"A METHODOLOGY FOR SPECIFICATION AND AGGREGATION IN PRODUCT CONCEPT TESTING"

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N° 87 / 03

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Director of Publication :

Charles WYPLOSZ, Associate Dean
for Research and Development

Printed at INSEAD,
Fontainebleau, France

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Revised Version

January 1987

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While consumer researchers have employed various methods for eliciting individuals' preferences toward new product concepts, it is not clear that the methods permit easy generalization to consumer behavior. In this paper we propose a methodology to deal with the common problem of limited information in conjoint analysis methods used to measure preferences. We also present a pre-estimation stage aggregation method based on the notion of the representative consumer. We identify appropriate methods of preference measurement, aggregation, and specification of utility functions of multi-attributed choice alternatives and describe an empirical study to illustrate the methods.

1. INTRODUCTION

A common activity of marketing researchers involves the difficult task of studying consumers' preferences for a product concept or product modification before market introduction. A crude estimate of the demand for the concept is derived from individuals' preferences under one or more scenarios of competitive behavior, market conditions, and assumed rules for consumer choice. Typically, marketing researchers engage in this activity as part of a firm's new product development program where it is important to guide research and development toward potential market opportunities that promise a reasonable chance of commercial success.

*The authors are grateful for a grant from the INSEAD Research and Development Committee for support of the data collection.

In economics, Lancaster's reformulation of consumer theory (Lancaster [15]), wherein objective product characteristics rather than commodity quantities are taken as arguments of the utility function, permits the estimation of the demand for new combinations of a set of characteristics describing existing alternatives in the market. The Lancasterian approach to demand estimation for new products is based on the revealed preferences of consumers.

By definition, transactions data are not available in product concept testing and may be limited in the case of new products. Even when transactions data are available - from a market test, for example - they may not reveal _true_ preferences. It is widely documented in marketing (see Kotler [14], for example) that consumers often elicit a series of responses to the marketing of a (new) product. Indeed, in most cases, a consumer does not _transact_ (i.e., choose an alternative on the market) until he is sufficiently _aware_ that it exists, has acquired a sufficient _understanding_ of it, has developed a sufficient _liking_ for it, resulting in a sufficiently strong _intention_ to buy it. If these responses can be seen collectively as a _response chain_, then a low market share for a new product could be the result of insufficient consumer awareness or insufficient comprehension. Of course one must also assume that consumers intending to buy the product can find it!

In practice, these are usually not minor issues. For example, the French PTT at present is attempting to encourage the adoption of Minitel by residential and commercial subscribers. Presumably, the low penetration (less than 10% at the time of this writing) is a result of collection of responses among PTT subscribers in the aggregate. Some subscribers are not aware of Minitel, some do not understand what it is or what it can do. If some of these subscribers were made aware and knowledgeable, they might prefer Minitel over other alternatives on the market. Some subscribers intend to obtain a terminal, but they cannot even place an order for one until they receive a voucher indicating availability of a terminal. And _some_ subscribers knowing about Minitel, preferring it over alternatives, and intending to obtain it, have successfully transacted.

In the case of product unavailability, there is insufficient production or distribution, so that supply does not match demand and the market is in disequilibrium. In the case of insufficient awareness or comprehension, a good number of consumers do not have a complete preference ordering over a choice set that includes the new product. In either case, the indirect utility function derived from the estimation of a choice model on transactions data could be misleading, suggesting to the producer that something may be "wrong" with the product when, in fact, the product may be "right" assuming the consumer knows about it and can find it.

Eventually the market may settle into equilibrium, and consumer's preference orderings may become complete. Of course, long before such eventualities, the product may cease to qualify as "new." Hence, limitations of transactions data in new product and product concept contexts present incentives for collecting survey or experimental data. In marketing one often applies conjoint analysis to measure directly consumers' preferences for alternative combinations of product characteristics and then to infer choices (Green and Wind [9]). Conjoint-like experiments have also been used recently to attempt to estimate a choice model directly and to infer an (indirect) utility function (e.g., Beggs et al. [2]).

