

## Understanding Consumer Behavior using Systat

The study of consumers helps firms and organizations improve their marketing strategies by understanding issues such as how

- ✦ The psychology of how consumers think, feel, reason, and select between different alternatives (e.g., brands, products);
- ✦ The psychology of how the consumer is influenced by his or her environment (e.g., culture, family, signs, media);
- ✦ The behavior of consumers while shopping or making other marketing decisions;
- ✦ Limitations in consumer knowledge or information processing abilities influence decisions and marketing outcome;
- ✦ How consumer motivation and decision strategies differ between products that differ in their level of importance or interest that they entail for the consumer; and
- ✦ How marketers can adapt and improve their marketing campaigns and marketing strategies to more effectively reach the consumer.

Understanding these issues helps us adapt our strategies by taking the consumer into consideration. For example, by understanding that a number of different messages compete for our potential customers' attention, we learn that to be effective, advertisements must usually be repeated extensively. We also learn that consumers will sometimes be persuaded more by logical arguments, but at other times will be persuaded more by emotional or symbolic appeals. By understanding the consumer, we will be able to make a more informed decision as to which strategy to employ.

One "official" definition of consumer behavior is "The study of individuals, groups, or organizations and the processes they use to select, secure, use, and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have on the consumer and society." Although it is not necessary to memorize this definition, it brings up some useful points:

- ✦ Behavior occurs either for the individual, or in the context of a group (e.g., friends influence what kinds of clothes a person

wears) or an organization (people on the job make decisions as to which products the firm should use).

✦ Consumer behavior involves the use and disposal of products as well as the study of how they are purchased. Product use is often of great interest to the marketer, because this may influence how a product is best positioned or how we can encourage increased consumption. Since many environmental problems result from product disposal (e.g., motor oil being sent into sewage systems to save the recycling fee, or garbage piling up at landfills) this is also an area of interest.

✦ Consumer behavior involves services and ideas as well as tangible products.

✦ The impact of consumer behavior on society is also of relevance. For example, aggressive marketing of high fat foods, or aggressive marketing of easy credit, may have serious repercussions for the national health and economy.

There are four main applications of consumer behavior:

✦ The most obvious is for *marketing strategy*—i.e., for making better marketing campaigns. For example, by understanding that consumers are more receptive to food advertising when they are hungry, we learn to schedule snack advertisements late in the afternoon.

✦ A second application is *public policy*.

✦ *Social marketing* involves getting ideas across to consumers rather than selling something.

✦ As a final benefit, studying consumer behavior should make us better consumers.

Industry measures consumer behavior with the goal of ascertaining whether a product or service is likely to produce sufficient market demand to justify investment in production and distribution. Its

methods are generally pragmatic and designed to limit risk while optimizing profits.

There are two main categories of research methods. *Secondary* research uses research that has already been done by someone else. For example, marketers often find information compiled by the U.S. Census very useful. However, in some cases, information specific enough to satisfy a firm's needs is not publicly available. For example, a firm will have to run its own research to find out whether consumers would prefer that more vanilla taste be added to its soft drink brand. Original research that a firm does for itself is known as *primary research*.

There is no one perfect primary research method. Each has strengths and weaknesses, and thus the appropriate method must be selected based on research needs.

Surveys are useful for getting a great deal of specific information. Surveys come in several different forms. Surveys, as any kind of research, are vulnerable to bias. The wording of a question can influence the outcome a great deal. Experiments are used when the researcher wants to rule out all but one explanation for a particular observation. Focus groups involve getting a group of 6-12 consumers together to discuss product usage. Focus groups are especially useful if we do not have specific questions to ask yet, since we don't know what consumers' concerns might be. Personal interviews involve in-depth questioning of an individual about his or her interest in or experiences with a product. Projective techniques are used when a consumer may feel embarrassed to admit to certain opinions, feelings, or preferences. Observation of consumers is often a powerful tool. Looking at how consumers select products may yield insights into how they make decisions and what they look for. Physiological measures are occasionally used to examine consumer response. For example, advertisers may want to measure a consumer's level of arousal during various parts of an advertisement.

