Canoeing-3	.28
Hunting-3	.17
Sailing-3	.17
Picnics-1	-.07
Pleasure-1	-.05
Photography-1	-.04
Factor VII (Group VII)	
Pleasure Driving-3	.73
Playing Tennis-2	-.09
Snow Skiing-3	-.06
Factor VIII (Group VIII)	
Picnics-3	.71
Tent Camping-3	.31
Trailer Camping-3	.25
Nature Study-2	.11
Pickup Camping-3	.09
Horseback Riding-2	-.07
Snowmobiling-2	-.06
Water Skiing-2	-.06
Golfing-2	-.06
Factor IX (Group IX)	
Sailing-2	.39
Snow Skiing-2	.35
Canoeing-2	.33
Power Boating-2	.32
Snowmobiling-2	.30

	Fac Loa
Factor 1X (Cont'd)	
Water Skiing-2	
Swimming-2	
Climbing-2	
Hunting-2	
Historic Sites Use-3	-
Picnics-1	-
Pleasure Walking-1	-
Factor X (Group X)	
No members	
Factor X1 (Group X	
Ice Skating-2	
Horseback Riding-2	
Bicycling-2	
Playing Tennis-2	
Snow Sledding-2	
Pleasure Walking-2	
Swimming-2	
Golfing-2	
Snowmobiling-3	
Sailing-2	-
Pleasure Driving-1	-
Factor X11 (Group	
Historic Sites Use-2	
Other Park Use-2	

Lost in Original Printing

TABLE 6 FACTOR ANALYSIS GROUPS BASED UPON 78 ACTIVITIES AND 16 ORTHOGONALLY ROTATED FACTORS

	Factor Loading
Factor X11 (Group X11)	
Photography-2	.23
Pickup Camping-3	.09
Water Skiing-3	-.06
Canoeing-3	-.05
Horseback Riding	-.05
Factor X111 (Group X111)	
Pickup Camping-2	.24
Tent Camping-2	.22
Swimming-1	.17
Trailer Camping-1	.15
Pickup Camping-3	.10
Water Skiing-2	-.14
Bicycling-3	-.12
Pleasure Walking-3	-.11
Climbing-1	-.09
Ice Skating-2	-.09
Golfing-3	-.09

	Factor Loading
Factor XV (Group XV)	
Tent Camping-1	.32
Trailer Camping-1	.25
Pickup Camping-1	.25
Snowmobiling-3	.18
Hunting-3	.13
Sailing-1	-.09
Photography-2	-.07
Picnics-1	-.07
Nature Study-2	-.06
Factor XV1 (Group XV1)	
No members	
Factor X1V (Group 1V)	
Playing Tennis-3	.34
Snow Skiing-3	.32
Sailing-1	.25
Golfing-3	.16
Golfing-2	.13
Nature Study-2	-.11
Swimming-2	-.08
Pleasure Driving-3	-.05

NOTES:

Weakly or negatively associated activities below double lines.
Factor loading rank in parentheses for activities listed in more than one group.
Appended numbers 1 to 3 indicate depth of participation categories.
See text explanation of depth categories.

A physically passive dimension emerges in Group II. All activities but swimming and outdoor photography involve travel as an essential part of the pursuit, and, as a result, tend slightly towards a rural setting. All but swimming are directly related to simple appreciation of both natural and man made environments. Only outdoor photography tends to be expensive and requires any degree of skill. These characteristics are reinforced strongly by the lowest loaded activities, which are very active, expensive and skill-oriented.

Group III's activities are highly physically active as emphasized by the weakly associated pursuits: picnicking and pleasure driving, for example. The activities are water based, except for snow skiing, and facility oriented. All except swimming are expensive, require a great deal of skill, and involve personal risk and danger to at least some degree, with the added exception of golfing. All involve individual participation, but usually in a group setting.