In spite of the increasing rigor of these analyses applied to the measurement of product concept preferences, there is no escaping the fact that the exercise in which the respondent in such studies participates is basically hypothetical. Indeed, there is a strong possibility that serious measurement error in the hypothetical setting would prevent accurate generalization to a market setting. Hence, in designing the experiment, the burden upon the researcher is to strike a balance between replicating a real environment and presenting the respondent with a manageable task.

With respect to the design of realistic experiments, two issues must be addressed. First, before a product is presented to the market it is often difficult for the marketing researcher to know precisely how a representative buyer defines the set of alternatives from which he intends to choose. In fact, consumers often use "evoked sets" of a limited number of alternatives in a well-defined product category and will not choose among all possible close substitutes (cf. Silk and Urban [27]). Moreover, the composition of a consumer's evoked set from one product category could influence his preference ordering on alternatives in his evoked set from another product category. This possibility is rarely acknowledged in product concept studies.

In many circumstances, the second issue regarding the design of the task follows from the first issue. If one represents choice alternatives as bundles of characteristics or attributes, then unavoidably the researcher must omit some attributes of alternatives in the experimental setting, if only to make the task for the respondent possible. Under the low information conditions of a conjoint analysis exercise price could be included in the preference function to proxy for unobservable qualities of alternatives. However, one must recognize that price also performs its conventional function as an allocative mechanism, given the individual's limited resources. Hence, the two influences of price--as a proxy and as an allocative tool--are likely to be confounded in such laboratory measurements of preferences. In a real market setting, the influence of price as a signal for hidden qualities of a product is likely to be significantly diminished, if not eliminated entirely, because information in a market setting is likely to be more complete than in a laboratory setting.

As it is generally important to determine the influence of price on demand (in the market), the two ways that price may influence preferences in the experimental setting must be distinguished from each other. In other words, it is not sufficient just to achieve satisfactory predictive validity in the experiment. In order for an experiment to be useful in guiding the eventual commercialization of a product concept, the models calibrated in the experimental setting must have true explanatory value as well. We propose a simple, multi-stage procedure to accomplish this. The procedure requires the collection of two preference orderings from the individual respondent, namely, an ordering in the presence of a budget constraint and another ordering in the absence of any constraint.

The structure of the paper is as follows. In the next section we specify the model of a representative individual's preferences and choices and address two potential specification problems. In the third section we discuss the procedures to identify representative individuals prior to the estimation of their utility functions. The estimation procedures suggested ensure separation of the informational and allocative effects of price in the utility function. An empirical illustration is presented next, and managerial implications are discussed in the last section of the paper.

2. SPECIFICATION OF THE REPRESENTATIVE CONSUMER'S PROBLEM

2.1. Modeling of Preferences

The representative consumer derives utility from consuming goods from a wide variety of product groups and categories. We may represent this utility, U, by a general utility function, G,

$$(1) \quad U = G(\chi_1, \chi_2, \ldots, \chi_I)$$

where χ_i is a vector of alternatives (e.g., brands) in product category i. In marketing one imposes (often implicitly) a condition of weak separability on $G(\cdot)$ such that U may be written as:

$$(2) \quad U = G[G_1(\chi_1), G_2(\chi_2), \ldots, G_I(\chi_I)]$$

and the subutility function for some group of alternatives, $G_i(\chi_i)$, is modeled without explicit reference to $G(\cdot)$. Furthermore, it is assumed that a mapping exists between a set of characteristics, Z_i, and the group of alternatives χ_i such that every alternative, $\chi_t^i \in \chi_i$, may be described as a combination of the elements in Z_i. Likewise, it is assumed that the individual's <u>utility</u> for any alternative in χ_i may be modeled as some combination of the individual's utilities for each of the elements in Z_i. So the utility function for alternatives in χ_i may be expressed generally as

