An Evaluation of Social Grade

as a Classification Scheme

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Abstract

Social Grade is a standard classifier that has been questioned by researchers on numerous occasions over the past thirty years but remains a key element of market research. This thesis presents results of research conducted on the discriminatory ability of Social Grade and other commonly used classification systems.

A systematic random sample of 2000 records was extracted from the 1989 Target Group Index (TGI) database of British Market Research Bureau. Social Grade and other classifiers were then used as classifiers of household usage, purchase, and ownership of consumer products and services. A variety of statistics were then calculated to evaluate how well Social Grade and the other classifiers could discriminate usage, purchase, and ownership of consumer products and services.

Social Grade was shown to clearly provide statistically significant discrimination for; usage and purchase of food products, ownership of consumer durables and use of service products. Social Grade was unable to provide statistically significant discrimination between regular users of different brands of household food products. Social Grade provided low levels of discriminatory power for usage and purchase of food products, consumer durables and service products. Social Grade indicated very poor discriminatory power when used to discriminate brand usage.

In general, the other socio-economic, demographic and geo-demographic classifiers did provide statistically significant discrimination of the purchase and use of food products, ownership of consumer durables and use of services but did not provide statistically significant discrimination between brands of food products. All these classifiers provided low levels of discriminatory power in all product categories.

The implications of this study relate to three main areas in which Social Grading is used. Firstly, Social Grade classification is commonly used as a control variable in sample surveys in stratification, establishing quota controls or post stratification. Secondly, Social Grade is used as a common system of classification in different data sets and, thence, as a linking variable between those data sets. In this situation Social Grade is required to provide consistent sub-groups across many data sources. The final major use of Social Grade is in the analysis of survey information. Social Grade is used to locate concentrations of groups of social or marketing interest or in the discrimination or prediction of behaviour. The results of this study pose many doubts on the suitability of Social Grade in each of these main areas in which it is used.

Chapter 1

1. Introduction

1.1 Background

At the end of the 19th and the beginning of the 20th centuries Booth and Rowntree undertook major studies on poverty in the United Kingdom. These studies were the first modern social surveys to be conducted in the United Kingdom. Researchers today still confront many of the problems encountered by Booth and Rowntree in their studies nearly one hundred years ago.

Booth's surveys aimed to find, *"two series of facts - first, the relative destitution, poverty or comfort of the home and, secondly, the character of the work from which the various bread-winners in the family derived their livelihood"* (Booth, 1889). The surveys conducted in York by Rowntree (1902) aimed to collect information on housing, occupation, and earnings. A major innovation by Rowntree was to attempt to distinguish between two levels of poverty, what he described as *primary* and *secondary* poverty. A second survey by Rowntree (1937) of households in York did not use the same poverty standard as in the first survey, as he considered it as *"being too stringent and unrealistic, and replaced it with his well-known Human Needs Standard"* (Moser and Kalton, 1972).

The work of Booth and Rowntree focused attention on the different social groups in society and laid the foundations for development of methods to classify individuals and households by social class.

In more recent times, social class has been used in market and opinion surveys to explain differences in consumer behaviour, to provide a basis for stratification and to link variables between data sets.

The term social class is used to describe a wide variety of social classification systems. Social class systems vary from the subjectively based Social Grading system commonly used in the United kingdom to the more sophisticated theory based socio-economic classification systems. It is often the case that a number of different social class systems are used in each country.

The Social Grading system is a household classification system with each member of the household being allocated the grade determined by the occupation of the head of household or chief income earner. Over the past twenty to thirty years, there has been much debate about the adequacy of the Social Grading system. Whilst it has been very common to find many criticisms of the system, few major changes have been adopted to overcome these criticisms. Proponents of new classification systems claim to overcome the specific criticisms of Social Grading, but little evidence exists to support these claims. Whilst many new alternative classification systems have emerged, they have not managed to meet all the major facilities that Social Grading has provided in the past and continues to provide. The new systems tend to concentrate on specific research needs and markets, thus being unable to provide the breadth of discrimination that many consider Social Grading provides.

Therefore, the research community in the United Kingdom is in a difficult position. The Social Grading system, believed by many to have performed well in the past and still capable of performing well in specific situations, continues to have major drawbacks despite many ad-hoc `improvements'. Other

problems with Social Grading, such as reliability, have been found to be common to all systems to some degree.

Countries that use social class or socio-economic classification systems in business research generally have adopted systems used by social researchers. In the United States of America, the Hoolingshead social class system has been widely used, and in New Zealand social and market researchers commonly use the Elley-Irving system. Regular evaluation, monitoring, and adjustment of theory-based classification systems, such as the Hoolingshead and Elley-Irving systems is possible.

There is very little detailed quantitative information on the discriminatory power of Social Grading or the relationship the Social Grading system has with other socio-economic variables in predicting or explaining consumer purchasing behaviour. There is a similar lack of information on the discriminatory ability of Social Grading compared with the more recently developed socio-economic and geo-demographic classification systems. Obtaining `benchmarks' of the discriminatory power of Social Grading and relative strengths and weaknesses of Social Grading compared to other systems will provide information that can be used to assess the potential of Social Grading in business, market and social research.

1.2 General Objectives

This study investigated the `state' of Social Grading in the United Kingdom as a general and specific discriminator of consumer products and services. Social Grade and other demographic, socio-economic and geo-demographic classification systems were evaluated to see how well they discriminated the usage, purchase, and ownership of consumer products and services. Statistics were calculated to measure the power of the discrimination that was present. A comparison was then made of the discriminatory ability of Social Grade found in this investigation with results from other studies in both the United Kingdom and the United States of America.

This study unlike previous studies of Social Grade provides a quantitative analysis of Social Grading using sums of squares and measures of association techniques. This enables specific comparisons to be made between the results of this and other studies. It also allows estimation of the relative discriminatory power of the classification systems. Consequently, this study moves towards providing a more thorough understanding of the role Social Grade plays with other explanatory variables in predicting and explaining consumer behaviour.

Specific objectives

The specific objectives of the study were fivefold, namely to:

1. Quantify the discriminatory ability of Social Grade and other demographic, socio-economic and geo-demographic classification systems for consumer products and services;

2. Compare the discriminatory ability of Social Grade to the discriminatory ability of other demographic, socio-economic and geo-demographic classification systems used in the United Kingdom for brand usage, frequency of usage/purchase of food items, consumer durable ownership and service products;

3. Investigate the discriminatory ability of Social Grade for brand usage, frequency of usage/purchase of food items, consumer durable ownership and service products;

4. Compare the discriminatory power of Social Grade found in this study to results in other investigations of Social Grade and social class;

5. Consider the implications of these analyses in the various contexts where Social Grade is applied.

1.3 Method

Sample

A random sample of 2000 adults was obtained from the 1989 Target Group Index (TGI) database. The TGI is a national product and media survey which collects information from 25,000 adults each year. The TGI database consists of the findings from self-completion questionnaires received from a representative sample of adults who have previously been contacted by random location methods in approximately 3,500 sampling points throughout the United Kingdom.

The TGI was chosen as it provides all the variables required to meet the specific objectives of this study. The TGI database is created from a product and media survey and has been used in previous studies of Social Grading and other classification systems. A sample of 2,000 was necessary as detailed analysis of sub-groups was planned and it was intended that probability statements about the findings would be made.

The following variables were extracted for this study:

Demographic / socio-economic

Sex - (men, housewives, other women);
Social Grade - (A, B C1, C2, D, E);
Household income - (seven intervals);
Age - (six intervals);
Acorn Classification - (eleven cluster solution);
Mosaic Types - (eleven types);
Super Profiles - (eleven lifestyle groups);
Home ownership - (five groups);
Length of time in present home - (five intervals);
Working status - (four intervals);

Terminal education age - (six groups);
Number of people in household - (five groups);
Marital status - (three groups);
Cars in household - (number).

Usage, purchase and ownership variables

Quantity used:

Food Items

Butter - (250 gm packs per week);
Soft margarine - (250 gm tubs per week);
Instant coffee - (cups per day);
Packet tea - (1/4 lb packets per month);
Tea bags - (packets of 40 per month);
Yoghurt - (cartons per week);
Fizzy soft drinks - (bottles/cans);
Baked beans - (portions per week).

Brands used:

Baked beans - (brand usage);
Packet tea - (brand usage);
Butter - (brand usage).

Consumer durables (have/own):

Dishwasher - electric;
Microwave oven;
Deep freezer - separate from refrigerator;
Automatic washing machine - front load;
Automatic washing machine - top load;
Washing machine (twin tub);
Spin dryer (separate);
Tumble dryer (separate);
TV video cassette recorder - have yes/no;

TV video cassette recorder - owned/rented.

Services:

Holidays - (yes/no in past year);
Holidays - (number in past year);
Cost of last holiday;
Cost of next to last holiday;
Holiday accommodation - (type for last holiday);
Holiday accommodation - (type for next to last holiday);
Cinema - (frequency of visits);
Credit Card - (frequency of usage);
Credit Card ownership;
Store Card ownership.

Analysis of Data

It was considered important to use a variety of measures of discriminatory ability in the analysis of classification systems for three reasons. Firstly, in specific instances the statistics that may be used to evaluate discrimination may be insensitive or too sensitive to variations in the data. This may lead to either under or over estimating the discriminatory power of a classification system. Secondly, it was considered prudent to use a variety of statistical techniques in order to obtain a consensus of statistics. Relying on just one or two statistical indicators to measure discriminatory power may provide false indication of discriminatory power. Thirdly, using a variety of statistical indicators allows the comparison of different approaches to assessing discriminatory power to be made.

The calculation of F ratios, chi-square values and significance levels for Social Grade and the other socio-economic, demographic and geo-demographic classification systems for a broad range of products and services provided an estimate of the discriminatory ability (whether statistically significant differences exist or not) for each of the classification systems.

Measures of association including lambda, eta^2 and tau-c were used to assess the discriminatory power of Social Grade and the other socio-economic, demographic and geo-demographic classification systems.

1.4 Organisation of the Thesis

This section provides an overview of each chapter in the thesis in order to assist the reader.

Chapter 2 provides a summary of the results of this study.

Chapter 3 discusses the various approaches that have been taken in constructing classification systems. The ideal characteristics of Social Grading and socio-economic classification systems are examined, together with a brief history of the development of these systems.

Chapter 4 reviews the various approaches that have been used to evaluate Social Grading and socio-economic classification systems.

Chapter 5 discusses the effectiveness of Social Grading and looks in detail at specific problems with the system. The reliability and stability of the system is discussed in a review of the various evaluations that have been conducted.

Chapter 6 looks at how Social Grading fits into the relative income hypothesis.

Chapter 7 provides a description and explanation of the methodology employed to meet the research objectives.

Chapter 8 examines the results of the statistical analysis and discusses the relative performance of the various demographic, socio-economic, geo-demographic classification systems for brand choice, product and service usage.

Chapter 9 examines the discriminatory power of Social Grade and compares the results from this study with others.

Chapter 10 provides discussion on the implications that arise from the results of this study. In particular, the usefulness of Social Grading as a control variable in sampling, as a linking variable between data sources and as an explanatory tool in survey research are discussed. Suggestions on the future paths for the development of Social Grade and socio-economic classification are given.

Chapter 2

2. Summary

2.1 Social Grade and statistically significant discrimination

This study found that Social Grade provides statistically significant discrimination for usage and purchase of food products, ownership of consumer durables and use of service products. However, Social Grade was unable to provide significant discrimination between regular users of different brands of household food products.

The failure to find statistically significant discrimination between regular users of different brands of household food products and Social Grade was not surprising as the Market Research Society (1981) study found similar results for Social Grade on discrimination between brands. The ability of Social Grade to provide statistically significant discrimination for service products was consistent with the limited analysis of service products in the Market Research Society study.

Significance levels from this study were also compared to a study of social class in the United States of America by Schaninger (1981). Similar significance levels were found when Social Grade/social class was used to discriminate for food items. The study by Schaninger found moderate but significant discrimination by social class for consumer durable ownership, which was consistent with the findings in this study.

Analysis of levels of significance for the users only sub-group of the sample compared to all respondents provided

interesting results for purchase and usage of food products, and for usage of service products. When non-users were removed from the sample, some significance levels became more significant whilst others became less significant. The major changes in the significance levels indicate that for some products and services, the significant differences between social grades lie between usage and non-usage, whilst for others they lie between levels of usage. Thus, if analysis of product or service usage by Social Grade did not include examination of sub-groups such as users only, then significant differences could be hidden.

2.2 Discriminatory power of Social Grade

Social Grade did not even exhibit moderate levels of discriminatory power for usage and purchase of food products, branded products, consumer durables or service products. At best, Social Grade indicated moderately low discriminatory power when used to discriminate ownership of consumer durables. At its worst, Social Grade indicated very poor discriminatory power when used to discriminate brand usage.

When non-users were removed from the sample, Social Grade continued to provided very low levels of discrimination. This was the case for purchase and usage of food products, and for usage of service products. The discriminatory power of Social Grade generally decreased when non-users were removed from the sample for each product category. A number of exceptions to this tendency were present for individual products. In these instances the original statistic for all users was usually depressed by high marginal totals.

The comparison of the discriminatory power of Social Grade found in this study with other studies produced some

consensus of results. The main exception is brand usage: while Social Grade was found to have poor discriminatory power in this study for brand usage, the Market Research Society (1981) study had found Social Grade to provide satisfactory discriminatory power. The Market Research Society study found that the discriminatory power of Social Grade "*was not large, except at the lower and, in some cases, the upper end... However, for some products Social Grade does discriminate.*" This was reasonably consistent with the findings of this study, where Social Grade was found to provide moderately low levels of discrimination for food purchasing and usage at best, and generally provided poor discrimination. Evidence of moderately low levels of discrimination of ownership of consumer durables, and moderate discrimination of service products was also found. This finding was consistent with the Schaninger study which found moderate but significant discrimination by social class for consumer durable ownership.

2.3 Other classifiers and statistically significant discrimination

As with Social Grade, other standard socio-economic, geo-demographic and demographic classification systems provided significant discrimination for most of the variables examined: frequency of usage/purchase of consumer food products, ownership of consumer durables and services but not for brand choice. The exception was Sex of respondent which failed to provide statistically significant discrimination over all product groups.

The standard classification systems were least effective in providing statistically significant discrimination between brands of fast moving consumer goods (FMCG), with only 18% of the Chi-square values being significant at the .05 level. The classifiers indicated no evidence of being able to

consistently discriminate between "regular users" of different brands for the products tested.

2.4 Discriminatory power of other classifiers

The standard classifiers proved to possess a very low level of discriminatory power over all product groups. These classification systems generally accounting for between 3% and 5% of the variation in usage.

The classification systems were of particularly little use in discriminating between brands of FMCG products, with almost none of the variation in brand choice being explained. This was not surprising as the classification systems were least effective in providing statistically significant discrimination between brands of FMCG products.

Overall, levels of discriminatory power found in this study were generally consistent with previous studies on relationships between classification systems and purchasing behaviour. It was however interesting to see that the commercial geo-demographic classification systems, Mosaic, SuperProfiles and ACORN proved to have no more and sometimes less discriminatory power than the standard Social Grade or household demographic classifications.

The classification systems were better at discriminating ownership of products such as credit cards than at discriminating between the levels of credit card usage. The various classification systems were least effective in discrimination between brands. No single classification system produced consistently better discrimination than another. Some classification systems did exhibit more discriminatory power in specific situations, but the level of discriminatory power was still only modest. This study clearly finds all systems to have very low levels of discriminatory power.

Previous studies that have evaluated classification systems tended to concentrate on finding statistically significant relationships and not to complete the analysis by then investigating the strength of the relationships. The results from the analysis in this section clearly show how misleading an analysis of discrimination can be if the level of discriminatory "power" is not investigated in conjunction with the identification of statistically significant relationships.

2.5 Implications

The implications of this study relate to three main areas in which Social Grading is used. While Social Grade is the focus of this summary of implications, the findings also apply to the socio-economic, geo-demographic and demographic classification system in this study. Firstly, Social Grade classification is commonly used as a control variable in sample surveys in stratification, establishing quota controls or post stratification. The goal of Social Grade as a control variable is to maximise the amount of variability between cells and minimise residual variability within cells of the scheme. This study found such classifiers to provide very low levels of discriminatory power for the purchase and use of consumer goods and services. Very little of the variability in the dependent variables was explained by the classifiers: the ratio of explained variance to total variance was very low. Social Grade may show statistically significant differences between cells but its ability to maximise the amount of variability between cells and minimise residual variability within cells is very limited and will do little to reduce the sampling variability.

Secondly, Social Grade is used as a common system of classification in different data sets and, thence, as a linking variable between those data sets. The process of

linking data (data fusion) from separate surveys lies at the heart of many applications in market research. The low level of discriminatory power exhibited by Social Grade in this survey must cast doubt on its utility as a linkage variable between survey data sets. If users become aware of the problem of a linkage variable such as Social Grade with low discriminatory power, they will not leap to the false conclusion that the linked variables are unrelated but may search for a more powerful linking variable. Problems are more likely to arise when the linking variable is believed to be powerful but remains untested. This may well be the case with Social Grade. Perhaps worst of all, the creation of a single data set may mean that the user may not be alert to the fact that the linkage has taken place and that it has inherent limitations.

The final major use of Social Grade is in the analysis of survey information. The analysis of relationships between variables is a fundamental aspect of survey analysis. It is therefore important that Social Grade (as the measure of class) be able to show differences (discriminate) for marketing variables. This study found that for most variables Social Grade provided statistically significant differences in the cross-tabulations. However, it is important to remember that a statistically significant differences might not be of practical significance, especially when the sample size is large enough. Thus it is necessary to calculate a measure of the power of the relationship. This study found the associations are very weak and thus, most of the variation in the marketing behaviour variables was not explained by Social Grade or other classifiers. The differences are therefore statistically significant but not practically significant.

This highlights a common problem of research analysis by Social Grade. Researchers will see "apparent" differences between social grades and then proceed to describe the

relationships they see. Unless the researcher quantifies the level of discriminatory power of the relationship, they may be seriously misled in the analysis. The problem may become cumulative. When we find a relationship between Social Grade and a survey variable, we believe that it adds to our understanding of that variable. This belief arises from our assumptions about a wide range of other characteristics and behaviours associated with Social Grade. These assumptions tend to be untested and may be unsound. If we become aware of the problem, we may search for social class variables that have higher discriminatory power.

The low level of discriminatory power found here for Social Grade may reflect unreliability in the classification rather than the irrelevance of the underlying class concept. But, the results for other classifiers are equally discouraging in terms of discriminatory power.

Despite some concerns over its suitability as a discriminator, Social Grade remains a standard analysis variable applied to social and market surveys. The findings in this study clearly indicate that Social Grade is not suitable as a standard discriminator. Previous studies of Social Grade have failed to report poor discriminatory power for Social Grade and other classifiers and therefore little or no effort has been made in searching for better alternatives. Social Grade suffers from many problems, and until an alternative that not only differentiates (and groups) better, but also has a more systematic and sounder theoretical grounding, researchers are going to continue to fail to fully understand relationships between class and marketing behaviour.

Chapter 3

3. Social Class and Socio-economic Classification Systems

This chapter traces the development and history of the social class and socio-economic classification systems in use today. Discussion of what are considered the ideal attributes of classification systems is followed by description and analysis of the theoretical basis and mechanics of construction of the various classification systems. In this thesis the term social class is used as a generic term, while the term Social Grade is used to describe the system developed and currently used by the United Kingdom market research industry.

3.1 Construction

Classification systems vary considerably depending upon the general discipline for which they were designed and the specific needs of the designers. The classification systems originally constructed in the first quarter of this century have evolved and been adapted over the years and generally do not closely reflect the original concept for which they were designed. The uses of these systems have also changed during this time and it is not surprising that the longer established systems are often criticized for not performing specific (current) tasks well.

Some classification systems classify individuals while others classify households or neighbourhoods. When we classify a household, all individuals in the household - regardless of their incomes, age, and other details - adopt the household classification.

The following categorisation of classification systems provided by Hoinville and Jowell (1978) illustrates the structure and range of systems:

Individual classifications, such as demographic, employment and education variables;

Household classifications, such as family composition, socio-economic and mobility variables;

Accommodation classifications, such as accommodation, space and amenity variables;

Geographical classifications, such as area and regional variables.

3.2 Ideal Characteristics

Social class has three main uses in social and market research. Firstly, researchers use social class as an explanatory variable in analysis of survey or census information. Typically, social class is used as a variable to cross-classify tabulated data to highlight differences between subgroups thought to be meaningful. Secondly, social class is commonly used as a stratification variable for quota sample surveys. The Social Grade system used by the market research industry is often used for stratification purposes as it offers more complete population coverage than do official social class systems. The third main use of social class is as a linking variable between surveys. This allows, for example, the linking of purchasing behaviour on one survey to media exposure on another, via social class. With these uses of social class in mind, a Joint Industry Working Party set out what they considered to be the requirements of an acceptable general purpose classification system when they reviewed Social Grade in the early 1980's. Sampson (1980) outlined these requirements:

"As with all variables used for marketing analysis across a wide spectrum of product areas and for different marketing purposes, any acceptable social grading system should possess a number of characteristics.

(i) It should provide discrimination across a wide range of product areas with respect to at least one of three basic parameters.

a) Product field usage;
b) Weight of usage;
c) Brand (or equivalent) usage.

(ii) It should be capable of simple, consistent application across different data sources and collection methods, and it

should be stable.

(iii) There should be no other measure capable of collection with the same facility providing stronger but similar discriminatory ability.

(iv) Both users and suppliers of data should have confidence in the measure they are using."

Following the work by O'Brien and Ford (1988), the Market Research Society Technical and Development Committee commissioned Ford and Bounds (1988) to prepare a discussion paper on socio-economic classification. In this paper the following criteria for classification systems and brief analysis of how Social Grade performed were presented.

"Criteria for systems

What a classification should do is:

1. *Discriminate between products;*
2. *Be reproducible;*
3. *Be easy to do;*
4. *Stay up to date;*
5. *Be generally accepted;*
6. *Be theory based....*

Class and these criteria

S.e.g is easy to do roughly, but hard to do reproducibly. It also needs enquiry about the head of household, a field disadvantage. S.e.g has also been attacked as based 'on an obsolete manual/non-manual dichotomy,' so its theory is bad.

On the other hand its wide usage enables media usage to be

examined with product usage and attitudes. S.e.g is highly correlated with both income and education, so these are useful surrogate theories.

Why not use income or terminal education age directly? Income everybody (well, many) say remains very difficult, though used in other countries, and education does not work well either in the United Kingdom, since most people leave school at the same age. Nobody much in marketing believes in class warfare or Marxist class theories. Many systems depend on collecting lots of data, or a data-bank. These cannot therefore be universal like s.e.g.."

O'Brien and Ford (1988) in a study on Social Grade put forward their major requirements of any system that would replace Social Grade. They considered that it should:

"(a). discriminate between groups of people in the ways that Social Class is assumed to do (ie identifiable groups should have more possessions, more disposable income, do more expensive 'upscale' things, tend to have different values etc.). They should also be seen to do this to the same degree, or to a greater degree than is achieved by Social Class.

(b). be replicable and stable (ie people allocated to a category would be allocated to the same category on re-measurement, and the criteria produce a consistent profile of individuals within different representative samples)."

The current review of the official social class system in the United Kingdom being undertaken by Rose (1996) highlights many of the requirements of a new official system: it should provide coverage of both those in paid employment and those not in paid employment, be valid and reliable, have a

coherent theoretical basis, provide the necessary analytical discriminatory power and be capable of being regularly revised without loss of consistency.

There is little disagreement concerning the criteria for an acceptable general purpose classification system. The problems lie in the establishment and use of agreed evaluation methods and standards. These evaluation methods will be discussed in Chapter 4.

3.3 History and development

Social class and socio-economic classification systems were used extensively in social research before they became firmly established as useful tools in marketing and market research analysis in the mid 1950's. Since the beginning of the century, social scientists and the market research industry have developed many new systems. The following review highlights some of the more prominent systems that have been developed and the different approaches taken to constructing these social class and socio-economic classification systems.

United Kingdom

Social Class based on Occupation (SC) and Socio-economic Groups (SEG)

The United Kingdom has two official social class classification systems: Social Class based on Occupations (SC) and Socio-economic Groups (SEG). These social class systems were formerly known as the Registrar General's systems.

Social Class based on Occupations provides the following groupings:

I	Professional occupations;
II	Intermediate occupations;
IIIn	Skilled non-manual occupations;
IIIm	Skilled manual occupations;
IV	Partly skilled/semi-skilled occupations;
V	Unskilled occupations.

The classification of occupations into Social Classes for the United Kingdom census began in 1911 with the Registrar General's Social Classes which were renamed Social Class based on Occupations (SC) in 1990. Currently, more than 25,000 occupational titles are grouped into 350 occupational codes. Each of these 25,000 occupations is allocated to a

Social Class. The following is an overview of the basis and rationale used in classifying occupations to Social Class based on Occupations.

"The unit groups included in each of these categories (i.e. social classes) have been selected so as to ensure that, so far as is possible, each category is homogeneous in relation to the basic criterion of the general standing within the community of the occupations concerned. This criterion is naturally correlated with, and its application conditioned by, other factors such as education and economic environment, but it has no direct relationship to the average level of remuneration of particular occupations. Each occupational unit group has been assigned as a whole to a Social Class, and is not a specific assignment of individuals based on the merits of a particular case (Classification of Occupations 1970).

These categories have been selected in such a way as to bring together, so far as is possible, people with similar levels of occupational skill. In general each occupation group is assigned as a whole to one or another social class and no account is taken of differences between individuals in the same occupation group, e.g. differences of education or level of remuneration. However persons of a particular employment status within occupational groups are allocate...by the following rules (Classification of Occupations, 1980).

(a) Each occupation is given a basic Social Class.
(b) Persons of foreman status whose basic Social Class is IV or V are allotted to Social Class III.
(c) Persons of manager status are allocated to Social Class II except for the following: Social Class I for General Administrators, national government (Deputy Secretary and

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(c) Persons of manager status are allocated to Social Class II except for the following: Social Class I for General Administrators, national government (Deputy Secretary and

above), Social Class III for club stewards, scrap dealers, general dealers, rag and bone merchants."

Social Class is used by official statisticians in census reports and is widely used in academic and social research studies. The long history of Social Class usage has resulted in wide familiarity and a general acceptance of the system even though its many weakness are well known. The wide and consistent usage of Social Class is seen by some users as a major strength as it provides a common analysis variable between studies. Other users also consider the system to be useful as a predictor.

The Social Class system has a number of weaknesses which are outlined by Rose (1996). The system was developed with the assumption that society is graded with some occupational hierarchy, but the system has no substantive theoretical basis. The system has been questioned for its validity as well as its reliability. Updating the system is difficult. Allocation of new occupations and revision of existing occupations results in many `judgements' being made; with no substantive theoretical basis these allocation judgements are arbitrary. A major problem with the system is that those who are not in paid employment are not classifiable. This leaves approximately 40 percent of the population unclassifiable, seriously weakening a system that already has many flaws.

In view of these criticisms the United Kingdom Office of National Statistics requested a review of the two official social classification systems, which is being undertaken by the United Kingdom Social and Economic Research Council (Rose, 1996). The strengths and weaknesses of Social Class are very similar to those of the Social Grading system used by the advertising and market research industry in the United Kingdom. These similarities will be discussed further in Chapter 5 where the critical problems of Social Grading

system are discussed.

The official Socio-economic Groups (SEG) have been classified since the early 1950's. The following is a brief description of the philosophy of the SEG system:

"Ideally each socio-economic group should contain people whose social, cultural and recreational standards and behaviour are similar. As it is not practicable to ask direct questions about these subjects in a population census, the allocation of occupied persons to socio-economic groups is determined by considering their employment status and occupation," (Classification of Occupations, 1960).

"...to bring people with jobs of similar social and economic status. The allocation of occupied persons to socio-economic groups is determined by considering their employment status and occupation," (Classification of Occupations, 1980).

The current classification system employs the following groups:

1.1 Employers and managers in central and local government industry, commerce, etc - large establishments;
1.2 Managers in central and local government, industry, commerce etc;
2.1 Employers in industry, commerce, etc - small establishments
2.2 Managers in industry, commerce, etc - small establishments;
3. Professional workers - self-employed;
4. Professional workers - employees;
5.1 Intermediate non-manual workers - ancillary works and artists;
5.2 Intermediate non-manual workers - foremen and supervisors non-manual;
6. Junior non-manual workers;
7. Personal service workers;
8. Foremen and supervisors;
9. Skilled manual workers;
10. Semi-skilled manual workers;

11. Unskilled manual workers;
12. Own-account workers (other than professional);
13. Farmers - employers and managers;
14. Farmers - own account;
15. Agricultural workers - employees;
16. Members of the armed forces;
17. Occupations inadequately described.

The collapsed version of the 17-group SEG classification system is used for the General Household Survey. It is made up of six groups and has the following composition:

Socio-economic class	Occupational groups	Description
1	3,4	Professional
2	1,2,13	Employers and managers
3	5,6	Intermediate and junior non-manual
4	8,9,12,14	Skilled manual (with own account - professional)
5	7,10,15	Semi-skilled manual and personal service
6	11	Unskilled manual

A number of different combinations of the collapsed version SEG classification have been used, for example, a five-group classification used by Sillitoe (1969) and a four-group classification used by Woolf (1971). A brief description of many of them can be found in Reid (1989). The collapsed SEG system is considered to have more systematic and understandable analytical power than the official Social Class system (Rose,1996). The Social Class system purports to be ordinal while the SEG system is overtly categorical. SEG has come under less critical examination than Social Class but this does not mean that it does not possess many of the same strengths and weaknesses.

Hope - Goldthorpe scale

A number of alternative social class classifications have been developed to overcome the weaknesses of the SC and SEG systems, the Hope and Goldthorpe scales is one such attempt.

Hope and Goldthorpe aimed to *"construct a scale, which we would interpret as a measure of the 'general desirability' of occupations of all economically active men and could be projected with some small, uniform, and estimable degree of error,"* Goldthorpe and Hope (1974).

The Hope-Goldthorpe scale is based on an adjusted set of 223 occupational "unit groups" used by the Office of Population Censuses and Surveys (Classification of Occupations 1970). From these unit groups, Hope and Goldthorpe developed a first approximation of the scale categories they required. They felt however that the resulting 45 categories were still too few and too internally heterogeneous to form the basis of their scale. Four experts from the fields of labour economics, industrial sociology and industrial relations disaggregated the 45 categories, resulting in a scale with 124 categories.

To obtain popular assessments of the 860 representative occupation titles chosen by Hope and Goldthorpe, a grading exercise was administered to 620 respondents. Each respondent was asked to rank a set of 20 cards bearing standard occupation titles (which were not included in the 860 representative titles) according to their "social standing." They were then given a further set of 20 cards, each bearing the title of one of the 860 representative titles, and to insert each of these into the ranking of the standard occupations at the point which, in terms of its "social standing," they believed it belonged. Respondents

were able to "tie" occupational titles, and could place any amount of titles alongside, above, below or between the first set of 20 ranked cards.

Then for each respondent, the 20 standard titles were given standard scores so that high-ranked occupations had positive scores and low-ranked occupations had negative scores. Representative titles were the scored according to their position relative to the standard titles. The output was a mean score for each representative occupational title.

The Hope-Goldthorpe scale provides status scores for 124 occupation categories, ranging from 82.05 to 17.52. Hope and Goldthorpe formed a collapsed version with 36 categories.

They constructed the following social class scale (Goldthorpe, Llewellyn and Payne, 1979):

Social Class	Hope-Goldthorpe categories	Occupational description
I	1,2,3,4,7	All higher-grade professionals, self-employed or salaried higher grade administrators/officials in central/local government and public/private enterprises (incl. company directors), managers in large industrial establishments, large proprietors;
II	5,6,8,9,10 12,14,16	Lower-grade professionals/administrators/officials, higher-grade technicians, managers in small business/ industrial/service establishments supervisors of non-manual workers;
III	21,25,28,34	Routine non-manual, mainly clerical, sales, rank-and-file employees in service;
IV	11,13,19,24, 29,36	Small proprietors, including farmers/smallholder/self-employed artisans/ own-account workers other than professional;
V	15,17,20	Lower-grade technicians (whose work is to some extent manual) supervisors of manual workers;
VI	18,22,23, 27,30	Skilled manual wage-workers, all industries;
VII	26,31,32, 33,35	All manual wage-workers in semi-and unskilled grades, agricultural workers.

The Hope and Goldthorpe and related social class systems share many weaknesses with Social Class. A major weakness is that groups in the population are unclassifiable if they are not in paid employment.

Social Grading

The Social Grading system is a household classification and aims to distinguish between households with differing backgrounds and habits. All individuals adopt the classification given to the household. A major advantage over the systems described so far is that almost all the

population can be classified using the Social Grading schema. The Social Grade system was first developed in the mid 1950's for use in the National Readership Survey. It has no firmly established theoretical basis but assumes a general hierarchy of occupation and is considered to be ordinal.

The structure of the system and the allocation of occupations to the grades was conducted by consensus among professionals in the advertising and market research industries. Many of the `rules' in using the Social Grade system appear to be arbitrary. A number of modifications to the Social Grade system have been made over the years but essentially the categories and the general allocation of occupations remain similar to the original system.

Monk (1985), provides the following general description of the philosophy of the Social Grading system:

"1. Social grading systems have invariably been based on occupation, and have differed mainly in the manner in which the occupations have been grouped, and the interpretations put on such groupings. The question of interpretation or end use is important. Given details of occupation a wide variety of groupings may be made and several varieties form part of the published official statistics. When using occupational data for social grading the implicit stratification is one of status or general standing in the community.

2. Once a method of grouping occupations together to form categories has been achieved, additional information becomes attached to those groupings. Such additional information may be empirically derived or value judgements....

3. Although the historical development of social grading based on occupations is well-established, the precise reasons for the choice in pre-war studies is not well documented.