Group IV is characterized by a need for freedom or mobility in the outdoors combined to some extent with a certain element or feeling of man conquering, mastering or rising above nature. This is rein-forced by the presence of activities such as sailing, climbing and park visitation that involve harmony with nature as negatively associated activities. The group activities are physically active, expensive and require skill. All involve an element of speed and/or danger, and take place in a rural setting.

Appreciation of and harmony with nature are common to Group V. Hunting and snowmobiling are among the lowest loaded activities on this factor. There is little requirement for facilities or equipment other than a camera. The activities can be physically active or passive and generally to involve an element of both. They also tend to be individual pursuits requiring some degree of skill or knowledge and are heavily concentrated in the rural environment.

Group VI involves travel and outdoorsmanship. All pursuits are active to some degree, and require some knowledge and skill. Facilities and equipment are prerequisites. All pursuits occur in a rural setting and tend to be group activities, although individuals can participate alone. The presence of bird watching-nature study, hiking-walking for pleasure, and sailing as the least related activities may indicate that the majority of campers may be motivated by other factors than the appreciation of nature, as one might have expected. Possibly, the need for cheap accommodation on holidays, and mobility are most important in the growth of camping.

For the purpose of monitoring the effects of depth or participation on the groupings, four factor analyses in total were applied to the 78-activity set yielding orthogonally rotated solutions of 10, 16 and 18 factors, and an obliquely rotated solution with 14 factors. Only the 16-factor solution is presented in this paper. Both the 14- and 16-factor solutions had a tenth factor which measured a dimension not easily described by the activities. No activities in the 16-factor case and only one in the 14-factor case loaded most highly on this factor. The final, sixteenth factor solution also measured a dimension to which none of the activities was most directly related, so the 16-factor solution resulted in only 14 actual groupings. The 16-factor solution was also a good representation of all 4 solutions. Since we ignore the Factor XVI of the 16-factor solution, there is an explanation of somewhat less than 36.5% of the total variation. The following is a discussion of the 14 groups produced by the 16-factor solution (refer to Table 6).

Group I is characterized by general light participation in a large number of activities all of which are very active in the physical sense and require some skill. All of the solutions of the 78-activity set produced a somewhat similar group.

TABLE 7 SOME STABLE GROUPS EMERGING FROM THE ANALYSES BASED UPON DEPTH OF PARTICIPATION

GROUP I
Sledding/Tobogganing/ Sleighing-I
Bicycling-I
Snow Skiing-I
Playing Tennis-1
Power Boating-I
Water Skiing-1
Snowmobiling-I
Ice Skating-I
Climbing-I
Canoeing-I
Golfing-I
Hunting-I
Tent Camping-I
Sailing-1
Trailer Camping-I
Camping with a Pickup Camper-I
GROUP II
Visiting Other Kinds of Parks-1
Visiting Historical Sites or Historical Parks-I
Sightseeing-I
Picnics/Cookouts Away From Homes-I
Walking/Hiking for Pleasure-I
Driving for Pleasure-I
Outdoor Photography-I
Swimming-I
Nature Study/Bird Watching-I
GROUP III
Sightseeing
Visiting Other Kinds of Parks-3
Visiting Historical Sites or Historical Parks-2
Nature Study/Bird Watching-2
Waling/Hiking for Pleasure-2
Outdoor Photography-2
Climbing-2
GROUP IV
Power Boating-2
Water Skiing-2
Swimming-2
Canoeing-2
Hunting-2
Sailing-2
GROUP V
Sailing-2
Snow Skiing-2
Canoeing-2
Power Boating-2
Snowmobiling-2
Water Skiing-2
Swimming-2
Climbing-2
Hunting-2
GROUP VI
Snow Sledding, /Tobagganing/ Sleighing-2
Ice Skating-2
Climbing-2
Snow Skiing-2
GROUP VI (Cont'd)
Horseback Riding-2
Cycling-2
Golfing-2
Playing Tennis-2
GROUP VI.1
Picnics/Cookouts Away From Home-2
Tent Camping-2
Trailer Camping-2
Nature Study/Bird Watching-2
Camping with a Pickup Camper-2
GROUP VIII
Ice Skating-2
Horseback Riding-2
Bicycling-2
Playing Tennis-2
Walking/Hiking For Pleasure-2
Snow Sledding/Tobogganing/ Sleighing-2
Swimming-2
Tent Camping-2
Snowmobiling-2
GROUP IX
Driving for Pleasure-2
Sightseeing-2
GROUP X
Driving for Pleasure-2
GROUP XI
Visiting Other Kinds of Parks-2
Visiting Historical Sites or Historical Parks-2
Outdoor Photography-2
GROUP XII
Camping with a Pickup Camper-2
Tent Camping-2
Trailer Camping-2