$$(3) \quad U_i = G(\chi_i) = h_i(Z_i).$$

We shall express $h(\cdot)$ in the form of a random utility function

$$(4) \quad U_i = h_i(Z_i) = V_i(Z_i) + e(Z_i)$$

where V is a utility component corresponding to the representative consumer and e represents the idiosyncratic deviation of the individual's utility from V in modeling U. In the context of a product concept test, one obtains evaluations on a set of alternatives X that represent some χ; and each alternative in X is described in terms of a vector of characteristics Z^o, where $Z^o \subseteq Z$. Accordingly, the researcher is likely to encounter some conventional specification problems in modeling individual level preferences using X and Z^o. We now address the two potential sources of misspecification of the preference model.

2.2. Misspecification (1): Incorrect X

If $\chi \cup X - \chi \cap X$ is non-empty, then the researcher is required to make some assumptions about the individual's preferences for alternatives in χ that are not elements of X. Given the separability assumption on G, an expedient means of accounting for preferences for excluded alternatives is to introduce a budget constraint explicitly into the analysis. For convenience, one can assume that the individual uses a two-stage budget procedure (cf. Deaton and Muellbauer [5]) such that in the first stage he apportions a global budget B according to intended allocations within each $\chi_1, \chi_2, \ldots, \chi_I$. We denote the budget portions as $\mathbf{b}_1, \mathbf{b}_2, \ldots, \mathbf{b}_I$. If we obtain the individual's preference ordering for the alternatives in some $X_i \in \chi_i$ in the presence of $\mathbf{b}_i$, then the individual could register his preference for each alternative in X_i and for $\mathbf{b}_i$. The individual's preference for $\mathbf{b}_i$ could be interpreted as his preference for alternatives outside of the set X_i.

2.3. Misspecification (2): Incorrect Z

When representing choice alternatives parsimoniously as bundles of characteristics, it is inevitable that the researcher will omit some elements of Z in an experimental setting. Indeed, to make the respondent's task of evaluating alternatives manageable, the researcher may choose to manipulate only a small number of characteristics (3 or 4) over delimited ranges even though additional characteristics or the same set of characteristics defined over wider ranges would better describe the alternatives. We partition $Z = (Z_1, Z_2, \ldots, Z_K)$ as $Z = [Z^o, Z^u]$ where $Z^o = [z_1^o, \ldots, z_k^o]$ are observed (included) characteristics in the product concept test and Z^u is a vector of unobserved (excluded) characteristics. Using this simple partitioning of Z, we re-express (4) as

$$(5) \quad U = V(Z^o, Z^u) + \epsilon(Z^o, Z^u).$$

If one attempts to estimate U with no knowledge of Z^u, then the estimators of V are likely to be biased. An obvious approach to controlling for Z^u is to find some kind of proxy variable. Srinivasan [29], for example, has argued that price can be used as a proxy variable for Z^u. Indeed, in the marketing research literature, a substantial set of empirical studies exploring the influence of price on consumers' evaluations of products has established that individuals tend to use price as a cue for unobservable qualities of products when available information about products is limited and where the salience of price varies inversely with the amount of information available to the consumer (cf. McConnell [17]; Tull, Boring, and Gonsior [31]; Stafford and Enis [30], and in economics, Gabor and Granger [6], for example).

The problem of using price as a proxy for Z^u is that price also performs a conventional function of allocating the individual's resources. It is this latter function that is most appropriate in attempting to extend the analysis in the product concept test to a market setting. Thus, the confounding of the Z^u-effect and the allocative effect of price must be reduced when preference measures are obtained by means of a conjoint analysis exercise. The procedure that we propose to reduce the confounding of the price effects requires that two preference orderings on X be obtained from each individual. These are labeled unconstrained and constrained preferences, respectively; see Rao [22] for an earlier use of these constructs.