It would appear that occupations were first used because in the more rigid social order that existed the occupation of the head of household was a simple and efficient method of deriving income categories. As the relationship between occupation and income has lessened occupation has remained the backbone of social grading because no better methods have been found, and because it has still remained a powerful and useful stratification factor, even though the interpretation has become more complex...."

The six groups formed by the Social Grade system are presented in Table 1.

Table 1. -- Social Grade groups

Social Grade	Description	Percentage of households
A	Upper middle class	3%
B	Middle class	13%
C1	Lower middle class	22%
C2	Skilled working class	32%
D	Semi-skilled and unskilled working class	21%
E	Households at the lowest level of subsistence	9%

Major weaknesses of the system such as not having a theoretical basis have led to a number of ad-hoc revisions. Social Grading is currently considered to have poor discriminatory power; this and other weakness are discussed in detail in Chapter 5.

Sagacity

The Sagacity system, developed by Cornish (1981), uses standard demographic variables including income and social grade and results in a 12-group classification system. It groups respondents into two general categories; `white

collar' or `blue collar' depending upon their social grade. The net income of the chief income earner of the household (with adjustments being made for the working status of the chief income earner's spouse) is then used to determine whether the respondent is classified `better off' or `worse off.' Finally, respondents are grouped according to their stage in the family life-cycle, thus producing the 12-group classification system. The decision on the number of categories in each demographic component and the range of each category appear to be intuitive and arbitrary decisions. This is likely to result in a loss of potential discriminatory power as they are unlikely to represent the optimal solution.

The Sagacity system is a household classification. The reliance of a classification system on variables such as net income of the chief income earner of the household (with adjustments being made for the working status of the chief income earner's spouse) is hard to justify with the considerable changes in family and social conditions in recent years. The traditional household and family structures that existed up to the 1980's are not as common today. Thus, the theoretical basis of the Sagacity system is hard to support. The practical application of such a schema would also pose many difficulties.

The following are the twelve groups formed by Sagacity:

Dependent	white collar	
	blue collar	
Pre-family	white collar	
	blue collar	
Family stage	better off	white collar
	better off	blue collar
	worse off	white collar
	worse off	blue collar
Late stage	better off	white collar
	better off	blue collar
	worse off	white collar
	worse off	blue collar

Geo-demographic systems

Geo-demographic systems have become widely used in the United Kingdom. ACORN (A Classification Of Residential Neighbourhoods), MOSAIC, PiN, SET and SuperProfiles are the major systems currently used in the United Kingdom. The British version of ACORN was developed from a cluster analysis of 40 census variables. Initially a 36-cluster solution was obtained. This was reduced to a 11-cluster solution (Bermingham, Baker and MacDonald, 1979).

The MOSAIC system is based on financial and demographic information from non-census sources. MOSAIC provides 58 segments of classification. The PiN system is based on the 1981 census and provides 60 segments. It is a major competitor to the ACORN system. SET is also based on census data and provides 26 social area classifications. The final major system is SuperProfiles which provides 150 neighbourhood types, ranked by affluence (Curry, 1993).

These geo-demographic classification systems operate at a level higher even than household systems. They differ from Social Grade in that they allocate the classification to the all the individuals who live in the wider cluster of households. Such systems have been widely promoted in the marketing and market research industries but very little independent evidence has been provided to support the claims of their proponents to discriminatory power.

United States of America.

While Social Grading and other classification systems were developing in the United Kingdom, socio-economic classification systems were also being constructed in the United States of America. The systems were used primarily in social research, with some also being adopted by the market research industry. Many of the problems that Social Grade has as a tool in market and social research in the United Kingdom were also encountered by the social class systems developed in the USA. In particular, these social class systems did not provide adequate discriminatory power of consumer products and services.

National Opinion Research Centre

A study by the National Opinion Research Centre (NORC) in 1947 aimed to establish *"the role of occupation as one distinctive mark of social class distinction"* (Reiss, 1961). The study involved 2920 respondents who were asked to score 90 occupations on the following basis:

Excellent standing;
Good standing;
Average standing;
Somewhat below average standing;
Poor standing.

NORC gave a weighting to each of the above response categories and the percentage of responses for each occupation in each category was multiplied by the weighting. The sum of the weights of the five categories was divided by five to obtain a single score for each occupation. The score distribution had a minimum value of 20 and a maximum value of 100.

Hodge, Siegel and Rossi replicated the NORC study in 1963.

This study involved a national sample of 651 and found there had been no substantial shifts in relative prestige since 1947.

Duncan

Duncan developed a scale to provide a list of socio-economic status levels that could be obtained from information provided from birth and death certificates (Reiss, 1961). Duncan used the occupational ratings from the NORC study as the criterion variable in the development of his socio-economic status levels. Education and income were the occupation characteristics used.

Education was measured by calculating the percentage of male workers in each occupation who were high school graduates. Income was measured by calculating the percentage of male workers in each occupation reporting incomes of $3500 or more in 1949. Both these variables were adjusted for the differences in age composition among occupations. Duncan weighted the age distribution of each occupation using the age-specific education and income patterns as weights.

Many of the 90 NORC occupational ratings were not used in the development of the Duncan scale. Duncan excluded occupations from the NORC study if they did not match the 1947 Census of Population occupation descriptions well. Many of the NORC occupations were too specific to match the census classification and were also excluded.

The remaining 45 occupations, with the education and income information, were then used in a multiple regression analysis.

The following equation expresses estimated prestige rating X1 as a function of the predictors:

X1 = 0.59 X2 + 0.55 X3 - 6.0

X1 = the % of `excellent' or `good' ratings received by an occupation in the prestige survey.

X2 = the % of men in the occupation with an income of $3500 or more in 1949.

X3 = the % of men in the occupation with four years of high school or higher educational attainment.

Although the index weights were derived from data on only 45 occupations, the socio-economic level of any occupation can be computed if the necessary education and income information is known.

Warner

Warner (1941) in his study of American social class identified six social class groups:

Upper-upper;
Lower-upper;
Upper-middle;
Lower-middle;
Upper-lower;
Lower-lower.

These social classes were adopted into marketing in the 1950's and have been used in a similar form ever since. Coleman, (1983) saw these groups representing *"classes of people who were approximately equal in community esteem, and were made up of men and women who regularly socialized among themselves, in both formal and informal ways, and shared behavioural expectations."*

Later, Warner, Meeker and Eells (1960) developed an index of status characteristics (ISC) in 1949. This index has been widely used in the United States of America. The head of the family is allocated a point on the index, with all other members of the family who are unmarried and living in the same household being assigned the same point on the index.

The level the head of the family achieves on the index is determined by the following characteristics:

Occupation	(weighted by a factor of 4);
Source of income	(weighted by a factor of 3);
House type	(weighted by a factor of 3);
Dwelling area	(weighted by a factor of 2).

The head of the family is assessed on each of the status characteristics and the corresponding value of the level is multiplied by the weight and summed across the four indicators to obtain the Warner index score.

Jain's Modified Index of Status Characteristics

The Jain index (Jain 1966, Rich and Jain 1968) is a modified version of the Warner ISC index. In this index, income and education are used in the reputational ranking, replacing source of income and house type. Dominquez and Page (1981), noted that *"No empirical evidence justifies the choice of substitute variables or their weights. At a minimum it would have been necessary to correlate ISC rankings with those obtained by Jain's scale. Although thoughtful, the modifications would need to be validated."*

Coleman

Index of Cultural Class (ICC)

In the early 1980's Coleman (1983) reviewed the continuing significance of social class to marketing in America. In his

review, Coleman investigated how applicable the social class systems that had been developed in the 1950's remained. Coleman saw the main issues as:

"Do we really have the same classes now as then, and if not what are they?

How do the status groupings that characterize today's America affect consumer behaviour?

How do we now tell who ranks where when we study status phenomena?"

Coleman looked at two updated views of social classification in America, the Gilbert-Kahl New Synthesis Class Structure (1982), and the Coleman-Rainwater Social Standing Class Hierarchy (1978). The updated models are presented in Table 2.

Table 2. -- Gilbert-Kahl and Coleman-Rainwater models

The Gilbert-Kahl New Synthesis Class Structure		**The Coleman-Rainwater Social Standing Class Hierarchy**	
Upper Americans:		**Upper Americans:**	
The Capitalist Class	1%	Upper-Upper	0.3%
Upper Middle Class	14%	Lower-Upper	1.2%
		Upper-Middle	12.5%
Middle Americans:		**Middle Americans:**	
Middle Class	33%	Middle Class	32.0%
Working Class	32%	Working Class	38.0%
Marginal and Lower Americans:		**Lower Americans:**	
The Working Poor	11-12%	A lower group but not the lowest	9.0%
The Underclass	8-9%	Real Lower-Lower	7.0%

Coleman saw that the work of such people as Kahl on social class in the 1950's as concentrating on the ideas of social

networks and personal prestige reputation. Now as Gilbert and Kahl (1982) put it:

"We have reversed the direction of emphasis....We pay more attention to capitalist ownership and to the occupational division of labour as the defining variables...then treat prestige, association, and values as derivative. This difference in viewpoint reflects shifts in the general orientation of the discipline of sociology."

Coleman describes how before World War II social scientists pictured American society as split into opposing halves, *"a higher-half business class versus a lower-half working class, white-collars on the one side and blue collars on the other - or, put even more harshly, `have' superiors versus `have-not' inferiors."* Coleman sees this split, as demonstrated by both the Gilbert-Kahl and Coleman and Rainwater models, as having diminished and now being *"a mere dividing factor within Middle America, while two formerly secondary division lines - one between Warner's upper-middle and lower-middle, the other between his upper-lower and lower-lower - have risen to primary status (leading, indeed, to class name changes)."*

Coleman concludes that *"as we survey the past 30 years, what is perhaps most astonishing is how much continuity there has been in class value systems, which have remained intact through economic cycles of inflation and recession and through pronounced changes in apparel customs, car purchases, and food habits. The many life-style variations that have appeared within each class - and that have crossed class lines to unite members of different status groups in common spare-time pursuits - have tended to obscure the fundamental continuity of the class structure: so too have changing educational standards and occupational shifts in income reward, not to mention declining family stability. The social class concept is not so much outdated as it is under-*

utilized...."

Hollingshead's Two-factor Index of Social Position (ISP)

Hollingshead developed the Index of Social Position (ISP) (Hollingshead and Redlich 1958) from a regression model on families in a community being ranked by status. The model resulted in five discrete strata being produced. The ISP has been validated against family characteristics and psychological traits of respondents (Hollingshead and Redlich, Myers and Roberts 1959, Otto 1975). It has also been validated against media use (Myers and Roberts 1959). The ISP has come in for some criticism as is noted by Dominquez and Page (1981), *"ISP has been faulted for its mathematics. It places teachers with doctors and lawyers in Class I and stevedores and welfare cases in Class V (Haug and Sussman 1971). Though not as old as ISC, the ISP scale is rather dated too."*

Geo-demographics

Geo-demographic classification systems have become widely used in the United States with the four major systems being: ACORN, ClusterPLUS, PRIZM and MicroVision.

ACORN

CACI developed the 44-cluster ACORN system (A Classification of Residential Neighbourhoods) which is based on US census data. The ACORN system *"draws vivid social, financial, housing, lifestyle portraits through the use of a precise customer profiling system,"* (Curry, 1993).

ClusterPLUS

Donnelley Marketing Information Services developed the ClusterPLUS system based on 1980 US census data. A combination of factor analysis and cluster analysis resulted in a 47-cluster solution that was used to construct ClusterPlus. The system has been updated annually since 1986 using a *"mini-census,"* (Curry, 1993).

PRIZM

Claritus developed the PRIZM classification system (Potential Rating Index for Zip Markets) in the mid 1970's. The PRIZM system uses a 40-cluster solution, divided into 12 major groups. The 40-cluster solution was considered an *"excellent compromise between manageability and discriminating power,"* (Curry, 1993).

MicroVision

National Decisions Systems developed MicroVision in the early 1980's. The MicroVision system uses a combination of 112 census and 30 proprietary variables. These variables initially produced a 95-cluster solution that was aggregated to form a 50-cluster solution.

International Socio-economic Classifications

International Labour Office (1990)

The International Labour Office developed the International Socio-economic Classification in 1968, with a revised version being released in 1988. This classification system aims *"to identify different population groups which are, on the one hand, reasonably homogeneous and, on the other hand, fairly clearly distinguished from other groups in respect of their behaviour and which can, therefore, be used to establish the relationship between the socio-economic position of individuals (and households and family nuclei) and many demographic, social, economic and cultural phenomena. The classification should also give an adequate picture of the changes which take place in the socio-economic structure of the population between two censuses."* The following classification of the population by socio-economic group was adopted.

International Standard Classification of Occupations

1.0 Self-employed persons (and unpaid family workers) with agricultural occupations
1.1 Employers
1.2 Own-account workers
2.0 Members of producers' co-operatives (and unpaid family workers) with agricultural occupations
3.0 Employees with agricultural occupations
4.0 Self-employed persons and unpaid family workers in liberal and related fields
5.0 Other self-employed persons and unpaid family workers
5.1 Employers
5.2 Own-account workers
6.0 Members of producers' co-operatives and unpaid family workers with non-agricultural occupations
7.0 Employees with administrative, managerial, professional and related occupations
7.1 Managers, legislative officials and government administrators
7.2 Employees with liberal and related professions.

European Society for Opinion and Marketing Research (ESOMAR)

Another attempt to establish an international social class system was by an ESOMAR working group in 1980. The aim of the working group was to investigate the *"practicability of harmonising demographics for use on international surveys."* A major part of the study dealt with problems of *"defining and working with social class."* As would be expected, it was difficult for the working group to establish consensus on a definition of social class. The group decided to *"abstain from any discussion about the meaning of a variable like social class in research."* The group however did attempt to *"establish a practical system of defining social class by using a scale with scores for respondents based on occupation, combined with degree of responsibility in the job function, and education,"* (Rohme, 1984).

This social class system uses the sum an individual obtains from adding together their scores on educational and occupational scales as a measure of their social class. A broad occupational classification system was used, avoiding the coding of respondents according to a list of all possible occupations. The occupational classification uses three major groups; self employed, employed and other (housewives and students). The educational classification used four major groups; university or similar education, terminal full-time education at 19 years or over (no university) terminal full-time education at 17-19 years, terminal at 16 years or younger (including none).

The social class system that was developed involved ranking the scores obtained on the educational and occupational classifications. This allowed for a *"better fit"* to a required distribution of social class. The system has a theoretical minimum score of 25 and a maximum of 100 points. The reports of the working group indicate that technical

aspects of this social class system work well. These reports do not provide any discussion or evaluation of the discriminatory power of this system. Without evidence of the discriminatory power this system has limited usefulness.

Chapter 4

4. Evaluating the effectiveness of classification systems

A major use of classification systems in social and market research is searching for variation between sub-groups in the population. The evaluation of classification systems has focused on how well they can explain this variation. Others areas in which classification systems are used, such as a control variable in sample surveys for stratification or as a linking variable between data sets have not been used as the principal focus on an evaluation.

While this chapter focuses on marketing related studies, the techniques and evaluation methods for classification systems generally relate to social class classification systems no matter where they are used.

Since the pioneering work of Martineau (1958) there has been a quest for new and better ways in which to select socio-economic sub-groups in order to explain and predict consumer behaviour. With the development of market segmentation theory in the 1960's, consumer classification became an even more important topic for marketing researchers with new classification systems being developed. This chapter reviews the techniques employed to evaluate the performance of classification systems. A brief description of each evaluation technique is provided along with examples of how it has been used and discussion of when it is appropriate for a technique to be used.

4.1 Measures of effectiveness

A debate on how effective various classification systems are began in the United Kingdom and the United States of America in the mid 1950's. Since then, a wide variety of measures have been used to evaluate classification systems.

A number of measures have been used to evaluate how much of the variation between sub-groups in the population the social class system account for. There are two main reasons for such a variety of measures to be employed. Firstly, there is no specific general measure that would be appropriate in all situations. It is necessary to use a measure that is appropriate to the level of data (nominal, ordinal, interval or metric) used in each specific case. Most social class systems are either nominal or ordinal in nature. The dependent variables can be any level. There is no universal measure that can be used on all such levels of data. Secondly, promoters of specific classification systems often choose a measure of effectiveness that best suits their purposes, aiming to shed the best light possible on their system. They tend to publish studies that include data and measures that fit well with their specific model.

Too often researchers have not taken a rigorous scientific approach to evaluation of the discriminatory ability of their classification systems. There is often little or no rationale provided for the choice of a particular evaluation measure being used in a piece of research. This could well be due to the fact that the measure is being chosen for convenience rather than on merit.

One might assume that there would be little choice of which measure to use as the level of data (nominal, ordinal, interval or metric) and specific situation would be likely to

dictate the appropriate measure to be used for each specific situation. Unfortunately this is not the case, as researchers too often take what appears to be an almost arbitrary approach to evaluating classification systems.

In order to understand the rationale behind the choice of an evaluation measure it is necessary to look at what specific researchers want to know about the classification system. In some circumstances the researcher merely wants to know which system generally is the better discriminator of some behaviour between sub-groups. In other circumstances, the researcher wants to quantify the discriminative power of a system, to be able to compare it with other systems and state how likely that the results obtained had arisen by chance. In choosing a measure of effectiveness, the researcher will have a number of requirements which may include any of the following:

- Does the system discriminate well on a specific product field or does it discriminate over a wide range of product fields?
- Can the measure be used on a variety of levels of data or is the measure limited to just nominal or some other level of data?
- Is it possible to use the measure to compare the results with other studies?
- Does the measure show what relationships exist?
- Does the measure show the strength of relationships?
- How likely is it that the differences or relationships that are found have arisen by chance?

The decision as to which measures or combination of measures are to be used is a very important one. The researcher must identify a measure that is appropriate for the level of data in the study. The researcher must also consider the detail of information they require on the relationships in the data. Dominquez and Page (1981) in reviewing eleven studies of stratification in consumer behaviour research, found that only one of these studies employed multivariate statistical analysis procedures. They concluded that use of multiple classification analysis (MCA) allowed Carman (1965) to gauge the effect of stratification net of the influences of income, family life cycle and six other household descriptors. Studies since Carman's have employed bivariate statistical procedures and therefore departed further from appropriate methodology.

4.2 Indices

Indices of discriminative ability have been popular in measuring the effectiveness of classification systems. The advantage of indices is that they can simplify data, are easy to use and understand, and thus are easy to explain to others. They can be useful in making comparisons or in showing typical variations. Indices do however have a number of drawbacks. They do not provide information on the relationship between the variables nor the strength of any relationships that may exist. Nor is it possible to calculate how likely it is that the results have arisen by chance.

4.2.1 Discrimination index

The Market Research Society (1981) used the following index of discrimination to evaluate the Social Grade classification system:

If *p%* and *q%* are the penetrations in any adjacent Social Grade groupings and *p%* is the larger of the two, calculate *(1 - q/p)* for each pair and average across all pairs.

The index equals zero when the system provides no discriminatory ability and one when the system provides total discrimination. For example if we take Social Grades A = 5% and B = 20% we would calculate (1 - 0.05/0.2) repeat the process for the other adjacent groups and average the results.

The index was devised to measure the performance of Social Grade as a discriminator over a period of time. It is based on the hypothesis that the greater the difference between adjacent grades in any year, the better the discrimination. It was also assumed that a difference between low percentage

penetrations is more significant than that same difference between high penetrations. This measure is easy to calculate and useful in comparing classification systems. Sampson (1980) noted that one drawback to this method is that it provides a measure of adjacency while Social Grade should not be considered as a monotonic scale. This sort of index is useful as an indicator of discriminatory performance, but not for actually measuring discriminatory performance.

4.2.2 An index of discriminative power

Agostini and Boss (1973) used an index to measure the effectiveness of a classification system to discriminate between two media audiences.

This index is a measure of the discriminative power of a given criterion (x). The index is calculated as follows:

According to the criterion x, the population like any sub-population could be classified into n groups ($x_1, x_2 \ldots x_n$); thus, one can compare the percentage of the audiences A and B.

A (%)	B (%)
a (x_1)	b (x_1)
a (x_2)	b (x_2)
.	.
.	.
.	.
a (x_n)	b (x_n)
100	100

The discriminative power of the criterion (x) can then be expressed by:

$$D(x) = \frac{1}{2} \Sigma \, |a(x_i) - b(x_i)|$$

Thus the index indicates no discrimination when the value equals zero and total discrimination when the value equals 100. This index has limited use as it can only be used to compare two audiences and can not be used in a multi-audience situation.

4.2.3 Belson's index of predictive power

The following index of predictive power was developed by Belson and used by Holmes (1970) to judge how efficient various cluster solutions were as discriminators over a range of product and media variables.

$$I = \frac{Q - PD}{D\,(100-D)}$$

P = percentage which has the independent characteristic
D = percentage which has the dependent characteristic
Q = percentage which has both

This index is only suitable for dichotomous variables. The index is equal to zero when there is no correlation between the two characteristics. When the predictor characteristic entirely explains the dependent characteristic, the index is equal to one and therefore $D = P = Q$. This index also has limited power in measuring discrimination; it can only be used as an indicator of discriminatory power and then only in limited situations.

4.2.4 Sagacity Index

In providing an evaluation of the interlaced demographic classification system Sagacity, Cornish (1981) used the following basic index.

$$I = \frac{P}{D} \times 100$$

P = percentage which has the independent characteristic

D = percentage which has the dependent characteristic

The following brief description of how the index was constructed and used is provided by Cornish.

"Suppose we find from the survey that 20% of all adults took a package holiday abroad, compared with 30% in one Sagacity group and 15% in another. The index for the first Sagacity group would be 30/20 x 100, or 150, and for the second 15/20 x 100, or 75. The index for the total population will always be 100."

The following is a partial extract from Cornish (1981) showing some of the Sagacity groups:

Package holidays taken abroad in last 12 months

All Adults	Dependent		Pre-family			Family stage		
% index	DW	DB	PFW	PFB	FW+	FB+	FW-	FB-
10.3	154	109	208	117	156	92	100	36

Thus the Pre-family white-collar subgroup (PFW) with an index value of 208 would represent 21.42% (208/100 x 10.3) of those

who took a holiday abroad in the past twelve months being classified into this sub-group. For the Family stage blue-collar worse off subgroup (FB-) an index value of 36 would represent 3.71%. This index highlights differences between sub-groups and also allows an easy intuitive comparison to be made between sub-groups. The index does however magnify the differences between sub-groups and makes differences appear larger than they are. The index also makes it easy to overlook the actual size of sub-groups. In this case only 10.3% of the sample took a package holiday abroad in the past twelve months. It is easy to overlook that subgroup PFW which has an index value of 208, in fact accounts for only 2.2% of all adults.

Nelson (1981) used a similar index technique in describing the discriminatory ability of Social Value Groups for various women's magazines. The problem with this index and the one used by Cornish (1981) is that there is no guide to what is a `sufficient difference'. This results in the researcher making an informed, but arbitrary judgement on what is a `sufficient difference'. A further drawback is not being able to state how likely it is that the differences have appeared by chance. This drawback is common to all indexes. Indexes are more suited to measuring changes in discrimination over time than providing empirical evaluation of discriminative ability. They are indicators of discrimination not measures of it and should only be used for that purpose. Too often this distinction is not made by promoters of specific classification system and they treat their indexes as an absolute measure and proof of the discriminatory power of a classification system.

4.3 Percentages

Using percentages to measure discrimination between sub-groups is from an analytical perspective a very poor decision. Percentages do not provide enough necessary information to evaluate the relationships between sub-groups, the amount of discrimination or the probability of the results occurring by chance. This however has not stopped percentages being used as a measure of discrimination.

Nelson (1981) evaluated the ability of Social Value Groups and Social Class to discriminate media readership. The evaluation was based on a comparison of the proportions in the sub-groups for each classification system that read each medium in question. Nelson considers that the larger the differences between sub-groups the better the discrimination. The following extract and table demonstrate this approach:

"If we look at the coverage of the TVTimes, Radio Times and Reader's Digest (Table 3), coverage declines with social class. Social class discriminates well in the case of the Radio Times and the TVTimes, which have different profiles, but Value Groups do not discriminate as well as Social class. The Social Value Group profiles of TV and Radio Times are very similar. Both have higher coverage among Achievers. Thus, we conclude that social class in this case discriminates better than Social Value Groups...."

Table 3. -- Readership by Social Class and Social Value Groups

	Regularly read (%)		
	TVTimes	**Radio Times**	**Reader's Digest**
Social Class			
AB	*15*	*25*	*19*
C1	*15*	*16*	*14*
C2	*11*	*12*	*10*
DE	*16*	*13*	*9*
Social Value Groups			
Self explorers	*14*	*17*	*9*
Social resisters	*13*	*14*	*9*
Experimentalists	*15*	*14*	*13*
Achievers	*20*	*22*	*14*
Belongers	*12*	*13*	*16*
Survivors	*11*	*13*	*8*
Aimless	*9*	*13*	*6*

This approach to measuring the effectiveness of a classification system is very subjective, provides no measure of the strength of discrimination nor how likely it is that the results could have arisen by chance. It does however provide a general indication of differences between sub-groups. This example is typical of the use of percentages and claims of discrimination when the statistics are not capable of providing the necessary information.

4.4 Proportions

Proportions have also been used extensively in measuring the discriminatory ability of classification systems. The following examples show various approaches to the use of proportions, with some being more appropriate to specific uses than others.

4.4.1 Belson

Belson (1963) published a proposal for the classification of informants in media research. Belson's proposal included the following suggestion on how to choose which of several variants of social class should be selected for classifying purposes. This method, which requires two calculations, is described in detail in Belson (1959):

"For each single product in the sample, determine the power of each of the competing variants of social class to discriminate between the buyers and the non-buyers of that commodity....The sample is divided into buyers and non-buyers (of a specific product). They are then further divided in terms of the variable being tested as a possible discriminant of buying behaviour. Next, a calculation is made of the number of respondents who would fall into each of the four cells (produced by the above sub-division) if the variable being tested had no correlation with buying behaviour. The differences between each of these four numbers and the actual numbers, expressed as a total for all four cells, is the discriminative power of the tested variable."

Since discriminative power as computed is directly additive, the levels of discriminative powers calculated for each product can be averaged to calculate an average

discriminative power for each of the competing variants of social class.

4.4.2 Cross classification analysis

Bass, Tigert and Lonsdale (1968) used cross classification analysis to provide greater focus on variations in group behaviour. This involved developing contingency tables for each of the socio-economic measurements and products in the study. Chi-square values were calculated for each contingency table. Bass, Tigert and Lonsdale point out that *"although cross-classification analysis of a single independent variable has the disadvantage relative to regression and other multi-variate techniques of failing to measure the joint effects of several variables, it helps greatly in demonstrating the nature of the variation. In principle, of course, multiple cross-classification is possible and desirable; but the number of cells becomes large enough to overwhelm even very large samples."*

The researchers performed multiple cross-classification analysis (cross-classification with variable stacking), which is the equivalent to regression with dummy variables (Andrews, Morgan, and Sonquist, 1967). Reynolds (1977) considered this technique appealing due to its convenience in terms of the data input and the provision of summary statistics.

4.4.3 Differences in proportions

Foxall (1975) in a study of the usefulness of social class as a predictor of consumer behaviour used proportions as the basis of his analysis. The test of significance involved a comparison between the observed difference between proportions and a statistic which equals twice the standard

error of the difference. Where the observed difference is greater than this statistic, it is significant at the 5 percent level (Conway 1967). When this technique is used on large samples it is equivalent to the chi-square test for the significance of differences in proportions.

4.4.4 Chi-square statistic

The chi-square statistic has been used widely in the evaluation of classification systems: Bass, Tigert and Lonsdale (1968); Rich and Jain (1968); Myers, Stanton and Haug (1971); Gronberg and Waagsbo (1979); Sleight and Levinthal (1989). Chi-square is used to compare frequency distributions (i.e. observed frequencies in a sample distribution) and expected frequencies based on a hypothesis that the data will exhibit a certain degree of correspondence or disparity.

The chi-square statistic is generally considered to be a good statistic for testing the hypothesis of independence (Liebetrau 1983). Chi-square can be used to indicate if the observed association between two variables in a cross-tabulation is statistically significant. The chi-square statistic does not indicate the strength of the relationship between variables. The strength of relationships between variables is usually measured by an index of agreement.

With respect to classification systems, the chi-square test is usually used to test the null hypothesis that there are:

"No difference in product usage / ownership among the sub groups of a classification system."

Each classification system would be tested separately. The following example provided by Myers, Stanton and Haug (1971) is typical:

"For instance if 68% of all respondents who reported an income had all purpose liquid cleaner on hand, 68% of each of the five income groups should also have the product on hand if income is not a purchase determinant for this product (i.e., if the null hypothesis is true). Significant deviations from the 68% would mean that product ownership varies among income groups; the same can be said for social class significance."

Chi-square is calculated to determine the degree to which differences in product ownership or usage classification systems sub-groups are statistically significant.

Problems with the chi-square test.

There are a few problems with the chi-square test. The test fails to indicate how useful a classification system is but indicates how likely it is that the results obtained have occurred by chance. The chi-square test is strongly influenced by sample size and therefore one can always find a significant relationship by making the sample size large enough. The way to get around this problem is to compute measures of association in conjunction with the chi-square test. Chi-square values calculated for different classification systems can not be compared in order to determine which classification system provides the better discrimination.

Indexes of agreement

Indexes of agreement (also known as measures of association) are useful in measuring the strength of a relationship between two variables. Therefore, when a classification system is cross-tabulated with a consumption variable, an index of agreement can be used to measure the strength of association of the two variables. A variety of different indexes of agreement are available. The choice of the appropriate index depends upon a number of requirements such as whether the two variables have the same number of categories or whether the variables are nominal, ordinal, interval or metric.

The phi coefficient (ϕ) is useful in the case of a 2 x 2 cross-tabulations when both variables are dichotomous. The phi coefficient is equivalent to the product-moment correlation coefficient and is calculated using the following formula:

$$\varphi = \sqrt{\frac{\chi^2}{N}}$$

The contingency coefficient (C) is one of the most popular indexes of agreement for summarising the strength of the relationship between two variables in a cross tabulation of rows and columns (Green and Tull 1978).

$$C = \sqrt{\frac{\chi^2}{\chi^2 + N}}$$

Both the phi and contingency coefficients are symmetric measures of association (i.e. it does not matter which is the independent and which is the dependent variable). When an

asymmetric measure is required, i.e. when we want to measure the extent to which errors can be reduced in predicting categories of one variable from knowledge of the categories of the other variable, it is appropriate to use Goodman and Kruskal's Lambda-asymmetric coefficient (λ).

Lambda is a measure of proportional reduction of error. Developed by Goodman and Kruskal (1954), Lambda can be used to show the proportional reduction in the probability of error in predicting say product usage or ownership from a classification system when you know into which sub-group of a classification system a respondent falls (Myers, Stanton and Haug 1971). Lambda measures the extent we can reduce errors in predicting categories of one variable from knowledge of the categories of another variable. It is therefore useful as a measure of the discriminatory ability of classification systems. Lambda is an appropriate measure to use when both variables are nominal.

$Lambda_{c|r}$ = (number of errors in first case) - (number of errors in second case) divided by the number of errors in the first case.

The following formula and description of Lambda is provided by Nie et al (1975):

$$\lambda_b = \frac{\sum_k \max.f_{jk} - \max.f_{\cdot k}}{N - \max.f_{\cdot k}}$$

Where $\sum \max f_{\cdot jk}$ represents the sum of the maximum values of the cell frequencies in each column, and $\max f_{\cdot k}$ represents the maximum value of the row totals. As an example, if we know nothing about a person's education, our best prediction of the person's income would be the category in which most cases

fall. Once we know the person's education, however, our ability to correctly predict income is improved by the extra information as we can see that as education increases so does income. Lambda provides a measure of the extra information provided by the knowledge of the second variable.

The values for Lambda always range between 0 and 1. A value of 0 means that the independent variable is of no help in predicting the dependent variable. A lambda value of 1 means that the independent variable perfectly specifies the categories of the dependent variable. It must be stressed that Lambda reflects the reduction in error when values of one variable are used to predict values of the other, therefore if this particular type of association is absent, the Lambda is 0. Other measures of association may find association of a different kind even if Lambda is 0. The major limitations of the lambda statistic are that it has no adjustment for sample size, nor for the number of categories in the independent variable. However, use of it or other indexes of agreement in conjunction with the chi square statistic provides the necessary information to measure the discriminatory ability of classification systems.

4.5 The Lorenz Curve

4.5.1 Lorenz curve

The Lorenz curve (gains chart) is a technique more commonly used in economics to show the relationship between a cumulative percentage and the total sum of a variable. Humby (1989) used a Lorenz curve to illustrate the effectiveness of various classification systems. The proportion of the target market reached was measured on the vertical axis, the proportion of the population selected to reach the target market being measured on the horizontal axis. A random selection was shown by a straight line at 45 degrees.

The Lorenz curve is more useful for illustrative purposes than for analytical insight. The main drawbacks to the Lorenz curve is that it does not provide information on the strength of any relationships that may exist and that it is not possible to calculate the likelihood that the results have arisen by chance.

4.5.2 Variations of the Lorenz curve

O'Brien and Ford (1988) used a variation on the Lorenz curve to compare social class, life stage and lifestyle classification systems. They used this to demonstrate the *"degree of inequality of distribution"* between social class, life stage and lifestyle. On the vertical axis the proportion of the variable in question is plotted whilst on the horizontal axis the proportion of the classification variable is plotted. Thus a straight line would represent no *"inequality of distribution."*

By plotting the curves for each classification variable, the divergence of the curves from the straight line indicates how well each classification variable discriminates for the variable concerned. This technique enabled the authors to take the size of sub-groups within a classification into account. O'Brien and Ford felt that this approach enabled them to confront the problem that one could be criticised for comparing disproportionate sets of data.