NOTES: Appended numbers I to 2 indicate depth of participation categories. See text for explanation of depth categories and formation of groups.

Heavy participation in the passive appreciation activities comprises Group II. All activities are generally cheap with the possible exception of photography, and none involve risk or danger. The negatively associated activities, heavy participation in ice skating and snowmobiling, are both active and can involve risk.

Group III also involves heavy participation, but in active, non-water-based activities requiring a fair amount of skill. Light participation in pleasure driving and moderate participation in active water-based activities score negatively.

Another more general light participation group emerges as Group IV, this time of passive appreciation activities. Some knowledge, but generally little skill, is required by these pursuits which occur in a rural environment and include travel as an integral part of the activity. Group V has only two activities but is an indication of a very strong dimension of moderate, highly travel related passiveness. This nature is emphasized by the negative loading or heavy participation in the specific purpose activity of visiting historical sites, and heavy participation in very active and sometimes risky water skiing and ice skating.

Heavy participation in active, water-based activities requiring skill is measured in Group VI. These activities, sometimes involving the elements of speed and danger, are countered by the very passive nature of the negatively related pastimes.

Group VII's only member, extensive pleasure driving, is another indication of the powerful automobile-related passive factor in Canadian recreation. Those who do a great deal of pleasure driving tend not to participate heavily in active pursuits such as tennis and snow skiing, which score negatively on this factor.

Heavy participation in a movement into the outdoors factor is indicated by Group VIII. Travel is an integral part of these activities, which generally require some equipment and can be active, but are not usually physically demanding. The negatively associated activities are active and sometimes involve speed and personal risk.

Group IX sees a recurrence of the active water-related activities, this time at a moderate level of participation. Snow skiing still is a member of this group because of its active and speed factors, and hunting and climbing are related, probably by their active nature.

Factor X does not produce a group as there are no highly related activities for it. Group XI is defined by the moderate level of participation in the active, non-water based activities. The group is quite similar to those formed by the other levels of participation in the same type of activities: Groups I and III.

Moderate participation in passive-appreciation pursuits forms Group XII. Sightseeing and pleasure driving, which are usually in this type, have combined to produce the travel-based passive Group V.

Group XIII sees emergence again of the camping-outdoorsman factor, this time at the moderate participation level. It is interesting that camping with a pick-up camper is a member of this group at both moderate and heavy levels of participation. This occurence indicates that there is little motivational difference behind moderate and heavy pick-up camping.

Active, skill-requiring activities comprise group XIV. All are at the moderate or heavy participation level except sailing, which is also the only water-based activity. Perhaps the availability of accessible water facilities limits participation in sailing, which remains attractive to this recreation type. The presence of golfing at both moderate and heavy levels may indicate that, generally, there is a common set of attractions for golfers who participate more than five times per year.

Group XV is the light participation camping-outdoorsman group, but is joined by two

activities that are physically active and at the heavy level of participation. This combination may result from a relationship between occasional camping and heavy participation in snowmobiling and hunting, as camping may sometimes be a part of the latter activities. Factor XVI, like Factor X, does not produce a viable group.

