AN ABSTRACT OF THE THESIS OF

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Shoplifting is among the most common crime committed in the United States and accounts for yearly business losses of millions, if not billions of dollars. Investigators have studied the problem from many different points of view, but little has been done in demographic research and shoplifters are generally treated by the courts as a homogeneous group. There have been a number of articles citing emotional and cultural aspects of shoplifting. It has also been observed that most shoplifting does not occur for financial reasons, as most shoplifters can pay for what they steal.

This study used demographic variables taken from a form filled out by shoplifters in a diversion program. One hundred male and one hundred female first offender

adult shoplifters who had committed a misdemeanor were investigated. The demographic variables for each shoplifter were subjected to a computer cluster analysis which resulted in four clusters of females and two clusters of males. Demographic characteristics generally found in individual shoplifters, such as impulsivity, depression, or chaotic family life, were also characteristic of the clusters. In addition, each cluster was uniquely different from the others. The finding of clusters within the general population of shoplifters opens the way for further investigation into factors influencing shoplifting and the development of more effective prevention and treatment programs.

AN EXPLORATORY INVESTIGATION INTO SHOPLIFTER CLUSTERS AS SEEN IN A COURT DIVERSION PROGRAM

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Chapter 1

INTRODUCTION

This chapter includes general background information and a discussion of the theoretical formulation. This chapter also includes a discussion of the assumptions of the study, the purpose and significance of this research, definition and clarification of terms, and limitations of the study due to uncontrolled variables.

THEORETICAL FORMULATION

The alarming rise in shoplifting and concomitant huge losses of income to businesses has resulted in stepped-up efforts to apprehend and prosecute shoplifters. It has also resulted in demands for preventative and rehabilitative programs. Clearly, there is a need to understand the various motivations for shoplifting in order to respond to these demands, and yet the literature is noticeably deficient in this investigative area. Programs in prevention and rehabilitation have been aimed at shoplifters in general, and the immensity of this social problem would suggest that the programs have been lacking.

Undoubtedly psychological factors play a role in who shoplifts, but other factors such as family background, age, marital status and race may be equally important.

Thus, if homogeneous clusters of shoplifters can be identified using variables such as those mentioned above, the variables might help in understanding the various motivations for shoplifting. This would then aid in the development and tailoring of more effective preventative and rehabilitative programs.

THE PROBLEM

Various investigations of shoplifters have been lacking in sufficient numbers of subjects and demographic variables. There is a need for a more detailed understanding of social and emotional variables in shoplifters, and whether these variables may be used to determine if shoplifters are one large homogeneous group.

Statement of the Problem

Is there a significant difference in demographic variables of male and female first offender shoplifters who commit a misdemeanor?

Statement of the Hypothesis

(Null Form) No male or female clusters of shoplifters will be found within a male and female sample of first offender shoplifters who have committed a misdemeanor.

Assumptions of the Study

The variables used in this investigation were taken from a pre-sentence questionnaire compiled by first offender shoplifters. It was assumed that the sample of subjects would be representative of the male and female first offender shoplifter in Shawnee County. It was also assumed that those apprehended for the first time were not hard core or professional shoplifters.

Another assumption implicit in the data collection was that the variables were psychologically, socially, culturally and economically significant and, while probably not all inclusive, would be useful in identifying clusters of shoplifters.

Purpose of the Study

The primary purpose of the study was to investigate if demographic variables applied to first offender shoplifters could be used to determine homogeneous clusters.

The variables used were taken from the pre-sentencing form used by Shawnee County Court Services for first offender shoplifters. The variables included items related to family composition and background, race, age, sex, and the item stolen, with a total of fifteen variables used.

Significance of the Study

For many years shoplifters have been treated as a homogeneous group in regard to preventative and rehabilitative programs. Typically, when apprehended, the fate of the shoplifter will rest upon the value of the item stolen (felony or misdemeanor) and whether it is a first offense. Very little has been done to investigate motivating factors involved, and clearly the current educational anti-shoplifting programs are not all that effective. Thus, if the variables used in this study can determine clusters of shoplifters, it would be a beginning step toward a better understanding of factors motivating shoplifting and in identifying high risk groups. In addition, it might be helpful in developing more effective preventative and rehabilitative programs.

DEFINITION OF TERMS

Shoplifting

Any person who shall willfully take possession of any goods, wares or merchandise of value of less than $50.00 offered for sale by any store or other mercantile establishment with the intention of converting the same to his own use without paying the purchase price thereof, shall be guilty of the offense of shoplifting.

Concealment from view of any goods, wares, or merchandise on the person or otherwise under the control of that person, shall be deemed prima facie evidence of shoplifting (Code of the City of Topeka, Kansas, 1972).

Felony

A felony is a crime punishable by death or imprisonment in the state prison. Theft of property of the value of $50.00 or more is also considered a felony.

Misdemeanor

A misdemeanor is a theft of property of the value of less than $50.00 and is punishable by other than imprisonment in the state prison.

Diversion Program

The diversion program of Shawnee County (Topeka, Kansas) is for people committing non-violent crimes of the nature of a misdemeanor. These people may bypass criminal proceedings, be referred for some form of special program, counseling or treatment, and upon completion of the program they will not have a criminal record.

The criteria for the Diversion Program in Topeka, Kansas have, for the most part, been set out by the District Attorney and include the following: (1) That the accused not have any prior criminal convictions; (2) That the offense be non-violent in nature and a misdemeanor; (3) That the misdemeanor not be the result of a reduction of an original charge which was a felony in nature; (4) That any restitution and/or court costs owing be paid prior to dismissal of charges at the end of a twelve month period; (5) That the accused cooperate with any normal conditions of the Diversion Program as well as any special conditions recommended and approved by the court at the time of the signing of the Diversion Agreement (Shawnee County Court Services, 1975).

Diversionary Agreement

A diversionary agreement is a contractural arrangement between the accused, the prospective sentencing judge, the District Attorney, and the defense attorney. They all agree to divert the entire matter surrounding a criminal offense for a period of one year while the accused is placed on the Diversion Program. Upon completion of the Diversion Program all charges are dismissed by the court.

LIMITATIONS OF THE STUDY

There are a number of uncontrolled variables within this study. The subjects were those referred for the Diversion Program after being charged with their first misdemeanor shoplifting offense. There was no way to assess how many times some had shoplifted before. This investigation did not study attitudes of store security personnel and no attempt was made to control whom security personnel apprehended for shoplifting. Furthermore, there was no way to control whom the judge referred for the Diversion Program, although assurances were given that all eligible persons had been referred.

All the subjects were people living within Shawnee County; and, thus, the findings may not be applicable to people living elsewhere. By using a large number of subjects, it was hoped that the uncontrolled variables would not unduly influence the results of the study.

Approximately 500 hours were involved in the collection and analysis of the data for this study.

Chapter 2

REVIEW OF THE LITERATURE

In 1972, it was estimated that shoplifting accounted for 15% to 33% of stock shortages, valued at .7 to 1.7 billion dollars per year (El-Dirghami, 1974). Thus, shoplifting ranks third, after burglary and vandalism, in financial loss to businesses (U.S. Congress, 1969). Shoplifting has also been reported to involve one in 8.5 to one in 20 customers (Astor, 1969). In light of the serious financial losses as well as the significant number of persons involved, it is not surprising that this subject has already been studied from many different points of view. This literature review focuses on those studies dealing with factors of race, sex, motivation and age of shoplifters.

Who is the shoplifter? The question is very difficult to answer because of numerous conflicting points of view. For many people, the shoplifter is synonymous with the kleptomaniac. Others think of the shoplifter in terms of a stereotyped middle aged female. She is usually described as menopausal, depressed, and succumbing to an uncontrollable impulse to shoplift (Griffin, 1971).

When shoplifters are studied as to incidence of males and females, the findings are not uniform. Some investigators (Griffin, 1971) report an equal distribution of males and females, others (Russell, 1973) report that 70% to 85% of adult shoplifters are female, and still others (Wisher, 1968) report that among teenagers, males shoplift more than females. Although a larger proportion of blacks have been found to shoplift than whites (Cohen & Stark, 1974), these studies are difficult to evaluate because of the variable of racial prejudice. Cameron (1964) found that blacks are kept under much closer observation while shopping than whites.

Attempts have been made to differentiate between male and female shoplifters on the basis of previous convictions and type of item stolen. Gibbens, Palmer, and Prince (1971) and Cox (1968) found that male shoplifters differed from female shoplifters in that they tended to steal books. Gibbens et al. (1971) also found that half of the males he studied had previous convictions and a third had been in prison before. In both sexes, however, the vast majority of shoplifters can pay for what they steal. Aside from those who steal out of necessity, for profit, or to support a drug habit (NIMH, 1965; Plair &

Jackson, 1970), other motives range from doing it for kicks (Lunden, Satterlee, & Connell, 1967) to feelings of merchandise being too expensive and shoppers feeling exploited by the merchants. Thus, most teenagers, college students, and adults shoplift for noneconomic reasons (Thall, 1973; Astor, 1971).