2.4. Preference Ordering 1 (Unconstrained Preferences)

Denote by $U(\mathbf{b}^*)$ a preference ordering on X obtained under no budget constraint. The alternatives in X may be thought of as possible prizes in a lottery, and the individual is merely asked to express his preference for each alternative under the assumption that he wins the lottery. Under this scenario, price cannot perform an allocative function, and if it has any influence on the individual's preferences, then it must be as a signal for unobservable qualities of the alternatives. Price as proxy for Z^u is denoted as $\hat{Z}^u$.

If we adopt an additive form for $U(\mathbf{b}^*)$, then we have

$$(6) \quad U(\mathbf{b}^*) = V^*(Z^o,P) + \epsilon\mathbf{b}^*$$

where $\frac{\partial V^*}{\partial Z^o}$ and $\frac{\partial V^*}{\partial P}$ are the marginal utilities of Z^o and $\hat{Z}^u$, respectively, P denotes price, and $\epsilon\mathbf{b}^*$ is the idiosyncratic deviation of the individual's utility from $V^*(Z^o,P)$. If, for example, $U(\mathbf{b}^*)$ is linear and additive in Z^o and P, then $u(\mathbf{b}^*) = \alpha_0 + \alpha_1 Z^o + \alpha_2 P + \epsilon\mathbf{b}^*$. If $\alpha_2 \neq 0$, then we conclude that Z^u is non-empty.

2.5. Preference Ordering 2 (Constrained Preference)

Denote by $U(\mathbf{b})$ a preference ordering on X obtained under the budget constraint $\mathbf{b}$. This ordering is conditioned on the event that the individual would decide to choose from X. One could ask, for example, "which of these alternatives would you most prefer to buy, if you were to buy an alternative from the set" under the scenario of a prespecified budget constraint and a set of prices for the alternatives? If we adopt an additive form for $U(\mathbf{b})$, then we have

$$(7)\quad U(\mathbf{b}) = V(Z^o,P) + \epsilon\mathbf{b}$$

where $\frac{\partial V}{\partial Z^o}$ is the marginal utility for Z^o and $\epsilon\mathbf{b}$ is the idiosyncratic deviation from $V(Z^o,P)$. In this case, $\frac{\partial V}{\partial P}$ accounts for the confounded effects of price, i.e., the Z^u-effect <u>and</u> the allocative effect of price. One can attempt to isolate the latter effect by expressing the difference between (7) and (6). Thus,

$$(8)\quad U(\mathbf{b}) - U(\mathbf{b}^*) = V(Z^o,P) - V^*(Z^o,P) + \epsilon\mathbf{b} - \epsilon\mathbf{b}^*.$$

Assuming an additive representation in Z^o and P for V and V^*, we may write equation (8) as:

$$(9)\quad U(\mathbf{b}) - U(\mathbf{b}^*) = [V_1(Z^o) - V_1^*(Z^o)] + [V_2(P) - V_2^*(P)] + \epsilon\mathbf{b} - \epsilon\mathbf{b}^*.$$

Here we interpret the term $[V_2(P) - V_2^*(P)]$ as the allocative effect of price. To illustrate the procedure, consider a situation with one product feature, Z_1, and price, P.[2] A possible functional form for (6) and (7) would be

$$(6')\quad U(\mathbf{b}^*) = \alpha_0 + \alpha_1 Z_1 + \alpha_2 P + \epsilon\mathbf{b}^*$$

$$(7')\quad U(\mathbf{b}) = \beta_0 + \beta_1 Z_1 + \beta_2 P + \epsilon\mathbf{b}.$$

The difference equation, (8), becomes

$$(8')\quad U(\mathbf{b}) - U(\mathbf{b}^*) = (\beta_0-\alpha_0) + (\beta_1-\alpha_1)Z_1 + (\beta_2-\alpha_2)P + (\epsilon\mathbf{b}-\epsilon\mathbf{b}^*).$$

In this case, one need only estimate equation (6') and equation (8') constraining $(\beta_1-\alpha_1)$ to zero. The main allocative effect of price is then revealed by the estimate of $(\beta_2-\alpha_2)$. The signaling effect is reflected in the estimate of α_2. In general, we expect that the signaling effect to be positive with high values associated with low levels of information available on product concepts. Similarly, we expect that the allocative effect to be negative for normal range budgets.