4.5.3 Mail shot approach

This technique is similar to the Lorenz curve approach, and also takes into account the size of the sub-groups within the classification system. The main difference from the Lorenz curve is that it uses the total population without excluding less relevant sub-groups. A full description of the method is provided by O'Brien and Ford (1988)

"...Suppose you wanted to do a mail shot to adults living in a household which owns a home computer. 27% of adults live in such households and ideally if you had their addresses, you would simply send your mail shot to these households and no others. However you do not have their addresses. You do however, know the penetration of home computers within the various social class groups and by stratifying the population by social class, in descending order you could perhaps target your mail shot to the 'best possible 27%' of the population - 'best' in that you target to those groups which have the highest probability of having a home computer.

If you could succeed in sending your mail shot to the 27% who have home computers your success rate (or penetration of owners) amongst this group would be 100%. One can work out how near one can get to this by going to the best 27%, as shown below:

(a) *Total penetration of home computers: 27%*

(b) *This is made up of*

6.7% accounted for by AB who are 18% of population
8.7% accounted for by C2 who are 28% of population
6.4% accounted for by C1 who are 23% of population
3.6% accounted for by D who are 18% of population
1.6% accounted for by E who are 13% of population

(c) *The sub-groups above are listed in descending order of penetration - penetration of home computers is the highest amongst ABs, they therefore have the highest probability of having home computers so you would target them first.*

If you targeted all ABs you would have mailed to 18% of the population. You want to mail to the best 27%, so you do not want to go to all the C2s as well - you need a random 32% of them:

$$\frac{(27 - 18)}{28}$$

(d) *32% of C2s would get you 32% of the owners accounted for by C2s: 32 x 8.7% = 2.8%.*

(e) *So by targeting all the ABs and 32% of C2s you will cover the best 27% of the population and 9.5 points (6.7 + 2.8) of the total penetration of 27%.*

(f) *Ideally you would have reached all the owners, but you have only reached 9.5% of them, hence your score is 35%*

$$\frac{(9.5)}{(27.0)} \times 100 = 35\%$$

Thus 35% is the score for Social Class on home computers."

The same method is carried out on all the variables and systems under investigation. O'Brien and Ford considered cases where a classification system scored higher than at least one of the other classifications at the 75% confidence level to be worthy of mention.

4.6 Penetration levels

The following measures of discrimination were developed by the Market Research Society specifically to provide insight into the discriminatory power of Social Grade. They are useful in that they indicate where differences occur but do not provide information on the strength of the relationships between the variables nor on how likely it is that the relationships have occurred by chance.

4.6.1 Maximum penetration level

The Market Research Society (1981) and O'Brien and Ford (1988) used the maximum penetration level as a measure of discrimination. This measure involves observing which classification system offers the highest level of penetration in a sub-group. O'Brien and Ford (1988) used this approach to compare Life stage, Lifestyle and Social class classification systems. O'Brien and Ford considered a classification system to indicate 'good' discrimination when one class achieved a level of penetration of a least 10 percentage points above the next highest level.

This measure fails to take into account the number and size of the sub-groups in the classification system. For example, a classification system that had either one or more small sub-groups or more sub-groups than the other systems is more likely to provide 'good' discrimination using this method. It is however easy to use and provides a direct comparison across systems.

4.6.2 Maximum and minimum range of penetration across a classification

The Market Research Society (1981) and O'Brien and Ford (1988) also used a measure of discrimination which looks at the difference between the maximum and minimum penetration levels achieved within each set of classification variables. This technique enables the assessment of each classification system according to the extent to which it discriminates across all its component sub-groups, rather than simply noting the sub-group with the maximum penetration. Data is standardised so that the overall level of penetration for an item does not influence the size of the range.

O'Brien and Ford compared classification systems on a number of items and found that each of the systems had items on which it proved most successful at discrimination using this measure. The authors were concerned that this measure needed to take the size of the range into account, as when the size of the ranges are low then no classification is performing particularly well. They decided to take the *"relatively low ranges"* out of the overall assessment and found that this highlighted differences between the classification systems that were not apparent before.

4.6.3 Maximum difference in penetration

The maximum difference in penetration (in percentage points) that exists between any two groups was used by the Market Research Society (1981) in their study of classification systems. The Market Research Society also evaluated classification systems using the difference in penetration (in percentage points) between other sub-groupings, i.e between Social Grade groups AB and D, and between AB and E groups. These measures tended to provided similar results, which would have been expected.

4.7 Sums of squares measures

Various statistics based on sums of squares methodology have been used in the United States of America for the evaluation of classification systems since the late 1960's. Sums of squares measures are generally considered powerful analysis tools. Each measure has a specific role and specific situations when it can be used.

4.7.1 Pearson product-moment correlation coefficient

The Pearson product-moment correlation coefficient has been used in studies by Wells and Tigert (1971), Fry and Siller (1970), and Hisrich and Peters (1974). The product-moment correlation coefficient is symbolised by *r*, and is a measure of the `degree' of association between two variables. The correlation coefficient is calculated by:

$$r = \frac{\sum_{i=1}^{N} (X_i - \bar{X})(Y_i - \bar{Y})}{(N - 1)S_x S_y}$$

Where N is the number of cases, and S_x and S_y are the standard deviations of the two variables. The correlation coefficient is expressed as a number between -1 and +1. The closer the coefficient is to either of these extremes, the closer the association between the two variables being measured. The multiple correlation coefficient is symbolised by *R*, and is defined as the correlation between the observed values of *y* and the estimated values.

4.7.2 Coefficient of determination

The coefficient of determination symbolised by r^2, is simply the square of the product-moment correlation coefficient. The r^2 statistic measures the proportion of the variation in the dependent variable (e.g. product usage) that is explained by the independent variable (e.g. income). When there is no linear association between the variables in the sample, r^2 will have a value of 0. When the independent and dependent variables are perfectly linearly related, r^2 will be equal 1. The r^2 statistic can be calculated using the following formula:

$$r^2 = \frac{\sum_{i=1}^{N} (\hat{Y}_i - \bar{Y}_i)^2}{\sum_{i=1}^{N} (Y_i - \bar{Y})^2}$$

The top half of the equation measures how much variability in the dependent variable is attributable to the linear relationship between the variables. The bottom half of the equation measures the total variability. Thus, dividing the variability due to the relationship between the variables by the total variability provides a ratio of explained variability to total variability.

The coefficient of multiple determination is symbolised by R^2, being the square of the multiple product-moment correlation coefficient. A more refined version of R^2 is the adjusted R^2 statistic. This is useful in that it adjusts R^2 for the number of independent variables in the equation and for the sample size. It is a more conservative estimate of the percent of variance explained, especially when the sample is small. The R^2 and adjusted R^2 statistics have been used in the following studies: Frank, Massy and Boyd (1967); Bass, Tigert and Lonsdale (1968); Hisrich and Peters (1974);

Wheatley, Chiu and Stevens (1980).

To test whether R^2 statistics are significant, against the null hypothesis that $R^2 = 0$; $B_1 = B_2 = 0$, the F-statistic is used. The F-statistic indicates whether the sample of observations being analysed has been drawn from a population in which R^2 is equal to zero, and that any observed multiple correlation being due to sampling fluctuation or measurement error. If the F-statistic is significant the researcher may go on to discover which of the beta coefficients are significant.

It is important to calculate the standard errors for the beta coefficients. The standard error is a measure of dispersion about the average partial regression coefficients. The larger the standard error is, the less reliable the beta coefficient is across repeated samples from the same universe.

The t value is the ratio of the beta coefficient to its own standard error. The t test for each partial regression coefficient tests whether the increment in R^2 produced by the predictor in question is significant when the model including the predictor (and all other predictors) is compared to a model including all predictors but the one being tested.

A typical example of the use of sums of squares techniques is provided by Wheatley, Chiu and Stevens (1980) who used multiple linear regression to examine the relationship between demographic and socio-economic variables and individual coffee and soft-drink consumption. They used this technique as it allowed direct comparison with other studies in the past that have used the same technique. The technique takes into account the effects of combinations of independent variables and permits prediction of the dependent term in the

equation.

The authors used a stepwise regression maximizing the adjusted coefficient of determination, R^2 and selecting only those variables for inclusion in the equation with t values greater than 1. The final criterion of significance for each explanatory variable was $t = 1.65$ or $p < .10$. F values were calculated to test the significance of the R^2 of the regression.

It is felt that the low R^2's found in such regression analysis studies as the one mentioned above have led to incorrect conclusions about the ability of socio-economic variables to discriminate since R^2 is a measure of the model's ability to predict individual rather than group behaviour. There is also the consideration that relationships may be nonlinear.

Metric level variables are required to be used in regression analysis. Seldom do we find metric level socio-economic or classification independent variables. In order to circumvent this problem, it is common to use dummy variables. For example, by turning an ordinal level variable into a dichotomy, the variable takes on the necessary metric level characteristics that are required for regression analysis.

These techniques can thus be used on nominal or metric level data. A drawback with the significance tests associated with multiple regression is that the following assumptions need to be met. The sample should be random. Each array of Y for a given combination of X's should follow the normal distribution. The regression of Y and X's should be linear. All the Y arrays should have the same variance. There are however a number of techniques that can be adopted if some of these assumptions are not met.

4.7.3 Discriminant analysis

Discriminant analysis has been used in conjunction with other measures to provide an evaluation of the power of classification systems, see Gronberg and Waagsbo (1979). In this study the classification categories were transformed into dummy variables and discriminant analysis was used to predict personal choice. By classifying the cases used to derive the functions in the first place and comparing predicted brand choice with actual brand choice, one can empirically measure the success in discrimination by observing the proportion of correct classifications. *F*-ratios and levels of statistical significance can then be calculated.

4.7.4 Analysis of variance (ANOVA) and Multiple analysis of variance (MANOVA)

Analysis of variance (ANOVA) and Multiple analysis of variance (MANOVA) are terms that describe a collection of statistical techniques used to examine the differences between means of a variable (e.g. mean brand usage) across groups of observations (e.g. by social grade groups). ANOVA and MANOVA are very useful techniques for evaluating classification systems as they can provide information on what relationships exist between variables, the strength of the relationships and how likely it is that the results have arisen by chance.

The study by Schaninger (1981) used ANOVA and MANOVA in the investigation of whether social class or income was the superior discriminator. Schaninger used a combination of single-factor and two-factor ANOVAS and MANOVAS for interval-

scaled dependent variables. Single-factor designs were used as they identify which dependent variables varied significantly with social class or income. Two-factor designs, utilising the classic experimental model, determined the significance of social class effects after removal of income effects and vice versa. In addition, log-linear modelling was applied on nominal appliance ownership data, which allowed the generation of likelihood chi-square tests. Schaninger used the following multi-variate tests in this study: Pillai's criterion, Hotelling's trace criterion, Wilk's Lambda and *F*-values.

This overall approach is suitable when the two independent factors are inter-correlated (as was the case), if cell sizes are unequal and if major interaction effects are not anticipated. The method has the advantage over correlation analysis and analysis of covariance in that it does not assume linear relationships between the dependent and independent variables.

Schaninger felt that this approach had the advantage over other approaches in that MANOVA designs tested overall significance across a large number of related dependent variables. Using the two-factor classic experimental model design enabled the examination of the conditional significance of both social class and income after the removal of the other. This enabled Schaninger to test whether or not social class was significantly superior to income and vice versa.

4.8 Log-Linear Models

Log-linear models have a great deal of potential in the analysis of classification systems but have not been used widely at this stage. Neither analysis of variance nor regression analysis is suitable for analysis of categorical data where the observations are not from populations which are normally distributed with constant variance. In these special situations log-linear models and logit-models are often suitable.

These models are useful for uncovering the complex relationships among the variables in a multi-way cross tabulation. In log-linear models all variables that are used for classification are independent variables, with the dependent variable being the number of cases in a cell of the cross tabulation. The log-linear model can be used to produce likelihood chi-square tests.

The logit-model is a special form of log-linear model and is suitable for determining the relationship between a dichotomous dependent variable, such as brand use, and one or more independent demographic variables such as income or Social Grade. Measures of dispersion and association that can be used to estimate the strength of the model in relation to logit-models are Shannon's entropy measure and Gini's concentration measure. Both of these statistics are measures of association.

Log-linear models were used by Schaninger (1981) in conjunction with ANOVA and MANOVA, in the investigation of whether social class or income was the superior discriminator. Schaninger applied log-linear modelling to nominal appliance ownership data. Likelihood chi-square tests were then generated to test whether significant relationships existed.

4.9 Summary of measures

The following table provides an overview of the evaluation techniques used on classification systems.

Table 4. Summary of techniques used to evaluate classification systems.

Statistical technique	Relationship between variables	Strength of relationship	Tests of significance
Indices	Some	No	No
Discrimination index			
Index of discriminative power			
Index of predictive power			
Basic index			
Percentages & Proportions	Yes	No	Yes
Percentages			
Proportions			
Cross classification analysis			
Differences in proportions			
Chi-square			
Indexes of agreement	Yes	Yes	Yes
Lambda			
Phi			
Contingency coefficient			
Lorenz curve	Some	No	No
Lorenz curve and variations			
Mail shot approach			
Penetration levels	Yes	No	No
Maximum penetration level			
Max-min penetration level			
Maximum difference			
Sums of squares	Yes	Yes	Yes
correlation coefficient			
Coefficient of determination			
Stepwise regression			
Discriminant analysis			
Log-linear models	Yes	Yes	Yes
Logit model			

Table 4. clearly illustrates which statistical measures are capable of providing the necessary information to measure

the discriminatory ability of social class and socio-economic classification systems. Evaluation techniques based on indices, percentages and proportions, penetration levels and the Lorenz curve are useful as general descriptive measures in evaluation, but lack the ability to provide the detailed information on the relationships between variables and can not provide any information on the strength of relationships. Their final shortcoming is that they do not provide any information on the statistical significance of the information and therefore it is not possible to state how likely it is that the information has occurred by chance.

Evaluation techniques based on indexes of agreement (measures of association), sums of squares and log-linear modelling are the most useful in the evaluation of classification systems. The major shortcoming of these evaluation techniques is that they are generally restricted to a specific level of data such as interval or metric. This means that, since data used in the evaluation of classification systems for marketing purposes is usually a combination of nominal, interval and metric data, the use of one evaluation technique for all the data is not possible. The advantage of this situation is that the evaluation will therefore require analysis from a number of techniques, providing differing perspectives on the performance of the classification system.

Chapter 5

5. The Performance of Social Grade

The previous chapter provided an overview of various techniques used to measure or merely display the discriminatory power of classification systems. In this chapter, I review past examinations of the discriminatory performance of Social Grade. Major problems of the Social Grading system are discussed in the context of an examination of the reliability, stability and discriminatory power of the system. The chapter finishes with a discussion of the various evaluations that have been conducted on the Social Grading system and their use of the techniques discussed in the previous chapter.

5.1 Problems

Discussion of the Social Grading system has continued since the early 1960's. The following is a brief review of the major points of view. Samuels (1981) noted the following short-comings with the Social Grading system:

"...we don't know that our system has any really respectable theoretical basis. Do you know how occupations were originally allocated? Do you know how often occupations change their Social Grade? In fact, the answers are that in effect, a group of people sat round and decided on the original structure, a group of people sit around and decide on the new occupations, and no-one can remember any occupation ever having changed its Social Grading! Moreover the `rules' that surround the decision as to whose occupation is taken on which to base the

whole household's Social Grade are decidedly `arbitrary'.

So the technical derivation of the system of Social Grading we use is not really explicit and it is not replicable. The rules for decisions are often arbitrary...."

Samuels has put forward the following reasons why the Social Grading system is still used:

"(i) We all genuinely believe that social classes exist and that they do have different attitudes and behave differently in relation to media and products....

(ii) This leads to the second reason, which is that we have to acknowledge that the one variable that we would probably forsake social class for, namely 'disposable income,' has greater problems in its practical collection than social class does. We typically get 20% refusals or more and we can't replace Social Grade with something where one in five is unclassifiable.

(iii) In the absence of income, social class is a valuable variable. Whenever it has been investigated it has been shown that it does discriminate. This was the conclusion of the O'Brien/Ford paper and of the Market Research Society's own investigation. So whatever its warts, it is useful.

(iv) The IPA Social Grade system has been around so long (since 1965 on the NRS) that it has achieved 'currency' status and we have a great deal of trend data. The loss in comparability if we abandoned it in favour of the Goldthorpe or Cambridge schema would not be compensated by the anticipated accuracy and reliability.

(v) It is only recently that other variables have been widely explored (lifestyle, lifestage) which might potentially stand in for social class at least some of the time."

These comments by Samuels are typical of the type of comments that supporters or detractors of the Social Grading system put forward. They are typically opinions which are not supported by systematic statistical evaluations of the situation. Samuels suggests that changing to another classification system such as the Goldthorpe or Cambridge would not compensate for the loss of trend data, but no evaluation or proof is offered to support this assertion.

Cornish (1980) stated that *"today the value of NRS Social Grade is increasingly questioned. This is perfectly reasonable on the grounds that the economic differences between classes have enormously diminished in the past 20 or 30 years."*

Cornish suggests that perhaps it would be worth investigating whether it would be better to look for different measures for different purposes rather than a single scale for all. Cornish (1981) developed a new inter-laced classification system called Sagacity to overcome the following problems with the Social Grading system.

"...while having more predictive power than income alone, its value has been reduced to some degree by the increasing number of families with two or more income earners, and by the redistribution of income and purchasing power across the classes (for example by taxation, social benefits, and union bargaining)."

Sampson (1980) as Chairman of the Market Research Society's working party on socio-economic grading highlighted the following points on Social Grading:

"1. A defence of the status quo

Arguments in favour of keeping the present system centre on the following four key issues:

(i) The simplicity of the present classification system.

(ii It's almost universal use.

(iii) The opportunity it offers to make comparisons between different current data bases.

(iv) The opportunity it offers to make comparisons between present and historical data.

However, these four arguments are open to serious dispute. Firstly, simplicity may no longer be appropriate against a background of rapid social and economic change. Secondly, important details in the application of the system appear to vary from one research agency to another, thus undermining point (ii) in practice and points (iii) and (iv) in theory, if not in practice also.

2. **An attack on the status quo**

The main arguments against keeping the present system centre on the following:

(i) The present Social Grade system is based on occupation and this may have a tenuous relation to `income', `spending power' and `consumption behaviour'.

(ii) The present system implies a hierarchy of some kind. However, changes in the relative remuneration between different occupations have made this unclear, and there is no basis for making reliable inferences about life-style or spending power.

(iii) No account is taken of the role of the female wage earner at different stages in the life-cycle.

(iv) No account is taken of the different structures of disposable/discriminatory income according to such factors

as number of wage earners in household, life-cycle and other financial commitments such as mortgage repayments and hire purchase debt."

Monk (1985) saw the critics of the current Social Grading system falling into two main groups:

"(i) Substitutionalists: suggesting a different method, eg. income.

(ii) Multi-dimensionalists: wishing to employ more than one dimension, eg. a weighted combination of occupation, income, education etc.

The first point to be made about the suggestions of both sets of critics is that neither is necessarily wrong in their suggestions given their own special needs. Where such suggestions tend to fall down is as a suitable, general purpose, classification for many different needs. There are, in addition, a number of objections that have prevented the alternative suggestions being adopted.

(i) From a methodological standpoint it is often difficult to collect accurately the data suggested as a substitute. This is particularly true of income.

(ii) The multi-dimensional approach can lead to very complicated and involved weighting. For example, Terminal Education Age (TEA) is much more closely related to Social Grade among the young than among the old. While the explanation is obvious, the problem of inter-relating TEA with occupationally derived Social Grade without also taking age into account remains.

(iii) Such weighted, multi-dimensional approaches have no firm base. For some product fields a stratification is

required that emphasises 'style of life' or 'taste' while for other fields a stratification needs to be orientated towards income.

Thus, Social Grading analyses used in published tables of the National Readership Survey are to a large extent chosen because:

- *From a technical standpoint occupation is relatively stable and reliable at the data collection stage;*

- *It is a reasonable 'general purpose' classification, in that it is useful for most product fields without necessarily being the most ideal for particular product fields."*

A paper presented to the Technical and Development Committee of the Market Research Society by Bound (1987) also looked at the pros and cons of the Social Grade system. The reasons given by Bound were:

"Reasons for dislike:

(i) Class is very hard to determine reliably, that is in such a way that different people will do it the same. Elaborate methods of collecting information about not only the respondent in detail but other household members are used to enable classification in the office with the aid of a completed questionnaire rather than leave it to individual field workers. This is what the National Readership Survey does. Others do leave it to the field. If respondents are being selected on a class quota basis it clearly must.

(ii) Even when classification is done in the office with the full treatment, different organizations working ostensibly to the same rules get different answers. The example of

the National Readership survey change of contractor effect is notorious.

(iii) All this is a lot of work.

(iv) Respondents do not like giving information, particularly about other people.

(v) Respondents do not like being classified by class, and still less being classified according to data about other people. The use of the term 'head of household' or 'chief wage-earner' is disliked by respondents.

(vi) Nobody else does it in other countries, leaving a suspicion it is all due to a British pre-occupation with class.

(vii) Other people, particularly social scientists and government, find it distasteful to acknowledge the existence of class.

Advantages:

They include:

(i) Class is a powerful discriminator of product and media usage. The 1981 Working Party said so, and there is no reason to suppose the situation has changed very much.

(ii) It can be very easy to do in the field if you are not too fussy.

(iii) Everybody is used to it, and unless the National Readership Survey and other major syndicated surveys (TGI, TCA, omnibuses) all changed at once confusion would ensue.

The problems with the Social Grading system such as lack of theoretical basis, its poor discriminatory power and inability

to be updated when changes occur in the economic and social contexts would probably disqualify it as a system if it was not being used already. The longer Social Grade is used, the stronger the attachment users have to it. This attachment is not based on strong evidence of its discriminatory power but more on practical problems associated with changing to a new system, such as retraining staff in new methods. When the reasons and evidence given for retaining Social Grade are evaluated on a case by case basis they do not provide sufficient evidence that Social Grade should be retained. Evidence examined in the following sections specifically relating to the reliability, stability and discriminatory power of Social Grade supports the contention that Social Grade should not be retained.

The issues that arise when Social Grade has been evaluated are almost identical to those that have arisen in the current evaluation of the two United Kingdom official social systems; Social Class based on Occupations and Socio-Economic Groups. The same arguments against change can be put forward. It is important in such an evaluation to be clear of the objectives of the system and the attributes then needed. Specifically Social Grade and the official systems have had to change in response to changes in the social and economic environment in which they are used. These changes are likely to continue and therefore must be considered in the development of new systems or selection of alternative systems.

5.2 Reliability

As discussed in Chapter 3, having a reliable classification system, that is a system that produces repeatable findings, is one of the fundamental elements of a usable classification system. The initial work on reliability by Cantril (1944) provides a useful insight into the need to check on reliability and variability. The study involved interviewing a group of respondents and classifying them by economic status into four groups. Three weeks later the same interviewers re-interviewed the respondents and once again classified them by economic status into four groups. Cantril found that 77 per cent retained their original grouping. In a subsequent study, but with different interviewers conducting the second interview, only 54 per cent of respondents retained their original grouping (from Moser & Kalton, 1971).

Allt (1979) reported on the reliability between different survey practitioners, as well as within company reliability. In particular, he was concerned that various organizations differ in their interpretation of the information needed to classify for Social Grade. Allt felt that some of the problems resulted from treating social class as an `attribute' variable, with the consequent need to make sure marginal cases are classified in one category or other.

A more recent study by O'Brien and Ford (1988) aimed to test the replicability and stability of classification variables. The initial study involved interviewing 1380 adults. They conducted a follow-up study of a geographical subset consisting of 677 of the initial respondents ten months later. The researchers managed to re-interview 400 of this group. No respondent was re-interviewed by the same interviewer, as the researchers thought that classification variables should be replicable for any single individual regardless of who interviewed them. Table 5. provides the cross-classification

of Social Grade in original interview by Social Grade in re-interview.

Table 5. -- Classification at original interview by re-interview

	Classification at original interview							
Classification at re-interview	A	B	C1	C2	D	E	**No.**	**%**
A	5	6	-	-	1	-	12	3
B	5	46	14	-	-	1	66	16
C1	2	17	61	11	5	4	100	25
C2	1	1	17	73	11	8	111	28
D	-	1	6	20	26	6	59	15
E	1	4	4	11	7	25	52	13
Total: No	14	75	102	115	50	44	400	100
%	3%	19%	25%	29%	13%	11%	100%	

O'Brien and Ford provided a number of reasons for the high level (41%) of change in Social Grade classification of respondents from when they were first interviewed to when they were interviewed ten months later.

Of the 164 respondents whose social classification was different, about 10% had in fact '*genuinely*' changed Social Grade due to a change in either employment or household composition. For the remaining 31% of respondents, the following explanations of why their Social Grade had changed were put forward.

Table 6. -- Reasons given for changes in respondent classification

	Changes of 2+ grades	Changes of 1 grade	All changes	%
	no.	no.	no.	
Interviewer miscode	6	50	56	45
Depth of probing	21	8	29	23
Change in details given by respdt.	1	23	24	19
Chief wage earner problems	5	5	10	8
Agency coder miscode	-	6	6	5
Total	33	92	125	100

O'Brien and Ford went on to explain how these problems were likely to have occurred:

*"**Interviewer's depth of probing**. This is simply where, for whatever reason, an interviewer does not appear to have established sufficient information to provide a reliable grading....*

***Details given by respondent about head of household's occupation**. Changes in the way a head of household's job is described can occur both when someone is describing his/her own job and when the occupation is being described by a respondent who is not head of household. Although it may seem odd that someone should describe his/her own job differently we can perhaps ascribe this to the respondent/interviewer relationship. Where rapport is bad, a respondent may be less specific or willing to give details, conversely, there may be occasions where a respondent is anxious to impress. Where the respondent is not the head of household, differences may occur*

for many reasons, especially if the head of household is present on one occasion, but absent on the next....

Problems with chief wage earners. *These can come about either because a chief wage earner has been taken unnecessarily (because further probing would have established that the retired head of household actually does have a pension from his previous job) or because a chief wage earner was present in the household and should have been used but was not....*

Miscoding of details by interviewer. *Even when the interviewer has managed to establish whose job she should be coding and collected proper details, he/she can still make mistakes in applying a code....*

Miscoding of details by agency coder. *There have been a few instances where a respondent has been correctly graded by interviewers, but one code has been changed by the research executive at BMRB. This would not normally be the case as this survey was unusual in being edited in this way - it is normal practice to assume that the interviewer, applying grades on a day to day basis, is more experienced than anyone else except supervisors and area office management."*

O'Brien and Ford concluded that clearly there is *"a serious question-mark about its replicability. Some of this movement could be reduced by still more stringent training...If one is running a panel survey there are opportunities to check and reduce error, but when applying quota controls or conducting ad-hoc work, there is only one chance to collect data for classification and we feel that the use of Social Class in this context must be re-examined."*

Following the work of O'Brien and Ford on misclassification, Samuels (1988) probed into the reasons for miscoding on the Social Grading system. Samuels suggested that *"...31 per cent of changes were the result of incorrect allocation to social class by the interviewer on one or other occasion. Since, presumably, incorrect classifications were randomly distributed between the two times, about half of these would be right and half would be wrong at the first interview and similarly at the second. Thus on any one survey we can conclude that about 15 per cent of the sample will be wrongly classified on the Social Grade dimension...."*

Samuels noted experiments at OPCS where highly-trained coders coding the same information in the office rarely achieve 90 per cent agreement and that experiments with interviewer versus office coding usually produced agreement levels in the low 70's. Samuels noted finally that *"on the NRS - where social grading is undertaken in the field but checked and finalised in the office - 16 per cent of all interviewer codes are changed."* and that *"The complexities of social grading are such that the bigger surprise is that 86 per cent are correct!."*

Rothman (1989) and Cornish and Denny (1989) also looked into the problems of the reliability of coding of Social Grade. The Rothman study found that Interviewer Coded Social Grade (ICSG) was only the same as Office Coded Social Grade (OCSG) in 84 per cent of all cases. Rothman found that the proportion of cases in which two independent interviewers fail to agree on Social Grade could be as high as 29%. Cornish and Denny felt that Social Grade is not a highly reliable demographic and should only be used with caution for structural purposes.

These studies highlight serious reliability problems with the Social Grade classification system. The magnitude of the problem of reliability of Social Grade has not been specifically addressed by its users. But such problems probably lie at the heart of users' concerns over the discriminatory

power of Social Grade. Regular evaluation of the reliability of the Social Grade system should be conducted. Regular studies would provide the data needed to establish benchmarks on which the reliability could be monitored. With established benchmarks, problems are likely to be identified much sooner than the current system where a study is generally conducted every ten years and with widely varying methodology. A classification system cannot be expected to perform at its optimum if reliability problems exist. It is therefore not surprising that the performance of Social Grade has been questioned so frequently.

5.3 Stability

There is disagreement whether the classification measure should be stable to the extent of producing rigid proportions of the population in each grade or not. The Social Grade system does not have an established theoretical basis. Nor does it possess an established systematic procedure to adjust for structural changes in the social and economic environment in which it operates. One of the most important attributes of a social classification systems being used today is to allow for the dynamic nature of society, thus reflecting continual social, economic and educational change.

The Joint Industry Working Party (1981) investigated the stability of Social Grade classification over a 15 year period 1965 to 1975. The Working Party considered stability in the context of Social Grade "*implies that the measure should not be prone to chance fluctuation but should adequately reflect change over time*".

The Working Party concluded:

"...overall there is little net change. Whilst for some fields, e.g. telephone, the range has fallen, for others, e.g. continental quilts, it has increased."

This conclusion is surprising since the proportion of the population in the AB groups changed from 12.7% in 1965 to 16.6% in 1979 with the survey contractor for the survey changing on three occasions during this period. These changes clearly show a classification system which is dynamic. The AB Social Grade groups increased by 31% during this period and it is hard to believe that these changes did not influence the discriminatory power of the system. In addition, the Working Group failed to

test whether Social Grade was "*prone to chance fluctuation*" but still managed to conclude that there was no problem.

The argument put forward by many supporters of the Social Grade system that the long history of the system means that detailed trend data is available can not be supported. If the AB Social Grade groups have changed by 31% in 15 years then other groups have also changed substantially during this period. The system has fundamentally changed and therefore trends cannot be established over this time period with what amounts to a variable measuring device. When new occupations are allocated to Social Grade or when an occupation changes its group allocation then the system has been revised. Since data was collected over a 15 year period and classified using revised systems, each time a revised system was used a statistical break in series should be considered to have occurred. In addition the change of contractor should also, it seems, have been considered a break in series. The Working Party failed to identify the changes in methodology introduced into the data collection and classification procedure by the three changes in contractor during the 15 year period under analysis.

The Joint Industry Working Party (1981) used the following National Readership Survey data to measure "stability":

Table 7. Proportion in Social Grade groups AB by year.

Year	AB %
1965	12.7
1966	12.7
1967	12.1*
1968	12.4+
1969	12.0
1970	13.8
1971	13.8*
1972	14.1
1973	13.4*
1974	13.1+
1975	12.7
1976	11.9*
1977	15.4*+
1978	16.0*
1979	16.6*

* a shift of 0.6% or more between adjacent years

\+ change of research contractor.

In addition to the above analysis the Working Party calculated four discriminatory measures for 28 product fields for years 1973 and 1979 (earlier TGI does not separate D and E grades).

Table 8. Summary of four discrimination measures.

	1973	1979
Max - Min	24%	25%
AB - E	22%	23%
AB - D	18%	18%
Discrimination index	.25	.21

The analysis of the Working Party in this situation is particularly weak. The "net change" value is not very interesting when the overall structure of the system has changed so much. With the AB groups increasing by 31% during the 1965-1979 period it would unrealistic to imagine that discrimination on specific products and services was not affected. The net figure hides these likely changes and does not provide any insight to the problem of stability of the system. It would have been more interesting to have details of absolute differences in the discrimination of Social Grade for these products and services.

5.4 Discriminatory power

Whilst the discriminatory power of Social Grading has been questioned on numerous occasions, no regular empirical evaluations have been conducted. The evaluations that have been conducted failed to provide the detailed analysis of the discriminatory ability of Social Grade necessary to develop this critical research tool. With the previously mentioned problems of the reliability and stability of Social Grade, it would be surprising to find that Social Grade has continued to provide the optimal discriminatory power.

Monk (1985), provides the following brief discussion of some of the evaluations of Social Grading: *"...In 1956 when the present system of Social Grading was introduced with the National Readership Survey, an experiment was carried out to assess the face validity of attaching class descriptions to particular occupations. The main conclusions of this work were that almost all people readily attached class labels to various tested occupations, and that different sections of the population were in broad agreement about the class of the occupations. Some occupations such as office clerk or shopkeeper were subject to differences of opinion, but to a large extent the traditional view of occupational status remained.*

The fact that the general public will conceptualise occupations in this way does not necessarily mean that they are good stratification material for commercial research. In this sense a more relevant and direct approach was carried out by J A Lunn of Research Bureau Limited on behalf of a Working Party of the Market Research Society and reported in Commentary (July 1965). Based on a sample of 1000 housewives, where a range of Social Gradings and consumption characteristics were obtained, two types of analysis were carried out.

(i) Cross tabulations of variables by income, occupation, class self-rating and food expenditure.

(ii) A factor analysis based on the inter-correlation matrix of all variables.

From the cross-tabulations occupation showed more overall discrimination among the remaining variables than the other classifications (income, self-rating and food expenditure)."

The main results from the factor analysis are shown below:

Table 9. -- Factor loadings with income partialled in and out

	Item included	Factor income included	Loadings income partialled out
	Interviewer's assessment	0.61	0.60
Y	Occupation	0.60	0.50
Y	Income group	0.53	-
	Spirits in house	0.51	0.47
X	Class of district	0.50	0.60
Y	Vehicle	0.46	0.23
Y	Telephone	0.46	0.34
Y	Refrigerator	0.46	0.34
	Beer in house	0.41	0.44
	Wine in house	0.41	0.42
X	Self-rated Social Class	0.39	0.48
Y	Age on school completion	0.38	0.31
X	Sunday Times	0.29	0.40
X	Observer	0.26	0.34
X	Daily Telegraph	0.24	0.40
X	Sunday Telegraph	0.18	0.33

Occupation and income have relatively high loadings, and the analysis is interesting in that factor loadings were obtained both including and excluding income data.