Other investigators have studied the emotional and social aspects of shoplifting, and their conclusions are very broad and general. Russell (1973) stated that shoplifting might be an expression of early deprivation associated with feelings of unfulfillment. Although there is probably an element of deprivation in all shoplifters, in some cases it may be more socially than emotionally determined. Douyan (1971) has mentioned several factors accounting for the neurotic and psychopathic acts of shoplifting including subconscious suggestion, fetishist tendencies, disguised equivalent of erotic gratification, a form of affective compensation, and depression. To these Russell (1973) adds the chronic inability to integrate prohibitions against stealing, and some cases of retardation or psychosis. Beck (1974) studied some personality aspects of college students using the Minnesota Multiphasic

Personality Test (MMPI) and the KD Proneness Scale (delinquency proneness scale). She reported that the KD Proneness Scale differentiated between the one time and chronic male shoplifters. The MMPI revealed that ". . . the personality of the chronic shoplifter is hostile, deceitful, impulsive, and/or anxious, with tendencies toward delinquency, emotional shallowness, and high energy level." Applebaum and Klemmer, (1974) studied social and psychological factors shared by a small number of shoplifters. Social factors included poverty, competitive sport among children and teenagers, and rebellion against rules and standards of society. Psychological factors included poor impulse control, sociopathic personality, neurotically determined antisocial acts, drugs or alcohol, and severe mental disorders. In reference to emotional problems, others (Gibbens et al., Chiswick, 1976) have reported that the middle aged to elderly female shoplifter may be suffering from psychiatric and/or serious physical illness. Butchelor (1969) has even suggested that in these particular age groups, shoplifting may represent a cry for help in depressed women who are suicide risks.

Shoplifting can start at any age, but frequently begins around age 14 (Wisher, 1968). Thus, some

investigators have studied teenagers, hoping to clarify what factors motivate the shoplifter. Wisher (1968) studied students in one high school and reported a number of interesting findings. Those teenagers who shoplifted tended to have more siblings, come from broken homes, be unemployed (but with the funds to pay for the item stolen), belong to no out of school organizations. Most of those sent to court did not stop shoplifting. Cameron (1964) and Cohen et al. (1974), however, found that being apprehended was a deterrent to further shoplifting. Boyd and Harrell (1975), reporting on high school and college students, found that the older students perceived shoplifting to be more of a problem than did younger students. These findings, while interesting and suggestive of possible influences of shoplifting in teenagers, still do not give us a clear picture of the shoplifter. Indeed, there are large numbers of people with similar backgrounds and characteristics who do not shoplift.

In all the above cited studies, the shoplifter is represented as ranging from the casually dishonest to pathologic. It appears that there is also considerable variance among shoplifters in social functioning and emotional functioning.

When the studies on shoplifting are reviewed, it is very difficult to make definitive statements about shoplifters. While this is, in part, because shoplifting may represent a symptom of any number of issues cited above, it is also due to the narrowness of the studies. Some investigators have studied students in a particular high school or college. Others have studied a few shoplifters and made generalizations to many, and still others have studied shoplifters from one store. From these studies, investigators have tended to make inferences about shoplifters as a group, with no systematic effort made to determine if there are subgroups within the group of shoplifters. Indeed, the failure to explore the possibility that there are subgroups (i.e., phenotypes) has seriously undermined the value of using the above studies to generalize to individuals.

Chapter 3

METHODS AND PROCEDURES

This chapter is divided into population and sampling, and collection and treatment of data. The heading Population and Sampling contains a discussion of the arrangement of the sample and criteria for inclusion in the sample. Under the heading Collection and Treatment of Data, there is a description of the variables used and a discussion of cluster analysis.

Population and Sampling

The sample was separated by sex (100 males and 100 females) in keeping with the literature cited (Griffin, 1971; Russell, 1973; Wisher, 1968), which suggests that there is a difference between male and female shoplifters. If the data had been analyzed as a combination of the two sexes, it would not have been possible to determine if a sexual difference existed.

The subjects, eighteen years of age or over, consisted of those shoplifters charged with shoplifting as a misdemeanor and referred to sign a Diversionary Agreement. All subjects had been seen during the period beginning January, 1976 through May, 1977.

Children, adolescents, and felons were excluded, as these are treated by the criminal justice system as separate groups and are not eligible for diversion.

Collection and Treatment of Data

Data used in this project were taken from the Pre-Sentence Information Form which is routinely completed by all shoplifters seen by Court Services, Third Judicial District, Topeka, Kansas. The demographic data were reported under the following fifteen variable headings: Age; education; welfare assistance; who raised you; natural father living; natural mother living; natural parents married; marital status; number of children; place arrested; reason offense committed and history of juvenile delinquency. Also collected, but not on the Pre-Sentence Information Form, was the shoplifter's race, the article or articles shoplifted, and the value of the article taken.

Some of these variable headings are self-explanatory, but several of them need further clarification. The variable, education, is broken down into four categories. The category, high school, is meant to indicate that the individual is a high school graduate.

The category, college, is meant to indicate that the subject had at least some college education. The variable, article taken, is divided into the following seven categories: Food, clothes, household items (including items such as soap, dishcloths, and sewing needles); cigars, cigarettes, beer; articles of personal adornment (including items such as jewelry, hats, sunglasses, cosmetics); other items or a combination of items (including items such as tapes, records, and books); and information not available.

The variable, reason for offense, was broken down into five categories. The first category, financial/food, is meant to indicate that the individual shoplifted because he needed an item and could not afford it. The second category is unconscious impulse/depression. This category is reserved for people who did not understand what prompted their behavior and were puzzled by it. People who indicated that they were depressed were also included in this category as they too did not understand what motivated their actions and were surprised by their own behavior. The third category included people who claimed that the shoplifting was an accident. For example, without thinking, they put an item in their

pocket or purse and forgot to pay for it when they checked out. These people claimed that they were innocent as did others who claimed not to have taken anything. The fourth category, alcohol, includes those people who indicated that they were intoxicated at the time they committed the offense. The last category, conscious intent, is reserved for those people whose conscious intention was to shoplift.

The variable, ever in trouble as a juvenile, refers to those people who had been involved in the criminal justice system as a juvenile.

Analysis of the data for purposes of identifying clusters, or subgroups, was done at the University of Kansas on a Honeywell 66/60 using BMDP1M, "Cluster Analysis on Variables", version 2.0A, February 7, 1975. (This program write-up is available in Appendix A.) The data description was done with BMDP2D, version 2.0A, February 7, 1975, a frequency count routine. These programs were developed at the Health Science Computing Facility, University of California at Los Angeles, sponsored by NIH Special Research Resources Grant RR-3.

Cluster analysis is a statistical procedure which creates a classification from a data set. The object of cluster analysis ". . . is to sort the observations into

groups such that the degree of 'natural association' is high among members of the same group and low between members of different groups", (Anderberg, 1973, p. 3).

Cluster analysis as a means of identifying recurring patterns among individual data profiles has only recently begun to find popularity and concurrent use in the behavioral sciences (Blashfield, 1976). In some measure, the reason for cluster analysis being used is due to Anderberg's (1973) classifications regarding analysis of various types of variables (nominal, ordinal, interval). Anderberg (1973) states, ". . . when nominal variables are employed, the comparison of data unit with another can only be in terms of whether the data units score the same or different on the variables" (p. 123). Thus, for this data which consisted of fourteen nominal variables and one interval variable (age), the measure of similarity used was a simple matching association coefficient (Anderberg, p. 123). These coefficients were computed with a Fortran program and then this matrix of association coefficients was the input to BMDP1M.

Chapter 4

ANALYSIS OF THE DATA AND RESULTS

To test the hypothesis, the data on the variables listed in Chapter 3 were submitted for each subject to a computerized hierarchical analysis. The results were not expressed in terms of the individual, but rather in terms of groupings and are summarized for females in Table 1, and for males in Table 2. This is followed by presenting the data pertaining to all 100 females and then presenting the data for each of the four female subgroups. Then the data pertaining to all 100 males and the data for each of the two male subgroups is presented. The data for the 100 females is then compared with the data for the 100 males. Each subgroup description is preceded by a heading that includes the number of subjects in the subgroup and the salient characteristics of that subgroup. It should be noted that of the 100 females 88% clustered, and of the 100 males 54% clustered.

Table I

Cluster Analysis Summary Table for 100

Female Shoplifters & Female Subgroups

Variables	100 Females	13 Females	21 Females	31 Females	23 Females
Race					
White	72%[a]	46%[a]	71%[a]	81%[a]	78%[a]
Black	20%	54%	19%	10%	22%
Other	8%	0	10%	10%	0
Age					
Range	18-77 yr.	18-64 yr.	20-77 yr.	18-51 yr.	18-73 yr.
18-23 yrs.	52%	31%	19%	81%	57%
18-34 yrs.	75%	92%	38% (20-32 yr)	97% (18-29 yr)	83%
Other	25% over age 34	8% (1) age 64	62% age 40 or over	one 51 yr. old	17% over age 34
Education					
Mean	11.4 yr.	11.4 yr.	10.6 yr.	12.2 yr.	12.1 yr
11th grade or below	30%	31%	52%	13%	22%
High school education	52%	38%	38%	68%	56%
College education	18%	31%	10%	19%	22%
Marital Status					
Married	37%	8%	76%	0	78%
Not married	63%	92%	24%	100%	22%
Never married	42%	46%	5%	97%	0
Married more than once	17%	23%	14%	0	30%
No. Of Children					
None	48%	31%	20%	97%	17%
One	17%	38%	20%	3%	17%
Two	20%	31%	30%	0	44%
Three	6%	0	15%	0	13%
Four or more	8%	0	15%	0	9%
Welfare					
Yes	39%	92%	14%	16%	43.5%
No	61%	8%	86%	84%	56.5%
Who Raised You					
Mother & Father	75%	0	81%	77%	100%
Mother	18%	85%	14%	10%	0
Father	1%	0	0	3%	0
Other	5%	15%	5%	10%	0

[a] =Percent of the number of people in that column.