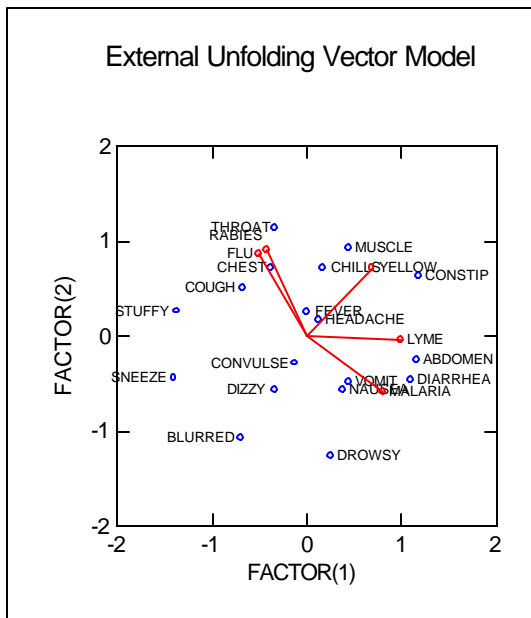
Transforming data information collected into insight, modeling and analytical capabilities provide actionable recommendations on choices one must make to optimize business: price levels,

promotion methods, media spending, product portfolio mix, retail category optimization and other areas where statistical techniques can quantify likely outcomes or evaluate historical effectiveness of choices.

Below are presented some methods as available in Systat for analysis of consumer behavior data.

### Perceptual Mapping

Perceptual mapping has been used as a strategic management tool for about thirty years. It offers a unique ability to communicate the complex relationships between marketplace competitors and the criteria used by buyers in making purchase decisions and recommendations. Its powerful graphic simplicity appeals to senior management and can



stimulate discussion and strategic thinking at all levels of all types of organizations.

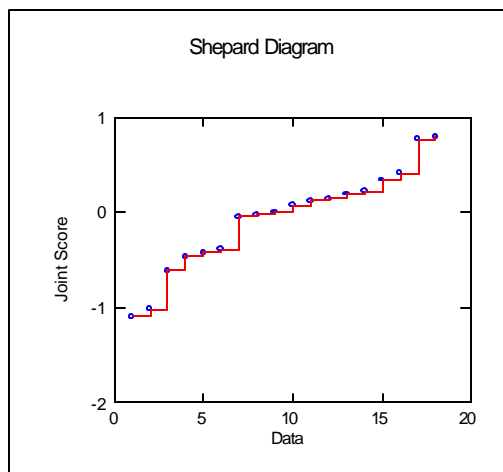
Perceptual mapping can be used to plot the interrelationships of consumer products, industrial goods, institutions, as well as populations. Virtually any subjects that can be rated on a range of attributes can be mapped to show their relative positions in relation both to other subjects as well as to the evaluative attributes. The products can be almost any identifiable object, including consumer products (toothpaste, cars, over-the-counter drugs), Web sites, industrial products (computers, tools), institutions (corporations, hospitals, magazine publishers), activities (vacation spots, movies) or people (entertainers, political candidates).

Systat's PERMAP offers two types of tools. The first is a group of procedures for fitting subjects and objects in a common space. This group

includes Carroll's internal and external unfolding models, MDPREF and PREFMAP, as well as Gabriel's BIPLLOT, which is a minor modification of MDPREF. The second is a set of procedures for relating one-dimensional configuration to another, generally called a Procrustes rotation. Both the orthogonal Procrustes and the more general canonical rotations are available.

### Conjoint Analysis

Conjoint analysis is a versatile marketing research technique that can provide valuable information for market segmentation, new product



development, forecasting and pricing decisions.

In a real purchase situation, shoppers examine and evaluate range of features or attributes

in making their final purchase choice. Conjoint analysis examines these trade-offs to determine what features are most valued by purchasers. Once data is collected the researcher can conduct a number of "choice simulations" to estimate market share for products with different attributes/features. This lets the researcher know which products or services will be successful *before* the product is introduced to the market.

Systat's conjoint analysis fits metric and nonmetric conjoint measurement models to observed data. It is designed to be a general additive model program using a simple optimization procedure. As such, conjoint analysis can handle measurement models not normally amenable to other specialized conjoint programs.

### Discrete Choice Analysis

Discrete choice analysis encompasses a variety of experimental design techniques, data collection procedures, and statistical procedures, which can be used to predict the choices that consumers will make between alternatives. These techniques

apply when consumers have the ability to choose between distinct ("discrete") courses of action. For example:

- ✦ To buy Brand A, Brand B, some other brand or no brand at all.
- ✦ To travel by car, train or bus.
- ✦ To vacation in the Caribbean, Europe, elsewhere, or to stay home.