Several interesting characteristics of Canadian participation patterns have emerged from the analyses based on depth of participation. The most striking, perhaps, is that Canadians tend to confine their participation in all their activities to the same level; those who participate heavily in certain activities tend to participate heavily in all their activities. This trend is revealed by the fact that, with only a few exceptions, groups were formed by the same level of participation in the member activities.

Depth of participation in activities would seem to depend more on the individual's general desire to participate than on the nature of the activities themselves. While there certainly must be motivational differences between marginal and heavy participation in an activity, these differences seem to apply to all activities within the individual's range of participation. That is, those motivations which prompt a person to participate extensively in one activity also result in his extensive participation in his whole range of activities. Thus activity groupings remain very similar at all levels of participation.

Only a few activities were placed at one level in a group comprised of a different level of participation. This placement resulted from various causes, including the dual nature of some activities such as moderate climbing whose characteristics are illustrated by its membership in both the active Group IX and the passive appreciation Group II. A basic difference between one activity and a group of otherwise highly related pursuits may be a second cause of the grouping of activities at different participation levels. The inclusion of only light participation in sailing in Group XIV, possibly due to its water requirement, has been mentioned as an example. A third cause may be the occasional participation in some activities in the course of pursuing others, as has been mentioned for snowmobiling, hunting, and camping in Group XV. Finally, a fourth cause may be the arbitrary delineation of the different levels of participation. Golfing and camping with a pick-up camper have been mentioned as activities to which the division point of ten occasions of participation between moderate and heavy participants may not be valid.

While Canadians seem to be either light, moderate, or heavy participants in their whole range of activities rather than light participants in some of their group of pursuits and heavy participants in other, they also seem to be very dependent on passive recreation relying on the use of the automobile. Of the 14 viable groups resulting from the 16 factor analysis, several possessed an element of travel, and two (Groups V and VII) were formed only by moderate pleasure driving and sightseeing, and heavy pleasure driving, respectively.

In all of the analyses of the 78-activity set, the first factor, and therefore the strongest dimension of Canadian outdoor recreation participation, was light participation in a broad range of activities. The members of this group varied slightly from analysis to analysis, but generally they were active outdoor recreation pursuits.

In an attempt to determine the stability of the groupings based on depth of activity, the groupings produced by all four solutions involving 78 activities were compared. Twelve groups were formed by members that were associated with each other in at least three of the four analyses. They are listed in Table 7.

DETERMINING AGGREGATES OF PEOPLE: CLUSTER ANALYSIS RESULTS

One of the easiest ways to understand how a particular cluster analysis proceeded and how to interpret the results is to look at Figure 1 and to see how the sequence of events depicted