As the Lunn report states:

"With income partialled out, the loadings of certain variables (marked X) increase; with the implication that they are measuring primarily taste and background. Conversely, the loadings of other variables (marked Y) decrease; with the implication that they are measuring primarily the income aspect of social class."

The study was described as exploratory and it was stressed that it would be preferable if many other similar analyses were carried out. However, it is interesting that the main results substantiate the Market Research Society study, views previously stated:

- occupation is relatively efficient as an unidimensional indicator of Social Grade;

- more complex methods of deriving grade categories inevitably lead to more relevant classification for some users and less relevant classification for other users.

The information that exists tends to suggest that whereas occupation forms a relevant method of forming real strata in the population, many of the other measures - such as income, education, type of house, etc. - are not real strata, but methods of forming sub-strata within the occupational groups. Such information may be used for producing more relevant groupings for particular users, and a full range of possible parameters are provided within the survey. Individual publishing houses and advertisers may make use of these to provide themselves with classifications suitable for their needs.

After many years of general dissatisfaction with the Social Grading system, a Joint Industry Working Party (1981)

representing the Institute of Practitioners in Advertising, the Incorporated Society of British Advertisers, the Independent Television Contractors Association, the Market Research Society, and the Newspaper Publishers Association evaluated Social Grading, with results as follows.

The study used the following measures in the analysis:

(i) The maximum difference in penetration (in percentage points) that exists between any two Social Grade definitions ('Max-Min').

(ii) The difference in penetration (in percentage points) that exists between the AB and D groups ('AB-D').

(iii) The difference in penetration (in percentage points) that exists between the AB and E groups ('AB-E').

(iv) If p % and q % are the penetrations in any adjacent Social Grade groupings, and p% is the larger of the two, calculate $(1-q/p)$ for each pair and average across all pairs. The index equals zero when the system provides no discriminatory ability and one when the system provides total discrimination.

The limitations of the four measures used by the Working Group have been discussed in detail in Chapter 4.

5.4.1 Product field usage

The primary source of data was the TGI, but NRS was also used for common product fields. The product fields included a mix of durables, services and fast moving consumer goods.

The average values of the measures were:

Max - Min	25%
AB - E	23%
AB - D	18%
Discrimination index	.21

The Working Party found that:

"the similarity of the first two measures indicates the strong tendency for Social Grade to act in a linear fashion, in either direction. For comparison with the discriminatory power of Social Grade, three of these measures have been calculated using gross household income as measured by the TGI, for product fields asterisked in Table 12."

Table 10. -- Income groups

Seven income breaks have been used:

Less than £1,500	12%
£1,500 - £2,499	13%
£2,500 - £3,499	13%
£3,500 - £4,499	13%
£4,500 - £5,499	11%
£5,500 - £7,499	12%
£7,500 - and over	9%
NS not included	17%

For the 23 product areas covered, the results are:

Table 11. -- Discrimination by household income and Social Grade

	Household income	Social Grade
Max - Min	25%	26%
A - E	24%	24%
Discrim. index	.15	.21

The Working Group considered the results illustrative of two points. "*Firstly, in spite of having one extreme group that is substantially larger, Social Grade discriminates as well as income on the Max-Min and direction measures. Secondly, the larger discrimination index for Social Grade indicates that, whilst generally working linearly, the differences between groups are greater than those of income. However, this in itself may be partially due to using seven rather than five groupings.*

Whilst the comparison does not prove that Social Grade is necessarily a better or equal discriminator compared with income, it does show, for the product areas covered, two key points: Social Grade does work as a meaningful discriminator; and income, perhaps the leading alternative contender (ignoring facility), does not perform any better, using these measures of discrimination".

From Table 12. "*a number of points can be drawn. As product field penetration increases, discriminatory ability declines. This is not a function of Social Grade but a mathematical truism. Correlated with this is the tendency for discrimination to be lower for FMCG This follows from the nature of the product fields. FMCG, by definition, will tend*

to be high penetration goods. Where Social Grade does discriminate in FMCG, it tends to be either in relatively innovative product areas, eg. pasta, or in declining product areas, eg. hand rolling tobacco." These conclusions on the discriminatory ability of Social Grade on specific product fields are based on indicators that do not provide any measure of statistical significance. They may be correct in some aspects but without an accompanying measure of significance we cannot state how likely it is that they occurred by chance.

Table 12. -- Discrimination measures and penetration: selected products

	Max Min %	AB-E %	D %	Discr. index	Use own %
Home ownership: own outright*	21	3	20	.32	22
Home ownership: buying*	48	48	34	.42	32
Telephone in home*	45	45	40	.16	68
Current bank account*	52	52	46	.21	56
Automatic washing machine*	38	38	21	.23	39
Deep freezer	33	33	24	.29	28
Full central heating*	43	43	43	.30	27
Colour TV: rented*	13	13	-2	.14	40
Colour TV: owned*	19	19	17	.16	27
Two or more cars in household*	24	24	19	.41	13
Continental quilt	19	19	8	.14	34
Holiday abroad: last 12 months	23	23	19	.31	16
Gardener: fruit in garden	14	14	12	.05	75
Buy by mail order*	19	1	16	.18	49
Eat one or more chocolate bars per week*	11	8	2	.04	80
Drink one or more brandies per month	16	14	16	.19	33
Drink draught lager*	10	10	3	.20	39
Drink bottled lager*	9	9	4	.19	34
Smoke cigarettes*	23	-10	-23	.20	38
Use handrolling tobacco*	12	-11	-12	.28	11
Moisturising creams*	34	34	10	.10	63
Rubs and rheumatism remedies*	16	-16	-5	.11	31
Bought men's suit in last 12 months*	22	22	15	.17	33
Kitchen roll/paper towels*	-	18	20	.08	63
Ground coffee*	44	44	43	.34	23
Frozen fish fingers	18	12	-3	.09	61
Breakfast cereals*	20	20	6	.06	85
Read quality daily (NRS 1979)	34	34	34	.39	-
Average (ignoring sign)	25	23	18	.21	

5.4.2 Weight of usage

The Working Group analysis of weight of usage used two sources - TCA and TGI Volumetrics. The Working Group found that the discriminatory power for weight of usage was not large, the exceptions being at the lower end, and in some cases, the upper end. The Working Party also found that where D's are separated from E's it is seen that this effect is largely confined to E's. It was found that discrimination was largely a function of household size, with the average size of E grade households being substantially smaller.

The Working Group found that there were some products for which Social Grade did discriminate. Not surprisingly, household size was found to be an effective discriminator for weight of usage, with other demographics such as age of housewife, and presence of children being highly correlated.

The Working Party also considered to what extent income is a more effective discriminator than Social Grade for weight of usage of products. They found that as far as food products were concerned, family income discriminates more effectively than Social Grade. Nevertheless, for other products the reverse was true.

The Working Party came to the following conclusions on weight of usage:

"We conclude that, for weight of usage of household products and foodstuffs, Social Grade will provide discrimination, but primarily only for products areas where penetration itself is Social Grade discriminated. For high penetration product areas other variables, such as household size and presence of children, can be more effective.

Obviously, the number of product areas which can be analysed is large. However, one further example, again taken from TGI Volumetrics, is given:

Table 13. -- Social Grade and income as discriminators of drinks

Soft drinks, mixers and alcoholic beverages; adults

Usage	**AB (16% of total)**	**£5500+ (24% of total)**
less than 10.0	2	-
10.0 - 14.9	10	-
15.0 - 19.9	5	1
20.0 - 24.9	4	6
25.0 - 29.9	3	5
30.0 - 34.9	2	11
35.0 and over	1	4
	27	27

Social Grade (as measured by AB usership) again provides discrimination for a large proportion of the products and analysis which looked at DE's would increase the proportion. Income provides comparable but less variable discrimination.

On the basis of the data examined we conclude that, for weight of usage, Social Grade acts as a general discriminator, subject to the caveats expressed above." As was the case with product field usage, the Working Group failed to use measures that provided information on the statistical significance of their results. Thus the conclusions on the discriminatory ability of Social Grade for weight of usage must be considered with some scepticism.

5.4.3 Brand usage

The Social Grading system has also come under attack from those who believe that it does not provide high enough within group discrimination (brand discrimination)[1]. A good example of this type of criticism comes from Thomas (1980):

"...Most are agreed that social class is no longer (if it ever was) a useful lowest common discriminator. The Observer's own back yard of Sunday newspapers is as good an example as any of social class's limitations.

Table 14 shows the latest National Readership Survey Social Grade profiles, reiterating the very well known fact that social class discriminates effectively between broad media groups in the national press, but does not discriminate satisfactorily between media within these broad groups.

If all that is sought is to distinguish the Sunday populars from the Sunday qualities, then social class will fulfil this end, showing the common characteristics of Sunday populars clearly with 40 per cent of readership in the C2 Social Grade. But if your need is to differentiate between, say, the Sunday Mirror and the Sunday People, or at the top end of the market, between the Sunday Telegraph and The Observer, then social class is of irritatingly little use. Irritating because it goes no way towards explaining why such apparently similar kinds of people do not choose to read the same newspaper. This is patently inadequate for both marketing and media purposes."

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[1] See Hammond, K.A., Ehrenberg, A.S.C and Goodhart, G.J. (1996) for a recent discussion on market segmentation and competitive brands.

Table 14. -- National Sunday newspapers profile by Social Grade

	AB	C1	C2	DE
News of the World	6	16	40	38
Sunday Mirror	8	20	40	32
Sunday People	7	19	40	35
Sunday Express	28	30	25	17
Sunday Telegraph *	40	32	18	10
The Observer *	41	32	17	10
The Sunday Times *	46	29	17	8

Source: NRS July 1979-June 1980 except *(NRS Jan-Jun 1980)

The Joint Industry Working Party (1981) also looked into the ability of Social Grade to discriminate for brand usage. In their analysis they were concerned that it was extremely easy to obtain a biased selection of brands to be tested. To overcome this problem, they took the five most heavily advertised product areas and analysed the four leading brands of each. The product areas used were chocolate bars, draught beer, washing powder, cigarettes and biscuits.

The analysis by the Working Party found that:

"The discriminatory power of Social Grade varies by the product field and within product field, by brand. Comparative data are shown for other key demographics. It can be seen that the discriminatory power of Social Grade is comparable with that of the other leading demographics and in some cases greater.

In FMCG markets dominated by a few brands, it is probable that any leading brand will have an "across the board" appeal, which mutes the efficacy of any demographic classification. The greater the fragmentation of the market (e.g. in the case of cigarettes), or the greater the opportunity to isolate segments

(eg Persil Automatic), the greater the probability of demographic discrimination.

Obviously, all brands are different and there will be a set of demographics particularly suited to identifying the actual or potential franchise of any particular brand. However, on the basis of these data, we again conclude that Social Grade acts as a general discriminator and as relatively effectively as any other in general use." The Working Party provided these claims after analysis of data such as is included in Table 15. on the following page. This analysis by the Working Group fails to provide any summary statistical measure of the overall discriminatory ability of Social Grade or the other socio-economic classification, nor is an estimate of the likelihood that the results have occurred by chance provided. Without this information, the Working Group does not have sufficient evidence to support claims that "*Social Grade is comparable with the other leading demographics and in some cases greater*".

Table 15. -- Brand Penetration: draught beers/lagers (adults)

	Any beer/lager %	Double Diamond %	Heineken %	Carlsberg %	Skol %
Social Grade					
AB	45	8	7	6	6
C1	42	5	8	6	5
C2	49	6	7	6	6
D	44	4	5	5	5
E	25	2	2	2	2
Age					
15-24	50	5	13	11	12
25-34	56	7	11	8	8
35-44	50	6	5	4	3
45-54	43	4	3	4	3
55-64	34	4	2	1	1
65 and over	25	3	1	0	0
Income					
£7500 and over	53	7	11	9	9
£5500 - £7499	54	7	8	7	7
£4500 - £5499	52	7	8	6	6
£3500 - £4499	51	6	6	4	4
£2500 - £3499	41	5	4	4	3
£1500 - £2499	33	3	4	4	3
£1499 or less	26	2	3	1	3
Not stated	31	3	4	3	3
Terminal Education age					
Still studying	36	4	9	8	10
19+	52	8	11	9	7
17 or 18	48	6	10	8	7
16	49	6	9	7	8
15	49	5	6	5	5
14 or under	34	3	2	1	1
Marital status					
Single (incl in engaged)	47	5	11	9	11
Engaged	61	5	17	15	20
Married	45	5	5	4	4
Separated/divorced widowed	22	2	2	2	1
All adults	43	5	6	5	5

5.5 Overall assessments of Social Grading

The Joint Industry Working Party (1981) came to the following conclusions on the state of Social Grading:

"We conclude that there is no strong evidence to support the hypothesis that Social Grade has declined in its discriminatory power, any more than other variables. Such change as has occurred is bound to, as real income rises and thus the proportion of the population in the market for any one product increases. There is no lodestone that can be mined to provide automatic market analysis. Rather each product field must be treated on its merits.

Social Grade as such performs its task adequately.

Whether substantial sums should be invested in attempting to find some new criteria is a question for further discussion."

The Working Party went on to provide the following more detailed findings:

"(i) Analysis of data covering product field penetration, weight of use and brand use shows that, overall, Social Grade provides satisfactory discriminatory power.

(ii) None of the alternative standard classification variables examined was found to provide consistently better discriminatory power.

(iii) No one classification variable works 'best' across all product fields or data types. Users must approach each problem on its merits and find that set of classification variables which is most relevant. If properly used, the current measure is acceptable.

(iv) No evidence was found to show a decline in the discriminatory power of Social Grade over the past ten years.

(v) There is a need for guide-lines to be introduced to ensure a greater degree of consistency, across different research suppliers, in sample profile by Social Grade.

(vi) There may be an 'ideal' variable which would provide significantly better discriminatory power than Social Grade and which would better reflect its underlying constructs. It is possible that, if found, it would be tractable and suit all user needs. However, the Working Party considers that the likely benefit derived would be out of proportion to the substantial expenditure required to investigate this point."

These evaluations of Social Grade provide many clues on the behaviour of the classification for brand usage, weight of usage, and product field usage. However, these studies failed to use analysis statistics that could provide information on statistical significance. The conclusions reached by the Joint Industry Working Group can not be supported when they have not used statistical measures that would allow them to make (and others to judge) statements such as: "*We conclude that there is no strong evidence to support the hypothesis that Social Grade has declined in its discriminatory power, any more than other variables.*"

The previous chapter highlighted many of the deficiencies of techniques used to evaluate the discriminatory power of Social Grade. These same techniques are the ones that have been used to make claims for the discriminatory power of Social Grade. These evaluations are not based on sound statistical practices and the conclusions reached can not be supported by the evidence provided. They should be considered as indications, rather than reliable measures, of discriminatory power.

It is likely that some of the observations in these evaluations of the discriminatory power of Social Grade are true; but unless sufficient statistical evidence is provided to support these evaluations then they can only be considered as observations, not as sufficient evidence.

Chapter 6

6. Social Grading, Demographics and Consumer Behaviour.

The previous chapter reviewed investigations that concentrated on the discriminatory ability of social grade. This chapter focuses on a specific debate: that relative income is the superior discriminator. It is clear from the debate that the underlying discriminatory power of classification systems and the relationships between discriminatory systems have only been considered superficially.

Martineau (1958) and Coleman (1960) suggested that social class is more closely linked to consumption patterns than is income. Other authors have suggested more of a link between social class and life style. Levy (1966) put forward that *"social class variations are variations in lifestyle,"* and that differences in consumption, media, and store patronage were not simply due to variations in income. This idea was followed up by Myers and Guttman (1974), who considered that social class captures lifestyle differences that income ignores. As can be seen from this brief description of the relationships between social grading, demographics and consumer behaviour the hypotheses are numerous and varied.

6.1 The Relative Income Hypothesis

Coleman (1960) developed the relative income hypothesis which was followed up by Peters (1970) and Schaninger (1981). The general hypothesis is that relative income (measured by whether a family is under or over privileged when compared with others in their social class) will be the best discriminator for products which *"are more nearly symbols of higher status within class than symbols of higher status per se"* Coleman (1960). Examples provided to support this hypothesis included automobiles, colour television sets, more costly brands, larger sizes of some home appliances, and recreational equipment. Schaninger (1981) summarised the work of Coleman (1960) and Peters (1970) as *"income and social class appear to be the choice for segmenting high cost durable goods that serve as symbols of affluence within social class membership."*

Schaninger (1981) noted that there were no studies on whether the combination of social class and income was superior to either of these discriminators alone. Schaninger (1981) went on to test this and concluded tentatively that:

"1. Social class is superior to income for areas of consumer behaviour that do not involve high dollar expenditures, but do reflect underlying lifestyle, value, or homemaker role differences not captured by income. Such differences as importance of quality or quality symbolism, price-rational versus deal-prone orientations, impulsiveness, preference for active versus passive entertainment, concern with health and body, self-indulgence, immediate gratification, and emphasis on the evening meal are identified by Levy (1966, 1971) across social classes. They are reflected in greater significance for social class in consumption of instant, frozen and convenience foods and beverages and their `prepare from scratch' counterparts; snack foods and sweet beverages;

imported and domestic wines; shopping behaviour and deal-proness; and evening television exposure.

Although social class and income are equivalent in predicting value of furniture owned, social class is superior for both method and place of purchase of highly visible, symbolic, and expensive livingroom furniture as suggested by Coleman (1960).

2. Income is generally superior for major kitchen and laundry appliances, products which require substantial expenditures, and, contrary to Coleman's (1960) findings, may no longer serve as symbols of status within class or as status symbols to the upper lower class. Evidently, ability to pay after providing for basic necessities and more visible symbols of status is the important factor in predicting major appliance ownership and feature levels. Income is also superior for soft drinks, mixers, and distilled alcohol when frequency of purchase is examined. Heavier in-home (and thus non-visible) consumption of such products may reflect ability to pay for these `luxury' items even though they do not require major expenditures.

3. The combination of social class and income is generally superior for product classes that are highly visible, serve as symbols of social class or status within class, and require either moderate or substantial expenditure (clothing and makeup, automobiles, and television sets).

Although relative income is supported for automobile ownership (and television sets to a lesser degree), status incongruence/inconsistency is also supported for these categories. Support is obtained for a modified version of relative income for several makeup usage items and for higher priced dress purchases.

Status incongruence/inconsistency is strongly supported for low priced dresses and receives some support for grocery product shopping behaviour. Lower income upper middle class housewives are more likely to purchase low priced dresses, and lower income upper middle and lower middle class housewives are also more likely to take advantage of grocery pricing promotions than housewives of the same classes in higher income quartiles - indicating a willingness to compromise their social class tendencies to cope with low relative income.

Relative social class is supported for television ownership and for several meat convenience food entrées. For such products, income or ability to buy tends to mask underlying social class tendencies which become stronger after removal of income."

The above tentative generalisations provided by Schaninger add to the overall understanding of the part social class and income play in consumer purchasing behaviour. There are, however, a number of problems in applying these generalisations to gaining an understanding on how the British version of social classification, Social Grading, operates.

The study by Schaninger (1981) consisted of 550 questionnaires being handed out to housewives, resulting in a final sample of 325. Schaninger conducted the sampling in the Ottawa-Hull metropolitan area, with French and English versions of the questionnaire being handed out. The French language responses were not used in the analysis as sub-cultural effects were detected. This resulted in analysis of 225 questionnaires, a response rate of only 41%. Thus these findings should be viewed (as the author suggests) as *"providing tentative research-based generalizations about the relative appropriateness of social class, income, and their*

combination for different situations."

In addition to the mediocre response rate, the study was conducted in Canada and generalised over other studies in the United States Schaninger (1981) points out that:

"...English-speaking samples in Canada have been shown to be generally consistent with U.S. findings (McCarthy and Shapiro 1975, Tigert and Arnold 1971). Store chains, store types, product types, and brands of various consumer products are generally similar to those of the U.S."

This does not assist greatly when wanting to extrapolate findings to the United Kingdom where social structure, attitudes and tastes differ greatly, as do the stores and consumer products, from those available in North America. Another problem in applying these generalisations to the United Kingdom situation is that a measure of social class quite different from the Social Grading system used in the United Kingdom was used in the analysis. The Schaninger (1981) study used Hollingshead's Two Factor Index of Social Position (Hollingshead and Redlich 1958; Reynolds and Wells 1977). The Hollingshead classification system is based on occupation and education and produces a five-level social class scale. Other previous studies in this area used varying schemes: Coleman (1960) used Warner's social class system and Peters (1970) used a ten-class scheme that was initially used in the 1967 Survey of Consumer Finances by the Survey Research Center at the University of Michigan. The result of all this is that a variety of measures of social class have been used as a basis for making generalisations on consumer purchasing behaviour. It would be very dangerous to take these generalisations and expect them to operate in the United Kingdom.

The work of Cornish (1981) took into account the general philosophy of the relative income hypothesis with the development of the Sagacity socio-economic classification system. The Sagacity system uses standard demographic variables such as age, income, social grade and groups the scores on these variables into the following 12-group family lifecycle stages:

Dependent	white collar;	
	blue collar;	
Pre-family	white collar;	
	blue collar;	
Family stage	better off	white collar;
	better off	blue collar;
	worse off	white collar;
	worse off	blue collar;
Late stage	better off	white collar;
	better off	blue collar;
	worse off	white collar;
	worse off	blue collar.

The relationship between the Sagacity system and the relative income hypothesis is as follows. Respondents are grouped into two general categories of either "white collar" or "blue collar" depending upon their social grade. The net income of the chief income earner of the household (with adjustments being made for the working status of the chief income earner's spouse) is then used to determine whether the respondent is classified "better off" or "worse off." Finally, the respondents are grouped according to their stage in the family lifecycle.

This classification system therefore relies on the tenets that there are meaningful differences in consumption patterns between those who are "better off" and "worse off," blue collar and white collar social grades, and family lifecycle stages. Cornish (1981) does provide some evidence to support the discriminatory power of this classification system but there has been no formal testing of the underlying tenets.

Chapter 7

7. Research Design

This chapter provides details and rationale on the database and statistical analysis used in this study.

7.1 Database

A systematic random sample of 2000 records was obtained from the 1989 Target Group Index (TGI) database. The TGI is a national product and media survey which collects information from 25,000 adults each year. This database consists of the findings from self-completion questionnaires from a representative sample of adults who have been contacted previously by random location quota sampling methods in approximately 3,500 sampling points throughout the United Kingdom.

The TGI was chosen as an established and stable database that could provide all the variables required to meet the objectives of this study. It has been used in previous studies of Social Grading and other classification systems such as the Market Research Society: Joint Industry Working Party (1981). A sample of 2,000 was necessary as detailed analysis of sub-groups was planned and it was intended that probability statements about the findings would be made.

7.2 Usage and Behaviour Variables

The dependent and independent variables in this study are a mixture of nominal, ordinal, interval and metric level variables. Having a variety of levels of variables complicated the analysis as it required the computation of a number of different evaluation statistics, rather than just one statistic for each combination of dependent and independent variable. Since the evaluation statistics are only appropriate for certain levels of data (e.g. nominal or ordinal) the test statistic varied. While the most simple situation would be to calculate one overall test statistic of the discriminatory ability of all classification systems on the consumption variables, this was not possible. So, evaluation statistics had to be chosen as appropriate. When a combination of say nominal and ordinal level variables was being tested, then the conservative nominal level evaluation statistic was calculated.

The following variables were extracted for this study:

Demographic, socio-economic and geo-demographic classification

Sex - (men, housewives, other women)
Social Grade - (A, B C1, C2, D, E)
Household income - (7-intervals)
Age - (6 intervals)
Acorn Classification - (11-cluster solution)
Mosaic Types - (11-types)
SuperProfiles - (11-lifestyle groups)
Home ownership - (5-groups)
Length of time in present home - (5-intervals)
Working status - (4-intervals)
Terminal education age - (6-groups)
Number of people in household - (5-groups)
Marital status - (3-groups)

Cars in household - (number)

Usage, purchase and ownership variables

Food Items; Quantity used:

Butter - (250gm packs per week)
Soft margarine - (250gm tubs per week)
Instant coffee - (cups per day)
Packet tea - (1/4 lb packets per month)
Tea bags - (packets of 40 per month)
Yoghurt - (cartons per week)
Fizzy soft drinks - (bottles/cans)
Baked beans - (portions per week)

Brands used:

Baked beans - (brand)
Packet tea - (brand)
Butter - (brand)

Whitewear in home (have/own)

Microwave oven
Deep freezer - separate from refrigerator
Automatic washing machine - front load
Automatic washing machine - top load
Washing machine (twin tub)
Spin dryer (separate)
Tumble dryer (separate)
TV video cassette recorder - have yes/no
TV video cassette recorder - owned/rented

Credit cards

Credit Card - frequency of usage
Credit Card - ownership
Store Card - ownership

Services

Holidays - (yes/no in past twelve months)
Holidays - (number in past year)
Cost of last holiday
Cost of next to last holiday
Holiday accommodation - (type for last holiday)
Holiday accommodation - (type for next to last holiday)
Cinema - (frequency of visits)

7.3 Analysis

7.31 Overview of analysis

The initial analysis of the data aimed to quantify the discriminatory ability of Social Grade and the other socio-economic, demographic and geo-demographic classification systems. The discriminatory ability of a classification system can be thought of as the amount of variation in the dependent variable (e.g. credit card usage) that is explained by the independent variable (Social Grade). This involved calculating a statistical measure of discriminatory ability for a classification system on a particular usage variable and then calculating the statistical significance of the statistic.

The discriminatory ability of the classification systems was summarised and then a comparison was made between the discriminatory ability of the Social Grading system with other social class and socio-economic systems used in the United Kingdom and the United States of America.

These objectives were achieved by performing single factor Analysis of Variance (ANOVAS) and calculating *F* ratios, and significance levels. Eta^2's were then calculated. Eta^2 is calculated by dividing the `sums of squares between groups' by the `total sums of squares' and then squaring the result. These statistics were calculated using the ONEWAY procedure on SPSS/PC. The Pearson chi-squared statistic and significance, lambda and tau-c, were then calculated using the CROSSTABS procedure on SPSS/PC.

The *F* ratios, chi-square values and significance levels were used to measure the discriminatory ability of the

classification systems, whilst eta^2, lambda, tau-c provided a measure of the power of the various classification systems.

7.32 Rationale for selection of statistical tests.

The focus of my analysis is in the area of `variance explained'. As will be discussed in Chapter 9, this is the key concept underlying all or most uses of socio-economic classification schemes in market research or marketing.

Analysis of Variance was chosen as the method of providing a sums of squares examination of the discriminatory ability of the various classification systems for the following reasons. A single factor analysis of variance allows the partitoning of the total sums of squares (corrected for the mean) into the sums of squares due to additive effects, the sums of squares due to interaction effects and the sums of squares due to error. From this partitoning of the sums of squares, *F* ratios and their significance levels as well as eta^{2}s, a measure of the amount of variance accounted for by the independent variable were calculated. The analysis of variance approach is suitable when the cell sizes are unequal and it does not assume linear relationships between the dependent and independent variables.

This approach had been used in similar studies in the United States of America (Frank et al 1967, Bass et al 1968, Hirsch and Peters 1974, Wheatley et al 1980) but seems not to have been used in the United Kingdom. It was useful to apply it as it provided both a benchmark as well as a basis for comparisons of the relationships between socio-economic classification systems and buying behaviour in the United Kingdom to those previously found in the United States of America.

The chi-square statistic has been used widely in the evaluation of classification systems. It was chosen in this study as a test statistic as it is generally considered to be a good statistic for testing the hypothesis of independence. In this study chi-square was used to test whether there were differences in product usage/ownership among the sub-groups of a classification system. The chi-square statistic can be used to indicate if the observed association between two variables in a cross-tabulation is statistically significant.

The major drawback of the chi-square statistic is that it does not indicate the strength of the relationships found. The chi-square values calculated for the various classification systems cannot be compared in order to determine which classification system provides the better discrimination. The chi-square test fails to indicate how useful a classification system is but does indicate how likely it is that the results obtained may have occurred by chance.

The chi-square test is also strongly influenced by sample size, and therefore one can always find a significant relationship by making the sample size large enough. The way to get around this problem is to compute measures of association (indexes of agreement) in conjunction with the chi-square test. When a classification system is cross-tabulated with a consumption variable, an index of agreement is used to measure the strength of association of the two variables. The index of agreement provides the information that was missing from the chi-square test on strength of the association. Different indexes of agreement are used depending upon the level of the variables. The following statistics were calculated for nominal, ordinal and interval level independent and dependent variables.

Nominal level:

The Goodman and Kruskal Lambda-asymmetric coefficient was used in this study. This measure is used when an asymmetric measure is required, i.e. when we want to measure the extent to which errors can be reduced in predicting categories of one variable from knowledge of the categories of the other variable - in essence, what is sought in all uses of socio-economic classifiers in survey research and marketing. Lambda is appropriate when both variables are nominal but has no adjustment for sample size, nor for the number of categories in the independent variable.

$\text{Lambda}_{c|r}$ = (number of errors in first case) - (number of errors in second case) divided by the number of errors in the first case.

The following formula and description of Lambda is provided by Nie et al (1975):

$$\lambda_b = \frac{\sum_k \max.f_{jk} - \max.f_{.k}}{N - \max.f_{.k}}$$

where $\sum \max.f_{.jk}$ represents the sum of the maximum values of the cell frequencies in each column, and $\max.f_{.k}$ represents the maximum value of the row totals.

As an example, if we know nothing about a person's income, our best prediction of the person's income would the category in which most cases fall. Once we know the person's education, however, our ability to correctly predict income is improved by the extra information as we can see that as education increases so does income. Lambda provides a measure of the extra information provided by the knowledge of the second variable.

The values for Lambda always range between 0 and 1. A value of 0 means that the independent variable is of no help in predicting the dependent variable. A lambda value of 1 means that the independent variable perfectly specifies the categories of the dependent variable. It must be stressed that Lambda reflects the reduction in error when values of one variable are used to predict values of the other, therefore if this particular type of association is absent, the Lambda is 0. Other measures of association may find association of a different kind even if Lambda is 0.

Ordinal variables

Although relationships among ordinal variables can be examined using nominal measures, the *tau-c* measure reflects the additional information available from ranking.

tau-c

This measure can attain or nearly attain, +1 or -1 for any *R x C* table. In a rectangular table (one in which the number of rows differs from the number of columns) *tau-c* is appropriate. It is the result of dividing the difference between *P* and *Q* by the approximation of the total number of pairs adjusted for the number of rows or columns, whichever is the smaller (*m*).

$$\tau_c = \frac{2m\,(P-Q)}{N^2\,(m-1)}$$

where: (*m*) is the smaller of the number of rows and columns,
(*P*) is the number of concordant pairs, and
(*Q*) is the number of disconcordant pairs.

When *P* is larger than *Q*, i.e., there are more pairs ordered in the same direction on both variables, the statistic will be positive.

Interval level data.

***eta*^{2}**

If the two variables in the table are measured on an interval scale, various coefficients that make use of this additional information can be calculated. One such measure is *eta*^{2}. *Eta* can be calculated using the following formula:

$$\eta = \left(\frac{(1.0 - \sum_{i=low}^{high} \{\sum_{i=low}^{high} f_{ij} j^2 - [(\sum_{j=low}^{high} f_{ij} j)^2] / (\sum_{j=low}^{high} f_{ij})\})}{\sum_{i=low}^{high} \sum_{j=low}^{high} f_{ij} j^2 - [(\sum_{i=low}^{high} \sum_{j=low}^{high} f_{ij} j)^2]/N} \right)^{1/2}$$

The *eta*^{2} coefficient is appropriate for data in which the dependent variable is measured on an interval scale and the independent variable on a nominal or ordinal scale. When squared, eta can be interpreted as the proportion of the total variability in the dependent variable that can be accounted for by knowing the values of the independent variable. The measure is asymmetric and does not assume a linear relationship between the variables.

Chapter 8

8. Results and Discussion

Chapter 8 is the first of three chapters that present and discuss the results and implications of this study. An overall assessment of all the classification systems under investigation is presented in this chapter. Each classification system is tested to see if it provides discrimination for a number of items, followed by an assessment of discriminatory power. Chapter 9 focuses on the discriminatory ability of Social Grade. Social Grade is tested as a discriminator of usage and purchase of food products, choice of brands of food products, ownership of consumer durables and usage of services. Chapter 10 provides discussion on the implications that arise from this study. In particular, the usefulness of Social Grading as a control variable in sampling, as a linking variable between data sources and as an explanatory tool in survey research.

This chapter is divided into two parts. The first investigates whether the classification systems provide *significant discrimination.* The second investigates the *discriminatory power* of the classification systems. The classification systems are tested in each of the following areas:

Frequency of usage/purchase of consumer food products,
Branded products,
Ownership of consumer durables,
Service products.

As discussed in the previous chapter, *F* ratios, chi-square values and significance levels were used to measure the discriminatory ability of the classification systems, whilst eta^2, lambda, tau-c provided a measure of the power of the various classification systems.

The dependent and independent variables in this study are a mixture of nominal, ordinal, interval and metric level variables. Having a variety of levels of variables complicated the analysis as it required the computation of a number of different evaluation statistics, rather than just one statistic for each combination of dependent and independent variable. Since the evaluation statistics are only appropriate for certain levels of data (e.g. nominal or ordinal) the test statistic varied. While the most simple situation would be to calculate one overall test statistic of the discriminatory ability of all classification systems on the consumption variables, this was not possible. So, evaluation statistics had to be chosen as appropriate. When a combination of say nominal and ordinal level variables was being tested, then the conservative nominal level evaluation statistic was calculated.

8.1 Significant Discrimination

8.1.1 Frequency of usage/purchase discrimination

In order to investigate whether the classification systems could discriminate between the levels of usage/purchase, the following eight standard food products were tested:

butter, soft margarine, instant coffee
packet tea, tea bags, yoghurt, fizzy soft drink
baked beans.

