

# The Contribution of Andrew Ehrenberg to Social and Marketing Research

John A. Bound

## Abstract

The life-long contribution of Andrew Ehrenberg, now retired, to both the wider science of social research and to marketing science has been notable. A major achievement has been to establish wide-ranging reproducible quantitative relationships in human behaviour in fields in which demonstration of such simple law-like relations had been thought unachievable. The paper gives a brief biography of Andrew Ehrenberg and reviews a few of many publications to illustrate his approach and the results.

**Keywords:** Ehrenberg, Lawlike relationships, Generalisation, Buyer Behaviour, Data Reduction.

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## 1. Biography

Andrew Ehrenberg was born in Germany in 1926 into a well-known academic family. He came to England with his [parents](#) in 1938, and attended Queen's College, Taunton. Subsequently he studied statistics at Kings College, Newcastle-upon-Tyne and Cambridge.

In 1951 he became Lecturer in Statistics at the Institute of Psychiatry in London, and in 1955 moved into commercial marketing research and consulting. His writings on statistical methodology in marketing research and wider fields soon became well-known and in 1970 he was invited to take the Chair of Marketing and Communication at the London Business School, where he remained for 23 years, eventually taking up a Research Chair.

In 1993 Andrew Ehrenberg became Professor of Marketing at the [London South Bank University](#) where he founded the Centre for Research in Marketing, which is now closely associated with the [Ehrenberg-Bass Institute for Research in Marketing](#) based at the University of South Australia.

Andrew Ehrenberg has the unique distinction of having been awarded the Gold Medal of the [British Market Research Society](#) twice, first in 1969 and again in 1996. He also holds the Honorary Fellowship of the [Royal Statistical Society](#). In December 2005 he was awarded an Honorary Doctorate by the University of South Australia.



*Professor Andrew Ehrenberg in 1999.*

## 2. Research Principles

The establishment of wide-ranging reproducible quantitative relationships in human behaviour is the outstanding contribution of Andrew Ehrenberg. In doing this in the course of a long career he has written and spoken much on different problem areas in both marketing and wider social science. This paper seeks to trace the development of these ideas over more than fifty years as shown in a selection of major publications from a total of some two hundred and fifty.

Ehrenberg's fundamental belief has been that the methods of the physical sciences are also applicable to social science. In an article contributed to the hard science journal *Nature* (Ehrenberg 1993a) entitled "Even the social sciences have laws", Andrew Ehrenberg demonstrated that even in Marketing, a field supposed to be dominated by people's impulses to buy, there are striking regularities. He went on to write that one reason for failure to find laws in the social sciences is that people seldom expect there to be lawlike regularities in social science ("Is it really Science?"), and therefore do not even look for them.

In this, he has contended, researchers are aided by modern statistics which concentrates almost exclusively on analysing single sets of data ("Is it significant?") instead of many sets of data ("Does it generalise?") and the focus thus becomes one of finding predictors for a single designated criterion variable. Many commonly used statistical approaches employ little or no previous knowledge and therefore find patterns which have no necessary application to other sets of data.

In contrast Ehrenberg points out that finding patterns seldom if ever starts from complete ignorance and the first step is to see whether the data conform to expectations. Previous knowledge is thus a key.

New data enable previous knowledge to be refined and basic theory to be developed. The functional relationship of relevant variables rather than the fitting of parameters is emphasised, and theory guides the choice of functional relationships.

The analysis of deviations from such models leads to the identification of other relevant variables as well as to a description of the scope of the relationship. By scope is meant the range of conditions in which it has been held to apply and with what accuracy. No optimisation is involved and it is noted that many similar models may adequately describe a simple relationship. The optimisation procedures used in no way influence the validity of the model.

Such models do not claim universal validity so problems of induction do not arise. The models state only the conditions in which the regularities embodied in the model have been found to apply.

The need to find in what circumstances or scope a generalisation applies means that in a wide range of the situations it is practicable to test only simple patterns, expressed as formal models. Multivariate models

are very difficult to test in varying conditions and must therefore always remain untested hypotheses. Thus sophisticated statistical methods are seldom required.

In short Ehrenberg's fundamental belief is simply that the methods of the physical sciences are also applicable to social science. Following the article in Nature quoted above in "The Discovery and Use of Laws of Marketing" (Ehrenberg 1969) he quoted five simple laws of buyer behaviour and asserted that the principle of discovering such regularities is the same as in other science: collecting enough of the right kind of facts and studying them. As Ehrenberg states, "If one studies the things which are regular, one will find regularities. Science is as simple as that. All one has to do is to pick on some regular things to study."