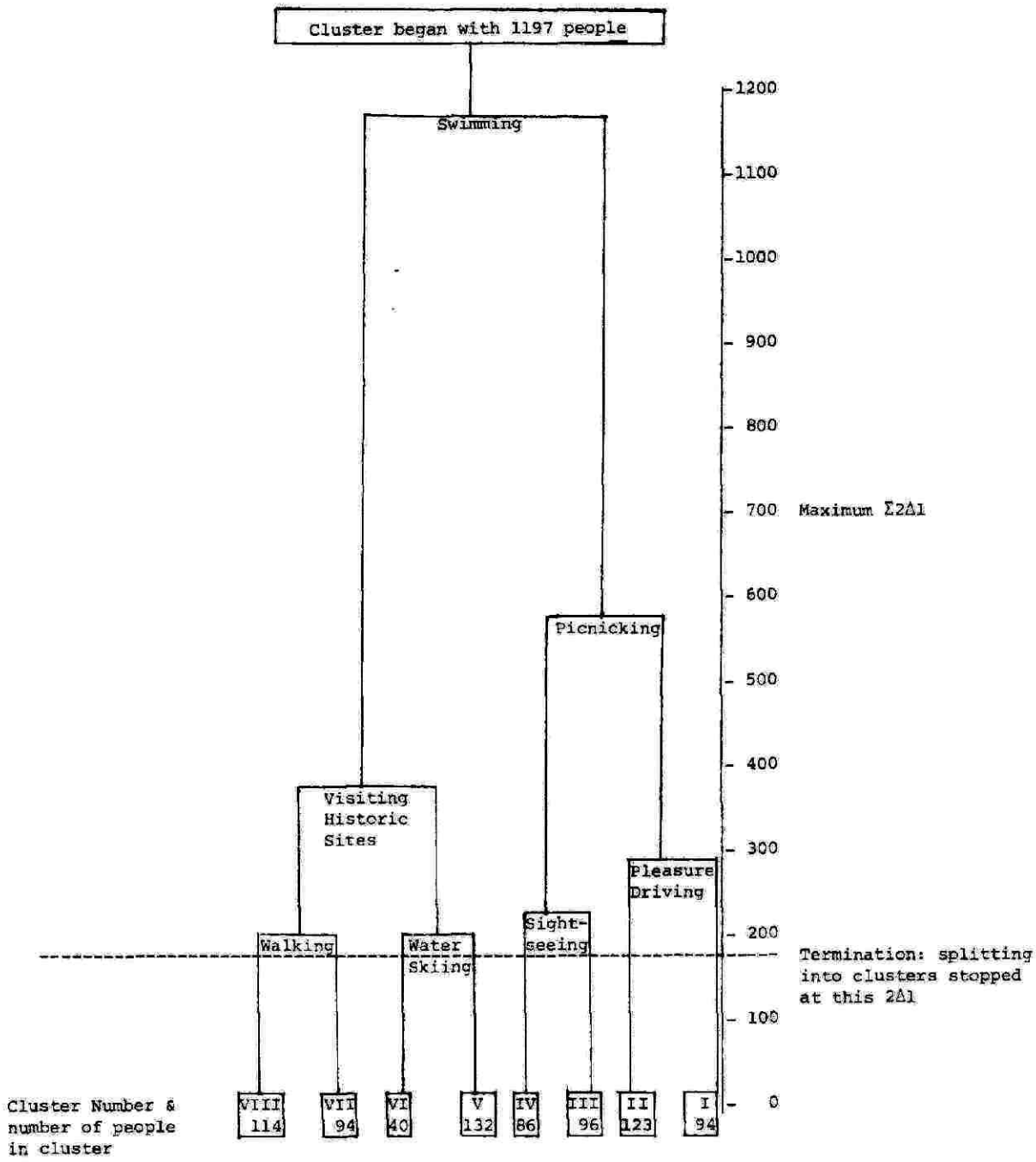
relates to the actual cluster description presented in Table 8. The reader who is knowledgeable about cluster analysis will see from the "tree" in Figure 1 that the clusters were formed by what is described in the Appendix as a monothetic divisive algorithm. This was done because the use of this algorithm was relatively cheap and in that respect appropriate for a preliminary study. However, as indicated later, there is good reason to believe that an alternative algorithm should be used in subsequent studies if only to avoid the biases that arise when terminal clusters become a function of the sequence of division that is carried out.

From Figure 1, one sees that the initial split of the universe of 1100 people (used because of available memory in the computer) was on swimming. By breaking the population into two groups on the basis of whether they did or did not participate in swimming, it was possible to get two more homogeneous groups of people: more homogeneous in terms of the activities in which they did or did not participate. A group of people who did not swim (not swimming by a "No" on the right–hand branch in the figure) was further divided on the basis of whether they did or did not go picnicking. As shown by the "maximum 2ΔI" axis, the splitting on picnicking further contributed to defining homogeneous groups. Other splits were made on the basis of visiting historic sites, driving for pleasure, sightseeing, walking and water–skiing, and can be seen from the figure.