F ratios, Chi-square values and significance levels were calculated for each combination of food product and classification system. These statistics were used to test the null hypothesis that there is:

"No difference in product usage/purchase among sub-groups of a classification system."

Thus, if statistically significant *F* ratios or Chi-square values are found, this means that at least one of the sub-groups is statistically different from the others. The results from this analysis are presented in Tables 16 and 17.

Eleven classification systems were tested on eight food products, resulting in a total of 88 *F* ratios being calculated. Of these 88 *F* ratios, 51 were statistically significant at the 5% level. Thus, a little over half (58%) of the combinations (classification system and food products) produced statistically significant discrimination. The most

successful classifications were Education and Age, producing statistically significant discrimination for seven out of the eight food products. The least successful were Acorn, MOSAIC, Income and Car ownership, which only produced statistically significant discrimination for three out of the eight food products.

In this food product perspective, the classification systems were most successful in discriminating yoghurt usage, with eleven out of the twelve classification systems producing statistically significant *F* ratios. The classification systems were also reasonably successful at finding statistically significant relationships for instant coffee usage (10 out of 11) and baked bean usage (9 out of 11). The products that the classification systems were the least successful at discriminating usage included; butter usage (2 out of 11), soft margarine (3 out of 11) and packet tea (4 out of 11).

Table 16. -- *F* ratio significance levels for food usage variables

	Butter	Soft marg.	Instant coffee	Packet tea	Tea bags	Yoghurt	Fizzy soft drinks	Baked beans	Number sig. 0.05 Level
Education	0.02	0.00	0.00	0.38	0.00	0.00	0.02	0.00	7
Age	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7
No. house	0.12	0.00	0.00	0.06	0.00	0.00	0.00	0.00	6
Work status	0.03	0.51	0.00	0.03	0.25	0.00	0.29	0.00	5
Super Profiles	0.44	0.14	0.00	0.04	0.00	0.01	0.18	0.04	5
Social Grade	0.30	0.22	0.00	0.08	0.00	0.00	0.05	0.01	5
ACORN	0.84	0.17	0.00	0.17	0.09	0.02	0.02	0.29	3
MOSAIC	0.74	0.09	0.02	0.24	0.00	0.00	0.10	0.77	3
Time in house	0.39	0.26	0.15	0.01	0.61	0.00	0.01	0.00	4
Income	0.44	0.07	0.00	0.54	0.06	0.00	0.92	0.00	3
Car ownership	0.38	0.56	0.00	0.22	0.22	0.00	0.21	0.00	3

The significance levels of the Chi-square values for food product usage/purchase are presented in Table 17. These suggest that the classification systems were a little more

successful at discriminating product usage, with 65 out of the possible 96 Chi-square values (68%) being significant, compared with 58% using the *F* ratio analysis (58%). The fairly close agreement between the two approaches to finding statistical significance confirms that the classification systems are reasonably good at finding statistically significant differences in levels of usage/purchase of food products.

The most successful classification systems were Number of people in household and Working status, producing statistically significant discrimination for all food products. The least successful were MOSAIC with three significant Chi-square values and Acorn which only produced one statistically significant Chi-square value out of the eight food products.

Table 17. -- Chi-square significance levels for food usage variables

	Butter	Soft marg.	Instant coffee	Packet tea	Tea bags	Yoghurt	Fizzy soft drinks	Baked beans	Number sig. 0.05 level
No. house	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8
Work status	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	8
Education	0.02	0.08	0.00	0.02	0.00	0.00	0.00	0.00	7
Age	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7
Home ownshp.	0.60	0.00	0.00	0.01	0.00	0.00	0.00	0.00	7
Social Grade	0.03	0.01	0.01	0.34	0.00	0.00	0.00	0.35	6
Time in house	0.35	0.20	0.05	0.00	0.54	0.00	0.00	0.00	5
Super Profiles	0.14	0.02	0.01	0.02	0.01	0.35	0.15	0.00	5
Income	0.20	0.68	0.00	0.94	0.33	0.00	0.01	0.05	4
Car ownership	0.14	0.50	0.00	0.59	0.03	0.00	0.35	0.03	4
MOSAIC	0.47	0.03	0.01	0.07	0.09	0.01	0.41	0.72	3
ACORN	0.69	0.11	0.14	0.00	0.08	0.49	0.08	0.30	1

As with the *F* ratios, the classification systems were most successful at finding statistically significant differences between levels of usage of Instant coffee and Yoghurt. The classification systems were least successful at finding statistically significant differences between levels of usage of Butter, with only four of the twelve classifications systems producing significant Chi-squares.

8.1.2 Discrimination between brands

The question examined in this section is the extent to which the various classification systems differentiate between "regular" users of different brands. This is examined for the following three FMCG product fields:

Packet tea - (19 brands),
Butter - (17 brands),
Canned baked beans - (14 brands).

In order to examine the extent to which the classification systems yield statistically significant discrimination in terms of brand usage, we can use the Chi-square test. Chi-square was used to test the null hypothesis that there is:

"No difference in brand usage among sub-groups of a classification system."

The results of the Chi-square tests are provided in Table 18. Overall, the Chi-square levels were very low, with only six out of the 39 Chi-square values being significant at the 5 percent level. This indicates that the various classification systems were poor at isolating differences in the sub-populations of FMCG brand users. Thus, the classifiers were not good at discriminating between brand usage for packet tea, butter or canned baked beans.

The occasional significant results such as Super Profiles, Number of cars in household and Home ownership as classifiers of baked bean brands, suggests that occasionally a few of the classifiers can discriminate between brands (although the results may well have arisen by chance). The calculation of

an average significance level for each FMCG product field, indicates that overall the classifiers were best at discriminating between brands of butter (average sig. 0.18) and worst at discriminating between brands of packet tea (average sig. 0.40) This suggests that it may depend upon the specific FMCG product field whether classifiers can discriminate brand usage. But the stronger conclusion is that they perform rather poorly throughout.

Table 18. -- Chi-square analysis of branded products

	Packet tea Chi-sq. sig.	Butter Chi-sq. sig.	Baked beans Chi-sq. sig.	No. sig. 0.05 Level	Average significance
ACORN	.10	.09	.09	0	.09
Education	.14	.18	.04	1	.12
Super Profiles	.21	.00	.22	1	.14
Number in house	.54	.01	.08	1	.21
Number of cars	.62	.00	.12	1	.25
Social Grade	.40	.16	.33	0	.30
MOSAIC	.28	.20	.51	0	.33
Home ownership	.24	.00	.38	1	.37
Age	.81	.33	.06	0	.40
Work status	.86	.04	.61	1	.42
Income	.70	.78	.15	0	.54
Time in house	.05	.25	.28	1	.58
Marital status	.69	.26	.86	0	.60
Average sig.	.40	.18	.29		

8.1.3 Consumer durables discrimination

The classification systems were also tested for consumer durable ownership. To investigate whether the classification systems could discriminate between ownership and non-ownership, the following consumer durable items were tested:

micro-wave oven, dishwasher, deep freezer, auto-washer - front load, auto-washer - top load, washer twin-tub, spin dryer, tumble dryer, video player.

F ratios, Chi-square values and significance levels were calculated for each combination of classification system and consumer durable. These statistics were used to test the null hypothesis that there is:

"No difference in consumer durable ownership among sub-groups of a classification system."

Thus, if statistically significant *F* ratios or Chi-square values are found, this means that at least one of the sub-groups of the classification system is statistically different from the other. The significance levels for the *F* ratios calculated for consumer durable ownership are presented in Table 19, with the Chi-square being presented in Table 20.

Of the 119 *F* ratios calculated for consumer durable items, 94 were statistically significant at the 5% level. Thus, most of (79%) the combinations (classification system and consumer durable items) produced statistically significant discrimination. The most successful classifiers were Age and Length of time living in the same house, producing

statistically significant discrimination for all consumer durable items. The least successful classification system was Sex of respondent which produced only one statistically significant *F* ratio out of the ten consumer durable items. In general, all the classification systems except Sex of respondent indicated that they had potential as discriminators of consumer durable ownership.

The classification systems were very good at discriminating ownership and non-ownership of all the consumer durable items except Auto-washer-top load, where only Age of respondent, Length of time in house and Mosaic produced statistically significant *F* ratios.

Table 19. -- *F* ratio significance levels for consumer durable variables

	Micro-wave oven	Dish-washer	Deep freeze	Auto washer front load	Auto washer top load	Washer twin tub	Spin dryer	Tumble dryer	Video yes/no	Video own/rent	No. sig. 0.05 level
Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10
Time in house	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	10
Education	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	9
No. in house	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	9
Work status	0.00	0.01	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	9
ACORN	0.00	0.00	0.00	0.00	0.36	0.00	0.14	0.09	0.00	0.95	6
Mosaic	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.28	0.00	0.12	8
Income	0.00	0.00	0.00	0.00	0.89	0.00	0.01	0.00	0.00	0.00	9
Social Grade	0.00	0.00	0.00	0.00	0.44	0.00	0.13	0.00	0.00	0.00	8
No of cars	0.00	0.00	0.00	0.00	0.93	0.00	0.28	0.00	0.00	0.00	8
Super Profiles	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.04	0.15	0.35	7
Sex	0.35	0.21	0.10	...	0.34	0.62	0.41	0.85	0.03	0.42	1

From Table 20, it can be seen that most systems produced Chi-square values significant at the 0.05 level for six or more of the consumer durable variables. The Chi-square significance levels indicate that the classification systems are successful at discriminating consumer durable ownership, with 108 out of the possible 130 Chi-square values (83%) being significant, much the same as the level indicated by the *F* ratio analysis (85%). This level of agreement between

the two approaches to finding statistical significance confirms that the classification systems are very good at finding statistically significant differences in the ownership of consumer durables.

The most successful classification systems were; Number of people in household, Age of respondent, Home ownership, and length of time in the house producing statistically significant discrimination for all consumer durable items. The least successful classifier once again was Sex of respondent, with only two of the nine consumer durables producing significant Chi-square values.

Table 20. -- Chi-square significance levels for consumer durable variables

	Micro-wave oven	Dish-washer	Deep freeze	Auto washer front load	Auto washer top load	Washer twin tub	Spin dryer	Tumble dryer	Video yes/no	Video own/rent	No. sig. 0.05 level
No. in house	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10
Age	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10
Home ownership	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10
Time in house	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0
Education	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	9
Mosaic	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.28	0.00	0.01	9
Work status	0.00	0.01	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	9
Social Grade	0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.00	0.00	0.00	9
Income	0.00	0.00	0.00	0.00	0.89	0.00	0.01	0.00	0.00	0.00	9
No of cars	0.00	0.00	0.00	0.92	0.00	0.28	0.00	0.00	0.00	0.00	8
Super Profiles	0.00	0.00	0.00	0.00	0.14	0.00	0.55	0.04	0.15	0.00	7
ACORN	0.00	0.00	0.00	0.00	0.36	0.00	0.15	0.14	0.25	0.04	6
Sex	0.35	0.20	0.10	...	0.33	0.62	0.41	0.85	0.03	0.05	2

8.1.4 Services discrimination.

The classification systems were also tested for their discriminatory ability for service variables. The systems were evaluated on the following service variables;

Holiday in past year (yes/no)
Number of holidays in past year
Cost of last holiday
Cost of next to last holiday
Accommodation type - last holiday
Accommodation type - next to last holiday
Cinema - frequency of attendance
Have credit card (yes/no)
Have store card (yes/no)
Credit card use - frequency

F ratios, chi-square values and significance levels were calculated for each combination of service and classification system. These statistics were used to test the null hypothesis that there is:

"No difference in service usage among sub-groups of a classification system."

The significance levels for the *F* ratios calculated for Holidays and Cinema attendance are presented in Table 21, with the Chi-square being presented in Table 22. Twelve classification systems were tested on seven service variables and resulted in the a total of 84 *F* ratios being calculated. Of these 84 *F* ratios, 61 were statistically significant at the 5% level. Thus, most (73%) of the combinations (classification system and service variables) produced statistically significant discrimination.

The most successful classification systems for service variables were; Education of respondent, Age of respondent and Number of people living in the household, as they produced statistically significant discrimination for all of the service variables. The least successful classification system was Sex of respondent which did not produce a statistically significant *F* ratio out of the seven service variables. In general, all the classification systems except Sex of respondent indicated that they had potential as discriminators of service variables.

Table 21. -- *F* ratio significance levels for holiday and cinema variables

	Holiday in past year yes/no	Number of holidays in past year	Cost of last holiday	Last holiday accom.	Cost of next to last holiday	Previous holiday accom.	Cinema	No. sig. 0.05 level
Education	0.00	0.00	0.00	0.02	0.00	0.00	0.00	7
No. in house	0.00	0.00	0.00	0.00	0.02	0.01	0.00	7
Age	0.00	0.00	0.00	0.00	0.03	0.00	0.00	7
Mosaic	0.00	0.00	0.00	0.02	0.00	0.21	0.00	6
Super Profile	0.00	0.00	0.00	0.03	0.00	0.99	0.00	6
ACORN	0.00	0.00	0.00	0.07	0.00	0.82	0.05	5
Social Grade	0.00	0.00	0.00	0.43	0.00	0.22	0.00	5
Income	0.00	0.00	0.00	0.07	0.00	0.90	0.00	5
No. of cars	0.00	0.00	0.00	0.68	0.00	0.68	0.00	5
Work status	0.00	0.00	0.00	0.14	0.07	0.29	0.00	4
Time in house	0.14	0.38	0.01	0.02	0.06	0.01	0.00	4
Sex	0.49	0.29	0.28	0.66	0.73	0.31	0.70	0

From Table 22, it can be seen that most systems produced chi-square values significant at the 0.05 level for five or more of the holiday or cinema variables. The sex of the respondent was the only classifier that did not produce any significant chi-square values.

Table 22. -- Chi-square significance levels for holiday and cinema variables

	Holiday in past year yes/no	Number of holidays in past year	Cost of last holiday	Last holiday accom.	Cost of next to last holiday	Previous holiday accom.	Cinema	No. sig. 0.05 level
Education	0.00	0.00	0.00	0.01	0.01	0.00	0.00	7
No. of cars	0.00	0.00	0.00	0.04	0.00	0.04	0.00	7
No. in house	0.00	0.00	0.00	0.00	0.15	0.00	0.00	6
Age	0.00	0.00	0.00	0.00	0.14	0.00	0.00	6
Home ownership	0.00	0.00	0.00	0.00	0.00	0.08	0.00	6
ACORN	0.00	0.00	0.00	0.00	0.00	0.55	0.03	6
Mosaic	0.00	0.00	0.00	0.00	0.00	0.99	0.00	6
Income	0.00	0.00	0.00	0.00	0.00	0.13	0.00	6
Work status	0.00	0.00	0.00	0.13	0.00	0.10	0.00	5
Time in house	0.14	0.26	0.02	0.01	0.06	0.26	0.00	3
Sex	0.50	0.70	0.38	0.50	0.43	0.12	0.07	0
Super Profiles	0.00	0.00	0.00	0.00	0.00	0.98	0.00	6
Social Grade	0.00	0.00	0.00	0.31	0.00	0.29	0.00	5

The significance levels for the *F* ratios calculated for credit card variables are presented in Table 23, with nearly all *F* ratios being significant at the 0.05 level. This indicates that for all the classification systems there is some relationship between the various categories in each system and the credit card variables. Super Profiles, Number of cars in household and ACORN were the only classifiers that did not have significant *F* ratios at the 5% level for frequency of credit card usage. Whilst just about all the classifiers were able to find significant relationships with the credit card variables, it is however necessary to look at the power of the discrimination to be able to come to a conclusion on the overall ability of the systems to discriminate.

Table 23. -- *F* ratio significance levels for credit card variables

	Have credit card	Have store card	Frequency of credit card usage	Number signif. 0.05 level
Education	0.00	0.00	0.00	3
Age	0.00	0.00	0.01	3
Mosaic	0.00	0.00	0.03	3
Work status	0.00	0.00	0.00	3
Time in house	0.00	0.04	0.02	3
Super Profiles	0.00	0.00	0.13	3
Social Grade	0.00	0.00	0.00	3
Income	0.00	0.00	0.00	3
No. in house	0.00	0.01	0.02	2
ACORN	0.00	0.00	0.13	2
Sex	0.00	0.00	...	2
No. of cars	0.00	0.00	0.09	2

From Table 24, it can be seen that all classification systems produced significant Chi-square values at the 0.05 level for credit or store card ownership, confirming the *F* ratio results.

Table 24. -- Chi-square value significance levels for credit card variables

	Have credit card	Have store card	Frequency of credit card usage	Number signif. 0.05 level
Marital Status	0.00	0.00	0.00	3
Education	0.00	0.00	0.00	3
No. in house	0.00	0.00	0.00	3
Age	0.00	0.00	0.00	3
Home ownership	0.00	0.00	0.00	3
ACORN	0.00	0.00	0.00	3
Mosaic	0.00	0.00	0.00	3
Work status	0.00	0.00	0.00	3
Time in house	0.00	0.04	0.00	3
Super Profiles	0.00	0.00	0.00	3
Social Grade	0.00	0.00	0.00	3
Income	0.00	0.00	0.00	3
No. of cars	0.00	0.00	0.00	3
Sex	0.00	0.00	...	2

8.1.5 Summary of significant discrimination

The statistics in this section show clearly that all the classification systems except Sex of respondent, provided significant discrimination for most of the variables examined: frequency of usage/purchase of consumer food products, ownership of consumer durables and services but not for brand choice. From summary Table 25, it is apparent that the classification systems were least effective in providing statistically significant discrimination between brands of FMCG products, with only 18% of the Chi-square values being significant at the .05 level. The classifiers indicated no evidence of being able to consistently discriminate between "regular users" of different brands for the products tested.

The ACORN classification system was the only system besides Sex of respondent that did not provided significant discrimination for more than two thirds of the product groups. Only 54% of ACORN's *F* ratios and Chi-square values where statistically significant. This was a surprising result for a specialised classification system for which much is claimed.

Using both *F* ratios and Chi-square values as statistics to test the general null hypothesis of no differences in usage/brand choice among sub-groups of the classified, was successful as the two test statistics produced consistent results for each product group. Overall the number of significant relationships found in this analysis were generally consistent with previous studies on relationships between classification systems and purchasing behaviour.

Table 25. -- Summary of significant F and Chi-square values for each classification system and product group.

Product Groups

	Food Products Purchase/usage		Food Brands	Consumer Durables		Services		Credit card Usage		Signif. 0.05 level	
	F	Chi-sq.	Chi-sq.	F	Chi-sq.	F	Chi-sq	F	Chi-sq.	No.	%
Age	7	7	0	10	10	7	6	3	3	53	90
No. in house	6	8	1	9	10	7	6	2	3	52	88
Home ownership	-	7	1	-	10	-	6	-	3	27	87
Work status	5	8	1	9	9	4	5	3	3	47	80
Social Grade	5	6	0	8	9	5	5	3	3	44	75
Education	7	7	1	9	9	7	7	3	3	44	75
Time in house	4	5	1	10	10	4	3	3	3	43	73
Super Profiles	5	5	1	7	7	6	6	3	3	43	73
Income	3	4	0	9	9	5	6	3	3	42	71
Mosaic	3	3	0	8	9	6	6	3	3	41	69
No of cars	3	4	1	8	8	5	7	2	3	41	69
ACORN	3	1	0	6	6	5	6	2	3	32	54
Sex	-	-	0	1	2	0	0	2	2	7	18
Overall %	58%	68%	18%	85%	83%	73%	76%	94%	100%		

Whilst statistically significant discrimination is present, this does not necessarily mean that a classification system is a "good" discriminator. The *F* ratio and chi-square values provide information on whether "a relationship exists between the variables (classification system and product usage etc.)."

A statistically significant relationship is said to exist if one or more of the sub-groups is more different from the others than what would be expected by chance. It takes just one of the sub-groups to be significantly different to reject the null hypothesis and be able to state that statistically significant discrimination is present. It is therefore vitally important to measure the "power" of the discrimination in order to be able to state whether a classification system is useful as a discriminator of product usage or brand choice and therefore is likely to have "practical" significance as well. The second part of Chapter 8 examines the "power" of discrimination that the various classification systems provide.

8.2 Discriminatory power

The previous section examined whether the classification systems provide significant discrimination for products and services. This section investigates the discriminatory power of the classification systems. As in the previous section, each classification system is tested in the following areas:

frequency of usage/purchase of consumer food products,
branded products, ownership of consumer durables,
service products.

A variety of statistical tests is used in the analysis in this section for two reasons. Firstly, the classification systems (independent variables) and products/services (dependent variables) are a mixture of nominal, ordinal and interval level variables. The statistical tests used to measure the "power" of relationships are generally designed to be used on one specific level of variable, e.g. ordinal only, although in some circumstances it is possible to use them on the lower levels as well. This results in some specific statistics being appropriate for specific combinations of classification systems (independent variables) and products/services (dependent variables). Secondly, a range of statistical tests was considered necessary as specific statistics measure specific aspects of relationships and thus some tests will be more sensitive in specific situations than others. A consensus of statistics on the "power" of discrimination will enable more detailed analysis and firmer conclusions.

The following statistical measures were used to measure the discriminatory "power" of the classification systems; *Lambda*, *Tau-c* and Eta^2. Details on computation and appropriateness of these statistics are provided in Chapter 7.

8.2.1 Frequency of usage/purchase discrimination

In section 8.1 it was found that most of the classification systems could differentiate some level of usage/purchase for food products. The power of this discrimination between levels of usage/purchase of food products is examined in this section.

The eta^2 values in Table 26 indicate a low level of discrimination being present, with most classification systems producing eta^2 values in the 0.0 to 0.06 range. Only four eta^2 values were more than 0.10, from the 88 calculated (11 classifications systems x 8 food products). These were size of household and age of respondent, for usage of yoghurt and canned baked beans. Size of household provided the highest level of discrimination for an individual food item when it explained 24% of the variation in usage of canned baked bean consumption in households. The next best performing classifier was age of respondent when that classifier explained 15% of the variation of fizzy soft drink consumption in households. These results show that the classifiers have little power as discriminators of food usage/purchase even though 58% of the *F* ratios were significant at the 0.05 level.

Table 26. -- Eta^2 values for food usage variables

	Butter	Soft marg.	Instant coffee	Packet tea	Tea bags	Yoghurt	Fizzy soft drinks	Baked beans
Education	**0.02***	**0.03***	**0.06***	0.01	**0.05***	**0.07***	**0.01***	**0.04***
No. in house	0.01	**0.07***	**0.06***	**0.01***	**0.06***	**0.13***	**0.02***	**0.24***
Age	0.01	**0.04***	**0.06***	0.02	**0.03***	**0.10***	**0.03***	**0.15***
ACORN	0.00	0.01	**0.01***	0.01	**0.01***	**0.01***	**0.01***	0.01
Mosaic	0.01	0.02	**0.03***	0.01	**0.03***	**0.04***	0.02	0.01
Work status	**0.01***	0.00	**0.02***	**0.01***	0.00	**0.01***	0.01	**0.03***
Time in house	0.00	0.01	0.01	**0.02***	0.00	**0.04***	**0.00***	**0.04***
Super Profiles	0.01	0.02	**0.03***	**0.02***	0.04	**0.02***	0.01	**0.02***
Social Grade	0.01	0.01	**0.03***	0.01	**0.03***	**0.05***	**0.01***	**0.02***
Income	0.01	0.02	**0.04***	0.01	0.02	**0.05***	0.00	**0.03***
Car ownership	0.00	0.00	**0.02***	0.00	0.00	**0.04***	0.01	**0.02***

* *F* ratio significant at 0.05 level.

In addition to the eta^2 values; lambda (Table 27), and tau-c (Table 28) were calculated to supplement and confirm the results obtained from the eta^2 analysis.

The lambda values in Table 27 also show the classification systems to have poor discriminatory ability for usage of food variables with all values being below 0.05. This means that the classifiers could at most, only improve prediction of the usage/purchase of food items by 4%. This is despite the fact that 68% of the Chi-square values calculated between the classifiers and the food usage/purchase items were significant at the 0.05 level.

Table 27. -- Lambda values for food usage variables

	Butter	**Soft marg.**	**Instant coffee**	**Packet tea**	**Tea bags**	**Yoghurt**	**Fizzy soft drinks**	**Baked beans**
Mosaic	0.00	**0.02***	**0.03***	0.00	0.03	**0.02***	0.00	0.02
ACORN	0.01	0.02	0.02	0.00	0.04	0.01	0.00	0.01
Super Profiles	0.01	**0.03***	0.03	**0.00***	**0.04***	0.02	0.00	**0.00***
Income	0.03	0.00	**0.01***	0.00	0.02	**0.04***	0.01	**0.01***
Social Grade	**0.00***	**0.00***	**0.01***	0.00	**0.01***	**0.01***	**0.00***	0.00

* *Chi-square value* significant at 0.05 level.

The tau-c statistics in Table 28 indicate number of people in the household and age as having moderately powerful relationships with food usage variables. Other classification systems indicated generally low levels of discriminatory power.

Table 28. -- Tau-c values for food usage variables

	Butter	Soft marg.	Instant coffee	Packet tea	Tea bags	Yoghurt	Fizzy soft drinks	Baked beans
Education	**0.05***	0.00	**-0.10***	**-0.01***	**0.00***	**-0.20***	**0.02***	**-0.07***
No. in house	**0.05***	**0.20***	**0.18***	**-0.04***	**0.17***	**0.27***	**0.10***	**0.40***
Age	0.06	**-0.08***	**-0.12***	**0.12***	**-0.06***	**-0.21***	**-0.13***	**-0.22***
Work status	**0.05***	**-0.01***	**-0.11***	**0.05***	**-0.03***	**-0.10***	**-0.04***	**-0.08***
Time in house	0.03	-0.03	**-0.05***	**0.10***	-0.03	**-0.13***	**-0.06***	**-0.11***
Social Grade	**0.01***	**0.03***	**-0.09***	-0.01	**0.07***	**-0.16***	**0.03***	0.03
Income	-0.03	0.04	**-0.15***	-0.02	0.05	**-0.16***	**0.00***	**-0.14***
Car ownership	0.02	-0.02	**0.13***	0.05	**-0.02***	**0.14***	0.03	**0.09***

* *Chi-square value* significant at 0.05 level.

In summary, the eta^2, lambda and tau-c values show clearly that whilst significant relationships exist between the classification systems and the food usage/purchase items, these relationships are generally very weak. The classifiers do not exhibit the discriminatory power necessary to discriminate between usage/purchase levels for food products.

8.2.2 Brand discrimination

In section 8.1 it was found that very few of the classification systems could differentiate between "regular" users of different brands of food products. The extent to which the various classifiers could differentiate between "regular" users of different brands is examined in this section. The following three FMCG product fields were examined:

Packet tea - (19 brands),
Butter - (17 brands),
Canned baked beans - (14 brands).

The power of the discrimination was measured by lambda (Table 29.)

Table 29. -- Lambda analysis of branded products

	Packet tea	Butter	Baked beans
ACORN	0.11	0.02	0.00
MOSAIC	0.09	0.02	0.00
Super Profiles	0.09	**0.01***	0.00
Social Grade	0.09	0.00	0.00
Time in house	**0.09***	0.00	0.00
Number in house	0.08	**0.04***	0.00
Home ownership	0.03	**0.00***	0.00
Income	0.07	0.01	0.00
Education	0.05	0.00	**0.00***
Work status	0.05	**0.00***	0.00
Number of cars	0.05	**0.00***	0.00
Age	0.04	0.00	0.00
Marital status	0.03	0.00	0.00

* *Chi-square value* significant at 0.05 level

ACORN with a lambda of 0.11 was the only classification system to account for more than 10% of the differences in

packet tea brand choice between households. The classifiers were best at explaining differences in brand choice for packet tea and could explain none of the differences between brand choice for canned baked beans (with no lambda was greater than 0.00). It is important to note that only 18% of the *Chi-square* values calculated between the classifiers and the food products were significant at the 0.05 level. The length of time the respondent had lived in their home was the best discriminator of those tested with a lambda of 0.09 for packet tea brands.

In summary, from the lambda analysis it is clear that the classification systems do not discriminate well between brands for packet tea, canned baked beans or butter. The various classifiers are very poor at differentiating between "regular" users of the different brands.

There are a number of possible explanations for this. It is possible that for these branded products no pattern of brand choice exists or that the classification systems are not structured in a manner that can detect the brand choice patterns. It is however more likely that the classification systems are in themselves insensitive to the patterns of brand choice and therefore can not detect the variations in brand purchasing behaviour.

8.2.3 Consumer durables discrimination

In section 8.1 it was found that almost all classification systems could discriminate consumer durable ownership, with 83% of the *F* ratios being significant at the 0.05 level. In this section eta^2, lambda and tau-c are calculated to measure the power of the discrimination that is present.

The eta^2 values in Table 30 demonstrate low levels of discriminatory power for consumer durable ownership by the classification systems. The highest eta^2 value was produced by the age of respondent on whether they owned (12% of variation explained) or rented a video player/recorder (11% of variation explained). Overall, very little of the variation was explained by the classification systems with most systems producing eta^2 values in the 0.0 to 0.03 range.

Table 30. -- Eta^2 values for consumer durable variables

	Micro-wave oven	Dish-washer	Deep freeze	Auto Washer front load	Auto Washer top load	Washer twin tub	Spin dryer	Tumble dryer	Video yes/no	Video own/ rent
Education	0.02*	0.02*	0.02*	0.04*	0.01	0.01*	0.01*	0.01*	0.06*	0.06*
No. in house	0.02*	0.02*	0.02*	0.05*	0.00*	0.01*	0.01*	0.04*	0.09*	0.07*
Age	0.03*	0.02*	0.03*	0.07*	0.02*	0.01*	0.04*	0.03*	0.12*	0.11*
ACORN	0.01*	0.02*	0.05*	0.04*	0.01	0.02*	0.01*	0.01*	0.01*	0.00*
Mosaic	0.02*	0.05*	0.04*	0.03*	0.01*	0.02*	0.01*	0.01	0.01*	0.01
Work status	0.03*	0.01*	0.01*	0.03*	0.00	0.01*	0.01*	0.01*	0.06*	0.05*
Time in house	0.01*	0.01*	0.02*	0.04*	0.01*	0.01*	0.02*	0.02*	0.03*	0.03*
Sex	0.00	0.00	0.00	...	0.00	0.00	0.00	0.00	0.00*	0.00
Super Profiles	0.01*	0.04*	0.04*	0.03*	0.01	0.02*	0.00*	0.01*	0.01	0.01
Social Grade	0.04*	0.05*	0.04*	0.06*	0.00	0.08*	0.00	0.02*	0.05*	0.03*
Income	0.05*	0.09*	0.05*	0.09*	0.00	0.05*	0.01*	0.03*	0.11*	0.07*
No. of cars	0.08*	0.07*	0.07*	0.08*	0.00	0.03*	0.00	0.02*	0.00*	0.04*

* *F* ratio significant at 0.05 level.

The lambda values presented in Table 31 confirm that the classification systems have poor discriminatory power. The highest lambda value of 0.12 was provided by income for

ownership of micro-wave ovens. Most lambda values ranged between 0.00 to 0.04., thus indicating low levels of discriminatory power.

Table 31. -- Lambda values for consumer durable variables

	Micro-wave oven	Dish-washer	Deep freeze	Auto Washer front load	Auto Washer top load	Washer twin tub	Spin dryer	Tumble dryer	Video yes/no	Video own/ rent
Mosaic	0.02*	0.00*	0.07*	0.00*	0.00*	0.00*	0.00*	0.00	0.00*	0.01*
ACORN	0.00*	0.00*	0.08*	0.00*	0.00	0.00*	0.00*	0.00	0.00	0.02*
Super Profiles	0.02*	0.00*	0.07*	0.00*	0.00	0.00*	0.00*	0.00*	0.00*	0.02*
Marital status	0.00*	0.00*	0.00*	0.00*	0.00	0.00*	0.00*	0.00*	0.06*	0.08*
Income	0.12*	0.00*	0.04*	0.00*	0.00	0.04*	0.04*	0.04*	0.04*	0.04*
Social Grade	0.05*	0.00*	0.07*	0.04*	0.00	0.00*	0.00*	0.00*	0.09*	0.10*

* *Chi-square value* significant at 0.05 level.

The tau-c analysis presented in Table 32 indicates that the classifiers at best, have moderate levels of discriminatory power for consumer durable ownership and generally have low levels of dicriminatory power. Income, Social Grade and the number of cars in household were the most powerful discriminators. In particular, income with tau-c values of -0.41 for auto washer (top-load) ownership and -0.35 for video ownership were the highest tau-c values. The negative tau-c value for income indicates that higher income respondents are more likely to own consumer durable items than lower income respondents. Whilst this is not surprising it does however confirm conventional wisdom.

Table 32. -- Tau-c values for consumer durable variables

	Micro-wave oven	Dish-washer	Deep freeze	Auto washer front load	Auto washer top load	Washer twin tub	Spin dryer	Tumble dryer	Video yes/no	Video own/rent
Education	-0.09*	-0.08*	-0.10*	-0.14*	0.01	0.06*	0.05*	-0.05*	-0.16*	0.14*
No. in house	0.15*	0.08*	0.13*	0.18*	-0.02*	-0.05*	-0.07*	0.20*	0.28*	0.23*
Age	-0.08*	0.00*	0.04*	-0.13*	0.04*	0.06*	0.13*	-0.09*	-0.29*	-0.24*
Home ownership	-0.08*	-0.06*	-0.15*	-0.09*	-0.02*	0.05*	-0.06*	-0.01*	-0.02*	0.02*
Work status	-0.17*	-0.03*	-0.06*	-0.15*	0.02	0.05*	0.06*	-0.09*	-0.23*	-0.19*
Time in house	-0.05*	-0.02*	0.03*	-0.16*	0.04*	0.07*	0.09*	-0.06*	-0.14*	-0.11*
Social Grade	-0.20*	-0.04*	-0.21*	-0.22*	-0.01	0.12*	0.03*	-0.10*	-0.14*	-0.10*
Income	-0.26*	-0.18*	-0.25*	-0.41*	-0.01	0.14*	0.07*	-0.16*	-0.35*	-0.26*
No. of cars	0.29*	0.16*	0.27*	0.25*	0.01	-0.11*	0.00	0.16*	0.27*	0.19*

* *Chi-square value* significant at 0.05 level.