The paper quoted with approval Sir Cyril Hinshelwood (Hinshelwood 1957), who was unique in being President of the Classical Association and President of the Royal Society in the same year, as saying that the first stage of scientific theory was gross over-simplification, reflecting partly the need for practical views and even more a too enthusiastic aspiration for the elegance of form. Discrepancies are found in the second stage, and in the third a more refined and complex theory emerges. Andrew Ehrenberg saw his empirical generalisations or 'lawlike relationships' as very much in the first stage

### 3. Research Methods

Early in his career as a statistician Ehrenberg had clear ideas about what statistical methods to use. As long ago as 1955 in "Measurement and Mathematics in Psychology" (Ehrenberg 1955) he maintained that regression and other multivariate methods in statistics had little to offer in psychology. In various papers he attacked, for example, the use of Factor Analysis, and, a particular topic, the inadequacy of Bivariate Regression. There followed more positive and prescriptive papers including "Description, Prediction and Decision", (Ehrenberg 1964) and "Laws in Marketing" (Ehrenberg 1966).

One such paper, "The Elements of Lawlike Relationships" (Ehrenberg 1968) he read to the Royal Statistical Society. The Summary preceding the paper sets out some of Andrew Ehrenberg's basic ideas.

*Much of what we know about science is as yet confused by uncertainty. But implicit in our observed phenomena are many lawlike relations saying that if this occurs, so does that. The systematic uncovering of such relationships and their subsequent applications to practical problems are how science and how technology progresses.*

The paper gives examples ranging from Boyle's Law to the Duplication of Television Viewing. A case history of the relation between the heights and the weights of children of different ages and in various

places sets out a simple method a finding a line which closely passes through the means of each of these data sets and thus provides a simple linear relationship applying to all ages and places in the data. Such a relationship may be rewritten algebraically to predict the alternative variable and remain valid. Andrew Ehrenberg contrasts this with the eighteen regression equations relating heights and weights in one set of data for nine various age groups, using either one dependent variable or the other. A multivariate approach would produce an even less parsimonious solution. However, the paper was criticised because the predictive equations in the examples had no direct practical application. They were not in fact typical of his work in marketing.

The definitive statement of Andrew's position on generalisation came much later in "Predictability and Prediction" (Ehrenberg and Bound 1993b), read to a meeting of the Royal Statistical Society. The Summary stated baldly:

*A result can be regarded as routinely predictable when it has recurred consistently under a known range of different conditions. This depends on the previous analysis of many sets of data, drawn from different populations. There is no such basis of extensive experience when a prediction is derived from the analysis of only a single set of data. Yet that is what is mainly discussed in our statistical texts.*

The paper argues that some predictions are interpolative using established theory, and others extrapolative, involving conditions not yet observed. The main issue is model form as opposed to the fitting of parameters. The simple assumption that variables are independent and have a linear relationship almost always has to be modified and it is better to do this using previous knowledge or theory than to be guided only by finding a better fit to a particular data set.

The need to consider data gathered in different circumstances raises the problem of induction – how far may the results be regarded as, to use Ehrenberg's term, 'law-like'.

The wider problem of the validity of induction in science is answered by two qualifications to predictions. First, that the evidence consists of a large number of repetitions under varied conditions. There is though some fuzziness as to the meaning of a 'range of conditions'. Second, that the laws of science are conditional rather than universal, that is, each holds under certain conditions and never under others.

It is not necessary in prediction to consider that all other things are equal. It is enough to consider that it is only their effects, or lack of them, that have to be the same.

Andrew Ehrenberg's principle in developing models is that simpler reproducible relationships, which by their nature are more likely to be useful, are found by inspecting data rather than seeking to predict a given variable. The analysis is thus of interdependency rather than dependency. The analysis of

deviations from such models leads to the identification of other relevant variables as well as to a description of the scope of the relationship. By scope is meant the range of conditions in which it has been held to apply and with what accuracy. No optimisation is involved and it is noted that many similar models may adequately describe a simple relationship.

It is the place of theory to choose between such models. Multivariate models are very difficult to test in varying conditions and must therefore always remain hypotheses. The optimisation procedures used in no way influence the validity of the model.