TABLE 8: PATTERN OF CLUSTER FORMATION THAT OCCURED IN DETERMINING CLUSTERS USING CORD 1969 STUDY NATIONAL DATA

		% Occurence Cluster								% in cluster participating compared to % in population Cluster							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
1.	Swimming	0	0	0	0	100	100	100	100	0	0	0	0	2.46	2.46	2.46	2.46
2.	Tent Camping	1	3	15	12	14	26	17	32	.10	.24	1.22	.93	1.07	1.70	1.33	2.52
3.	Trailer Camping	1	2	10	13	3	10	5	10	.11	.26	1.78	2.21	.59	3.39	.80	1.80
4.	Pick Up Camping	0	0	1	5	3	7	2	3		0 0	.45	2.55	1.77	3.39	.80	1.35
5.	Hunting	4	7	14	11	14	26	11	15	.39	.62	1.28	1.01	1.27	2.43	1.00	1.37
6.	Power Boating	3	5	10	13	24	71	41	36	.17	.28	.56	.70	1.29	3.89	2.24	1.97
7.	Canoeing	0	2	4	2	10	36	9	21	0	.30	.58	.27	1.37	4.80	1.23	2.78
8.	Sailing	1	0	2	0.	3	19	6	11	.17	0	.49	0	.97	5.57	1.75	3.20
9.	Water Skiing	0	2	0	2	0	100	14	15	0	.22	0	.28		014.3 9	1.97	2.22
0.	Bird Watching	3	9	14	14	9	16	6	21	.28	.84	1.29	1.29	.90	1.54	.58	1.95
1.	Photographing	7	19	25	25	24	16	33	53	.27	.79	1.02	1.05	.98	.67	1.38	2.19
2.	Visiting Historic Sites	9	26	27	66	0	0	100	100	.25	.70	.73	1.76	0	0	2.67	2.67
3.	Visiting Other Parks	11.1	28	27	71	38	52	71	76	.26	.68	.66	1.72	.91	1.25	1.73	1.84
4.	Driving for Pleasure	0	100	71	90	71	71	73	82	0	1.53	1.09	1.38	1.09	1.09	1.11	1.25
5.	Sightseeing	7	45	0	100	36	58	62	75	.17	1.06	0	2.37	.86	1.38	1.47	1.78
6.	Climbing	1	2	0	6	3	13	0	21	.13	.31	0	1.21	.70	2.68	0	4.44
7.	Mow Skiing	0	2	3	4	7	55	14	18	0	.20	.35	.53	.91	7.42	1.85	2.43
8.	Snowmobiling	4	6	12	11	18	45	26	15	.32	.45	.92	.83	1.40	3.48	1.99	1.19
9.	Tobogganing	2	2	8	13	16	48	18	33	.18	.12	.58	.96	1.22	3.66	1.38	2.52
0.	Picnicking	0	0	100	100	62	58	70	87	0	0	1.87	1.87	1.15	1.09	1.30	1.63
1.	Walking	15	26	30	42	46	48	0	100	.39	.70	.76	1.10	1.22	1.28	0	2.64
2.	Golfing	3	4	4	11	12	45	21	26	.26	.33	.38	.95	1.01	3.99	1.88	2.27
3.	Ice Skating	2	5	13	13	30	55	38	38	.10	.27	.68	.67	1.60	2.90	2.00	1.99
4.	Horseback Riding	3	1	5	6	8	19	8	19	.42	.11	.72	.83	1.15	2.75	1.08	2.67
5.	Bicycling	4	5	3	10	16	19	15	27	..37	.47	.31	.88	1.46	1.75	1.37	2.39
6.	Tennis	1	2	5	3	8	26	11	22	.08	.30	.69	.40	1.09	3.49	1.44	3.01