In summary, the eta^2, lambda and tau-c values clearly show that whilst significant relationships exist between the classification systems and consumer durable ownership, the discriminatory power is at best moderate, with most being weak. The classifiers do not provide the discriminatory power necessary to discriminate consumer durable ownership.

From Table 34 it can be seen that whilst most classification systems produced significant chi-square values at the 0.05 level, the overall discriminatory power was very poor. Household income, ACORN and Social Grade were the best discriminators of the number of holidays in the past year and they could only explain about 10% of the variation. Most lambda values for holiday and cinema variables ranged between 0.0 to 0.04.

Table 34. -- Lambda values for holiday and cinema variables

	Holiday in past year yes/no	Number of holidays in past year	Cost of last holiday	Last holiday accom.	Cost of next to last holiday	Previous holiday accom.	Cinema
Mosaic	0.03*	0.08*	0.01*	0.03*	0.00*	0.01*	0.00*
ACORN	0.05*	0.10*	0.00*	0.04*	0.00*	0.02	0.00*
Super Profiles	0.02*	0.08*	0.00*	0.03*	0.00*	0.02	0.00*
Marital status	0.00*	0.05*	0.00*	0.01*	0.00*	0.02	0.00*
Income	0.04*	0.10*	0.03*	0.04*	0.00*	0.04	0.04*
Social Grade	0.10*	0.12*	0.00*	0.01*	0.00*	0.03	0.00*

* *Chi-square value* significant at 0.05 level.

The tau-c statistics in table 35 again show low to moderate levels of discriminatory power between the classification systems and holiday and cinema variables. Social Grade, Income and Number of cars in the household were the stronger classifiers for the holiday variables. The age and education classifications showed moderate discriminatory power for cinema attendance.

Table 35. - Tau-c values for holiday and cinema variables

	Holiday in past year yes/no	Number of holidays in past year	Cost of last holiday	Last holiday accom.	Cost of next to last holiday	Previous holiday accom.	Cinema
Education	**-0.12***	**-0.09***	**-0.09***	**-0.06***	**-0.06***	**-0.11***	**-0.21***
No. in household	**0.00***	**-0.05***	**0.02***	**-0.02***	**0.16***	**0.15***	**0.11***
Age	**0.03***	**0.04***	**0.01***	**0.02***	**-0.12***	**-0.21***	**-0.21***
Home ownership	**-0.13***	**-0.12***	**-0.10***	**-0.08***	**0.09***	0.08	**0.01***
Work status	**-0.15***	**-0.09***	**-0.13***	-0.04	**0.01***	0.03	**-0.11***
Time in house	0.02	0.03	**-0.01***	**0.03***	-0.05	-0.18	**-0.10***
Social Grade	**-0.30***	**-0.25***	**-0.23***	**-0.13***	**0.04***	0.00	**-0.13***
Income	**-0.31***	**-0.24***	**-0.26***	**-0.14***	**0.06***	0.01	**-0.16***
No. of cars	**0.27***	**0.21***	**0.23***	**0.14***	**-0.01***	**0.06***	**0.11***

* *Chi-square value* significant at 0.05 level.

From Table 36 it can be seen that Social Grade and income were the only classifiers that could explain more than 10% of the variation in credit card ownership. None of the classifiers could explain more than 7% (Social Grade) of the variation in store card ownership or 4% of the variation in frequency of usage of the credit cards. In general most systems were better discriminators of whether the respondent had a credit card than how often it was used. Overall, the classifiers provided low levels of discriminatory power for credit/store card ownership and usage.

Table 36. -- Eta^2 values for credit card variables

	Have credit card	Have store card	Frequency of credit card usage
Education	0.08*	0.04*	0.04*
No. in house	0.01*	0.01*	0.00*
Age	0.05*	0.03*	0.02*
ACORN	0.03*	0.03*	0.02
Mosaic	0.07*	0.03*	0.03*
Work status	0.04*	0.03*	0.03*
Time in house	0.01*	0.01*	0.02*
Sex	0.02*	0.01*	...
Super Profiles	0.08*	0.03*	0.02*
Social Grade	0.13*	0.07*	0.03*
Income	0.12*	0.07*	0.04*
No. of cars	0.09*	0.03*	0.01

* *F* ratio significant at 0.05 level

Analysis of the credit/store card variables using the lambda statistic produced results similar to those found using Eta^2. Income and Social Grade produced the highest lambda values of 0.24 and 0.20 respectively for credit card ownership. Again, Table 37 shows that none of the systems produced any evidence of discrimination for store card ownership and poor discriminatory power for the frequency of usage of credit cards.

Table 37. -- Lambda values for credit card variables

	Have credit card	Have store card	Frequency of credit card usage
Mosaic	0.11*	0.00*	0.04*
ACORN	0.12*	0.00*	0.03*
Super Profiles	0.11*	0.00*	0.02*
Marital status	0.00*	0.00*	0.01*
Income	0.24*	0.00*	0.03*
Social Grade	0.20*	0.00*	0.01*

* *Chi-square value* significant at 0.05 level.

The tau-c statistics in Table 38 show income, Social Grade and number of cars in the household as having a moderate level of association with credit card and store card ownership but a low level of association with frequency of credit card usage.

Table 38. -- Tau-c values for credit card variables

	Have credit card	Have store card	Frequency of credit card usage
Education	-0.14*	-0.10*	-0.14*
No. in house	-0.03*	0.03*	0.03*
Age	0.08*	0.01*	-0.09*
Home ownership	-0.21*	-0.08*	-0.01*
Work status	-0.22*	-0.13*	-0.12*
Time in house	-0.06*	-0.03*	-0.10*
Social Grade	-0.39*	-0.23*	-0.09*
Income	-0.39*	-0.25*	-0.13*
No. of cars	0.29*	0.15*	0.05*

* *Chi-square value* significant at 0.05 level.

In summary, the eta^2, lambda and tau-c values clearly show that whilst significant relationships exist between the classification systems and the service variables, these relationships are generally weak. The classifiers do not provide the discriminatory power necessary to discriminate between the levels usage of services.

8.2.5 Summary of discriminatory power

This section of the analysis examined the level of discriminatory power of the classification systems in respect of the purchasing and usage variables. The classifiers proved to possess a very low level of discriminatory power over all product groups, as can be seen from summary Table 39 which provides the average eta^2 and lambda values for each product group. All classification systems failed to account for more than 10% of the variation in product group usage, with most classifiers generally accounting for between 3% and 5% of the variation in usage.

Table 39. -- Average eta^2 and lambda values for each classification system and product group.

Product Groups

	Food Products				Consumer		Services		Credit card		Average	
	Purchase/usage		Brands		Durables		Holidays/cinema		Usage			
	eta^2	lambda	eta^2	lambda	eta^2	lambda	eta^2	lambda	eta^2	lambda	eta^2	lambda
Age	.06	...	...	.01	.05	...	.03	...	.04	...	.05	.01
No. in house	.08	...	...	.04	.03	...	.05	...	.01	...	.04	.01
Home ownership	...	...	...	.01	...	...	...	...	...	...	...	.01
Work status	.01	...	...	.01	.02	...	.01	...	.03	...	.02	.01
Social Grade	.03	.00	...	.03	.04	.04	.05	.04	.08	.07	.05	.04
Education	.04	...	...	.02	.03	...	.03	...	.05	...	.04	.02
Time in house	.02	...	...	.03	.02	...	.01	...	.01	...	.02	.03
Super Profiles	.02	.02	...	.03	.02	.01	.03	.02	.04	.05	.03	.03
Income	.03	.02	...	.03	.05	.03	.05	.04	.08	.08	.05	.04
Mosaic	.02	.02	...	.04	.02	.01	.04	.02	.04	.05	.03	.03
No of cars	.02	...	...	.01	.04	...	.04	...	.04	...	.04	.01
ACORN	.01	.01	...	.04	.02	.01	.03	.03	.02	.05	.02	.03
Sex	...	...	...	...	.00	...	.00	...	.01	...	.00	...
% significant	58%	68%	...	18%	85%	83%	73%	76%	94%	100%		

The classification systems were of particularly little use in discriminating between brands of FMCG products, with almost none of the variation in brand choice being explained. This was not surprising as the classification systems were least effective in providing statistically significant discrimination between brands of FMCG products.

Overall, levels of discriminatory power found in this analysis were generally consistent with previous studies on relationships between classification systems and purchasing behaviour. It was however interesting to see that the commercial geo-demographic classification systems, Mosaic, Super Profiles and ACORN proved to have no more and sometimes less discriminatory power than the standard Social Grade or household demographic classifications.

Previous studies that have evaluated classification systems tended to concentrate on finding statistically significant relationships and not to complete the analysis by then investigating the strength of the relationships. The results from the analysis in this section clearly show how misleading an analysis of discrimination can be if the level of discriminatory `power' is not investigated in conjunction with the identification of statistically significant relationships.

In the previous section about 75% of the relationships between classification systems and product/brands were found to be statistically significant at the 0.05 level. But, low levels of discriminatory power were found for all classification systems in each of the product areas tested: brand usage, frequency/quantity of purchase/usage food variables, consumer durable ownership, and use of service products.

The various classification systems were least effective in discrimination between brands. The classification systems were better at discriminating ownership of products such as credit cards than at discriminating between the levels of credit card usage. The systems were generally better at discriminating in a dichotomous situation. No one classification system produced consistently better

discrimination than another. Some classification systems did exhibit more discriminatory power in specific situations but the level of discriminatory power was still only modest. This study clearly finds all systems to have very low levels of discriminatory power.

Chapter 9

9. Discriminatory ability and power of Social Grade

In the previous chapter the discriminatory ability and power of a variety of classification systems was analysed. This chapter concentrates on Social Grade as a classifier. We look first at the ability of Social Grade to provide statistically significant discrimination for: usage and purchase of food products, brand choice for food products, ownership of consumer durables, and use of service products. This is evaluated for the full sample (product users and non-users) and for users as a distinct sub-group. The results of the evaluation of Social Grade as a discriminator are then compared with results in other studies.

The second part of the chapter examines the power of Social Grade in discriminating across the same range of variables. Again the analysis is carried out for the full sample (product users and non-users) and for users as a sub-group. The results of the evaluation of the discriminatory power of Social Grade are then compared with results from previous studies in the United Kingdom and in the United States of America.

9.1 Significant discrimination

9.1.1 Social Grade and frequency of usage/purchase

In order to investigate whether Social Grade could discriminate between levels of usage/purchase for food products, *F* ratios and Chi-square values were calculated for the following products:

butter, soft margarine, instant coffee, packet tea, tea bags, yoghurt, fizzy soft drinks, baked beans.

The *F* ratios and Chi-square values were then used to test the null hypothesis that there is:

"No difference in product usage/purchase among social grades."

Nearly all the *F* ratios and chi-square values were significant at the 0.05 level (see Table 40), indicating significant differences in food product purchasing or usage behaviour for at least one social grade.

Table 40. -- Social Grade as a discriminator of food purchasing/usage

	***F* ratio significance**	**Chi square significance**
Yoghurt	0.00	0.00
Instant coffee	0.00	0.01
Tea bags	0.00	0.00
Baked Beans	0.01	0.35
Soft drinks - fizzy	0.05	0.00
Packet tea	0.08	0.34
Soft margarine	0.22	0.01
Butter	0.30	0.03
No. signif. at 0.05	5	6

A study of social class in the United States of America by Schaninger (1981) investigated the frequency of usage for

household food products. The study found *F* ratios and levels of significance similar to those found in this study. The *F* ratios found included: butter (*F* 4.207 $p < .01$), instant coffee (*F* 1.67 $p < .10$), teabags (*F* 3.03 $p < .05$). The Schaninger study was primarily concerned with the respective abilities of social class and income as discriminators of purchasing behaviour and therefore statistics that could be used to measure discriminatory powers were not calculated. The evidence provided from the *F* ratios and significance levels indicates that social class did provide significant discrimination for food items.

The preceding analysis of Social Grade as a discriminator has concentrated on all levels of food purchasing and usage, from those who do not purchase or use the product, to those who purchase or use the product frequently. In order to gain a more detailed understanding of where the discriminatory ability of Social Grade lies, it is necessary to investigate the sub-groups which constitute purchasing and usage. The following analysis evaluates the discriminatory ability of Social Grade for users and purchasers of the food products and compares it to all respondents in the sample.

Table 43 shows the significance levels for *F* ratios and chi-square for the two usage groups. The group labelled "Users and Non users" includes all respondents in the sample, those who use and those who do not use or purchase the products. The group labelled "users only" includes only those who have some level of purchasing or usage of the product.

Table 41. -- Social Grade discrimination of users/non-users of food items - *F*, chi-square and significance levels.

	Users and Non-users		Users only	
	F signif.	Chi square signif.	*F* signif.	Chi square signif.
Yoghurt	0.00	0.00	0.30	0.04
Instant coffee	0.00	0.01	0.03	0.19
Tea bags	0.00	0.00	0.00	0.01
Baked Beans	0.01	0.35	0.13	0.80
Soft drinks - fizzy	0.05	0.00	0.00	0.01
Packet tea	0.08	0.34	0.16	0.75
Soft margarine	0.22	0.01	0.00	0.08
Butter	0.30	0.03	0.12	0.08
No. signif. at 0.05	5	6	4	3

As can be seen from Table 41, the *F* ratios were generally less significant once the non-users were removed from the analysis. The exceptions were fizzy soft drinks, soft margarine and butter. All chi-squared values were less significant. This would be expected as the sample size decreased and this has a direct influence on the size of the chi-square value and thus its significance. Only three of eight chi-square values were significant at the 0.05 level, indicating that when non-users are removed from the sample, Social Grade could find less significant variation in usage/purchase for the food products.

The significance levels of the *F* ratios were interesting, with tea bags, instant coffee, fizzy soft drinks and soft margarine being significant at the 0.00 level. This indicates that at least one Social Grade is significantly different from the others for the purchasing or usage of each of these food product. When the non-users were removed from the sample, some of the significance levels of the *F* ratios became more significant whilst others became less significant. The *F* ratio significance level for yoghurt

changed from 0.00 to 0.30, baked beans changed from 0.01 to 0.13 and packet tea changed from 0.08 to 0.16. The *F* ratio significance level for fizzy soft drinks changed from 0.05 to 0.00, soft margarine changed from 0.22 to 0.00 and butter changed from 0.30 to 0.12. These major changes in the *F* ratio significance levels for food products indicate that for some food products the significant differences between social grades lie between usage and non-usage, whilst for others they lie between levels of usage. Thus if analysis of food product usage by Social Grade did not include examination of sub-groups such as users only, then significant differences could be hidden.

9.1.2 Social Grade and brand usage

The question examined in this section is the extent to which the Social Grade classification system differentiates between "regular" users of different brands of household food products. This is examined for the following three FMCG product fields:

packet tea - (19 brands),
butter - (17 brands),
canned baked beans - (14 brands).

In order to examine the extent to which the Social Grade classification systems yields statistically significant discrimination in terms of brand usage, we can use the Chi-square test. Chi-square was used to test the null hypothesis that there is:

"No difference in brand usage among social grade sub-groups."

Social Grade proved to be a very poor discriminator of branded products as can be seen in Table 42. Social Grade was unable to provide significant discrimination at the 0.05 level for the food products tested. Thus we can conclude that there is no significant difference in brand choice between social grades for packet tea, butter and canned baked beans.

Table 42. -- Social grade as a discriminator of brand usage

	Chi-square significance
Packet tea	0.40
Butter	0.16
Baked Beans	0.33
No. signif. at 0.05 level	0

The Market Research Society (1981) also investigated brand usage and found it to be *"fraught with peril."* Due to the wide range of choice available the possibility of a biassed selection was high. The Market Research Society found that *"the discriminatory power of Social Grade varies by product field and within product field by brand."* This is not an unexpected view for a general classification system such as Social Grade. They also consider that *"in f.m.c.g. markets dominated by a few brands, it is probable that any leading brand will have `across the board' appeal, which mutes the efficiency of any demographic classification."* This view is in line with the results from this study, where brand discrimination was inconsistent.

9.1.3 Social Grade and consumer durable ownership

The Social Grade classification system was also tested for its ability to provide significant discrimination in terms of ownership of consumer durables. To investigate whether Social Grade could discriminate between ownership and non-ownership, the following consumer durable items were tested:

> micro-wave oven, dishwasher, deep freezer, auto-washer - front load, auto-washer - top load, washer twin-tub, spin-dryer, tumble dryer, video player.

F ratios, Chi-square values and significance levels were calculated for Social Grade for each consumer durable. These statistics were used to test the null hypothesis that there is:

"No difference in consumer durable ownership among social grade sub-groups."

The results of this analysis are presented in Table 43. Nearly all *F* ratios and chi-square values for Social Grade as a discriminator of consumer durables were significant at the 0.05 level, with most being significant at the 0.001 level. The main exception was the 0.44 *F* ratio level of significance for the auto-washer - front load which was partly due to the low number of respondents owning this type of machine. The generally high level of significance of these statistics indicates that significant differences in ownership of consumer durables exist between Social Grade groups.

Table 43. -- Social Grade as a discriminator of consumer durable ownership.

	F ratio significance	Chi-square significance
Microwave oven	0.00	0.00
Electric dishwasher	0.00	0.00
Freezer	0.00	0.00
Auto front load washer	0.00	0.00
Auto top load washer	0.44	0.44
Twintub washer	0.00	0.00
Spin dryer	0.13	0.00
Tumble dryer	0.00	0.00
Have video	0.00	0.00
Own/rent video	0.00	0.00
No. signif at 0.05	8	9

The Market Research Society (1981) study found that "*Social Grade does work as a meaningful discriminator*" for product field usage. This general comment was based on analysis of a wide range of products including: ownership of consumer durables, use of food and alcohol, service products and other items. In this study, ownership and usage of consumer durables and services were investigated separately. Evidence of moderate and consistent discrimination of ownership of consumer durables by Social Grade was found. This finding appears to be consistent with the findings from the Market Research Society study.

The study by Schaninger (1981) investigated social class as a discriminator of consumer durable ownership. Typical chi-square results and significance levels found by Schaninger were:

microwave oven (chi-sq. 1.34 $p < .10$),
washer (chi-sq. 8.68 $p < .05$),
dishwasher (chi-sq. 16.55 $p < .01$),
dryer (chi-sq. 14.17 $p < .01$).

Schaninger considered this to be moderate but significant discrimination by social class for consumer durable ownership. Again, the results are consistent with the findings in this study. In general, the chi-square values in this study were larger and at higher levels of significance than in the Schaninger study. This is most probably due to the differences in sample sizes since the chi-square statistic is influenced by sample size, and, with the sample for this study being approximately six times that of the Schaninger study, considerably higher chi-square statistics would be expected.

9.1.4 Social Grade and service products

The Social Grade classification system was also tested for its discriminatory ability for service variables. Social Grade was evaluated on the following service variables:

holiday in past year (yes/no),
number of holidays in past year,
cost of last holiday,
cost of next to last holiday,
accommodation type - last holiday,
accommodation type - next to last holiday,
cinema - frequency of attendance,
have credit card (yes/no),
have store card (yes/no),
credit card use - frequency.

F ratios and chi-square values were calculated to test whether there was any difference in usage of service products between social grades. These statistics were used to test the null hypothesis that there is:

"No difference in service usage among social grade sub-groups."

The results of this analysis are presented in Table 44. As with the *F* and chi-square values for consumer durables, nearly all of the *F* ratios and chi-square values were significant at the 0.05 level, with most being significant at the 0.001 level. The exceptions were: accommodation on last holiday with 0.43 level of significance, and accommodation on previous holiday with 0.22 level of significance. The generally high level of significance for services products indicates that Social Grade does discriminate for the service products in this study.

Table 44. -- Social Grade as a discriminator of service products.

	F ratio significance	Chi-square significance
Holidays (yes/no)	0.00	0.00
Holidays (no.)	0.00	0.00
Cost Holiday - last	0.00	0.00
Acomm. last holi.	0.43	0.31
Cost Holiday - previous	0.00	0.00
Accom. previous holi.	0.22	0.29
Cinema	0.00	0.00
Credit card (yes/no)	0.00	0.00
Store card (yes/no)	0.00	0.00
Credit card usage	0.00	0.08
No. significant at 0.05 level	8	7

The study by the Market Research Society (1981) did not investigate service products in detail. It did however investigate how well Social Grade discriminated whether or not the respondent had a holiday abroad in the last 12 months. It found that Social Grade discriminated better for this variable than it did for most of the other variables being tested.

Analysis of the discriminatory power of Social Grade for all levels of usage of service products, versus users only, can be seen in Table 45. From Table 45., it can be seen that the significance levels of the *F* ratios and chi-square values decreased dramatically when the non-users were taken out of the sample for cost of previous holiday and cinema attendance. This indicates that for these services the main differences between social grades are between usage and non-usage, not between levels of usage. However, number of holidays, cost of last holiday and frequency of usage of credit card remained statistically significant at the .01 level. This indicates that for these services the main

differences between social grades are between levels of usage, not between usage and non-usage.

Table 45. -- Social Grade discrimination of users/nonusers of service products - *F*, chi-square and significance levels.

	Users and Non users		Users only	
	F signif.	Chi signif.	*F* signif.	Chi signif.
Holidays (no.)	0.00	0.00	0.00	0.00
Cost Holiday - last	0.00	0.00	0.00	0.00
Cost Holiday - prev.	0.00	0.00	0.22	0.84
Cinema	0.00	0.00	0.75	0.29
Credit card usage	0.00	0.00	0.00	0.09
No. signif. at 0.05	5	5	3	2

9.1.5 Summary of Social Grade as a significant discriminator

In this chapter, Social Grade was shown to provide significant discrimination for: usage and purchase of food products; ownership of consumer durables; and use of service products. Social Grade was unable to provide significant discrimination between regular users of different brands of household food products. A summary of these results is provided in Table 46.

Table 46. -- Summary of significant *F* and Chi-square values for each classification system and product group.

	F ratios		Chi-square	
Product Groups	No.	%	No.	%
Food products purchase/usage	5	63%	6	75%
Food brands	...	...	0	0%
Consumer durables	8	80%	9	90%
Services	8	80%	7	70%

The *F* and chi-square values and significance levels from this study were compared to a study of social class in the United States of America by Schaninger (1981). Similar *F* ratios and significant levels were found when Social Grade/social class was used to discriminate for food items. The study by Schaninger found moderate but significant discrimination by social class for consumer durable ownership. This was consistent with the findings in this study. The failure to find significant discrimination between regular users of different brands of household food products and Social Grade was not surprising as the Market Research Society (1981) study found Social Grade to be less efficient in discriminating between brands. The ability of Social Grade to provide significant discrimination for service products was consistent with the limited analysis of service products in the Market Research Society (1981) study.

The *F* ratio levels of significance for the users only sub-group compared to all respondents provided interesting results. This was the case for purchase and usage of food products, and for usage of service products. When the non-users were removed from the sample, some of the significance levels of the *F* ratios became more significant whilst others became less significant. The major changes in the *F* ratio significance levels of food products, indicate that for some food products the significant differences between social grades lie between usage and non-usage, whilst for others they lie between levels of usage. Thus, if analysis of food product usage by Social Grade did not include examination of sub-groups such as users only, then significant differences could be hidden.

9.2 The discriminatory power of Social Grade

The previous section examined whether social grade provides significant discrimination for products and services. This section investigates the amount of discriminatory power Social Grade has for the same products and services. As in the previous chapter, a variety of statistics is calculated to measure the discriminatory power of Social Grade. These statistics are calculated for all respondents (product users and non-users) and product users only.

9.2.1 Food product usage/purchase discrimination

In the previous section, Social Grade was found to be significant discriminator for food product usage. However, whilst there are significant differences between social grades and levels of usage, the statistics calculated and displayed in Table 47 show Social Grade to have low levels of discriminatory power.

Table 47. -- Social Grade as a discriminator of food purchasing and usage

	F signif	Chi signif.	Eta^2	Tau-c	Lambda
Yoghurt	0.00	0.00	0.05	-0.16	0.01
Instant coffee	0.00	0.01	0.03	-0.09	0.01
Tea bags	0.00	0.00	0.03	0.07	0.01
Baked Beans	0.01	0.35	0.02	-0.03	0.00
Soft drinks - fizzy	0.05	0.00	0.01	0.03	0.00
Packet tea	0.08	0.34	0.01	-0.01	0.00
Soft margarine	0.22	0.01	0.01	0.03	0.00
Butter	0.30	0.03	0.01	0.01	0.00
Average (sign ignored)			0.02	0.05	0.00

The eta^2 statistics ranged from 0.01 to 0.05, lambda statistics ranged from 0.00 to 0.01 and the tau-c statistics

ranged from 0.01 to -0.16. The highest level of discrimination was found for yoghurt with an eta^2 of 0.05 and a tau-c value of -0.16. Instant coffee was the next highest with an eta^2 value of 0.03, a tau-c value of -0.09. It is clear from these statistics that Social Grade provided only moderate discrimination of food purchasing and usage at its best, and generally provided poor discrimination.

The discriminatory power of Social Grade was also estimated for the sub-group of food product users and is shown in Table 48. The eta^2 values ranged from 0.01 to 0.04, indicating very poor discriminatory power. The tau-c values indicated low levels of association between Social Grade and product purchase or usage.

Table 48. -- Social Grade discrimination of users/nonusers of food items - Eta^2, tau-c, gamma and lambda values.

	Users and Non users			Users only		
	Eta^2	Tau-c	Lambda	Eta^2	Tau-c	Lambda
Yoghurt	0.05	-0.16	0.01	0.01	-0.06	0.04
Instant coffee	0.03	-0.09	0.01	0.01	-0.07	0.01
Tea bags	0.03	0.07	0.01	0.03	0.10	0.01
Baked Beans	0.02	-0.03	0.00	0.01	0.00	0.00
Soft drinks - fizzy	0.01	0.03	0.00	0.04	0.14	0.01
Packet tea	0.01	-0.01	0.00	0.04	0.09	0.00
Soft margarine	0.01	0.03	0.00	0.03	0.11	0.00
Butter	0.01	0.01	0.00	0.01	0.07	0.03
Ave. (sign ignored)	0.02	0.05	0.00	0.02	0.08	0.01

It is interesting to note that the eta^2, tau-c and lambda values increased for some food products when the non-users were excluded from the analysis. This increase in discriminatory power is due to the original statistics being depressed by high marginal totals of non-users. The increase in discriminatory power however was not sufficient for us to

describe Social Grade as having anything but very low levels of discriminatory power among purchasers and users of food products.

The Market Research Society (1981) also investigated the purchase rate of food products. The study found that *"the discriminatory power of Social Grade is not large, except at the lower and, in some cases, the upper end...However, for some products Social Grade does discriminate."* The results of this study can only confirm Social Grade providing low levels of discriminatory power for food purchasing and usage. Any exceptions to these low levels of discriminatory power such as those cited by the Market Research Society can not be confirmed.

9.2.2 Brand discrimination

In section 9.1.2 it was found that Social Grade could not provide significant differentiation between "regular" users of different brands of food products. The extent to which Social Grade could provide any level of differentiation between "regular" users of different brands is examined in this section and presented in Table 49. The following three FMCG product fields were examined:

Packet tea - (19 brands),
Butter - (17 brands),
Canned baked beans - (14 brands).

The lambda analysis found similar results with Social Grade explaining 9 per cent of the variation in brand usage of packet tea, 1 per cent for butter and 0 per cent for brand usage of baked beans. Whilst the 0.09 lambda for packet tea appears promising, it must be noted that the chi-square statistic had a 0.40 level of significance and therefore can not be relied upon. Overall, the analysis indicated that there was no evidence that Social Grade was able to provide significant discrimination or acceptable levels of discriminatory power for brand usage.

Table 49. -- Social grade as a discriminator of brand usage

	Chi signif.	Lambda
Packet tea	0.40	0.09
Butter	0.16	0.01
Baked Beans	0.33	0.00

9.2.3 Consumer durable discrimination

In section 9.1.3 it was found that Social Grade could discriminate consumer durable ownership for most of the products tested, with 8 out of 10 *F* ratios being significant at the 0.05 level. In this section eta^2, lambda, and tau-c are calculated to measure the power of the discrimination that is present. The results are presented in Table 50.

Whilst nearly all the *F* ratios and chi-square values calculated for Social Grade as a discriminator of consumer durables are significant at the 0.05 level, the statistics calculated to measure the power of discrimination indicate low levels of discriminatory power. The eta^2 values ranged from 0.00 to 0.08, the lambda statistics ranged from 0.00 to 0.10, the tau-c statistics ranged from -0.01 to -0.22.

Table 50. -- Social Grade as a discriminator of consumer durable ownership.

	F signif.	Chi signif.	Eta^2	Tau-c	Lambda
Microwave oven	0.00	0.00	0.04	-0.20	0.05
Electric dishwasher	0.00	0.00	0.05	-0.14	0.00
Freezer	0.00	0.00	0.04	-0.21	0.07
Auto front load washer	0.00	0.00	0.06	-0.22	0.04
Auto top load washer	0.44	0.44	0.00	-0.01	0.00
Twintub washer	0.00	0.00	0.08	0.12	0.00
Spin dryer	0.13	0.00	0.00	0.03	0.00
Tumble dryer	0.00	0.00	0.02	-0.10	0.00
Have video player	0.00	0.00	0.05	-0.14	0.09
Own/rent video player	0.00	0.00	0.03	-0.10	0.10
Average (sign ignored)			0.04	0.13	0.04

As can be seen from Table 50 the statistics were inconsistent in measuring the discriminatory power of Social Grade for

consumer durable ownership. The two highest lambda statistics were found for whether the respondent own or rented a video player (lambda 0.10) and whether the respondent had a video player (lambda 0.09). The two highest eta^2 statistics were found for whether the respondent had a twin tub washer (eta^2 0.08) and whether the respondent had an auto front load washer (eta^2 0.06). The two highest tau-c statistics were found for whether the respondent had an auto front load washer (tau-c 0.22) and whether the respondent had a freezer (tau-c 0.21).

Whilst it would be preferable to have consistent statistical indicators of discriminatory power, we should not be worried by the apparent inconsistency in this case, for two reasons. Firstly, each statistic calculates discriminatory power in a different manner and variation between the statistics should be expected. Secondly - and more importantly - all the statistics in Table 50 are consistent in showing that Social Grade had either moderate or poor discriminatory power in terms of consumer durable ownership. In no instance could Social Grade be described as a powerful discriminator of consumer durable ownership. Discussion of the variability of statistics is continued in more detail in Chapter 10.

9.2.4 Services discrimination

In section 9.1.4 it was found that Social Grade provides significant discrimination for consumer services, with eight out of ten *F* ratios being significant at the 0.05 level. In this section eta^2, lambda and tau-c are calculated to measure the power of the discrimination that is present. Social Grade is tested on holiday, cinema and credit/store card variables with the results being presented in Table 51. The power of Social Grade is estimated for all respondents in the sample and then for the sub-group of respondents who are service product users.

The eta^2 values ranged from 0.00 to 0.13, the lambda statistics ranged from 0.00 to 0.20, the tau-c statistics ranged from 0.0 to -0.39. The two highest lambda statistics were found for whether the respondent had a credit card or not (lambda 0.20) and the number of holidays the respondent took in the past 12 months (lambda 0.12).

Table 51. -- Social Grade as a discriminator of service products.

	F signif.	Chi sq. signif.	Eta^2	Tau-c	Lambda
Holidays (yes/no)	0.00	0.00	0.09	-0.30	0.10
Holidays (no.)	0.00	0.00	0.09	-0.25	0.12
Cost Holiday - last	0.00	0.00	0.09	-0.23	0.00
Acomm. last holi.	0.43	0.31	0.00	0.04	0.01
Cost Holiday - previous	0.00	0.00	0.05	-0.13	0.00
Accom. previous holi.	0.22	0.29	0.02	0.00	0.00
Cinema	0.00	0.00	0.04	-0.13	0.00
Credit card (yes/no)	0.00	0.00	0.13	-0.39	0.20
Store card (yes/no)	0.00	0.00	0.07	-0.23	0.00
Credit card usage	0.00	0.08	0.03	-0.09	0.01
Average (sign ignored)			0.06	0.18	0.04

Moderately low levels of discriminatory power were found for whether the respondent had a credit card or not (eta^2 0.13, tau-c 0.39), the frequency of usage of the credit card (eta^2 0.13), and whether the respondent had a holiday in the past 12 months (tau-c 0.30).

Overall, Social Grade provided moderate discrimination of service products. It appears that Social Grade provides better discrimination for income sensitive service products such as credit card usage than for non-income sensitive service products such as frequency of attendance at cinemas.

The discriminatory power of Social Grade for users of service products compared to all respondents can be seen in Table 52. It is clear from these statistics that the discriminatory ability of Social Grade decreases substantially when non-users are taken from the sample. This indicates that the discriminatory power of Social Grade lies in its ability to discriminate users from non users of services, not in discriminating service usage.

Table 52. -- Social Grade discrimination of users/nonusers of service products - Eta^2, tau-c, gamma and lambda values.

	Users and Non users			Users only		
	Eta^2	Tau-c	Lambda	Eta^2	Tau-c	Lambda
Holidays (no.)	0.09	-0.25	0.12	0.02	-0.12	0.01
Cost Holiday - last	0.09	-0.23	0.00	0.03	-0.10	0.00
Cost Holiday - prev.	0.05	-0.13	0.00	0.02	-0.08	0.00
Cinema	0.04	-0.13	0.00	0.00	-0.03	0.03
Credit card usage	0.13	-0.26	0.00	0.03	-0.09	0.02
Ave. (sign ignored)	0.08	0.20	0.02	0.02	0.07	0.01

The lambda values increased in the case of cinema attendance and frequency of use of credit card. This was due to the

removal of the high marginal total of non-users from the sample. The tau-c values were also depressed by the removal of non-users from the sample. This would be expected as the tau-c is a measure of association which uses the ordinal nature of the data in the calculation of the statistic.