3. IDENTIFYING REPRESENTATIVE CONSUMERS

In conjoint analysis (cf. Moore [20]) one typically aggregates the responses of individuals in conjunction with the estimation of the preference or choice model. The most compelling reason for aggregating is to improve the efficiency of estimation. Hagerty [10] has shown that in most cases the gain in efficiency outweighs the concomitant increase in bias. One assumes that there exists some vector, Y, that controls for individual differences. Adopting the expression in (4) of individual level utility this approach suggests that the inclusion of Y in the empirical expression for U controls for elements of Z^u that are correlated with elements of Z^o. If one assumes that V is linear in its arguments (Z^o and Y) and Y includes socio-economic variables, then generalization to the level of a market segment is accomplished by expressing

$$(9) \quad \hat{U} = V(Z^o, \bar{Y})$$

where $\bar{Y}$ corresponds to the average values of the socio-economic characteristics of a (pre-defined) market segment. Aggregation to the total market is then accomplished by taking the weighted average of different $\hat{U}$'s, where the weights reflect the proportional representation of different segments (socio-economic groups) in the relevant population. Because the vector Y is introduced to minimize the bias in the estimates of the parameters of Z^o, the implicit assumption in conjoint analysis is that V is common to all individuals in the sample (and, ultimately, in the population).

The procedure that we propose as an alternative to the conventional aggregation methods is based on the concept of the <u>representative consumer</u>. Briefly, our procedure aims to group individuals in terms of their stated preferences before proceeding to the estimation stage. We recommend the pre-estimation aggregation on the grounds that the preference orderings should allow us to aggregate individuals into different <u>preference</u> groups. In terms of the general individual level utility model in (4), this means that each group should have a unique V. Hence, a unique representative consumer corresponds to each group. A set of background characteristics, Y, may be associated with each group <u>after</u> it has been formed.

3.1. Tests for Homogeneity of Preferences

Our procedure calls for ascertaining the degree of homogeneity of preferences of the individuals in the sample. We propose two diagnostic tests for consistency and transitivity for this purpose. (The same tests can be applied for any subgroup of individuals in the sample.)

The basic data for these tests are the preference measures (constrained or unconstrained) for the set of alternatives obtained from N individuals in the sample. First, for each individual, n, construct a dominance matrix, D_n, such that the i,j-th cell is defined as follows

$$(10)\quad d^n_{ij} = \begin{cases} 1, \text{ if } x_i \text{ is preferred to } x_j \\ 0, \text{ otherwise} \end{cases}$$

using the measures of preference.

3.2. Consistency Test

Construct the summary dominance matrix, SD, of the total sample of N individuals by combining additively the individual dominance matrices, D_n, such that the i,j-th cell is defined as follows:

$$(11)\quad sd_{ij} = \begin{cases} \sum\limits_n d^n_{ij}, \text{ if } \sum\limits_n d_{ij} > N/2, \\ N/2, \text{ if } \sum\limits_n d_{ij} = N/2 \text{ and } i > j \text{ and} \\ 0, \text{ otherwise.} \end{cases}$$

Cells in which the frequency of individuals preferring x_i to x_j equals the frequency of individuals preferring x_j to x_i are non-zero only in one triangle of the SD matrix. The middle condition of (11) places (arbitrarily) the non-zero equal frequency entries in the upper triangle.

We define the <u>consistency score</u> for the total sample of individuals as

$$(12)\quad \overline{CS} = \sum_{\substack{i,j \\ i \neq j}} sd_{ij} / \binom{A}{2}$$

where A is the number of choice alternatives. Note that this sum effectively excludes the zero cells of the SD-matrix and that only A(A-1)/2 cells are added. The maximum possible score is N and the minimum possible score is N/2. The score can be viewed as an index of the "goodness of grouping", where a score of N indicates that the total sample is composed of individuals with perfectly consistent preferences and a score of N/2 indicates that the total sample is composed of individuals with minimally consistent preferences.