Table I (continued)

Variables	100 Females	13 Females	21 Females	31 Females	23 Females
Natural Parents Married					
Yes	45%	0	0	68%	91.3%
No	54%	100%	100%	32%	9%
Separated	2%	0	5%	0	4.3%
Divorced	24%	59%	5%	26%	4.3%
Natural Father Living					
Yes	73%	75%	20%	93.5%	100%
No	27%	25%	80%	6.5%	0
Natural Mother Living					
Yes	83%	92%	57%	93.5%	100%
No	17%	8%	43%	6.5%	0
Where Arrested					
Department store	63%	80%	50%	60%	76%
Food market	35%	20%	50%	39%	24%
Drug store	1%	0	0	4%	0
Other	0	0	0	0	0
Value of Article Taken					
Under $1.00	15%	8%	17%	8%	20%
$1.00 to $4.99	31%	0	28%	46%	30%
$5.00 to $9.99	21%	17%	39%	25%	5%
$10.00 to $19.99	18%	42%	6%	21%	20%
$20.00 to $29.99	6%	25%	6%	0	5%
$30.00 to $50.00	9%	8%	6%	0	20%
Article Taken					
Food	23%	15%	52%	17%	13%
Clothes	30%	61%	14%	21%	39%
Personal acornment	13%	8%	14%	5%	13%
Household items	14%	8%	9.5%	14%	13%
Cigar/cigarettes/beer	3%	0	0	0	9%
Information not available	16%	8%	9.5%	31%	13%
Other or combination	0	0	0	0	0
Reason for Offense					
Financial/food	13%	10%	0	19%	13%
Unconscious impulse/ depressed	41%	60%	42%	19%	47%
Accident/innocent	15%	10%	33%	14%	7%
Alcohol	3%	10%	0	5%	0
Conscious intent	28%	10%	25%	43%	33%
In Trouble as Juvenile					
Yes	11%	31%	0	10%	9%
No	89%	69%	100%	90%	91%

Table II

Cluster Analysis Summary Table for 100 Male Shoplifters and Male Subgroups

Variables	100 Males	35 Males	19 Males
Race			
White	75%[a]	80%[a]	79%[a]
Black	18%	11%	21%
Other	7%	9%	0
Age			
Range	18-78 yr.	18-29 yr.	20-78 yr.
18-23 yrs.	57%	80%	10% (20-21 yr)
18-34 yrs.	83%	100% (18-29 yr)	47% (20-36 yr)
Other	17% over age 34	0	63% are 45-78 yr.
Education			
Mean	11.5 yr.	12.2 yr.	11.2 yr.
11th grade or below	35%	23%	37%
High school education	46%	51%	42%
College education	19%	26%	21%
Marital Status			
Married	23%	0	84%
Not married	77%	100%	16%
Never married	65%	100%	0
Married more than once	10%	0	32%
No. of Children			
None	68%	100%	6%
One	12%	0	44%
Two	13%	0	31%
Three	3%	0	0
Four or more	3%	0	19%
Welfare			
Yes	24%	9%	21%
No	76%	91%	79%
Who Raised You			
Mother & Father	69%	94%	68%
Mother	12%	0	0
Father	2%	0	5%
Other	17%	6%	26%

[a] =Percent of the number of people in that column.

Table II (continued)

Variables	100 Males	35 Males	19 Males
Natural Parents Married			
Yes	45%	89%	5%
No	54%	11%	94%
Separated	3%	3%	0
Divorced	21%	14%	0
Natural Father Living			
Yes	70%	100%	6%
No	30%	0	94%
Natural Mother Living			
Yes	84%	100%	56%
No	16%	0	44%
Where Arrested			
Department store	28%	26%	19%
Food market	66%	74%	69%
Drug store	1%	0	6%
Other	5%	0	6%
Value of Article Taken			
Under $1.00	30%	32%	31%
$1.00 to $4.99	40%	47%	44%
$5.00 to $9.99	13%	9%	12%
$10.00 to $19.99	12%	6%	6%
$20.00 to $29.99	2%	3%	6%
$30.00 to $50.00	2%	3%	0
Article Taken			
Food	42%	62%	42%
Clothes	11%	10%	5%
Personal adornment	3%	0	0
Household items	20%	14%	26%
Cigar/cigarettes/beer	13%	10%	16%
Information not available	0	0	5%
Other or combination	4%	3%	5%
Reason for Offense			
Financial/food	20%	21%	13%
Unconscious impulse/ depressed	16%	17%	13%
Accident/innocent	18%	6%	31%
Alcohol	16%	8%	19%
Conscious intent	31%	46%	25%
In Trouble as Juvenile			
Yes	16%	20%	0
No	84%	80%	100%

Analysis of 100 females

Based on a study of 100 female shoplifters, the average female shoplifter was white (72%), but with a higher percentage of blacks (20%) than in the Shawnee County, Kansas population (7.2% black). The ages ranged from 18 to 77 with slightly more than half (52%) below the age of 23 and 75% age 34 or younger. The mean level of education attained was 11.4 years. Fifty-two percent had a high school education and 18% had some college. At the time of apprehension, 63% of the 100 women were not married and 42% of this group of unmarried women had never been married. Forty-eight percent of the women had no children and those who did have children tended to have small families. Thirty-nine percent of the women studied were on welfare.

The majority of the women (75%) were raised by their mother and father. Eighteen percent were raised by their mother alone. Only 45% of their parents were still married with 24% divorced and 44% deceased.

Most of the women (63%) were apprehended for shoplifting in department stores. Other places of apprehension included food markets (36%) and drug stores (1%). The majority of the women shoplifting (67%) stole items valued

at below $10.00, which included clothes (30%), food (23.5%), household items (14%), cigarettes and beer (3%), and articles of personal adornment (13%).

A significant number of the women shoplifters (41%) committed the offense as a result of an unconscious impulse or while depressed. The people who responded to an unconscious impulse indicated that they were puzzled by their action and that they didn't know what came over them. Some of those who were depressed indicated that they were having a difficult time due to a breakup of an important relationship. Another reason given for shoplifting was financial difficulties or need for food (13%). Some claimed that the act was an accident and that they were innocent (15%). Others (28%) stated that they knew what they were doing and that they did it because they wanted the item. Only three percent of the people used alcoholic intoxication as a reason for committing the offense.

Analysis of the cluster of 13 females: Racially equally mixed (black and white), young, depressed women on welfare.

This cluster of 13 differed from the description based on 100 female shoplifters in the following ways: 54% of this group were black and 46% were white. This group

tended to be younger in that all but one were below the age of 34. The mean level of education was about the same as for the average female shoplifter; however, the distribution differed in that 31% had less than high school, 38% had a high school education, and 31% had some college education, the highest percent with college education of all the groups. At the time of apprehension, 8% of the women were married and 23% had been married more than once. Thirty-one percent of the women had no children, 38.5% had one child and 31% had two children. There were no families with more than two children. All of the women but one (92%) were on welfare. All but two women (85%) in this group were raised by their mother and none by both parents. None of their natural parents were still married, with nine of the 13 marriages (69%) ending in divorce. Thus, this group had the largest percentage of divorced parents and unstable marriages of their own.

Most of the women (80%) were arrested for shoplifting in department stores and the rest (20%) were arrested in food markets. This group tended to steal more expensive items with 67% of them stealing items valued at between $10.00 and $30.00. In terms of the item taken, 61.5% stole clothes and 15% stole food.

Sixty percent of the women shoplifted as a result of unconscious impulses and/or with depression. Thirty-one percent of the women in this group had been in trouble as a juvenile as compared to only 11% for all 100 women studied.

Analysis of the cluster of 21 females: Older, family women, from stable homes.

This cluster of 21 differed from the description based on 100 female shoplifters in the following ways: This group tended to be older, with 19% between the age of 20 to 23, 38% between the age of 20 to 32, and 62% over the age of 40. The mean age was 43 years. They also had less education, with 52% of them not having graduated from high school and only two (10%) having any college. At the time of apprehension, 76% of the women were married and only one person in the group (5%) had never been married. Twenty percent of the women had no children, and 60% had two or more children as compared to 34% for the total female sample. Fourteen percent of the women were on welfare. Although they were similar to the total group of 100 women in terms of being reared by both parents, they differed in that none of their parents were still married (as compared to 54% not married for the entire group). Eighty percent

of their fathers were deceased, compared to 27% for the entire group. More of their mothers (57%) were still living.

Half of these women were apprehended in department stores and the other half in food markets. Eighty-four percent stole items valued at under $10.00 which included food (52%), clothes (14%), household items (9.5%), and articles of personal adornment (14%). None of the women claimed to shoplift for financial reasons or out of a need for food, and 33% stated that it was an accident and/or that they were innocent.

Analysis of the cluster of 31 females: Younger, unmarried women who consciously steal.

In the cluster of thirty-one females, 81% were between the ages of 18 and 23, and 97% were between the ages of 18 and 29. Sixty-eight percent of these women had a high school education, 13% were not high school graduates, and the mean level of education was 12.2 years. This group was uniquely homogeneous among the clusters of females in that none were married, and only one had children. Although only 16% were on welfare, that would be considered a high percentage for a group that had only themselves to support. Sixty-eight percent of their parents were still married.

Ninety-three and a half percent of their parents were still living.