FIGURE I NATIONAL ACTIVITY PACKAGES BASED ON 1969 CORD STUDY NATIONAL SURVEY DATA



Dividing people into groups in the way suggested means that some of the aggregates, which have been called terminal clusters, will have people who do not participate in certain activities and some of them will have people who do participate in certain activities. This is the way that the clusters were defined in this analysis. This is obvious from Table 8 when one looks at the percentage occurrence figures and sees that, for example, in cluster 2, 100% of the people drove for pleasure. Driving for pleasure is a defining characteristic of this cluster along with non–participation in picnicking and non–participation in swimming. So, also one sees that there

was no participation by people in cluster 2 in the activities swimming and picnicking. However, one only really learns something new when one sees that for cluster 2 there was also no participation in the activity sailing or in the activity pick–up camping. These latter activities do not have zero participation by definition. Having zero participation conveys real information about other activities that people in this aggregate do or do not participate in. For further illustration, cluster 1 of Figure 1 indicates that not swimming, not picnicking and not driving for pleasure are defining characteristics. In the percentage occurrence figures in Table 8, one sees that zero participation in these activities occurs. Zero participation also occurs in pickup camping, water skiing, snow skiing: very little participation, even compared to people in cluster 2, occurs in many other activities. So a picture begins to emerge of the people in cluster 1 being far less active than people in cluster 2.

The results presented in Table 8 are interesting in a number of respects that have not been covered in the descriptive discussion above. They certainly make clear that there are groups of population that have different activity packages, so a planner should not think of the population as a homogeneous body of people who have a certain probability of participating in each of a number of activities independently of other activities they participate in. The importance of this in making projections is commented on earlier in this paper (also in TN 13, 29, 32).

Still, the analysis leaves something to be desired. The algorithm used does not allow some people who may participate in a number of the activities that are included in one of the more active clusters to be in that cluster unless one does or does not participate in the two or so critical activities that define that cluster. This is because a monothetic divisive type of cluster algorithm was employed to define clusters. But the influence of supply on what people participate in may automatically eliminate people from a cluster because, where they live, it is not convenient to participate in a certain key activity which defines a cluster.

One who has taken some biology will recall that the classification problem is one of defining critical characteristics. Many characteristics are not critical in determining whether a certain plant should be grouped with other plants. At first examination it may even appear curious that certain plants or animals are grouped together. This kind of consideration carries over to studying the groupings of recreation activities if one wants activity clusters for aggregates of people and if clusters are to be truly behaviourally meaningful. It is the belief of the authors that if one wants to consider substitutability and recognize the fact that it may be operative for different individuals who would be in the same cluster, it is critical to carry out cluster analyses with a "natural class-seeking algorithm" (see Appendix).

In terms of guidelines for further research one may note that it is possible to achieve more natural clusterings by incorporating supply information into a cluster analysis. The way that this can be done is to use existing supply information on two different areas to form a weight that is used in determining how significant the difference between participation in a given activity is between the areas in which two people being considered live. If two persons who live in different areas are being compared, then instead of simply taking the difference between some numbers that reflect whether a person is a non-participant, or a regular or irregular participant and squaring these and adding them up over all activities, one may take this squared value and weigh the difference by reducing it if there is a difference in supply that reduces the difference in scores (depending on whether the difference in supply in the two areas is large, medium or small, defined according to some arbitrary scale that is set up). In particular one might use the kind of potential map generated for camping in TN 5, but for each activity have a similar kind of map so that the potentials in every geographic area would be known (see also Tn 29). On the basis of

such a map differences would be taken as reflecting true differences if the potential were within 25% of each other and in other cases a correction would be introduced to say that the differences between the people and the activities in which they participate, and to reflect supply and thereby the participation level of one person, would be shifted towards the potential of the other person by varying degrees depending on how much the potential for the activities actually did deviate between the two areas.

This proposal does not get into the more tricky matter of substitutability or what some people refer to as substitute supply (see e.g. TN 32, 37). Until some work is done in the more straightforward way just suggested, and until actual behavioural information becomes available on what substitutions people do make and why, it is not really plausible to make a suggestion about how to take into account substitution in defining clusters. At this point it is simply important to note that substitution must be considered when one is aiming at defining natural classes as opposed to defining classes which, when corrected for availability of supply, may have a strong bias toward meeting certain mathematical conditions rather than telling one truly about behavioural influences that are operating on people.