One test (cf. Corstjens and Gautschi [4]) of the consistency of the preferences among the individuals in the total sample would entail measuring deviations of $\bar{CS}$ from the mean of a chance distribution of the choice of the dominant alternative in each pair of alternatives. With N individuals and a 50/50 chance of choosing either alternative in any pair, the chance distribution is binomial folded over N, N-1, N-2, ..., (N+1)/2 [if N is odd] or N/2 [if N is even]. The mean of this distribution is

$$(13)\quad \mu_{Bin} = \sum_{k}^{N} k\, P_{Bin}(r=k;\ N;\ p=0.5)/(1-\sum_{0}^{k-1} P_{Bin}(r=k;\ N;\ p=0.5)$$

where k=N/2 for N even and (N+1)/2 for N odd. The variance is

$$(14)\quad \sigma^2_{Bin} = [\sum_{k}^{N} k^2 P_{Bin}(r=K;N;P=0.5)/(1-\sum_{0}^{k-1} P_{Bin}(r=k;N;p=0.5))] - \mu^2_{Bin}$$

The relevant null hypothesis is H_0: $\bar{CS} = \mu_{Bin}$ versus H_1: $\bar{CS} > \mu_{Bin}$. Rejection of H_0 gives a crude indication that the preferences of the individuals in the total sample are sufficiently consistent to obviate a disaggregated analysis of individuals in the sample. We call this test a crude test because of its low power, i.e., it is difficult <u>not</u> to reject H_0, when N is large.

The consistency score in (12) depends upon N, the number of individuals in the sample. One way of comparing this measure across samples is to use $\bar{CS}/N$. An alternative way is to convert it to the 0-1 scale by the appropriate normalization.

3.3. Transitivity Tests

The "average" preference ordering of the total sample might be viewed as the preferences of the "benchmark" representative consumer.

Because all individuals in the total sample will not likely have identical preference orderings, it would be useful to determine how stable the preferences of the benchmark representative consumer are. Under the worst possible case the representative consumer's preferences would appear to be randomly generated. The more random the preferences appear to be, the less confidence one should put in the predictions on the total sample. We propose an index of the stability of the benchmark representative consumer's preferences based on the incidence of intransitivity among triples of alternatives.

For each triple of alternatives, there are eight possible sets of pairwise orderings, of which two are explicitly intransitive <u>at the level of the representative consumer</u>. That is, from any D_n the two possible intransitive orderings for any three alternatives, x_i, x_j, x_k are defined as:

(15) $d_{ij} > d_{ji}$ and $d_{jk} > d_{kj}$ and $d_{ki} > d_{ik}$
and
$d_{ji} > d_{ij}$ and $d_{kj} > d_{jk}$ and $d_{ik} > d_{ki}$.

At any aggregate level, the detection of the two possible intransitive orderings must be sensitive to the stochastic nature of the data. Coombs [3] suggests three tests--strong, moderate and weak--to detect intransitivity from a stochastic dominance matrix, such as SD. Using $\succ$ to denote strict preference, for any three alternatives x_i, x_j, x_k, if

$$\mathrm{Prob}(x_i \succ x_j) \geq \mathrm{Prob}(x_j \succ x_i)$$
and
$$\mathrm{Prob}(x_j \succ x_k) \geq \mathrm{Prob}(x_k \succ x_j)$$

then the ordering on x_i, x_j, x_k is intransitive if

(16) $\mathrm{Prob}(x_i \succ x_k) < \max[\mathrm{Prob}(x_i \succ x_j), \mathrm{Prob}(x_j \succ x_k)]$, or if

(17) $\mathrm{Prob}(x_i \succ x_k) < \min[\mathrm{Prob}(x_i \succ x_j), \mathrm{Prob}(x_j \succ x_k)]$, or if

(18) $\mathrm{Prob}(x_i \succ x_k) < 0.5$.