These women tended to steal less expensive items with 79% of them having stolen goods valued at under $10.00 as compared to 67% for the group of 100 women. This group had the highest percentage (43%) of people indicating a conscious intent to steal. The percentage for all 100 women was 28%. Also, fewer of these women were depressed or indicated an unconscious impulse to steal (19% versus 41% for the group of 100).

Analysis of the cluster of 23 females: Better educated, married women, from intact homes.

These women tended to be better educated in that only 22% were lacking a high school education. The mean level of education attained was 12.1 years. At the time of apprehension, 78% of the women were married, all had been married at least once, and 30% had been married more than once. Only 17% of these women had no children with the remainder tending to have larger families. All of these women were reared by their mother and father. Ninety-one percent of their parents were still married and none were deceased.

A higher percentage (76%) of the women were arrested in department stores and only 24% in food markets. More of them (39%) tended to steal clothes and 13% stole food. Approximately one-half were on welfare and almost half indicated that they were having emotional problems.

Analysis of 100 males.

The average male shoplifter was white (75%), but with a higher percentage of blacks (18%) than in the Shawnee County, Kansas population (7.2% black). The age range was from eighteen to seventy-eight, with 57% between age 18 to 23, and 83% who were age 34 or younger. The mean level of education attained was 11.5 years. Forty-six percent had a high school education and 19% had some college. At the time of apprehension, 77% were unmarried, 65% of those had never been married, and 10% were married more than once. Sixty-eight percent of the men had no children, and those who did, tended to have small families. Twenty-four percent of the men studied were on welfare.

The majority of the men (69%) were raised by their mother and father. Twelve percent were raised by mothers alone. Only 45% of their parents were still married, with 21% divorced, 30% of the natural fathers deceased, and 16% of

the natural mothers deceased. Most of the men (66%) were apprehended for shoplifting in grocery stores. Other places of apprehension included department stores (28%), drug stores (1%), and other places (5%). The majority of men shoplifting stole inexpensive items. Thirty percent took items valued at under $1.00, 70% took items valued at under $5.00, and a total of 83% stole items valued at below $10.00. Items stolen included clothes (11%), food (42%), household items (20%), cigarettes, cigars, and beer (13%), articles of personal adornment (3%), and other items or a combination of items (4%).

Reasons given for committing the offense included the following: Financial/food (20%), unconscious impulse/depression (16%), accidental/innocent (18%), and conscious intent (31%). Sixteen percent of the men used alcoholic intoxication as a reason for committing the offense.

Analysis of the cluster of 35 males: Young, single men, who consciously steal.

This male cluster differed from the description based on 100 male shoplifters in the following ways: This was a younger group, with eighty percent between the ages

of 18 to 23, and none over the age of 29. These men tended to be more educated, with a mean level of education at 12.2 years. Only 23% had 11th grade education or less and 26% had some college. None of these men were married at the time of apprehension nor had any ever been married. They had no children. Only nine percent of them were on welfare.

Most of these men were reared by their mother and father (94%) and 89% of their parents were still married. For 100% of the group, both parents were still living.

Food markets were the place of apprehension for 74% of the men with 62% having stolen food and fewer of them (14%) having stolen household items. The remainder of this category was similar to the description for 100 male shoplifters. More of these men (46%) indicated a conscious intent to their theft and fewer claimed that it was an accident or that they were innocent (8%). Only eight percent used alcohol as a reason for committing the offense.

Analysis of the cluster of 19 males: Older, married men, from broken homes.

This cluster differed from the description based on 100 male shoplifters in the following ways: These men

tended to be older with an age range from 20 to 78 years. Forty-seven percent were between the ages of 20 and 36. The remainder (63%) were between the ages of 45 and 78. At the time of apprehension, only 16% were not married; however, all of the men in this cluster had been married, with 32% of them married more than once. Six percent of the men had no children and those who did have children tended to have small families. Ninety-four percent of the natural parents of this group were not married. Ninety-four percent of the natural fathers and 44% of the natural mothers were deceased.

As compared to 100 male shoplifters, the majority of these men (69%) were apprehended in food markets. However, fewer of the men (19%) were apprehended in department stores and more of them (6%) were apprehended in drug stores. As with the group of 100 men, a similar percentage (42%) stole food with fewer taking clothes (5%) and more taking household items (26%).

The dissimilar reasons given for committing the offense included 31% who claimed that the shoplifting was an accident or that they were innocent. Only 25% indicated that the shoplifting was of conscious intent. There were

only 13% who stated that they committed the offense for financial reasons or for food.

None of these men were ever in trouble as juveniles.

Comparison of 100 male and 100 female shoplifters.

The differences in racial percentages for males versus females was very small. Adult males tended to shoplift at an earlier age, with 24% of the males age 18 as compared to only 14% of the females of the same age. Between the ages of 18 and 34, there was still a larger percentage of males (83%) as compared to females (75%). Twenty-five percent of these females who shoplifted were over age 34 as compared to 17% of the males.

The educational achievements for male and female shoplifters were similar. Thirty percent of the females versus 35% of the males had an 11th grade education or below, 52% of the females versus 46% of the males were high school graduates, and 18% of the females versus 19% of the males had some college education.

Areas where differences emerged between males and females include marital status, number of children, and welfare. Thirty-seven percent of the females versus 27% of

the males were married. Forty-two percent of the females were never married and 17% were married more than once versus 65% of the males who were never married and 10% who were married more than once. Forty-eight percent of the women indicated that they had no children versus 68% of the men who indicated having no children. Also, more women (39%) were on welfare than males (24%).

Percentages were similar for the following variables: Whom the subjects were raised by, whether their natural parents were married, and whether their mothers and fathers were living.

Other areas of dissimilarities emerged under the category of where arrested, value of item taken, article taken, and reason for the offense. Sixty-three percent of the females versus 28% of the males were apprehended in department stores, and 36% of the females versus 66% of the males were apprehended in food markets. Males (70%) tended to steal items valued at under $5.00 as compared to 46% of the females who reported stealing under $5.00. On the other hand, 54% of the females stole items valued at

between $5.00 and $50.00 as compared to 29% of the males who reported stealing between $5.00 and $50.00.

Food was stolen by 23% of the females and clothes by 30% of the females versus 42% and 11% for the males. More males tended to steal household items (20% of the males versus 14% of the females) and cigars, cigarettes, and beer (13% of the males versus 3% of the females). Only three percent of the males stole items of personal adornment versus 13% of the females.

Men and women had similar reasons for shoplifting in regard to their conscious intent (28% of females versus 31% of males), and their statements that it was an accident or that they were innocent (15% of the females versus 18% of the males). Differences emerged in regard to reasons related to finances or need for food (13% of females versus 20% of the males), unconscious impulse or depression (41% of the females versus 16% of the males), and alcoholic influence of the shoplifting (3% in the females versus 16% in the males).

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter contains a statement of rejection of the null hypothesis, conclusions based on characteristics of shoplifters in general, and conclusions based on the clusters and groups studied. At the end of the chapter questions are raised and recommendations suggested for further research.

SUMMARY

There is a general lack of knowledge of demographic variables among shoplifters, and the courts tend to treat them as a homogeneous group. This study was undertaken to investigate demographic variables among shoplifters. In order to do this, 100 male and 100 female first offender shoplifters were investigated. The demographic variables used were taken from a pre-sentencing form completed by each shoplifter. The variables for each shoplifter were then subjected to a computer cluster analysis with males and females treated separately. This resulted in four distinct clusters of females and two distinct clusters of males. While each cluster was uniquely different from

the others. they also shared characteristics generally found in the individual shoplifter, such as chaotic family life, depression, and impulsivity. Those subjects who did not cluster probably have characteristics seen in each of the subgroups, and therefore are not distinct enough to form their own cluster or be included in the existing clusters.

The findings have established that the null hypothesis should be rejected since individual shoplifters could be grouped into distinct clusters of males and females.

CONCLUSIONS

When the data pertaining to shoplifters were studied, most of the general findings were similar to some of those reported in the literature review. Wisher (1968) found that many teenage shoplifters came from broken homes. A large number of shoplifters in this study also came from unstable families and had an unstable family life of their own (or no family).

The many inexpensive items stolen (under $10.00) was also reported in the literature review (Thall, 1973; Astor, 1971) and would support the view that shoplifting is not usually done for financial reasons. Emotional factors

seemed to play a large role in that many shoplifters in this sample were suffering from depression, poor impulse control, alcoholism, or antisocial behavior. These findings were also supported by Douyan (1971) and Applebaum et al. (1974). Other emotional factors found in this study included loneliness, lack or loss of family support, and a decreased sense of responsibility.

It can be concluded that for many of the shoplifters in this study, shoplifting represents a symbolic displacement from other areas of emotional turmoil. Not infrequently, people who were interviewed indicated they were struggling with recent marital turmoil, loss of business opportunities, or family pressures. For example, one person stated, "I wasn't living with my parents at the time. I was hungry, but I didn't want to ask them for anything." Another person indicated, ". . . pressures of school, job, girlfriend, finances. . . ." Other examples include, "I had an argument with my daughter"; "To reach out for help and for punishment"; "I was angry at my husband and was trying to hurt him"; "I found myself lonely, sick and with no husband"; and "I was getting a divorce and was under severe emotional strain." When poor impulse

control was a factor, a number of shoplifters made the following statements: "I wasn't myself, something came over me"; ". . . I suppose on an impulse"; ". . . frustration and impulsiveness"; "I was depressed and had a couple of drinks"; and "I acted on impulse and was intoxicated."