Not all consumer choices are clearly discrete (filling the gas tank versus some lesser amount). Not all consumer behavior results from conscious, deliberated choices (buying a gallon of the only brand of milk your store carries). Discrete choice analysis is not a magic tool for understanding all consumer behavior. However, it offers certain advantages which are unmatched by any other consumer research technique.

The most-common application in consumer behavior is to the problem of how consumers choose between competing products. Qualitative research, motivation research, positioning research, segmentation research etc. all

can give partial answers to the question of "Why do consumers buy what they buy?" All are deficient, though, when it comes to practical predictions of what is likely to happen in the marketplace given a competitive situation.

A key advantage of discrete choice techniques is that they are based on the observation of consumer choices (real or simulated). In the end, what we do as consumers is make choices, and those choices are ultimately what matters to the marketer. All else is secondary. The closer any research technique comes to modeling and/or predicting choices, the more actionable and credible it will be to marketers.

The discrete choice framework in Systat (discrete choice logit) is designed specifically to model an individual's choices in response to the characteristics of the choices. This is embedded in the Logistic Regression menu. Characteristics of choices are attributes such as price, travel time, horsepower, or calories; they are features of the alternatives that an individual might choose from. One can

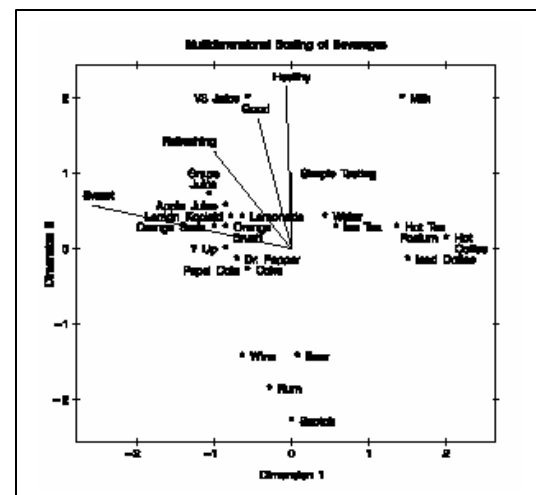
define set names for groups of variables, and create, edit, or delete variables.

## Multidimensional Scaling

Multidimensional Scaling. Multidimensional scaling (MDS) is a class of methods for estimating the coordinates of a set of objects in a space of specified dimensionality from data measuring the distances between pairs of objects. The data for MDS consist of one or more square symmetric or asymmetric matrices of similarities or dissimilarities between objects or stimuli. Such data are also called proximity data. In consumer research, the objects are often products. MDS is used to investigate product positioning.

For example, consumers were asked to rate the differences between pairs of beverages. In addition, the beverages were rated on adjectives such as Good, Sweet, Healthy, Refreshing, and Simple Tasting. The figure below contains a plot of the beverage configuration along with attribute vectors derived through preference mapping. The alcoholic beverages are

clustered at the bottom. The juices and carbonated soft drinks are clustered at the left. Grape and Apple juice are above the carbonated and sweet soft drinks and are perceived as more healthy than the other soft drinks. Perhaps sales of these drinks would increase if they were marketed as a healthy alternative to sugary soft drinks. A future analysis, after a marketing campaign, could check to see if their positions in the plot change in the healthy direction.



Water, coffee and tea drinks form a cluster at the right. V8 Juice and Milk form two clusters of one point each. Milk and V8 are perceived as the most healthy, whereas the alcoholic beverages are perceived as least healthy. The

juices and carbonated soft drinks were rated as the sweetest. Pepsi and Coke are mapped to coincident points, as are Postum (a coffee substitute) and Hot Coffee. Orange Soda is near Orange Crush, and Lemon Koolaid is near Lemonade.

Systat's multidimensional scaling offers nonmetric multidimensional scaling of a similarity or dissimilarity matrix in one to five dimensions. Multidimensional scaling is a powerful data reduction procedure that can be used on a direct similarity or dissimilarity matrix or on one derived from rectangular data with Correlations. SYSTAT provides three MDS loss functions (Kruskal, Guttman, and Young) that produce results comparable to those from three of the major MDS packages (KYST, SSA, and ALSCAL). All three methods perform a similar function: to compute coordinates for a set of points in a space such that the distances between pairs of these points fit as closely as possible to measured dissimilarities between a corresponding set of objects.