In summary, it is clear that Social Grade has very little discriminatory power for service products. Social Grade provided less discriminatory power when the analysis focused on the sub-group of service product users.

9.2.5 Summary of the discriminatory power of Social Grade

Social Grade did not even exhibit moderate levels of discriminatory power for usage and purchase of food products, branded products, consumer durables or service products. At best, Social Grade indicated moderately low discriminatory power when used to discriminate ownership of consumer durables. At its worst, Social Grade indicated very poor discriminatory power when used to discriminate brand usage. A summary of these results is presented in Table 53.

When non-users were removed from the sample, Social Grade continued to provided very low levels of discrimination. This was the case for purchase and usage of food products, and for usage of service products. The discriminatory power of Social Grade generally decreased when non-users were removed from the sample for each product category. A number of exceptions to this tendency were present for individual products. In these instances the original statistic for all users was usually depressed by high marginal totals of non-users.

Table 53. -- Summary of significant *F* and Chi-square values for each classification system and product group.

	Eta^2		lambda	
	All respondents	Users only	All respondents	Users only
Product Groups				
Food products purchase/usage	.02	.02	.00	.01
Food brands	...	...	...	.03
Consumer durables	.04	...	.04	...
Services	.08	.02	.02	.01

The comparison of the discriminatory power of Social Grade found in this study with other studies produced some consensus of results. Whilst Social Grade was found to have poor discriminatory power in this study for brand usage, the Market Research Society (1981) study had found Social Grade to provide satisfactory discriminatory power on brand usage. The Market Research Society study found that the discriminatory power of Social Grade *"was not large, except at the lower and, in some cases, the upper end... However, for some products Social Grade does discriminate."* This was reasonably consistent with the findings of this study, where Social Grade was found to provide moderately low levels of discrimination for food purchasing and usage at best, and generally provided poor discrimination.

Evidence of moderately low levels of discrimination of ownership of consumer durables, and moderate discrimination of service products was also found. The study by Schaninger found moderate but significant discrimination by social class for consumer durable ownership. This was consistent with the findings in this study.

Chapter 10

10. Implications

This study clearly shows that Social Grade and other socio-economic, geo-demographic and demographic classifications are not providing the discriminatory power claimed by their supporters. The wide use of Social Grade and other classification systems in many facets of marketing and social research makes it imperative that the systems perform to the levels claimed and expected.

In general, the classifiers do provide statistically significant discrimination of the purchase and use of household food products, ownership of consumer durables, and use of services but do not provide statistically significant discrimination between brands of food products. All classifiers provided low levels of discriminatory power in all product categories. The implications of these findings are far-reaching.

The focus of this study is on Social Grade. But, while Social Grade is the focus of this implications chapter, most of the implications from the findings also apply to the other socio-economic, geo-demographic and demographic classifications analysed in this study.

The implications relate to the three main areas in which Social Grading is used. Firstly, Social Grade classification is commonly used as a control variable in sample surveys in stratification, establishing quotas or post stratification. Secondly, Social Grade is used as a common system of classification in different data sets and, thence,

as a linking variable between those data sets. In this situation Social Grade is required to provide consistent sub-groups across many data sources. The final major use of Social Grade is in the analysis of survey information. Social Grade is used to help locate concentrations of groups of social or marketing interest or in the discrimination or prediction of behaviour. Less formally, such analysis is believed to add understanding, linking relationships in current data to other assumed relationships or characteristics.

10.1 Sampling implications

Sample surveys of populations represent a cost effective method of obtaining information with only minor decreases in the quality of information obtained. The quality of the information that is obtained from a sample survey is dependent upon a number of factors including sampling variability and sampling bias. Both of these factors can be affected by the quality, the validity, and power of classification schemes used in sample design, selection and control.

10.1.1 Sampling variability and the use of control variables

Samples are intended to be good approximations of the populations from which they are drawn, but cannot avoid some level of sampling variability. Researchers are well aware of sampling variability and try to minimise its effects through sample design and management. One commonly used technique to reduce the sampling variability is the use of socio-economic control variables such as Social Grade, Acorn or Mosaic.

Whether these control variables are used in design (as stratifiers), in selection (as quota controls), or in sample validation (post stratification), the goal is to maximise the amount of variability between cells and minimise residual variability within cells of the scheme. This study found such classifiers to provide very low levels of discriminatory power for the purchase and use of consumer goods and services. Very little of the variability in the dependent variables was explained by the classifiers: the ratio of explained variance to total variance was very low. Social Grade, ACORN Mosaic and the other classifiers may show statistically significant differences between cells but their ability to maximise the amount of variability between cells and minimise residual variability within cells is very limited. They will do little to reduce the sampling variability.

10.1.2 Stratified samples

Stratification is a basic and valuable tool for the designer of a sample survey. The purpose of using it is to reduce the impact of sampling variability and so increase the precision of the survey estimates. Stratification entails dividing the population into sub-groups or strata and selecting a separate sample from each stratum. Most commonly, the sample is designed to mirror the population in terms of its distribution over the strata - the process of proportional stratification.

Proportional stratification nearly always increases precision. The total variation for a variable in a population is composed of variation between strata and variation within strata. In proportional stratified random sampling, the variation between strata does not affect the standard error as this variation in the population is exactly reflected in the sample. Only variation within strata will

contribute to the standard error. Therefore the greater the proportion of the total variation in a population that is accounted for by between strata variation, the greater the benefit of stratification. Thus, with very little of the between or within variation being accounted for by Social Grade and other classifiers, little is to be gained by proportional stratification by these control variables.

Less commonly (at least in consumer research), a sample may employ disproportionate stratification, where the sample distribution across the strata is controlled, but not to mirror the distribution in the population. The latter property is restored to the sample prior to analysis by corrective weighting. Disproportionate sampling may be adopted for a variety of reasons unrelated to the considerations of precision in the total sample estimates, for example to boost the size of sub-groups of particular interest. It can, however, contribute to overall precision when within-stratum variation differs appreciably from stratum to stratum. Then, more variable strata are sampled more intensively to yield greater overall precision from a given total sample size. Alternatively, if survey costs vary appreciably between strata, more intensive sampling of lower-cost strata will yield a larger sample for a given expenditure, and usually, greater overall precision. This might not be true if higher-cost strata also showed higher variability.

10.1.3 Social Grade as a stratifier

However stratification is applied, in order to maximise the likelihood of its reducing the standard error we must ensure that the stratification factor(s) employed are relevant. The object is to divide the total population into strata that differ markedly in respect of the characteristics measured in the survey. Within each stratum, we seek as much homogeneity

as possible in terms of the same characteristics. In proportional stratification, the relationship between stratification power and overall precision will be straightforward: if between-strata variation accounts for x% of total variation in a survey measure, then the variance of the survey estimates (ie the square of its standard error) will be reduced by x%.

The very poor performance of Social Grade as a discriminator in this study clearly shows that the gains in precision by stratifying by Social Grade will be minimal. This study found Social Grade could only generally explain between 2% and 5% of total variation across a range of consumer survey variables. This will have little impact on the standard errors of survey estimates, reducing them only by 1% to 3%. Even at its best - as a predictor of credit card ownership, Social Grade accounted for only 13% of total variation, resulting in a reduction in the standard error of only about 7%. These findings will not come as a surprise to many critics of Social Grade or other socio-economic classifiers. Critics of these classifiers consider them to have great potential in theory but to be of little benefit in practice, as this study confirms. The only major beneficial effect of stratifying by Social Grade will be in providing a sample that is in line with the distribution of the population. This may add to the credibility of the survey results but the effect will be almost entirely cosmetic.

In terms of its use in stratification, Social Grade fails in the two associated requirements. It is not capable of dividing the total population into strata that differ markedly in respect of the characteristics measured in the survey. And it does not provide within stratum homogeneity in terms of the characteristics measured in the survey. We might, of course, take the position that, even if the use of Social Grade in stratification brings few benefits by reducing sampling variability and the standard error of a

survey estimate, it will not make matters worse. But this is not necessarily true. The use of Social Grade in stratification may discourage the search for other more useful stratifiers, or even preclude their use. This will be especially important in two contexts: in correcting for differential non-response and quota sampling.

10.1.4 Post-Stratification

Post-stratification involves weighting a sample to correct its profile, usually to a population profile. This approach is theoretically sound when used to correct for unbalanced outcomes from a random sampling process. Then, for Social Grade, all the above arguments remain true. The correction will achieve little beyond a cosmetic match between sample and population. But the technique is also commonly used to correct for the effects of varying levels of non-response between different sub-groups in the population. The weighting of cells is based on the untested assumption that those in a sub-group who do respond can adequately represent those in a sub-group who do not respond. Just as Social Grade is not an appropriate stratification variable, it should also be avoided as a post-stratification or weighting variable. If Social Grade is not providing discrimination, adjusting the sample by cell-weighting may only distort the sample further. The researcher will however have a sample profile in-line with the population and this cosmetic advantage may discourage the search for other more important variables or for variables associated with the differential non-response itself.

10.1.5 Quota Sampling

In United Kingdom market research, Social Grade is most commonly used in sampling as a control variable in quota

sampling. In quota sampling, each interviewer is given an assignment of interviews to be conducted with respondents who match a prescribed profile in terms of attributes such as sex, age and Social Grade. Interviewers are free to choose in a non-random way, respondents to fit the quota they are given. The underlying assumption is that the control variables such as Social Grade account for all the systematic variation in the population in terms of the variables under investigation.

The adequacy of quota sampling versus probability sampling has been an ongoing debate for many years. Quota samples can provide substantial reductions in the costs associated with interviewing respondents. Those who support quota sampling consider that its cheapness and administrative convenience outweigh its limitations. Some go further, suggesting that the stratification embodied in quota sampling approach makes it actually better than random sampling.

Opponents of quota sampling criticise it on a number of grounds, including its lack of a sound theoretical base and the difficulty of assessing some of the characteristics used to control variables. Their major concern, however, is with the likelihood of bias. Interviewers have too much control over the selection of respondents and may secure unrepresentative samples within quota groups. In particular, more accessible or approachable people are likely to be over-represented in the sample. If these people differ from others in terms of the survey variables, the resultant estimates will be biased.

Any variable which has low power as a stratifier is also likely to be of little use in controlling a quota sample. As Moser and Kalton (1972) point out "*The kind of factor to be chosen as a quota control is partly determined by its usefulness as a stratification factor; if a control fails to*

separate the population into strata which differ in their opinions on the subject under study, it is of no value." When we consider this statement in light of the results of this study which found Social Grade and the other classifiers failing to separate respondents into strata which differ in their purchase and use of household food products, ownership of consumer durables, and use of services there is little justification for its use as a control.

The use of Social Grade as a control variable in quota sampling cannot be justified in terms of meeting the assumption of accounting for all systematic variation in the population in terms of purchase and use of household food products, ownership of consumer durables, and use of services. Social Grade has been shown to account for very little of the variation in these variables and thus clearly breaks this fundamental assumption. Again, the use of Social Grade may stand in the way of the use of other variables more closely associated with the survey variables or, more generally, with variations in accessibility or approachability. The largely cosmetic match between sample and population may deter the search for more relevant controls. The use of Social Grade may even preclude the use of other variables in order to avoid excessive complexity in the interviewers task.

10.1.6 Geo-demographic classifiers in sampling

The main focus of this study is on Social Grade. The study results, however, also allow us to comment on the use of geo-demographic classification schemes such as ACORN and Mosaic in sample design and selection.

One problem which has had major effects on sampling practice in market research is the paucity of information available in

popular sampling frames for consumer surveys (e.g. Electoral Registers, Postcode Address File). Since these frames tell virtually nothing about individuals beyond their address we are unable to use stratified sampling in its purest form. We may be able to identify strata which are, or are believed to be, relevant to our survey objectives but are unable to identify in the frame which individuals belong to each stratum. This is one rationale underlying the adoption of quota sampling: that it may be worth losing the security against bias delivered by probability sampling in the interest of gaining the added precision of stratification. Most theorists, however, would today argue that the same objective is better met by post-stratification of a probability sample.

The most general effect, though, has been a focus on stratification at the area level rather than the individual level. With most samples being selected in two or more stages (e.g. constituency - polling district or ED - individuals or addresses), socio-economic stratification is introduced in stages prior to the final selection. Such schemes have used a wide variety of socio-economic measures available at area level from the population census - % in "higher" SEG groups, car ownership, household tenure, population density, labour vote, etc. The development of geo-demographic classification schemes is claimed in this context to bring advantages, in particular since these multivariate classifications bring greater stratification power than offered by previously used univariate classifications.

A full study of the utility of geo-demographics in sampling would require assessment of the trade off between the benefits of stratification at the small area level and the losses that might arise from a high intra-class correlation coefficient. This would require multi-level analysis beyond the scope of the current project, examining both variation

between and within area types (e.g. ACORN clusters) and variation between and within individual small areas within strata. The current study has looked only at the overall discriminatory power of geo-demographics at the level of the individual respondent: the value of classifying individuals in terms of the characteristics of the small area in which they live.

The results show that popular geo-demographic classification schemes are relatively weak discriminators in terms of purchasing behaviour, casting doubt on the underlying premise that their composition (and probably more reliable measurement) brings added benefits. This would seem to imply that the results of a more detailed study would be unlikely to be encouraging.

On the other hand, however, we could emphasise that, in this study of variability at the individual level, geo-demographic classifiers perform as well as Social Grade. In sampling, especially quota sampling, geo-demographic classifiers do have other major advantages: they do not depend on questioning of the respondent (given prior knowledge of where they live) or the difficult and unreliable assignment by interviewers of individuals to Social Grades. To that extent, the results are encouraging. The substitution of a weak but unintrusive socio-economic classification at the area level for a weak but intrusive one at the individual level will at least allow (and may encourage) the development and application of more valuable stratification schemes at the individual level.

10.2 Linking survey data sets

The second broad use of Social Grade is as a common variable in linking data sets. The process of linking data from separate surveys lies at the heart of many applications in market research. Data sets in market and social research are generally limited to specific topics. Thus, a research agency or organization may find that it has data sets on readership, media habits, household consumer goods spending, recreational behaviour, services spending and attitudes, all obtained from different sample surveys.

Marketing action may depend upon relationships between variables which arise in different data sets, for example between media habits and purchasing behaviour. The ideal would be to collect and produce data sets that contain all the variables of interest. Different survey data sets do, however, tend to hold common classification variables, including Social Grade. These common variables can be used to generate links between the data sets.

In the past, the process of linkage has tended to be indirect, through cross-analysis of each data set by common classifiers. More recently, we have seen rapid development of more elaborate approaches whereby researchers produce synthetic data sets by combining data from multiple sources. This technique, traditionally called statistical matching, is now known as data fusion. It involves matching "similar" records using common items with non-unique values. Thus, results from separate surveys are combined to simulate a single survey. The linking or pairing of records generally employs a multivariate approach, using a number of classification variables, and might include Social Grade.

Whether the linkage is achieved through independent cross-tabulation or through data fusion, there is bound to be some reduction in our ability to find and estimate the scale of relationships between variables drawn from different original data sets. Only in the extremely rare case of the common linking variable(s) being perfectly correlated with one of the variables of interest will we produce unbiased estimates of the relationship between the linked variables. The extreme example would be a unique record identifier appearing in data sets, as in the case of a data base built from repeated interviews with a panel.

More generally, the quality of the estimate of correlation between the linked variables will depend upon the reliability of the classification variable and on its discriminatory power with respect to the variables to be linked. Most demographic classifiers may be considered reliable, although concern exists over the reliability of Social Grade.

The following diagram depicts variables X_1 and X_2 being linked by a single classifier (e.g. Social Grade) appearing in both data sets.

var X_1 ——— Social Grade (linking variable) ——— var X_2

Our concern is that poor performance in the linkage process may mask a strong relationship between X_1 and X_2. The relationship between variable X_1 and variable X_2 may be strong but this may be hidden by the low discriminatory power of the linkages. This scenario is summarised below with r^2 used as the measure of discriminatory power:

r^2 $(X_1, link)$ = low
r^2 $(X_2, link)$ = low
r^2 (X_1, X_2) = high in reality but appearing to be low.

If we become aware of the problem of a linkage variable with low discriminatory power, we will not leap to the false conclusion that the linked variables are unrelated but may search for a more powerful linking variable. Problems are more likely to arise when the linking variable is believed to be powerful but remains untested. This may well be the case with Social Grade.

The low level of discriminatory power exhibited by Social Grade in this study must cast doubt on its utility as a linkage variable between survey data sets. Because of the low level of discriminatory power, the link between variable X_1 and Social Grade may be very weak, as may be the link between Social Grade and variable X_2. As a result, whatever the true strength of the relationship between X_1 and X_2, it will appear to be low. Unless the researcher quantifies the level of discriminatory power of the linkages, the user may be seriously misled by the analysis.

The low level of discriminatory power found here for Social Grade may reflect unreliability in the classification rather than the irrelevance of the underlying class concept. But the results for the other simpler and probably more reliable classifiers are equally discouraging. It may be that we have elected to examine behavioural variables which happen to be poorly explained by Social Grade, but this at least serves to illustrate the danger of relying on "standard" variables to provide linkages simply because they are familiar, and the need to search for and validate suitable variables for the linkage task in hand.

In this context, we must be critical of data fusion and of tests claiming to validate it as a technique. In data fusion, the multivariate linkage process is complex and difficult to assess; and the process is held constant for all analysis tasks regardless of its performance for each.

Perhaps worst of all, the creation of a single data set may mean that the user may not be alert to the fact that the linkage has taken place and that it has inherent limitations. Published tests of data fusion are similarly unconvincing, in that they do not quantify the discriminatory power of the linkage process. Nor do they report the ability of the approach to reproduce correlations between the linked variables. Until such evidence is produced, we must remain dubious about the value of data fusion and concerned about its potential to mislead. For the moment, the alternative of panel based data bases seems more attractive.

10.3 Analysis within surveys

The third broad use of Social Grade we consider is analysis within surveys. The analysis of relationships between variables is a fundamental aspect of survey analysis. Marketing actions may depend upon the relationships between Social Grade and for example, media habits and purchasing behaviour and therefore it is important to understand these relationships. Whilst many advances have been made in statistical analysis techniques of surveys in recent years, market researchers for the most part continue to rely upon simple cross-tabulations to aid in understanding the relationships between standard classifiers such as Social Grade and marketing behaviour or attitude variables.

Cross-tabulation is the simplest form of associative data analysis. Cross-tabulation by Social Grade consists of a simple count of the number of entities that fall into each of the possible categories of the cross-tabulation. Row and column percentages are then usually computed for the cross-tabulation. Cross-tabulation of a marketing variable by Social Grade aims to add to our understanding in a number of ways. Firstly, if the other marketing variable has only one category, the differences in the proportions in each of the Social Grade categories are used to add to our understanding of the relationship between that variable and the various Social Grades. If the marketing variable has been collected at other times, we can look at changes in the proportions in the Social Grades to add to our understanding of the relationship. If the marketing variable has more than one category we can look at the proportions of items in each of the cells. It is the differences between the Social Grade classes in cross-classifications that assist in showing these associations and adding to our understanding of the relationships. It is therefore important that Social Grade (as the measure of class) be able to show differences (discriminate) for marketing variables.

Once the relationship between Social Grade and a marketing variable has been analysed, the researcher needs to be concerned with two aspects of the relationship in the cross-tabulation. Firstly, whether the observed association and relationship between the variables is statistically significant, and secondly, how strong the association is. It is important for both of these aspects to be confirmed for the association to be of interest. If they are not, then the researcher can be easily misled.

This study found that for most variables Social Grade provided statistically significant differences in the cross-tabulations. However, it is important to remember that a statistically significant differences might not be of practical significance, especially when the sample size is large enough. Thus it is necessary to calculate a measure of the power of the relationship. This study found the associations are very weak and thus, most of the variation in the marketing behaviour variables was not explained by Social Grade or other classifiers. The differences are therefore statistically significant but not practically significant.

This highlights a common problem of research analysis by Social Grade. Researchers will see "apparent" differences between social grades and then proceed to describe the relationships they see. Unless the researcher quantifies the level of discriminatory power of the relationship, they may be seriously misled in the analysis. The problem may become cumulative. When we find a relationship between Social Grade and a survey variable, we believe that it adds to our understanding of that variable. This belief arises from our assumptions about a wide range of other characteristics and behaviours associated with Social Grade. These assumptions tend to be untested and may be unsound.

If we become aware of the problem, we may search for social class variables that have higher discriminatory power. As discussed in the previous section, the low level of discriminatory power found here for Social Grade may reflect unreliability in the classification rather than the irrelevance of the underlying class concept. But, as also discussed, our results for other classifiers are equally discouraging in terms of discriminatory power.

Despite some concerns over its suitability as a discriminator, Social Grade remains a standard analysis variable applied to social and market surveys. The findings in this study clearly indicate that Social Grade is not suitable as a standard discriminator. Previous studies of Social Grade have failed to report poor discriminatory power for Social Grade and other classifiers and therefore little or no effort has been made in searching for better alternatives. Social Grade suffers from many problems, and until an alternative that not only differentiates (and groups) better, but also has a more systematic and sounder theoretical grounding, researchers are going to continue to fail to fully understand relationships between class and marketing behaviour.

10.4 The future of Social Grading and socio-economic classification in the United Kingdom

The Social Grade classification system must be fundamentally revised if it is to have a future as a general purpose classification system. The initial aim of a revision should be to incorporate a sound theoretical basis to the system. Without a theoretical basis it is not possible to understand how the system is working, nor is it possible to provide thoughtful analysis from its discrimination. The United Kingdom Office of National Statistics has recognized this problem with its own social classification systems and their experiences in developing new social class systems with theoretical bases should be used in a revision of Social Grading.

This thesis has provided many examples of the Social Grading system providing none or some discrimination. These instances should be used as a starting point to further develop the system. Product and services where Social Grade provides no discriminatory power should be examined to find out how this could be improved. In areas where Social Grade provides some discrimination, it needs to be improved. For Social Grade to have relevance in the future as a general purpose social class classification system, it must provide discrimination over a broad range of products and services.

There have been many changes in the related socio-economic variables that are part of the current Social Grade system in the past twenty years and there is no reason to believe that these socio-economic variables will not continue to change. Regular systematic monitoring of the discriminatory ability and power of Social Grade should therefore be conducted. This should be part of a broader programme for broader updating or revising of Social Grade, thus providing a

classification system that will provide the best discrimination possible.

Many users of Social Grade are primarily interested in using Social Grade as a discriminator of specific products or services. This thesis provides these users with many examples of specific products and services where Social Grade and other demographic variables exhibit some discriminatory power (whilst not large some potential is exhibited). These users could use this knowledge to develop hybrid socio-economic classification systems specifically tailored to their products and services.

This thesis provides a systematic methodology for evaluation of socio-economic and demographic classification systems for marketing purposes. This methodology could be applied to all products and services in a major product and media survey and provide marketing professionals with a detailed evaluation of the discriminatory ability and power of Social Grade and other classification systems for their products and services. This evaluation would provide the specific information required to develop hybrid classification systems for specific products and services.

Appendices

Appendix 1.

Target Group Index Source Questions

The following variables were extracted for this study:

Demographic / socio-economic

Sex - (men, housewives, other women);
Social Grade - (A, B C1, C2, D, E);
Household income - (7 intervals);
Age - (6 intervals);
Acorn Classification - (11 cluster solution);
Mosaic Types - (11 types);
Super Profiles - (11 lifestyle groups);
Home ownership - (5 groups);
Length of time in present home - (5 intervals);
Working status - (4 intervals);
Terminal education age - (6 groups);
Number of people in household - (5 groups);
Marital status - (3 groups);
Cars in household - (number).

Usage, purchase and ownership variables

Quantity used:

Food Items

Butter - (250gm packs per week);
Soft margarine - (250gm tubs per week);
Instant coffee - (cups per day);
Packet tea - (1/4 lb packets per month);
Tea bags - (packets of 40 per month);
Yoghurt - (cartons per week);
Fizzy soft drinks - (bottles/cans);
Baked beans - (portions per week).

Brands used:

Baked beans - (brand usage);
Packet tea - (brand usage);
Butter - (brand usage);

Consumer durables:

Whitewear in home (have/own);
Microwave oven;
Deep freezer - separate from refrigerator;
Automatic washing machine - front load;
Automatic washing machine - top load;
Washing machine (twin tub);
Spin dryer (separate);
Tumble dryer (separate);
TV video cassette recorder - have yes/no;
TV video cassette recorder - owned/rented.

Services:

Holidays - (yes/no in past year);
Holidays - (number in past year);
Cost of last holiday;
Cost of next to last holiday;
Holiday accommodation - (type for last holiday);
Holiday accommodation - (type for next to last holiday);
Cinema - (frequency of visits);
Credit Card - frequency of usage;
Credit Card - ownership;
Store Card - ownership.

Sample and database

The National Buying Survey conducted by British Market Research Bureau provided the data for this study. The National Buying Survey uses a self completion questionnaire for the collection of purchasing and usage information. The survey draws a representative sample of about 25000 adults each year. The respondents are selected using random location methods in approximately 35000 sampling points throughout the United Kingdom. The information is then collated into the Target Group Index (TGI), a national product and media survey database.

The following questions were used to obtain the consumer information.

Butter

"About how many 250g packs do you use each Week on average?"

Five or more
Four
Three
Two
One
less than one

"Which brands do you use? Most often"

Adams
Anchor
Asda
Co-op
Country Life
Dairy crest Cottage Butter
Danelea
Danish Lurpak

Kerrygold
Safeway
Sainsburys
Scottish Pride
St. Ivel
St. Michael/M & S
Tesco
Wheelbarrow
Other brands

Soft Margarine

"About how many 250g tubs do you use each Week on average?"

Five or more
Four
Three
Two
One
less than one

Baked Beans

"About how many portions do you serve each week on average?"

Seven or more
Five or six
Four
Three
Two
One
less than one

"Which brands do you serve? Most often"

Asda
Co-op
Crosse & Blackwell:
  Beans

Beans & Sausage
Hartleys
Heinz Beans
Heinz Beans & Sausage
Heinz Curried Beans
Heinz Barbecue beans
HP
Safeway
Sainsburys
Tesco
Other brands

Yoghurt

"About how many cartons do you buy each Week on average?"

Nine or more
Six-eight
Five
Four
Three
Two
One
less than one

Instant Coffee

"About how many cups are drunk in your household each day on average?"

Twelve or more
Seven to eleven
Six
Four or five
Two or three
One or less

Tea Bags

"About how many packets (of about 40) do you use each month on average?"

Eight or more
Six or Seven
Five
Four
Three
Two
One or less

Tea (by the packet)

"About how many 125g (1/4lb) packets do you use each month on average?"

Ten or more
Eight or Nine
Six or Seven
Five
Four
Three or less

"Which brands do you use ? Most Often

Asda
Brooke Bond Choicest
Brooke Bond `D'
Brooke Bond PG Tips
Co-op 99
Other Co-op
Jackson's
Lyons Red Label
Lyons Silver Label
Quick Brew
Ridgeways
Ringtons

Safeways
Sainsburys
Tea Blender
Twinings
Typhoo Fresh Brew
Typhoo
Other Brands

Fizzy Soft Drinks

"About how often do you drink them?"

More than once a day
Once a day
2 or 3 times a week
Once a week
2 or 3 times a month
Once a month
Less than once a month

Holidays

"How many holidays have you had in the last 12 months?"

One
two
Three or more

"What was the total cost of your holiday (excluding spending money)?"

Under £100
£100 - £249
£250 - £499
£500 - £749
£750 - £999
£1,000 - £1,749
£1,750 - £2,499
£2,500 or more

"What sort of accommodation did you have?"

Own holiday home or time share
Hotel (full or half board)
Hotel (bed & breakfast)
Rented villa/flat/cottage
Guest house
Caravan (static)
Caravan (towing)
Tent
Stayed with friends /relations
Other

Cinema

"About how often these days do you go to the cinema?"

Once a week or more often
2 or 3 times a month
Once a month
Once every 2 or 3 months
2 or 3 times a year
Less often
Never go these days

Whitewear and electrical appliances

"Now we come to some questions about appliances and household items you own. You will see that the questions are again very simple.

We would like to know whether you (or any member of your family living with you) own each of the items or not. It doesn't matter how old they are or whether they were obtained new or secondhand."

Microwave oven
Deep freezer - separate from refrigerator
Automatic washing machine - front load

Automatic washing machine - top load
Washing machine (twin tub)
Spin dryer (separate)
Tumble dryer (separate)

Video Recorders

"Do you have a video recorder?"

"Is it Owned or Rented?"

TV video cassette recorder - have yes/no
TV video cassette recorder - owned/rented

Plastic cards

"Do you have any of these plastic cards either yourself or jointly with another person?"

Credit Card/Charge Card
Store Card/Retailer Card
Bank Debit Card (Connect/Switch)
Bank Cash Dispenser Card
Bank Cheque Guarantee Card
None of these

Appendix 2.

Sample Description

Demographic / socio-economic characteristics

The National Buying Survey only collects information on the usage and consumption of household products from housewives. Thus the total number of respondents for questions on household product usage and brand choice was 900. For all other questions the sample was 2000 respondents.

Demographic composition of the sample with codes used in data analysis shown in parentheses.

Sex

	n	%
Men (1)	964	48.2
Housewives (2)	900	45.0
Other women (3)	136	6.8
Total	2000	100.0

Social Grade

	n	%
A (1)	33	1.7
B (2)	259	13.0
C1 (3)	532	26.6
C2 (4)	596	29.8
D (5)	337	16.9
E (6)	243	12.2
Total	2000	100.0

Household Income

	n	%
not stated (8)	308	15.4
£4,999 or less (7)	356	17.8
£5,000 - £6,999 (6)	215	10.8
£7,000 - £8,999 (5)	273	13.7
£9,000 - £10,999 (4)	294	14.7
£11,000 - £14,999 (3)	272	13.6
£15,000 - £19,999 (2)	143	7.2
£20,000 or more (1)	139	7.0
Total	2000	100.0

Age

	n	%
15 - 24 (1)	346	17.3
25 - 34 (2)	434	21.7
35 - 44 (3)	393	19.7
45 - 54 (4)	268	13.4
55 - 64 (5)	327	16.4
65 + (6)	232	11.6
Total	2000	100.0

Home ownership

	n	%
Not stated	27	1.4
Own home outright (1)	478	23.9
Buying home (2)	924	46.2
Rent from council (3)	457	22.9
Rent from someone else (4)	100	5.0
Occupy rent free (5)	14	0.7
Total	2000	100.0

Length of time in present home

	n	%
Not stated	17	0.9
Under 1 year (1)	218	10.9
1 - 4 years (2)	466	23.3
5 - 9 years (3)	371	18.6
10 -19 years (4)	485	24.3
20 years or more (5)	443	22.2
Total	2000	100.0

Working status

	n	%
Full - time 30+ hours per week (1)	881	44.1
Part - time 8 - 29 hours per week (2)	203	10.2
Part - time less than 8 hours per week (3)	31	1.6
Not working (4)	885	44.3
Total	2000	100.0

Terminal education age

	n	%
Not stated	6	0.3
Still studying (1)	129	6.5
19 or over (2)	205	10.3
17 or 18 (3)	291	14.6
16 (4)	543	27.2
15 (5)	475	23.8
14 or under (6)	351	17.6
Total	2000	100.0

Number of people in household

	n	%
1 (1)	188	9.4
2 (2)	608	30.4
3 (3)	438	21.9
4 (4)	475	23.8
5 or more (5)	291	14.6
Total	2000	100.0

Marital status

	n	%
Single (1)	412	20.6
Married (2)	1391	69.6
Separated/divorced/widowed (3)	197	9.9
Total	2000	100.0

Number of cars in the household

	n	%
1 (1)	512	25.6
2 (2)	990	49.5
3 (3)	435	21.8
4 (4)	63	3.2
Total	2000	100.0

ACORN Classification

	n	%
A - Agricultural areas (1)	20	3.5
B - Modern family housing, higher incomes (2)	325	16.3
C - Older housing of intermediate status (3)	367	18.4
D - Older terraced housing (4)	84	4.2
E - Council estates - category I (5)	283	14.2
F - Council estates - category II (6)	182	9.1
G - Council estates - category III (7)	132	6.6
H - Mixed inner metropolitan areas (8)	63	3.2
I - High status non-family areas (9)	67	3.4
J - Affluent suburban housing (10)	337	16.9
K - Better - off retirement areas (11)	90	4.5
Total	2000	100.0

Mosaic Types

	n	%
L1 - Prosperous pensioners (1)	41	2.1
L2 - Older couples in leafy suburbs (2)	137	6.9
L3 - Families in interwar semis (3)	255	12.8
L4 - Older communities (4)	276	13.8
L5 - Singles and flat dwellers (5)	75	3.8
L6 - Disadvantaged council tenants (6)	259	13.0
L7 - Older council tenants (7)	136	6.8
L8 - Go-getting council tenants (8)	214	10.7
L9 - Young families with mortgages (9)	313	15.7
L10 - Country dwellers (10)	165	14.7
L11 - Missing	129	6.5
Total	2000	100.0

SuperProfiles

	n	%
A - Affluent minority (1)	144	7.2
B - Metro singles (2)	55	2.8
C - Young married suburbia (3)	188	9.4
D - Country and retiring suburbans (4)	141	7.1
E - Older suburbia (5)	174	8.7
F - Aspiring blue and white collars (6)	354	17.7
G - Multi-ethnic areas (7)	90	4.5
H - Fading industrial (8)	188	9.4
I - Council tenants (9)	332	16.6
J - The underprivileged (10)	214	16.7
K - Missing	120	6.0
Total	2000	100.0

Appendix 3.