When the data were studied in terms of the clusters formed, each cluster was found to have unique and salient features which allowed for labeling of that cluster. In addition to salient characteristics, the clusters were also different from each other in other specific ways that allow for a number of conclusions to be drawn.

The cluster of 13 females characterized as racially equally mixed, young, depressed women on welfare, tended to steal clothes and that probably accounts for the items stolen being more expensive. It may be that these women who tended to be better educated, experienced a sense of hopelessness, frustration, and failure, and unconsciously chose to steal what they had no hope of otherwise obtaining.

The cluster of 21 females was characterized as being older family women from stable homes. Was this the group of menopausal depressed women frequently described as the typical shoplifter (Griffin, 1971)? Despite the

apparent stability of their family lives, 60% indicated that they were depressed or responded to an unconscious impulse. Thus, for this group their stable relationships were in contrast with their unhappiness and the instability of their impulses. Perhaps for these women, shoplifting was a cry for help (Butchelor, 1969) as well as an attempt to symbolically fulfill needs for which they felt deprived (Russell, 1973).

There were two clusters of younger females. The cluster of 31 females was characterized as young, unmarried women who consciously steal. The cluster of 23 females was characterized as better educated, married women from intact families. The cluster of 31 subjects may represent the group closest to the teenage shoplifter. Perhaps this group of women felt freer to commit the crimes because of less personal responsibility such as might occur if they had a family. This group also seemed to be the most sociopathic (Russell, 1973; Applebaum et al., 1974). Although the cluster of 23 women tended to come from intact families, 30% had been married more than once, close to one-half were on welfare, and almost one-half indicated they were having emotional problems. Undoubtedly, the instability in their personal lives contributed to their shoplifting impulses.

Two clusters emerged for the males. The cluster of 35 males was characterized as young unmarried men who consciously steal. This group can be compared to the group of 31 females and, also like those women, may have felt they had little to lose. One subject indicated he was convinced of his ability to get away with it.

The cluster of 19 males was characterized as older, married men from broken homes. This group of men, although similar to the cluster of 21 females, appeared to have more personality instability as indicated by their incidence of welfare, alcoholic intake, divorces, and conscious intent to steal.

In comparing the 100 male to the 100 female shoplifters, differences did emerge, some of which may be due to sociocultural factors. Women, as opposed to men, tended to steal clothes. Women are probably more interested in clothes. Those who are married may get money for food but not for clothes. Those who are not married, but have children, will need a larger percentage of their income for their children's needs. For most women, including those who are single, finances are limited and department stores contain items of interest that are not easily obtained. All of these factors may

play a role in the particular expression of impulses and emotional needs.

It is difficult to know why men tend to steal food. Certainly, it is easier to account for their stealing cigars, cigarettes and beer on the basis of those items having a more gender linked acceptability for men.

RECOMMENDATIONS

The variables chosen for this investigation did confirm some of the findings of other investigators when applied to individuals. The variables also resulted in the emergence of clusters which had some of the characteristics of the individuals, but were also unique, with differences emerging for female and male shoplifters. Although the variables and data were collected from the records of the Third Judicial District Court Services, Topeka, Kansas, all shoplifters who signed a diversionary agreement were treated as a homogeneous group. They were all placed on diversion for the same length of time (one year) and were routinely sent to the Shoplifters Orientation Program. Based on the results reported, there would seem to be reason to question this approach to shoplifters. Should individuals who are depressed, hungry or

alcoholic be treated in the same manner as those who consciously steal? Should younger individuals be treated in the same manner as older individuals? It has been reported that some people do not shoplift again after being apprehended (Cameron, 1964; Cohen et al., 1974). This may well be the case for those who shoplift for the first time while in an emotional crisis. Before more definitive programs can be devised, however, it would be necessary to investigate the recidivism rate of shoplifters in the various clusters. In that way it might be possible to determine that some people need job placement or brief counseling while others might benefit from the Shoplifters Orientation Program and still others might need much more intensive treatment.

The variables used resulted in specific clusters of shoplifters residing in Shawnee County. Would the same type of clusters emerge for larger or smaller counties?

There are many questions unanswered; however, a better understanding has been obtained of some of the factors involved in shoplifting, thus opening the way for further investigation and a reassessment of treatment and prevention.

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APPENDIX

BMDP1M

CLUSTER ANALYSIS ON VARIABLES

(Columns of a Data Matrix)

GENERAL DESCRIPTION

BMDP1M clusters similar variables by using an initial measure of association between pairs of variables (e.g., correlation or Euclidean distance) to form a cluster of the two most similar variables and then using an amalgamation rule to form further clusters. The amalgamation rule determines the degree of association between any two clusters; a cluster consists of one or more variables. When the clustering process is finished each cluster consists of two or more variables and each variable is placed in one or more clusters. The user may specify both the measure of association for the variables, and the amalgamation rule for the clusters. As input the program accepts a data matrix or a distance matrix (measures of association).

1. Output

   - summary table for the clustering process
   - tree diagram of clusters superimposed over a similarity or distance matrix scaled from 0 to 100
   - table of similarity or distance matrix scaling
   - explanation of tree diagram for the first problem

2. Limitations (in addition to those stated in the Program Information section)

   Up to 150 variables can be clustered. The number of words (M) of computer memory needed is approximately

   $$M = 22*VT + [VT(VT + 1)]/2 + 375$$

   where

   VT = total number of variables after transformations

   M should be less than or equal to 15,000. To accommodate larger problems, the size of the program can be increased by using the BIMEDT procedure (see Program Information, page IV.30).

3. References

Sokal, R.R. and P.H.A. Sneath (1973). *Numerical Taxonomy: The Principles and Practice of Numerical Classification.* San Francisco, W.H. Freeman and Co.

is program was written by Howard Gilbert and Steve Chasen, Health Sciences Com-ting Facility, University of California, Los Angeles, California.

quiries regarding this program should be directed to the Supervisor of Applica-ons Programing, Health Sciences Computing Facility, University of California, s Angeles, California 90024.

3. DATA INPUT FORM

Input can be a data matrix, a correlation or covariance matrix, a similarity or distance matrix or an angular distance matrix (measured in radians). If input is other than a data matrix, means and standard deviations for the variables will not be printed.

Measure of association

- correlation or absolute correlation
- covariance or absolute covariance
- angular or absolute angular distance
- Euclidean distance: this distance is defined as the square root of the sum over all cases of the squared differences between the values of a pair of variables

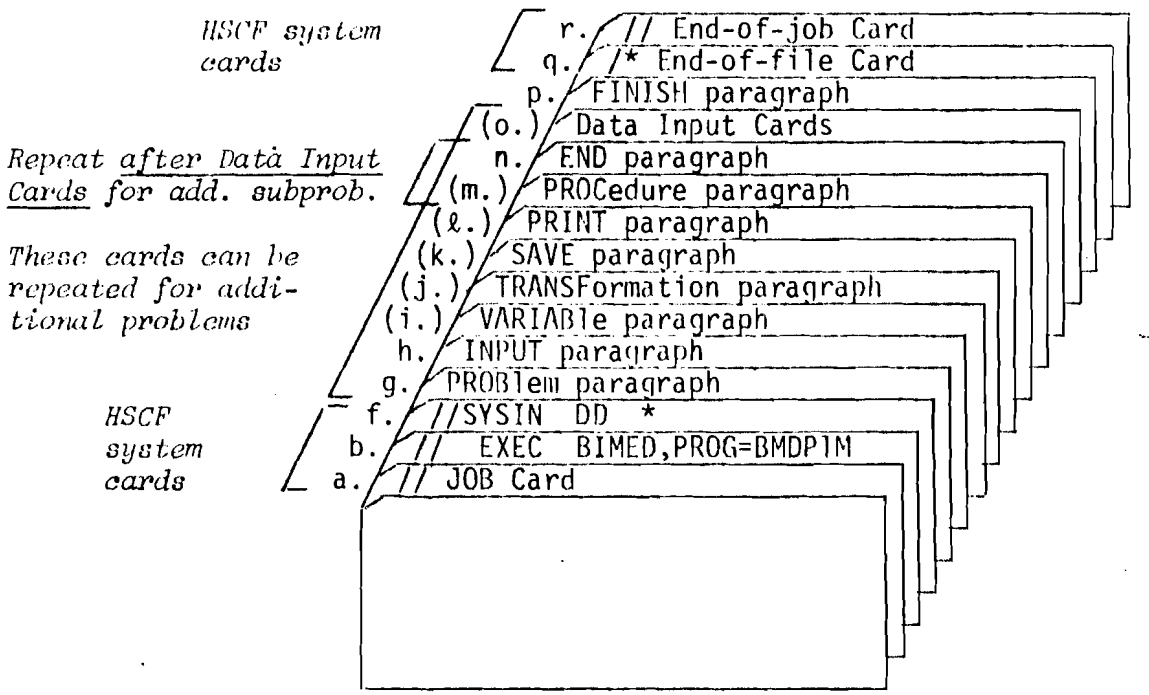
Amalgamation rule

- minimum distance (single linkage algorithm): the distance between two clusters is the shortest distance from a variable in the first cluster to a variable in the second cluster
- maximum distance (complete linkage algorithm): the distance between two clusters is the longest distance from a variable in the first cluster to a variable in the second cluster
- average distance (average linkage algorithm): the distance between two clusters is the average distance from a variable in the first cluster to a variable in the second cluster; if angular measure is used, each variable is standardized so it can be considered a vector of unit length and the distance between two clusters is the angle between the mean vector of the first cluster and the mean vector of the second

C. DECK SETUP

1. Order of Cards in Deck (sample deck setup, page P1M.12)

Parentheses around letters indicate that the cards are optional.