In this discussion the matter of examining socioeconomic characteristics of people who are in various aggregates that are determined using cluster analysis programs have almost been totally ignored. In the introductory discussion, particularly that based on the work by Burton, the value of knowing socio-economic characteristics was stressed with respect to the matter of making projections. This theme is taken up in CORD Study Technical Notes 13 and 32, in particular. Here, it is only necessary to note that in work already published by Romsa (1973) results have been presented on the characteristics of people in relation to the aggregates to which they belong. It is not a difficult matter when a person has been classified into a given cluster to carry out analyses of the individual clusters to see what characteristics people have, but it is not a simple matter to characterize a cluster by the characteristics of the people who are in it because there may be a wide range of ages of people and there may be wide deviations in the socio-economic characteristics. Giving a "typical profile" based on average education, average income, etc. for a cluster is not a very adequate way of indicating what socioeconomic characteristics are really important with respect to a cluster. In fact, there may be somewhat the same problem associated with characterizing clusters as there is in saying what activities really constitute the important activities in defining an activity package. The income variable may not be important for one activity even though people in the particular cluster involved have an above average income: it may in the case of this cluster be the rural urban variable that is important and the income difference may only express the highly urban concentration of people in a particular cluster. Regardless, it should be clear from depreciating examples that the issue of characterizing clusters is seen as important and is yet another area that must receive attention if practical use or even academic uses may be made of the procedures for deriving aggregates of individuals from information on their participation in various activities.

CONCLUSION

From the results presented in this article one can see that the two analysis strategies used produced results that are quite different in terms of what they means but which may be confused. Clearly when one speaks about activity packages, unless there is general acceptance that this is not a collection of inter-correlated activities determined by R-mode factor analysis, there is the possibility that one will misunderstand what is meant. Similarly when a list of activities is presented and it is said that these define a "recreation type", one may become confused and not realize that this is the collection of activities with which people have been associated in the way

described by Burton. Thus one can see that from a practical perspective it is very important to indicate whether lists of activities define groups in the sense of Burton or whether the lists relate to the activity package of a group of individuals in the spirit of the cluster analysis methodology.

Obviously, the two different sets of results do not have the same implication for planning. Knowing that a certain proportion of the universe of individuals is characterized by participating in a certain group of activities means that a planner can know what proportion of the universe being studied is served by a certain activity. By looking at cluster after cluster one is able to see how important a certain activity is in the different activity packages of the different aggregates of people into which a universe has been divided. One can even put this importance in perspective by presenting figures on the size of the various aggregates. One may say that for 15% of the population a certain activity is one of the two activities usually participated in (these people have only 2 activities) while for 30% of the population this activity was only 9% of their activities (meaning these people had about 12 activities in their activity packages). Such a statement could be made for several groups with activity packages ranging in size from 8 or 9 activities to 15 or 16 activities.

The reader may wish to attempt to formulate an example of where the Burton cluster of activities information would be useful. As indicated in the beginning of this paper, there are other studies that comment on the uses of cluster analysis and on the Burton factor analysis methodology (TN 32, 37, Romsa 1973). Since these matters need not be pursued here the example just introduced is not elaborated on. However, it is in the context of the example, and the kind of planning concerns just raised, that the future of the kind of research presented here lies.

This article has only shown the feasibility of certain lines of analysis without pursuing in depth even what the implications of carrying out these analyses are. An obvious next step is the preparation of papers where actual management applications of one or other of the techniques are made. Another area for further research is that of theory development in relation to which of the models should be used and in what circumstances. This involves clarifying the behavioural considerations relevant to the use of factor analysis in cluster analysis as has already been begun (see TN 32, 37).