In short, Andrew Ehrenberg considers that Social Science undoubtedly is a science. Although it may be claimed that physical laws have permanent validity and that social laws depend on the society considered, we see over time, as Hinshelwood (1957) says, great changes in the accepted beliefs about laws of physical nature. Andrew Ehrenberg suggests social science will prove similar as the range of applications increases.

These papers were able to use as examples some of the results quoted in Section 4.

## 4. Buyer Behaviour

The second strand is Buyer Behaviour. In 1955 Andrew Ehrenberg moved into marketing research and began working on consumer panels. His study of typical patterns of consumer purchasing in different categories led him in 1963 to set up a consultancy specialising in these topics, later to be joined by Gerald Goodhardt and Martin Collins. The consultancy had a strong academic leaning and Andrew Ehrenberg published a number of papers on the problems of generalising and quantifying conclusions, as well as holding various visiting teaching appointments in the UK and USA.

The first milestone paper in the study of buyer behaviour was “The Pattern of Consumer Purchases” (Ehrenberg 1959) which showed that the Negative Binomial Distribution (NBD) provided a very good description of the numbers of purchases of individual brands of consumer goods in a single time period. In this field his next major publication, “Progress on a Simplified Model of Stationary Purchasing Behaviour” (Chatfield, Ehrenberg and Goodhardt 1966) showed that the model underlying the NBD provided an excellent description of buyer behaviour over time, in particular showing how brand penetration and rate of buying increased in longer time periods. The key conclusion was that predictions of the numbers of purchases of a particular brand in a stationary or approximately stationary branded market followed from a number of simple statistical assumptions about the behaviour of individuals

The generalisation to the multi-brand case was put forward in “The Dirichlet: A Comprehensive Model of Buying Behaviour”, (Goodhardt, Ehrenberg and Chatfield, 1984) read to the Royal Statistical Society in

1984. The Dirichlet Model brings together and explains in one comprehensive model a very wide range of empirically observed regularities in consumer buyer behaviour.

The paper's assertion that:

*The Dirichlet model successfully and parsimoniously describes many aspects of buying behaviour in approximately stationary non-segmented markets. It makes explicit that there are simple, general and rather precise regularities in a substantial area of human behaviour where this has not always been expected.*

is now widely accepted and the model has become an important tool for many researchers.

A limitation of the Dirichlet model is that it describes only stationary or approximately stationary market conditions while predictions of the effect of change are what are needed in practice. The counter argument is that the establishment of benchmarks in markets is itself valuable (Ehrenberg, Uncles & Goodhardt 2004), and these can in practice often be applied to non-stationary conditions.

All this work was summarised in the book Repeat Buying (Ehrenberg 1988). Although this is now out of print after two editions, the full text may be found in the web-based Journal of Empirical Generalisations in Marketing Science.

An empirical generalisation based on Ehrenberg's work that has had wide application in Marketing is Double Jeopardy. Originally discovered by social researchers (McPhee 1963) long before the Dirichlet was propounded, its wide-ranging appearance in the marketing area was described in "Double Jeopardy Revisited" (Ehrenberg, Goodhardt and Barwise 1990). A small brand not only has fewer buyers than a large brand but they also tend to be somewhat less loyal. A simple model will relate the number of buyers and the rate of purchase in a particular market. The Double Jeopardy effect which occurs in practice in many different consumer choice situations, duly appears in Dirichlet predictions.

## 5. Marketing Implications of Buyer Behaviour Theory

### 5.1 Television viewing

The same methods of searching for empirical regularities in behaviour which had proved so successful in the analysis of Buyer Behaviour led to an examination of Television viewing patterns. These turned out to have many of the same characteristics as purchasing of other goods and services. Two books, The Television Audience (Goodhardt, Ehrenberg & Collins 1987) and Television and its Audience, (Barwise and Ehrenberg 1998), bring together the results of this work

One of the earliest, and at the time most surprising, results was that whilst the numbers of people viewing successive episodes of a programme was fairly constant from week to week, the viewers were by no means the same people. In fact, only about half the viewers one week also watched the following week. This is consistent with different people having different propensities to view programmes, similar to their differing propensities to buy brands.

These studies showed that most people watched a variety of programs, and there was no tendency for viewers of a particular program to choose other programs of the same type. Double Jeopardy type patterns showed in a variety of circumstances. Thus, lower rating programmes have slightly lower repeat-viewing rates; within a genre, lower rating programmes are 'liked' less by their viewers; TV channels that reach a smaller proportion of viewers are generally watched for fewer hours on average by those reached; and so on.