The system cards listed here are used for the Health Sciences Computing Facility and for other computing centers where the HSCF cataloged procedures are used. These cards are used when no transformations of the input data are required, or when transformations are made through the TRANSFormation paragraph. When transformations by FORTRAN statements are used, three cards (c, d and e) are added and BIMED (card b) becomes BIMEDT and SYSIN (card f) becomes GO.SYSIN.

```
a. // JOB Card
b. //  EXEC  BIMEDT,PROG=BMDP1M
c. //TRANSF  DD  *
d. FORTRAN statements, transformations to be performed
e. /* End-of-file Card
f. //GO.SYSIN  DD  *
```

2. Card Preparation

The card preparation below is specific for this program. The format for the required parameters, transformation process, and Save File usage is described in the Program Information section.

Many of the parameters have assumed values (see Assumed Value Chart, page IV.26). The assumed values before the slash (/) refer to the first problem or the first time the parameter is used. Those after the slash refer to subsequent problems ("/previous problem" means the same value is assumed for a parameter as in the previous problem). Any statement that has an assumed value is optional. Parentheses around letters in front of a paragraph indicate that the entire paragraph is optional.

Control values specified by the user are shown in the Program Control Chart on page PlM.9. Details are given below.

g. PROBlem paragraph (required, see Program Information, page IV.6)

TITLE = problem title (up to 160 alphanumeric characters)

Assumed title: blank

h. INPUT paragraph (required for first problem of deck setup, see Program Information, page IV.7)

VARIAßle = the number of input variables (VI); must be stated unless data are from Save File

Assumed number: none/previous problem

FORMAT = input format (up to 800 alphanumeric characters); must be stated unless data are from Save File or VARIAß=0)

Assumed format: none/previous problem

CASE = the number of input cases (CI)

Assumption: data are read to end-of-file/previous problem if number of cases were stated; otherwise end-of-file

UNIT = the input unit number where the data file is located (not 1, 2 or 6)

Assumed unit: 5/previous problem

REWIND - request to rewind the input data unit before the first case is read; to negate state NO REWIND

Assumption: yes/previous problem

TYPE = one of the following, stating how input is to be treated

DATA (data)

COVA (covariance matrix)

CORR (correlation matrix)

ANG (angular distance matrix with distance measured in radians)

SIMI (similarity matrix)

DIST (distance matrix)

Assumed type: determined by CONTENT if input is from Save File; otherwise assumed to be DATA

Note: The remaining parameters of the INPUT paragraph refer to Save File only.

CODE = input Save File identification (up to 8 alphanumeric characters); must be stated if data are from Save File

Assumption: if CODE is not given, INPUT is assumed to be from non-Save File

CONTENT = input Save File identification (up to 8 alphanumeric characters)

Assumed content: none

LABEL = input Save File identification (up to 40 alphanumeric characters)

Assumed label: none

(i.) VARIABle paragraph (optional, see Program Information, page IV.9); more than one item is specified for several parameters -- the first item refers to the first variable, the second to the second, etc.

ADD = the number of variables added through transformations (VA)

Assumed number: zero/previous problem

NAME = names of variables (up to 8 alphanumeric characters each)

Assumed names: X(subscript)/previous problem

USE = names or subscripts of variables to be processed

Assumption: all variables (VT) (VT = VI + VA)

LABEL = names or subscripts of one or two variables used as case labels in printed output; these variables must be read in under A format control (0,0 indicates no case labeling variable)

Assumed labels: none/previous problem

MISSing = missing value codes for each variable

Assumed codes: none/previous problem

MAXimum = maximum limits for each variable

Assumed maximums: none/previous problem

MINimum = minimum limits for each variable

Assumed minimums: none/previous problem

Note: Cases are not used in the computations if the value of a variable that is used in the analysis is less than the minimum, greater than the maximum or equal to the missing value code; the entire case is omitted.

BEFORETransformation or AFTERTransformation - statement of whether to check for missing values and values outside limits before or after transformations

Assumption: BEFORET/previous problem

(j.) TRANSFormation paragraph (optional, see Program Information, page IV.13)

Name or X(variable subscript) = simple expression

Assumption: none

(k.) SAVE paragraph (optional, see Program Information, page IV.24)

UNIT = output Save File unit number (not 1, 2, 5, 6 or non-Save File input unit number); must be stated if Save File is written

Assumed unit: none

NEW - statement required if the file is new; if it is old, a subfile is added

Assumption: not new

CODE = output Save File identification (up to 8 alphanumeric characters); must be stated if Save File is written

Assumed code: none

CONTENT = one or more of the following, specifying what to save

DATA (data matrix after transformations)

COVA (covariance matrix)

CORR (correlation matrix)

Assumed value: DATA

LABEL = Save subfile identification (up to 40 alphanumeric characters)

Assumed label: blank

(ℓ.) PRINT paragraph (optional, see Program Information, page IV.21)

MEANs - request to print the means and standard deviations of variables used in the program

Assumption: no/previous problem

CORRelation - request to print the correlation matrix

Assumption: no/previous problem

(m.) PROCedure paragraph (optional); defines parameters for cluster analysis

VARIABles = names or subscripts of variables to be clustered

Assumption: all variables in VARIAB USE/previous problem or subproblem

MEASure = one of the following, specifying the initial measure of association between pairs of variables

CORR (correlation as a measure of similarity)

ABSCORR (absolute values of correlation as a measure of similarity)

ANG (angle between two variables (= arccos(correlation)) as a measure of distance)

ABSANG (arccos(absolute value of correlation) as a measure of distance)

EUCLID (Euclidean distance as a measure of distance)

Assumed measure: CORR/previous problem or subproblem

Note: If TYPE=SIMI or TYPE=DIST is specified in the INPUT paragraph, MEAS is ignored.

AMALGamation = one of the following, specifying the amalgamation rule for clustering

MIN (minimum distance or maximum similarity, single linkage)

MAX (maximum distance or minimum similarity, complete linkage)

AVE (average distance or similarity, average linkage)

Assumed rule: AVE/previous problem or subproblem

n. END paragraph; indicates the end of control information for a problem (paragraphs g through n) or subproblem (paragraphs m and n)

(o.) Data Input Cards (optional, see Program Information, page IV.7)

p. FINISH paragraph; indicates the end of all problems -- end of run

Note: If the PROCedure and END paragraphs are repeated after the data, cluster analysis is performed on the same data with the new cluster parameters. This analysis is called a subproblem.

PROGRAM CONTROL CHART

raph	Parameter Name	Assumed Value	Comment	Type and Max. Size	Reference
(req'd)	TITLE	Blank	Problem title	Literal, 160 char.	IV.6
	VARIAB	None/pp	Number of input variables	Number	IV.7
d, 1st only)	FORMAT	None/pp	Input data format	Literal, 800 char.	IV.7
	CASE	E-o-f/pp	Number of input cases	Number	IV.7
	UNIT	5/pp	Input unit number	Number	IV.7
	REWIND	Yes/pp	Rewind input data unit	Logical	IV.8
	TYPE	DATA or determined by CONTENT	One only: DATA, COVA, CORR, ANG, SIMI, DIST	Literal	IV.7
	CODE	None	Input Save File identification	Literal, 8 char.	IV.8
	CONTENT	None	Input Save File identification	Literal, 8 char.	IV.9
	LABEL	None	Input Save File identification	Literal, 40 char.	IV.9
3	ADD	Zero/pp	Number of variables added through transf.	Number	IV.20
onal)	NAME	X(subscript)/pp	Variable names, one for each variable	Literals, 8 char. each	IV.10
	USE	All variables	Variables to be processed	NAMEs or numbers	IV.10
	LABEL	None/pp	One or two case label variables	NAMEs or numbers	IV.10
	MISS	None/pp	Missing value codes for each variable	Numbers	IV.9
	MAX	None/pp	Maximum limits for each variable	Numbers	IV.9
	MIN	None/pp	Minimum limits for each variable	Numbers	IV.9
	BEFORET or AFTERT	BEFORET/pp	Variables checked before or after transf.	Logical	IV.20
	Name or X(subscript)	None	Program Control Language transformations		IV.13
onal)					
	UNIT	None	Output Save File unit number	Number	IV.24
onal)	NEW	Not new	Used when Save File is new	Logical	IV.25
	CODE	None	Output Save File identification	Literal, 8 char.	IV.24
	CONTENT	DATA	One or more: DATA, COVA, CORR	Literals	IV.24
	LABEL	Blank	Output Save File identification	Literal, 40 char.	IV.25
	MEAN	No/pp	Print means and standard deviations	Logical	PIM.7
onal)	CORR	No/pp	Print correlation matrix	Logical	PIM.7
	VARIAB	All in USE/pp or sp	Variables to be clustered	NAMEs or numbers	PIM.7
onal)	MEAS	See PIM.7	One only, association measure: CORR, ABSCORR, ANG, ABSANG, EUCLID	Literal	PIM.7
	AMALG	AVE/pp or sp	Amalgamation rule, one only: MIN, MAX, AVE	Literal	PIM.7
req'd)			End of control information for problem		IV.3
H	(req'd unless data input is from cards and INPUT CASE is not specified)		End of deck setup		IV.3

Key: pp = previous problem
sp = subproblem
IV = Program Information section
E-o-f = end-of-file

Caution: Don't forget slash (/) at the end of each paragraph, and period at the end of each sentence.