MDS also computes the INDSCAL (individual differences multidimensional scaling) model of Carroll and Chang. The INDSCAL model fits dissimilarity/similarity matrices for multiple subjects into one common space, with jointly estimated weight parameters for each subject (that is, a dissimilarity matrix is input for each subject and separate (monotonic) regression functions are computed). MDS can fit the INDSCAL model using any of the three loss functions, although we recommend using Kruskal's STRESS for this purpose.

Finally, MDS can fit the nonmetric unfolding model. This allows one to analyze rank-order preference data.

### **Partially Ordered Scalogram Analysis with Coordinates (POSAC)**

Facet Theory had its origins in the work of the research psychologist Louis Guttman and his associates in the 60's and 70's. Guttman is probably best known for the scaling technique named after him. Guttman and his colleagues developed Facet Theory out of concern "with the selection of

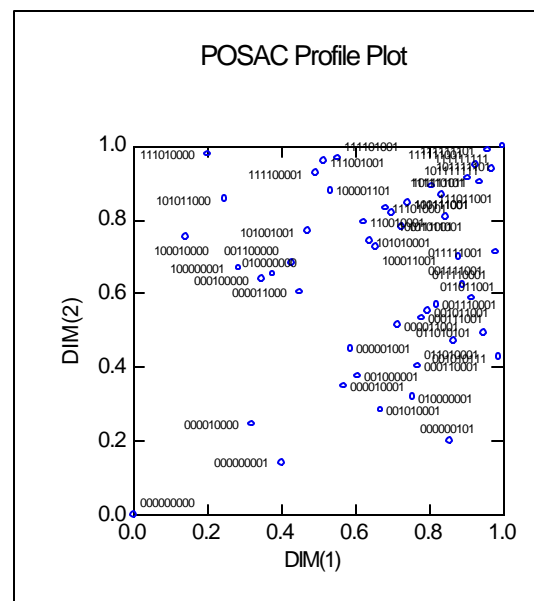
items for test construction and with the weaknesses in factor-analytic procedures as well as with the lack of clarity of existing approaches to the definition of research problems".

Facet Theory has been successfully applied in such social sciences as psychology, criminology, and organisational studies. Within these and other fields, it has been used to conduct research studies, re-analyse existing data sets to obtain a deeper understanding of underlying patterns, meta-analysis of different data sets, and even as a basis for analysing qualitative research results.

With regard to consumers' attitude to pack design, from a study that was conducted amongst 200 people in a specific brand's target group, about new pack designs, respondents were asked to indicate which of a deck of new and existing pack designs they associated with a list of 17 statements.

One of the most innovative aspects (or shall we say facets!) of the Facet Theory is the mapping sentence - the

tool with which to indicate the content of and relationship between different facets or aspects of interest in a research study. Not only does a mapping sentence ensure that you cover all relevant aspects in the research, it also forms a neat bridge between the objectives of the study and the questionnaire design.



Facet Theory researchers have developed a number of statistical techniques to structure and interpret data such as smallest space analysis, partial-order scalogram analysis, multiple scaling analysis, etc.

Systat's POSAC module calculates a partial order scalogram analysis on a set of

multicategory items. It consolidates duplicate data profiles, computes profile similarity coefficients, and iteratively computes a configuration of points in a two-dimensional space according to the partial order model. POSAC produces Quick Graphs of the configuration, labeled by either profile values or an ID variable.

### Summary

The above paragraphs just mention a bird's eye view of methods available in Systat. But Systat provides a powerful statistical and graphical analysis system in a graphical environment using descriptive menus and simple dialog boxes.

Systat offers more scientific and technical graphing options than any other desktop statistics package. Compare subgroups, overlay charts, transform coordinates, add geographic projections, change colors, symbols and more to create insightful presentations. Change graph locations, point-and-click to alter axis labels, scales, colors and symbols. Create unique graphs that bring out the true meaning in

your data with advanced chart options including normal and kernel densities, multiplots, maps, Voronoi tessellations, function plots, contours, scatterplot matrices with 20 diagonal density choices and 126 non-parametric smoothing options, just to name a few. Speed up your analysis by rotating your 3-D graphs to visually determine the perfect power or log transformation to normalize your data using the Dynamic Explorer to speed up your analysis.

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Whether you are looking for an all-in-one tool, or an advanced addition to your statistical library, you'll never have to worry about finding the right statistic or perfect graphic for the specific needs of your research. SYSTAT delivers over 15 years of experience in statistical algorithms written by leading statisticians.