Channel choice was diverse in much the same way as brand choice is: clear patterns of purchase duplication (or what can be called cross-purchasing). This finding had important implications for public policy and advertising.

## 5.2 Prices

Andrew Ehrenberg also worked on pricing research over a number of years. The most recent work, a programme of laboratory style studies on the effect of price differences and price changes in branded consumer goods markets was reported in Scriven and Ehrenberg (2004),

The paper concluded that although pricing was not too complex for consistent patterns to emerge, individual price elasticities for different brands and price changes could appear varied and irregular. But it has been shown in these tests that responses to price changes depend more on the context than on the brand as such. A particularly interesting finding when the Double Jeopardy principle is considered was that price elasticity generally decreases in magnitude as brand shares increase. The studies found no consistent relationship between demographics and price sensitivity, save that the under 45's were more sensitive to price change than the older age-group.

## 5.3 Advertising

"Brand Advertising as Creative Publicity" (Ehrenberg et al. 2002) summarises the views of Andrew Ehrenberg and his colleagues on the function of advertising. This is that it mostly serves to publicise the advertised brand, and that advertising seems seldom to persuade. Competitive brands are perceived as



very similar, and salience governs choice between them. This view relates to the Buyer Behaviour experience that consumers have, over a period, experience of nearly all the competitive brands.

## 5.4 Consumer Promotions

This observation that consumers have over a period experience of nearly all the competitive brands may well be related to the results reported in “The After-effects of Price-related Consumer Promotions” (Ehrenberg, Hammond and Goodhardt 1994). This international study of grocery brands showed that price promotions generally had only a short-term effect, and did not affect a brand’s subsequent sales or brand loyalty. This was presumably because the extra buyers during the promotion had almost all bought the promoted brand before, rather than that new buyers were being attracted.

## 6. Data Reduction

The last strand we consider is Data Reduction. This has been important in all Andrew Ehrenberg’s work. In 1975 he first published “Data Reduction: analysing and interpreting statistical data” (Ehrenberg 1975). It has been revised, reprinted and translated into various languages.

Much of the approach to research methods and prediction depends on finding patterns in data. Andrew Ehrenberg argues that this is much aided by the presentation of data in simple table form. Charts have only a small part to play. His rules for the arrangement of tables and charts to communicate conclusions stem from this. The attempt to display multivariate data in a chart seldom if ever communicates successfully. The same approach helps both the analyst to see the pattern and then with refinement to communicate the conclusion to others. Some simple principles using the psychology of perception and memory are described.

The basic rules of data reduction are very simple and depend on principles of how memory works: clear layout of tables, placing figures to be compared in the same column where possible, rounding to two variable figures, and showing averages or other summary measures. By variable figures is meant the number of digits that vary in the data, rather than an absolute number of decimal places.

According to Ehrenberg’s view of data reduction, expressing relationships and patterns does not necessarily require the use of correlation, regression and formal multi-variate modelling technique. It is argued that the most useful and testable relationships are simple, and may initially be seen by careful tabulation.

This work has had a very marked effect on the way data is presented in academia, commerce and the public sector even though the presenters may be unaware of the source of the principles they are applying.

## 7. Conclusion

A feature of all the papers and books that Andrew Ehrenberg and his colleagues have published is their readability. The language is straightforward and underlying sophisticated mathematical concepts are introduced only when required. Tables are easy to follow, and results presented in such a way that they may readily be checked using new data.

We may repeat that the underlying theme in all Andrew Ehrenberg's work has been the finding and testing of patterns in data about human behaviour by the use of methods generally used in the physical sciences. The emphasis is always on seeing what is in the data rather than predicting variables selected in advance. The key to finding regularities in all science is to seek what regularities may be found rather than to pick a variable and see to what it is related.

As a final example we may quote that which Andrew Ehrenberg wrote in the end pages of *Repeat Buying* (Ehrenberg 1988):

*Of the thousand and one variables which might affect buyer behaviour, it is found that nine hundred and ninety-nine usually do not matter. Many aspects of buyer behaviour can be predicted simply from the penetration and the average purchase frequency of the item, and even these two variables are interrelated.*

The writer who has been a colleague and indeed a friend of Andrew Ehrenberg over many years has seen over these decades a consistent evolution of these basic ideas and their wider acceptance.

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*Note: Much of the material in this paper was originally published in Goodhardt and Bound (2003).*

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