Tables of Statistical Results

Social Grade

	F value	F signif	Eta sq.	Chi sq.	Chi signif	Tau-c	Lambda
Frequency of usage variables							
Yoghurt	9.00	0.00	0.05	100.10	0.00	-0.16	0.01
Instant coffee	5.30	0.00	0.03	53.60	0.01	-0.09	0.01
Tea bags	5.20	0.00	0.03	62.80	0.00	0.07	0.01
Baked Beans	3.10	0.01	0.02	37.50	0.35	-0.03	0.00
Soft drinks - fizzy	2.30	0.05	0.01	63.10	0.00	0.03	0.00
Packet tea	2.00	0.08	0.01	32.60	0.34	-0.01	0.00
Soft margarine	1.40	0.22	0.01	49.90	0.01	0.03	0.00
Butter	1.20	0.30	0.01	45.80	0.03	0.01	0.00
Consumer durable ownership							
Microwave oven	17.30	0.00	0.04	83.00	0.00	-0.20	0.05
Electric dishwasher	21.20	0.00	0.05	100.90	0.00	-0.14	0.00
Freezer	15.47	0.00	0.04	74.71	0.00	-0.21	0.07
Auto frt. load washer	24.00	0.00	0.06	113.40	0.00	-0.22	0.04
Auto top load washer	1.00	0.44	0.00	4.80	0.44	-0.01	0.00
Twintub washer	15.45	0.00	0.08	74.61	0.00	0.12	0.00
Spin dryer	1.72	0.13	0.00	8.58	0.00	0.03	0.00
Tumble dryer	6.85	0.00	0.02	33.80	0.00	-0.10	0.00
Have video	22.94	0.00	0.05	108.77	0.00	-0.14	0.09
Own/rent video	14.23	0.00	0.03	114.63	0.00	-0.10	0.10
Service variables							
Holidays (yes/no)	38.56	0.00	0.09	176.35	0.00	-0.30	0.10
Holidays (no.)	37.05	0.00	0.09	219.10	0.00	-0.25	0.12
Cost Holiday - last	40.91	0.00	0.09	258.57	0.00	-0.23	0.00
Acomm. last holi.	0.98	0.43	0.00	38.55	0.31	0.04	0.01
Cost Holiday - prev.	19.85	0.00	0.05	137.19	0.00	-0.13	0.00
Accom. previous holi.	1.39	0.22	0.02	39.12	0.29	0.00	0.00
Cinema	16.40	0.00	0.04	112.37	0.00	-0.13	0.00
Credit card (yes/no)	57.90	0.00	0.13	253.60	0.00	-0.39	0.20
Store card (yes/no)	30.80	0.00	0.07	143.50	0.00	-0.23	0.00
Credit card usage	4.69	0.00	0.03	34.99	0.08	-0.09	0.01

Social Grade - users and non users

	Chi square	Chi sq. signif.	Lambda
Brand usage variables			
Packet tea	82.41	0.40	0.09
Butter	92.44	0.16	0.01
Baked Beans	69.57	0.33	0.00

Social Grade - analysis of product users only.

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Tau-c	Lambda
Frequency of usage variables							
Yoghurt	1.22	0.30	0.01	44.55	0.04	-0.06	0.04
Instant coffee	2.46	0.03	0.01	30.95	0.19	-0.07	0.01
Tea bags	5.02	0.00	0.03	50.87	0.01	0.10	0.01
Baked Beans	1.72	0.13	0.01	23.26	0.80	-0.00	0.00
Soft drinks - fizzy	4.37	0.00	0.04	53.60	0.01	0.14	0.01
Packet tea	1.62	0.16	0.04	19.97	0.75	0.09	0.00
Soft margarine	4.80	0.00	0.03	35.24	0.08	0.11	0.00
Butter	1.77	0.12	0.01	35.68	0.08	0.07	0.03
Service variables							
Holidays (no.)	6.08	0.00	0.02	39.52	0.00	-0.12	0.01
Cost Holiday - last	6.71	0.00	0.03	65.32	0.00	-0.10	0.00
Cost Holiday - prev.	1.42	0.22	0.02	26.72	0.84	-0.08	0.00
Cinema	0.53	0.75	0.00	28.42	0.29	-0.03	0.03
Credit card usage	4.69	0.00	0.03	34.99	0.09	-0.09	0.02

Household income

	F value	F sig.	Eta sq.	Chi sq.	Chi signif.	Tau-c	Lambda
Frequency of usage variables							
Yoghurt	6.46	0.00	0.05	95.09	0.00	-0.16	0.04
Instant coffee	5.36	0.00	0.04	69.18	0.00	-0.15	0.01
Tea bags	2.02	0.06	0.02	45.35	0.33	0.05	0.02
Baked Beans	4.09	0.00	0.03	57.88	0.05	-0.14	0.01
Soft drinks - fizzy	0.33	0.92	0.00	64.87	0.01	0.00	0.01
Packet tea	0.84	0.54	0.01	23.78	0.94	-0.02	0.00
Soft margarine	1.96	0.07	0.02	31.62	0.68	0.04	0.00
Butter	0.98	0.44	0.01	42.82	0.20	-0.03	0.03
Consumer durable ownership							
Microwave oven	15.81	0.00	0.05	90.16	0.00	-0.26	0.12
Electric dishwasher	27.90	0.00	0.09	152.89	0.00	-0.18	0.00
Freezer	15.29	0.00	0.05	87.35	0.00	-0.25	0.04
Auto front load wsh.	29.77	0.00	0.09	145.42	0.00	-0.41	0.00
Auto top load wsh.	0.38	0.89	0.00	2.27	0.89	-0.01	0.00
Twintub washer	14.32	0.00	0.05	82.10	0.00	0.14	0.04
Spin dryer	3.01	0.01	0.01	17.95	0.01	0.07	0.04
Tumble dryer	9.28	0.00	0.03	54.15	0.00	-0.16	0.04
Have video	34.58	0.00	0.11	185.52	0.00	-0.35	0.04
Own/rent video	22.01	0.00	0.07	214.38	0.00	-0.26	0.04
Service variables							
Holidays (yes/no)	27.04	0.00	0.09	148.59	0.00	-0.31	0.04
Holidays (no.)	22.91	0.00	0.02	171.78	0.00	-0.24	0.10
Cost Holiday - last	41.59	0.00	0.13	292.32	0.00	-0.26	0.03
Acomm. last holi.	1.95	0.07	0.01	73.57	0.00	0.06	0.04
Cost Holiday - prev.	20.77	0.00	0.07	168.71	0.00	-0.14	0.00
Accom. previous holi.	0.35	0.90	0.00	52.55	0.13	0.01	0.04
Cinema	16.48	0.00	0.06	167.08	0.00	-0.16	0.04
Credit card (yes/no)	38.60	0.00	0.12	204.47	0.00	-0.39	0.24
Store card (yes/no)	22.81	0.00	0.07	127.13	0.00	-0.25	0.00
Credit card usage	4.33	0.00	0.04	54.83	0.00	-0.13	0.03

Household income

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	88.27	0.70	0.07
Butter	85.08	0.78	0.00
Baked Beans	90.77	0.15	0.34

Marital status

	Chi square	Chi signif.	Lambda
Frequency of usage variables			
Yoghurt	41.87	0.00	0.00
Instant coffee	25.98	0.01	0.00
Tea bags	28.49	0.01	0.01
Baked Beans	62.39	0.00	0.02
Soft drinks - fizzy	24.96	0.03	0.00
Packet tea	17.40	0.14	0.00
Soft margarine	32.29	0.00	0.01
Butter	26.83	0.01	0.01
Consumer durable ownership			
Microwave oven	34.82	0.00	0.00
Electric dishwasher	15.82	0.00	0.00
Freezer	39.59	0.00	0.00
Auto front load washer	81.52	0.00	0.00
Auto top load washer	0.28	0.87	0.00
Twintub washer	6.78	0.03	0.00
Spin dryer	3.35	0.19	0.00
Tumble dryer	37.40	0.00	0.00
Have video	74.05	0.00	0.06
Own/rent video	81.99	0.00	0.08
Service variables			
Holidays (yes/no)	24.68	0.00	0.00
Holidays (no.)	25.36	0.00	0.05
Cost Holiday - last	55.03	0.00	0.00
Accom. last holi.	38.01	0.00	0.01
Cost Holiday - previous	36.28	0.00	0.00
Accom. previous holi.	36.50	0.00	0.02
Cinema	377.67	0.00	0.00
Credit card (yes/no)	73.25	0.00	0.00
Store card (yes/no)	30.40	0.00	0.00
Credit card usage	16.66	0.08	0.01

Marital status

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	27.63	0.69	0.03
Butter	36.66	0.26	0.00
Baked Beans	18.54	0.86	0.00

Terminal education age

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Tau-c
Frequency of usage variables						
Yoghurt	12.89	0.00	0.07	116.45	0.00	-0.20
Instant coffee	12.00	0.00	0.06	71.58	0.00	-0.10
Tea bags	8.74	0.00	0.05	70.78	0.00	0.10
Baked Beans	8.36	0.00	0.04	92.51	0.00	-0.07
Soft drinks - fizzy	2.68	0.02	0.01	62.46	0.00	0.02
Packet tea	1.06	0.38	0.01	47.82	0.02	-0.01
Soft margarine	5.34	0.00	0.03	41.46	0.08	0.00
Butter	2.79	0.02	0.02	48.38	0.02	0.05
Consumer durable ownership						
Microwave oven	6.20	0.00	0.02	30.62	0.00	-0.09
Electric dishwasher	7.18	0.00	0.02	35.37	0.00	-0.08
Freezer	8.43	0.00	0.02	41.39	0.00	-0.10
Auto front load washer	18.27	0.00	0.04	87.62	0.00	-0.14
Auto top load washer	2.14	0.06	0.01	10.68	0.06	0.01
Twintub washer	3.82	0.00	0.01	18.97	0.00	0.06
Spin dryer	3.38	0.00	0.01	16.83	0.00	0.05
Tumble dryer	4.87	0.00	0.01	24.15	0.00	-0.05
Have video	25.03	0.00	0.06	118.10	0.00	-0.16
Own/rent video	23.55	0.00	0.06	145.74	0.00	-0.14
Service variables						
Holiday (yes/no)	7.84	0.00	0.02	38.55	0.00	-0.12
Holiday (no.)	5.56	0.00	0.01	47.60	0.00	-0.09
Cost Holiday - last	9.10	0.00	0.02	112.44	0.00	-0.09
Acomm. last holi.	2.74	0.02	0.01	59.50	0.01	-0.06
Cost Holiday - previous	4.92	0.00	0.01	63.41	0.01	-0.06
Accom. previous holi.	3.79	0.00	0.04	70.76	0.00	-0.11
Cinema	40.11	0.00	0.09	517.75	0.00	-0.21
Credit card (yes/no)	32.31	0.00	0.08	149.86	0.00	-0.14
Store card (yes/no)	18.58	0.00	0.04	89.00	0.00	-0.10
Credit card usage	5.00	0.00	0.04	48.66	0.00	-0.14

Terminal education age

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	76.39	0.14	0.05
Butter	91.42	0.18	0.01
Baked Beans	85.81	0.04	0.00

Number of people in household

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Tau-c
Frequency of usage variables						
Yoghurt	32.17	0.00	0.13	151.97	0.00	0.27
Instant coffee	15.25	0.00	0.06	84.04	0.00	0.18
Tea bags	13.51	0.00	0.06	77.75	0.00	0.17
Baked Beans	71.12	0.00	0.24	367.33	0.00	0.40
Soft drinks - fizzy	4.76	0.00	0.02	53.15	0.00	0.10
Packet tea	2.28	0.06	0.01	69.26	0.00	-0.04
Soft margarine	17.45	0.00	0.07	92.40	0.00	0.20
Butter	1.79	0.12	0.01	49.74	0.00	0.05
Consumer durable ownership						
Microwave oven	12.21	0.00	0.02	47.82	0.00	0.15
Electric dishwasher	8.10	0.00	0.02	31.96	0.00	0.08
Freezer	10.41	0.00	0.02	40.88	0.00	0.13
Auto front load washer	25.10	0.00	0.05	95.82	0.00	0.18
Auto top load washer	1.78	0.13	0.00	7.12	0.00	-0.02
Twintub washer	4.92	0.00	0.01	19.56	0.00	-0.05
Spin dryer	6.35	0.00	0.01	25.13	0.00	-0.07
Tumble dryer	22.51	0.00	0.04	86.37	0.00	0.20
Have video	48.38	0.00	0.09	176.85	0.00	0.28
Own/rent video	40.10	0.00	0.07	202.13	0.00	0.23
Service variables						
Holidays (yes/no)	7.83	0.00	0.02	30.92	0.00	0.00
Holidays (no.)	6.38	0.00	0.01	46.71	0.00	-0.05
Cost Holiday - last	7.88	0.00	0.02	61.90	0.00	0.02
Acomm. last holi.	12.06	0.00	0.04	129.55	0.00	0.16
Cost Holiday - previous	2.97	0.02	0.01	40.21	0.15	-0.02
Accom. previous holi.	3.36	0.01	0.03	51.36	0.00	0.15
Cinema	12.81	0.00	0.03	66.94	0.00	0.11
Credit card (yes/no)	3.55	0.00	0.01	12.96	0.00	-0.03
Store card (yes/no)	3.25	0.01	0.01	14.13	0.00	0.03
Credit card usage	0.65	0.62	0.00	10.33	0.96	0.03

Number of people in household

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	62.12	0.54	0.04
Butter	91.54	0.01	0.00
Baked Beans	67.07	0.08	0.00

Age

	F value	F sig.	Eta sq.	Chi sq.	Chi signif.	Tau-c
Frequency of usage variables						
Yoghurt	19.54	0.00	0.10	144.64	0.00	-0.21
Instant coffee	11.88	0.00	0.06	88.10	0.00	-0.12
Tea bags	5.53	0.00	0.03	71.32	0.00	-0.06
Baked Beans	31.04	0.00	0.15	170.81	0.00	-0.22
Soft drinks - fizzy	5.10	0.00	0.03	65.74	0.00	-0.13
Packet tea	4.52	0.00	0.02	72.11	0.00	0.12
Soft margarine	7.81	0.00	0.04	61.89	0.00	-0.08
Butter	1.62	0.15	0.01	27.88	0.58	0.06
Consumer durable ownership						
Microwave oven	12.63	0.00	0.03	61.39	0.00	-0.08
Electric dishwasher	9.27	0.00	0.02	45.43	0.00	0.00
Freezer	10.55	0.00	0.03	51.57	0.00	0.04
Auto front load washer	29.50	0.00	0.07	137.76	0.00	-0.13
Auto top load washer	6.26	0.00	0.02	30.89	0.00	0.04
Twintub washer	5.07	0.00	0.01	25.11	0.00	0.06
Spin dryer	16.70	0.00	0.04	80.41	0.00	0.13
Tumble dryer	11.15	0.00	0.03	54.42	0.00	-0.09
Have video	52.26	0.00	0.12	231.74	0.00	-0.29
Own/rent video	49.37	0.00	0.11	282.94	0.00	-0.24
Service variables						
Holidays (yes/no)	3.56	0.00	0.01	17.71	0.00	0.03
Holidays (no.)	4.73	0.00	0.01	38.01	0.00	0.04
Cost Holiday - last	8.29	0.00	0.02	86.19	0.00	0.01
Acomm. last holi.	6.16	0.00	0.02	103.82	0.00	-0.12
Cost Holiday - previous	2.53	0.03	0.01	49.76	0.14	0.02
Accom. previous holi.	6.57	0.00	0.07	81.49	0.00	-0.21
Cinema	38.17	0.00	0.09	578.73	0.00	-0.21
Credit card (yes/no)	21.84	0.00	0.05	103.86	0.00	0.08
Store card (yes/no)	13.24	0.00	0.03	64.26	0.00	0.01
Credit card usage	3.18	0.01	0.02	35.80	0.07	-0.09

Age

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	68.74	0.81	0.04
Butter	84.97	0.33	0.00
Baked Beans	83.54	0.06	0.00

Home ownership

	Chi sq.	signif.
Frequency of usage variables		
Yoghurt	91.57	0.00
Instant coffee	45.26	0.00
Tea bags	41.66	0.00
Baked Beans	75.97	0.00
Soft drinks - fizzy	77.45	0.00
Packet tea	44.05	0.01
Soft margarine	64.77	0.00
Butter	21.57	0.60

	Chi sq.	signif.	Tau-c
Consumer durable ownership			
Microwave oven	95.95	0.00	-0.08
Electric dishwasher	86.19	0.00	-0.06
Freezer	87.12	0.00	-0.15
Auto front load washer	170.47	0.00	-0.09
Auto top load washer	16.56	0.00	-0.02
Twintub washer	86.46	0.00	0.05
Spin dryer	48.43	0.00	-0.06
Tumble dryer	46.58	0.00	-0.01
Have video	128.01	0.00	-0.02
Own/rent video	172.51	0.00	0.02
Service variables			
Holidays (yes/no)	99.69	0.00	-0.13
Holidays (no.)	123.19	0.00	-0.12
Cost Holiday - last	159.60	0.00	-0.10
Acomm. last holi.	59.53	0.00	0.09
Cost Holiday - previous	94.05	0.00	-0.08
Accom. previous holi.	39.26	0.08	0.08
Cinema	106.93	0.00	0.01
Credit card (yes/no)	208.22	0.00	-0.21
Store card (yes/no)	83.71	0.00	-0.08
Credit card usage	45.79	0.00	-0.01

Home ownership

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	71.62	0.24	0.03
Butter	93.40	0.00	0.04
Baked Beans	54.51	0.38	0.00

ACORN classification

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Lambda
Frequency of usage variables						
Yoghurt	2.09	0.02	0.01	69.60	0.49	0.01
Instant coffee	2.65	0.00	0.01	71.89	0.14	0.02
Tea bags	1.64	0.09	0.01	87.49	0.08	0.04
Baked Beans	1.20	0.29	0.01	75.74	0.30	0.01
Soft drinks - fizzy	2.19	0.02	0.01	87.98	0.07	0.00
Packet tea	1.42	0.17	0.01	104.17	0.00	0.00
Soft margarine	1.41	0.17	0.01	73.69	0.11	0.02
Butter	0.57	0.84	0.00	54.09	0.69	0.01
Consumer durable ownership						
Microwave oven	3.78	0.00	0.01	37.27	0.00	0.00
Electric dishwasher	7.40	0.00	0.02	71.73	0.00	0.00
Freezer	11.17	0.00	0.05	101.89	0.00	0.08
Auto front load washer	6.53	0.00	0.04	63.61	0.00	0.00
Auto top load washer	1.10	0.36	0.01	11.02	0.36	0.00
Twintub washer	3.77	0.00	0.02	35.02	0.00	0.00
Spin dryer	1.51	0.14	0.01	15.55	0.11	0.00
Tumble dryer	1.64	0.09	0.01	14.81	0.14	0.00
Have video	1.39	0.00	0.01	12.50	0.25	0.00
Own/rent video	0.37	0.95	0.00	32.33	0.04	0.02
Service variables						
Holidays (yes/no)	12.33	0.00	0.06	105.36	0.00	0.05
Holidays (no.)	9.78	0.00	0.04	134.39	0.00	0.10
Cost Holiday - last	12.79	0.00	0.06	184.07	0.00	0.00
Acomm. last holi.	1.74	0.07	0.01	113.94	0.00	0.04
Cost Holiday - previous	6.43	0.00	0.03	118.83	0.00	0.00
Accom. previous holi.	0.58	0.82	0.00	67.84	0.55	0.02
Cinema	1.86	0.05	0.01	83.22	0.03	0.00
Credit card (yes/no)	15.82	0.00	0.03	147.37	0.00	0.12
Store card (yes/no)	6.33	0.00	0.03	61.68	0.00	0.00
Credit card usage	1.51	0.13	0.02	68.74	0.04	0.03

ACORN classification

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	182.82	0.10	0.11
Butter	184.66	0.09	0.02
Baked Beans	151.82	0.09	0.00

MOSAIC types

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Lambda
Frequency of usage variables						
Yoghurt	2.71	0.00	0.04	91.55	0.01	0.02
Instant coffee	3.21	0.00	0.03	82.80	0.01	0.03
Tea bags	3.13	0.00	0.03	78.89	0.09	0.03
Baked Beans	0.64	0.77	0.01	56.02	0.72	0.02
Soft drinks - fizzy	1.64	0.10	0.02	64.98	0.41	0.00
Packet tea	1.29	0.24	0.01	70.13	0.07	0.00
Soft margarine	1.66	0.09	0.02	74.61	0.03	0.02
Butter	0.67	0.74	0.01	54.03	0.47	0.00
Consumer durable ownership						
Microwave oven	4.29	0.00	0.02	38.00	0.00	0.02
Electric dishwasher	10.38	0.00	0.05	89.43	0.00	0.00
Freezer	8.48	0.00	0.04	73.70	0.00	0.07
Auto front load washer	6.99	0.00	0.03	61.26	0.00	0.00
Auto top load washer	2.33	0.01	0.01	20.81	0.01	0.00
Twintub washer	3.83	0.00	0.02	34.05	0.00	0.00
Spin dryer	1.97	0.04	0.01	17.63	0.04	0.00
Tumble dryer	1.22	0.28	0.01	10.97	0.28	0.00
Have video	2.82	0.00	0.01	25.20	0.00	0.00
Own/rent video	1.56	0.12	0.01	36.10	0.01	0.01
Service variables						
Holidays (yes/no)	11.82	0.00	0.05	101.18	0.00	0.03
Holidays (no.)	9.45	0.00	0.04	123.96	0.00	0.08
Cost Holiday - last	13.04	0.00	0.06	166.06	0.00	0.01
Acomm. last holi.	2.21	0.02	0.02	100.16	0.00	0.03
Cost Holiday - previous	5.85	0.00	0.03	117.78	0.00	0.00
Accom. previous holi.	1.35	0.21	0.03	40.54	0.99	0.01
Cinema	3.30	0.00	0.02	95.61	0.00	0.00
Credit card (yes/no)	16.55	0.00	0.07	138.66	0.00	0.11
Store card (yes/no)	6.72	0.00	0.03	58.86	0.00	0.00
credit card usage	2.04	0.03	0.03	50.16	0.27	0.04

MOSAIC types

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	153.24	0.28	0.09
Butter	158.00	0.20	0.02
Baked Beans	115.83	0.51	0.00

Working status

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Tau-c
Frequency of usage variables						
Yoghurt	4.40	0.00	0.01	39.43	0.01	-0.10
Instant coffee	6.26	0.00	0.02	32.57	0.00	-0.11
Tea bags	1.37	0.25	0.00	24.77	0.00	-0.03
Baked Beans	9.99	0.00	0.03	48.09	0.00	-0.08
Soft drinks - fizzy	1.56	0.29	0.01	27.04	0.00	-0.04
Packet tea	2.90	0.03	0.01	26.62	0.00	0.05
Soft margarine	0.77	0.51	0.00	20.66	0.00	-0.01
Butter	3.06	0.03	0.01	19.53	0.00	0.05
Consumer durable ownership						
Microwave oven	20.35	0.00	0.03	59.37	0.00	-0.17
Electric dishwasher	3.79	0.01	0.01	11.34	0.01	-0.03
Freezer	5.07	0.00	0.01	15.13	0.00	-0.06
Auto front load washer	19.66	0.00	0.03	57.41	0.00	-0.15
Auto top load washer	1.41	0.24	0.00	4.24	0.24	0.02
Twintub washer	5.37	0.00	0.01	16.02	0.00	0.05
Spin dryer	5.19	0.00	0.01	15.50	0.00	0.06
Tumble dryer	5.45	0.00	0.01	16.27	0.00	-0.09
Have video	39.98	0.00	0.06	114.06	0.00	-0.23
Own/rent video	36.52	0.00	0.05	136.90	0.00	-0.19
Service variables						
Holidays (yes/no)	14.30	0.00	0.02	47.81	0.00	-0.15
Holidays (no.)	9.02	0.00	0.01	53.49	0.00	-0.09
Cost Holiday - last	18.82	0.00	0.03	73.64	0.00	-0.13
Acomm. last holi.	1.81	0.14	0.00	28.53	0.13	0.01
Cost Holiday - previous	2.37	0.07	0.00	24.71	0.00	-0.04
Accom. previous holi.	1.25	0.29	0.01	29.77	0.10	-0.03
Cinema	18.30	0.00	0.03	60.45	0.00	-0.11
Credit card (yes/no)	30.94	0.00	0.04	88.88	0.00	-0.22
Store card (yes/no)	19.11	0.00	0.03	55.85	0.00	-0.13
Credit card usage	5.45	0.00	0.03	27.78	0.02	-0.12

Working status

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	37.37	0.86	0.05
Butter	36.66	0.26	0.00
Baked Beans	35.91	0.61	0.00

Length of time in present home

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Tau-c
Frequency of usage variables						
Yoghurt	8.65	0.00	0.04	59.72	0.00	-0.13
Instant coffee	1.69	0.15	0.01	36.34	0.05	-0.05
Tea bags	0.67	0.61	0.00	26.55	0.54	-0.03
Baked Beans	9.05	0.00	0.04	59.99	0.00	-0.11
Soft drinks - fizzy	3.33	0.01	0.00	59.62	0.00	-0.06
Packet tea	3.66	0.01	0.02	49.77	0.00	0.10
Soft margarine	1.31	0.26	0.01	29.59	0.20	-0.03
Butter	1.03	0.39	0.00	26.02	0.35	0.03
Consumer durable ownership						
Microwave oven	5.59	0.00	0.01	22.20	0.00	-0.05
Electric dishwasher	19.58	0.00	0.01	23.37	0.00	-0.02
Freezer	8.21	0.00	0.02	32.39	0.00	0.03
Auto front load washer	19.58	0.00	0.04	75.54	0.00	-0.16
Auto top load washer	2.97	0.02	0.01	11.85	0.02	0.04
Twintub washer	7.04	0.00	0.01	27.84	0.00	0.07
Spin dryer	10.36	0.00	0.02	40.70	0.00	0.09
Tumble dryer	9.77	0.00	0.02	38.44	0.00	-0.06
Have video	14.76	0.00	0.03	57.47	0.00	-0.14
Own/rent video	13.60	0.00	0.03	70.39	0.00	-0.11
Service variables						
Holidays (yes/no)	1.71	0.14	0.00	6.83	0.14	0.02
Holidays (no.)	1.05	0.38	0.00	14.73	0.26	0.03
Cost Holiday - last	3.17	0.01	0.01	50.93	0.02	-0.01
Acomm. last holi.	2.97	0.02	0.01	48.98	0.01	-0.05
Cost Holiday - previous	2.30	0.06	0.00	49.18	0.06	0.03
Accom. previous holi.	3.26	0.01	0.03	32.29	0.26	-0.18
Cinema	12.58	0.00	0.02	81.55	0.00	-0.10
Credit card (yes/no)	4.36	0.00	0.01	17.33	0.00	-0.06
Store card (yes/no)	2.57	0.04	0.01	10.24	0.04	-0.03
Credit card usage	2.92	0.02	0.02	22.95	0.29	-0.10

Length of time in present home

	Chi square	Chi. signif.	Lambda
Brand usage variables			
Packet tea	84.25	0.05	0.09
Butter	71.09	0.25	0.00
Baked Beans	57.32	0.28	0.00

Sex

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.
Frequency of usage variables					
Yoghurt	0.71	0.49	0.00	1.41	0.49
Consumer durable ownership					
Microwave oven	1.05	0.35	0.00	2.09	0.35
Electric dishwasher	1.58	0.21	0.00	3.17	0.20
Freezer	2.67	0.10	0.00	2.70	0.10
Auto top load washer	1.08	0.34	0.00	2.16	0.33
Twintub washer	0.24	0.62	0.00	0.25	0.62
Spin dryer	0.68	0.41	0.00	0.68	0.41
Tumble dryer	0.03	0.85	0.00	0.04	0.85
Have video	4.96	0.03	0.00	4.95	0.03
Own/rent video	0.60	0.42	0.00	5.80	0.05
Service variables					
Holidays (yes/no)	0.47	0.49	0.00	0.47	0.50
Holidays (no.)	1.10	0.29	0.00	1.43	0.70
Cost Holiday - last	1.14	0.28	0.00	8.53	0.38
Acomm. last holi.	0.19	0.66	0.00	6.31	0.50
Cost Holiday - previous	0.11	0.73	0.00	8.02	0.43
Accom. previous holi.	1.00	0.31	0.00	11.50	0.12
Cinema	0.14	0.70	0.00	11.71	0.07
Credit card (yes/no)	20.70	0.00	0.02	40.63	0.00
Store card (yes/no)	9.11	0.00	0.01	18.09	0.00

SuperProfiles

	F value	F signif.	Eta sq.	Chi sq.	Chi signif.	Lambda
Frequency of usage variables						
Yoghurt	2.37	0.01	0.02	66.71	0.35	0.02
Instant coffee	3.05	0.00	0.03	80.45	0.01	0.03
Tea bags	3.59	0.00	0.04	93.59	0.01	0.04
Baked Beans	2.00	0.04	0.02	97.60	0.00	0.00
Soft drinks - fizzy	1.41	0.18	0.01	74.70	0.15	0.00
Packet tea	1.97	0.04	0.02	77.19	0.02	0.00
Soft margarine	1.50	0.14	0.02	77.62	0.02	0.03
Butter	0.99	0.44	0.01	65.36	0.14	0.01
Consumer durable ownership						
Microwave oven	2.92	0.00	0.01	26.08	0.00	0.02
Electric dishwasher	9.08	0.00	0.04	78.71	0.00	0.00
Freezer	8.53	0.00	0.04	74.17	0.00	0.07
Auto front load washer	5.49	0.00	0.03	48.40	0.00	0.00
Auto top load washer	1.52	0.13	0.01	13.64	0.14	0.00
Twintub washer	4.09	0.00	0.02	36.30	0.00	0.00
Spin dryer	0.87	0.55	0.00	7.89	0.55	0.00
Tumble dryer	1.93	0.04	0.01	17.28	0.04	0.00
Have video	1.47	0.15	0.01	13.23	0.15	0.00
Own/rent video	1.11	0.35	0.01	44.93	0.00	0.02
Service variables						
Holidays (yes/no)	9.37	0.00	0.04	81.11	0.00	0.02
Holidays (no.)	8.73	0.00	0.04	110.33	0.00	0.08
Cost Holiday - last	11.54	0.00	0.05	152.11	0.00	0.00
Acomm. last holi.	2.04	0.03	0.02	97.25	0.00	0.03
Cost Holiday - previous	6.08	0.00	0.03	138.93	0.00	0.00
Accom. previous holi.	0.18	0.99	0.00	42.67	0.98	0.02
Cinema	3.05	0.00	0.01	87.64	0.00	0.00
Credit card (yes/no)	16.96	0.00	0.08	141.87	0.00	0.11
Store card (yes/no)	7.52	0.00	0.03	65.68	0.00	0.00
Credit card usage	1.53	0.13	0.08	50.57	0.26	0.02

SuperProfiles

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	157.69	0.21	0.09
Butter	191.13	0.00	0.02
Baked Beans	128.30	0.22	0.00

Number of cars in household

	F value	F sig.	Eta sq.	Chi sq.	Chi signif.	Tau-c	Lambda
Frequency of usage variables							
Yoghurt	10.90	0.00	0.04	65.79	0.00	0.14	0.00
Instant coffee	7.39	0.00	0.02	56.59	0.00	0.13	0.01
Tea bags	1.46	0.22	0.00	34.20	0.03	-0.02	0.01
Baked Beans	4.55	0.00	0.02	34.04	0.03	0.09	0.00
Soft drinks - fizzy	1.50	0.21	0.01	22.86	0.35	0.03	0.00
Packet tea	1.47	0.22	0.00	16.00	0.59	0.05	0.00
Soft margarine	0.68	0.56	0.00	17.37	0.50	-0.02	0.00
Butter	1.03	0.38	0.00	18.73	0.41	0.02	0.00
Consumer durable ownership							
Microwave oven	55.43	0.00	0.08	153.82	0.00	0.29	0.13
Electric dishwasher	47.00	0.00	0.07	131.97	0.00	0.16	0.00
Freezer	46.44	0.00	0.07	130.49	0.00	0.27	0.09
Auto front load wash.	55.97	0.00	0.08	155.20	0.00	0.25	0.04
Auto top load washer	0.16	0.93	0.00	0.46	0.92	0.01	0.00
Twintub washer	20.23	0.00	0.03	59.61	0.00	-0.11	0.00
Spin dryer	1.28	0.28	0.00	3.84	0.28	0.00	0.00
Tumble dryer	16.46	0.00	0.02	48.27	0.00	0.16	0.01
Have video	52.36	0.00	0.00	145.91	0.00	0.27	0.05
Own/rent video	31.27	0.00	0.04	180.62	0.00	0.19	0.15
Service variables							
Holidays (yes/no)	54.90	0.00	0.08	152.46	0.00	0.27	0.10
Holidays (no.)	46.59	0.00	0.07	171.35	0.00	0.21	0.12
Cost Holiday - last	56.56	0.00	0.08	229.12	0.00	0.23	0.00
Acomm. last holi.	0.50	0.68	0.00	34.09	0.04	-0.01	0.01
Cost Holiday - prev.	37.81	0.00	0.05	131.54	0.00	0.14	0.00
Accom. previous holi.	0.51	0.68	0.00	34.09	0.04	0.06	0.03
Cinema	14.34	0.00	0.02	62.42	0.00	0.11	0.00
Credit card (yes/no)	61.93	0.00	0.09	170.30	0.00	0.29	0.07
Store card (yes/no)	22.83	0.00	0.03	66.35	0.00	0.15	0.00
Credit card usage	2.19	0.09	0.01	16.35	0.36	0.05	0.02

Number of cars in household

	Chi square	Chi signif.	Lambda
Brand usage variables			
Packet tea	44.37	0.62	0.05
Butter	87.29	0.00	0.00
Baked Beans	49.44	0.12	0.00

Appendix 4.

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