. COMPUTATIONAL PROCEDURE

Step 1

The input is read. If TYPE=DATA is specified in the INPUT paragraph, the mean and standard deviation of each variable used are computed and may be printed. If TYPE=COVA is specified, the covariance and correlation matrices may be printed or placed on a Save File.

Step 2

If INPUT TYPE=SIMI is not specified, an initial similarity matrix is computed according to the specified measure of association between variables. If TYPE=DIST is specified, each distance is negated to form a similarity matrix so the lesser the distance between two variables the greater the similarity between them.

If MEAS=EUCLID is specified in the PROCedure paragraph, the Euclidean distance between each pair of variables is computed and each distance is negated to form the similarity matrix. The Euclidean distance between a pair of variables is computed as the sum of the variance of two variables minus twice their covariance. If MEAS=CORR or ABSCORR is specified, the correlation or absolute value of the correlation between pairs of variables is used as a similarity matrix. If TYPE=ANG or ABSANG is specified, the arccosines of the correlations or arccosines of the absolute value of the correlations are used to form the similarity matrix and to define the clusters; however, for computational reasons, the correlations or their absolute values are stored.

Step 3

The variables are clustered. A cluster of variables is recorded as a sequence of variable subscripts with the first subscript representing the whole cluster. Four arrays are used to describe the clustering process. The NEXTS array contains the sequences for each cluster arranged so that the ith element NEXTS(i) contains the subscript of the variable which follows the ith variable in the sequence. The IOTHB array contains the first and last subscript of each cluster sequence. If i is the first variable in a sequence and j the last, then IOTHB(i)=j and IOTHB(j)=i. In the third array NCL, the ith element NCL(i) contains the subscript representing the cluster which is most similar to cluster i. Finally in the array DCL, the ith element DCL(i) contains the similarity between the cluster i and the cluster NCL(i). Initially, NEXTS(i)=i and IOTHB(i)=i.

The clustering proceeds by searching through the DCL array for the highest similarity value which in turn determines the two most similar clusters. These clusters are then combined into a new cluster by modifying the NEXTS and IOTHB arrays. For example, a sequence 2,5,4 and another sequence 9,12, 15 can be joined to form a new sequence 2,5,4,9,12,15 by setting NEXTS(4)= 9, IOTHB(2)=15 and IOTHB(15)=2, while IOTHB(4)=2 and IOTHB(9)=15 remain unchanged so that the two previous sequences may be recovered.

After a new cluster is formed, a new set of similarities between clusters is computed. If the original similarity matrix between variables is $S=[s_{ij}]$ then the similarity between cluster I and cluster J is one of the following:

1) $\max s_{ij}$ for all i in I and j in J (minimum distance)

2) $\min s_{ij}$ for all i in I and j in J (maximum distance)

3) $\frac{1}{N} \Sigma s_{ij}$ over all i in I and j in J (average when distance is not angle)

where N is the product of the number of variables in I and the number of variables in J

4) $\frac{\Sigma s_{ij}}{\sqrt{\Sigma s_{k\ell} \Sigma s_{mn}}}$ (cosine of average when distance is angle)

for all i,k,ℓ in I; and j,m,n in J

The clustering process ends when each variable is joined directly or indirectly with every other variable.

Step 4

Finally the appropriate correlation, similarity or distance matrix is scaled from zero to one hundred and both a summary table and a tree diagram are printed. The tree diagram is superimposed over the appropriately scaled distance matrix. An explanation of the tree diagram is printed for the first problem only.

```
//YNNNARC JOB YNNN,YOURNAME
// EXEC BIMED,PROG=BMDP1M
//SYSIN DD *
PROBLEM   TITLE IS 'EXAMPLE 1.  CLUSTER ANALYSIS OF QUESTIONNAIRE ITEMS.'./

    REMARK    COMMENT = 'THIS REMARK PARAGRAPH IS OPTIONAL.

                        THE DATA ARE FROM JARVIK, SELECTED ITEMS FROM A
                        SMOKING QUESTIONNAIRE.

                        SEE EXAMPLE 1 OF BMDP4M (FACTOR ANALYSIS) FOR AN
                        ALTERNATIVE ANALYSIS.

                        THE TREE IN THE OUTPUT INDICATES THAT THERE ARE TWO
                        VERY DISTINCT GROUPS OF VARIABLES - THE SMOKING GROUP
                        AND THE PSYCHOLOGICAL GROUP.  THE PSYCHOLOGICAL
                        VARIABLES BREAK INTO THREE GROUPS - CONCENTRATION,
                        IRRITABILITY AND TIREDNESS, WITH THE CONCENTRATION
                        GROUP ABOUT EQUIDISTANT FROM THE OTHER TWO.'./

INPUT     VARIABLES ARE 12.
          CASES ARE 110.
          FORMAT IS '(12F2.0)'./
VARIABLE  NAMES ARE CONCENTR,ANNOY,SMOKING1,SLEEPY,SMOKING2,TENSE,SMOKING3,
                    ALERT,IRRITABL,TIRED,CONTENT,SMOKING4./
END/
 3 2 1 3 2 2 1 3 2 2 3 2
 4 2 5 3 5 4 5 4 3 4 4 5
 5 3 4 4 5 5 4 5 3 4 3 4
 4 2 4 3 5 4 4 4 3 4 3 5
 4 2 4 3 4 2 4 4 2 4 3 4
 3 2 3 1 3 2 3 3 2 3 3 4
 4 2 4 2 4 3 3 2 2 3 3 4
 3 2 3 2 4 2 3 3 2 3 3 4
 3 2 3 2 4 4 3 3 2 3 3 4
 3 2 4 1 4 3 4 3 2 3 3 4
 5 5 1 4 1 4 1 5 4 5 5 1
 1 1 2 3 3 3 3 2 1 3 1 2
 2 1 3 4 4 3 4 2 1 4 1 4
 2 1 3 4 4 2 3 3 1 4 1 4
 2 1 4 3 4 2 4 2 1 3 1 4
 3 1 3 4 4 2 4 3 1 4 1 4
 3 2 4 4 4 2 4 3 3 4 2 4
 2 2 4 3 4 2 4 3 3 4 2 5
 3 2 4 4 5 2 5 3 3 4 2 5
 3 2 4 4 5 3 5 3 3 3 2 5
 3 3 5 4 5 2 4 3 2 4 2 5
 3 1 3 3 4 2 2 3 2 4 2 4
 3 1 3 1 3 2 2 2 2 1 1 3
 3 2 4 2 4 2 4 3 2 2 3 4
 3 2 5 2 4 2 5 2 2 3 2 5
 3 2 5 2 5 3 5 2 2 3 3 5
 4 3 5 3 5 4 5 4 3 3 3 5
 3 2 5 2 5 2 5 3 2 3 3 5
 4 3 5 3 5 3 5 4 3 3 3 5
 3 2 5 1 5 3 5 3 2 3 3 5
 3 2 5 2 5 3 5 3 2 3 3 5
 4 2 5 3 5 3 5 4 2 3 3 5
 2 1 5 2 5 1 5 3 1 3 2 5
 1 2 2 2 2 2 1 3 2 3 3 2
 3 2 4 3 4 2 4 2 3 3 2 4
 2 2 3 2 4 2 4 2 2 3 2 4
 3 2 2 3 4 2 4 3 2 4 2 4
 4 4 5 4 5 4 5 4 4 4 4 5
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 2 2 3 2 4 3 3 3 2 3 3 3
 4 4 4 3 4 4 4 4 3 4 4 4
 2 2 3 2 3 2 3 2 2 2 2 3
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 2 1 2 3 2 2 1 3 2 3 3 1
 4 3 1 3 1 3 1 3 3 3 3 1
 2 2 4 3 4 3 4 3 3 3 3 4
 4 2 4 3 4 3 4 3 2 3 3 4
 2 3 4 2 4 3 4 2 3 3 3 4
 4 4 3 3 3 3 3 4 3 3 3 3
 4 4 4 2 3 4 2 3 3 3 3 3
 2 4 3 3 2 4 3 4 3 3 4 3
 3 4 2 3 2 3 2 3 3 3 3 2
 3 3 3 2 2 4 3 2 3 3 3 2
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 3 2 2 2 3 2 2 3 3 3 3 2
 3 2 4 2 5 3 5 3 3 3 2 5
 4 3 5 3 5 3 5 4 3 3 3 5
 3 2 5 3 5 3 5 3 3 4 2 5
 3 3 5 5 5 3 5 4 3 5 3 5
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 3 2 4 2 4 4 3 3 3 2 3 4
 3 3 4 3 4 4 4 3 3 3 3 4
 3 3 3 3 3 3 3 4 3 3 3 3
 3 2 3 3 2 3 2 3 2 4 3 3
 3 2 2 2 2 3 2 2 2 3 2 3
 2 2 3 3 2 2 2 2 2 2 2 3
 2 4 5 4 4 2 5 3 2 4 3 5
 2 1 3 1 3 2 4 2 1 1 2 3
 1 2 5 2 4 2 5 2 3 3 3 3
 2 2 5 4 4 2 4 4 2 5 3 3
 3 2 4 4 4 1 4 3 2 4 2 5
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 2 2 3 1 4 2 3 1 3 2 3 2
 1 1 2 3 2 1 2 3 1 4 2 1
 2 1 3 3 4 2 3 3 1 3 2 4
 2 2 2 2 2 2 1 2 2 2 2 1
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 2 1 3 2 3 1 3 1 1 2 1 3
 1 1 3 1 3 1 3 1 1 1 1 3
 1 1 4 1 3 1 4 1 1 1 1 4
 1 1 4 3 4 1 4 1 1 3 2 4
 1 1 3 1 2 1 3 1 1 1 1 3
 1 1 2 4 3 1 2 5 2 4 2 3
 2 2 1 1 2 2 1 2 2 3 2 1
 5 2 1 3 1 1 2 4 2 4 1 1
 2 2 2 1 2 1 3 2 2 2 1 2
 2 2 4 3 3 1 4 2 2 3 1 5
 2 3 5 4 4 2 4 2 2 4 2 5
 1 1 4 1 3 2 3 2 2 2 2 2
 2 1 4 1 4 2 4 2 2 2 2 4
 2 2 3 2 3 2 4 2 2 3 2 4
 4 1 1 4 2 1 2 4 2 4 2 2
 4 2 3 3 3 2 3 3 2 3 2 4
 2 2 3 1 4 2 3 2 2 3 2 2
FINISH/
/*
//
```

PROGRAM CONTROL INFORMATION

```
       PROBLEM   TITLE IS 'EXAMPLE 1.  CLUSTER ANALYSIS OF QUESTIONNAIRE ITEMS.'./

           REMARK    COMMENT = 'THIS REMARK PARAGRAPH IS OPTIONAL.

                               THE DATA ARE FROM JARVIK, SELECTED ITEMS FROM A
                               SMOKING QUESTIONNAIRE.

                               SEE EXAMPLE 1 OF BMDP4M (FACTOR ANALYSIS) FOR AN
                               ALTERNATIVE ANALYSIS.

                               THE TREE IN THE OUTPUT INDICATES THAT THERE ARE TWO
                               VERY DISTINCT GROUPS OF VARIABLES - THE SMOKING GROUP
                               AND THE PSYCHOLOGICAL GROUP.  THE PSYCHOLOGICAL
                               VARIABLES BREAK INTO THREE GROUPS - CONCENTRATION,
                               IRRITABILITY AND TIREDNESS, WITH THE CONCENTRATION
                               GROUP ABOUT EQUIDISTANT FROM THE OTHER TWO.'./

       INPUT     VARIABLES ARE 12.
                 CASES ARE 110.
                 FORMAT IS '(12F2.0)'./
       VARIABLE  NAMES ARE CONCENTR,ANNOY,SMOKING1,SLEEPY,SMOKING2,TENSE,SMOKING3,
                           ALERT,IRRITABL,TIRED,CONTENT,SMOKING4./
       END/
```

PROBLEM TITLE . . . . . .EXAMPLE 1. CLUSTER ANALYSIS OF QUESTIONNAIRE ITEMS.

```
NUMBER OF VARIABLES TO READ IN. . . . . .      12
NUMBER OF VARIABLES ADDED BY TRANSFORMATIONS. .     0
TOTAL NUMBER OF VARIABLES . . . . . .  .      12
NUMBER OF CASES TO READ IN. . . . . .     110
CASE LABELING VARIABLES . . . . . .
LIMITS AND MISSING VALUE CHECKED BEFORE TRANSFORMATIONS
INPUT UNIT NUMBER . . . . . .  .  .  .  .      5
REWIND INPUT UNIT PRIOR TO READING. . DATA. . .      NO
```

INPUT FORMAT
(12F2.0)

VARIABLES TO BE USED

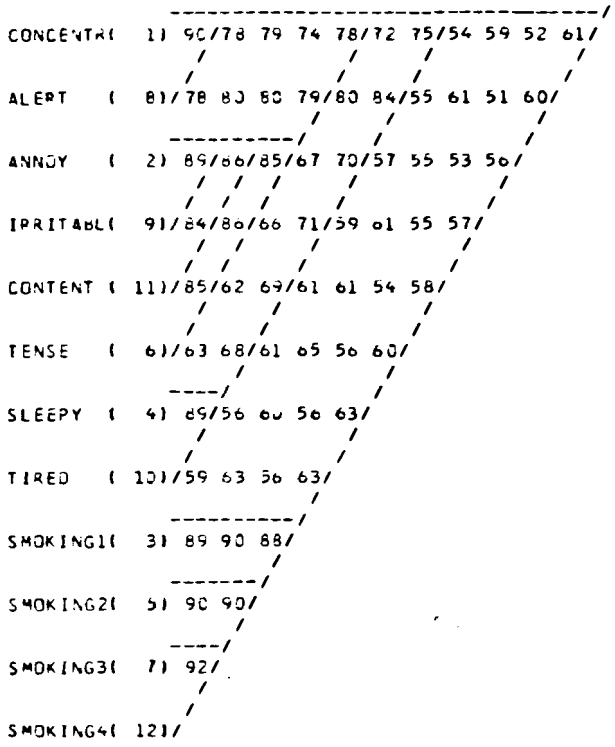
1	CONCENTR	2	ANNOY	3	SMOKING1	4	SLEEPY	5	SMOKING2
6	TENSE	7	SMOKING3	8	ALERT	9	IRRITABL	10	TIRED
11	CONTENT	12	SMOKING4						

```
PROCEDURE MEASURE . . . . . .CORR
PROCEDURE AMALGAMATION RULE . . . . . .AVE
```

110 CASES READ IN WITHOUT MISSING DATA

VARIABLE NAME	VARIABLE NO.	OTHER BOUNDARY OF CLUSTER	NUMBER OF ITEMS IN CLUSTER	DISTANCE OR SIMILARITY WHEN CLUSTER FORMED
CONCENTR	1	12	12	58.56
ALERT	8	1	2	90.10
ANNOY	2	6	4	85.68
IRRITABL	9	2	2	89.80
CONTENT	11	2	3	85.91
TENSE	6	1	6	78.81
SLEEPY	4	10	2	89.91
TIRED	10	1	8	71.17
SMOKING1	3	12	4	89.51
SMOKING2	5	12	3	90.74
SMOKING3	7	12	2	92.26
SMOKING4	12	1	12	58.56

TREE PRINTED OVER CORRELATION MATRIX (SCALED 0-100).
CLUSTERING BY AVERAGE DISTANCE METHOD.



THE VALUES IN THIS TREE HAVE BEEN SCALED 0 TO 100
ACCORDING TO THE FOLLOWING TABLE

VALUE ABOVE	CORRELATION	VALUE ABOVE	CORRELATION
0	-1.000	50	0.000
5	-0.900	55	0.100
10	-0.800	60	0.200
15	-0.700	65	0.300
20	-0.600	70	0.400
25	-0.500	75	0.500
30	-0.400	80	0.600
35	-0.300	85	0.700
40	-0.200	90	0.800
45	-0.100	95	0.900

AN EXPLANATION OF THE VARIABLE CLUSTERING PROCESS SHOWN IN THE TREE PRINTED ABOVE

THE PROCESS BEGINS WITH THE CLUSTER CONSISTING OF VARIABLE ANNOY (2), THE 3TH VARIABLE LISTED IN THE TREE.

THIS CLUSTER JOINS WITH THE CLUSTER BELOW IT CONSISTING OF THE VARIABLE IRRITABL(9).
THE NEW CLUSTER IS INDICATED ON THE TREE BY THE INTERSECTION OF THE DASHES BEGINNING ABOVE VARIABLE ANNOY (2)
WITH THE SLASHES STARTING NEXT TO VARIABLE IRRITABL(9).

THIS CLUSTER JOINS WITH THE CLUSTER BELOW IT CONSISTING OF THE VARIABLE CONTENT (11).
THE NEW CLUSTER IS INDICATED ON THE TREE BY THE INTERSECTION OF THE DASHES BEGINNING ABOVE VARIABLE ANNOY (2)
WITH THE SLASHES STARTING NEXT TO VARIABLE CONTENT (11).

THIS CLUSTER JOINS WITH THE CLUSTER BELOW IT CONSISTING OF THE VARIABLE TENSE (6).
THE NEW CLUSTER IS INDICATED ON THE TREE BY THE INTERSECTION OF THE DASHES BEGINNING ABOVE VARIABLE ANNOY (2)
WITH THE SLASHES STARTING NEXT TO VARIABLE TENSE (6).

THIS CLUSTER JOINS WITH THE CLUSTER ABOVE IT CONSISTING OF THE VARIABLES CONCENTR(1) DOWN TO ALERT (8).
THE NEW CLUSTER IS INDICATED ON THE TREE BY THE INTERSECTION OF THE DASHES BEGINNING ABOVE VARIABLE CONCENTR(1)
WITH THE SLASHES STARTING NEXT TO VARIABLE TENSE (6).

THE PROCESS CONTINUES UNTIL EACH VARIABLE IS JOINED TO AT LEAST ONE OTHER VARIABLE

BMDP1M - CLUSTER ANALYSIS ON VARIABLES
HEALTH SCIENCES COMPUTING FACILITY
UNIVERSITY OF CALIFORNIA, LOS ANGELES

PROGRAM REVISED OCTOBER 7, 1974
WRITEUP REVISED NOVEMBER 1974

PROGRAM CONTROL INFORMATION

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FINISH/
```

PROGRAM TERMINATED NORMALLY.