The condition in (16) is referred to as the strong test, the condition in (17) is referred to as the moderate test, and the condition in (18) is referred to as the weak test for intransitivity (cf. Coombs [3]. In reference to the matrix SD, the relative frequency sd_{ij}/N is the maximum likelihood estimate of $\mathrm{Prob}(x_i \succ x_j)$.

Under the worst possible case of a random preference ordering the distribution of the number of intransitive triples follows a binomial (T; π=0.25). The mean of the distribution is

$$\mu_{Int} = T\pi = \binom{A}{3} \times 0.25$$

where A is the number of alternatives in the choice set X, and $T = \binom{A}{3}$ is the number of triples. Denoting the number of observed intransitivities (using either the strong, moderate or weak test) by I, we can state the relevant hypothesis to test as:

(19) K_0: $I = \mu_{Int}$ versus K_1: $I > \mu_{Int}$

The Z-scores and the significance probability associated with that level of I at which K_0 cannot be rejected become useful indicators of the stability of the benchmark representative consumer's preferences.

3.4. Procedure

Our methodology involves four steps labeled A through D as follows.

Step A. Assess the preference homogeneity of the total sample.

Step B. Two-stage grouping for identifying representative individuals.

Step C. Assess the preference homogeneity of the subgroups.

Step D. Estimate the two price effects.

We will elaborate on each of these.

Step A. This step involves conducting the two tests discussed in the previous section using the constrained measures of preference for the sample as a whole. Usually, these tests will indicate that the sample is not homogeneous in which case Steps B and C are necessary.

Step B. Construct groups C_1^*, C_2^*, ..., C_K^* of individuals according to the strength of the correlation of their unconstrained preferences, $U(\mathbf{b}^*)$, for the alternatives in X. (A variety of clustering algorithms are available to accomplish this. See, for example, Romesburg [25], Anderberg [1] and Hartigan [11]. Recently, Hagerty [10] has demonstrated that a form of Q-factor analysis may be more accurate than clustering procedures). For each group, C_k^*, construct sub-groups $C_{k1}, C_{k2}, \ldots, C_{kM_k}$ of individuals according to the strength of the correlation of their constrained preferences, $U(\mathbf{b})$, for the alternatives in X. Let the size of a typical group, km be N_{km}.

Step C. For each sub-group, C_{km}, construct the dominance matrix, D_{km}, from the dominance matrices of all individuals in the sub-group using the definition in (11). For each sub-group C_{km} compute the consistency score $\bar{C}\bar{S}_{km}$, using the definition in (12). The consistency score for any given C_{km} can be compared with that of the benchmark representative consumer (i.e., the total sample). The difference in the proportion of consistent individuals in the subgroup and the total sample becomes a suitable index of the "goodness-of-grouping" for the sub-group. Indeed, if this proportion for any group significantly exceeds that of the total sample, then, the resulting sub-group qualifies as a specific representative consumer for purposes of estimating the preference functions. Moreover, for each resulting sub-group, one can search for background characteristics, Y, that distinguish individuals in any one group from individuals in other groups.

It will be of interest to test the hypothesis that the subgrouping procedure has improved the total consistency taking all the subgroups together compared with that of the ungrouped case of the total sample. For this purpose, we can use the measure, $R = \sum_k \sum_m \bar{C}\bar{S}_{km}$ which approximately measures the "degree of consistency" in the subgroups taken together and set up the null hypothesis:

(20) L_0: $R = \overline{CS}$ against the alternative, L_1: $R > \overline{CS}$.

Noting that the statistic, R, can be built up from several binomial variables corresponding to each subgroup, we can compute the variance of R as

$$\mathrm{Var}(R) = \sum_k \sum_m N_{km} P_{km} (1-P_{km})$$

where $P_{km} = \frac{2}{N_{km}} (\overline{CS}_{km} - \frac{N_{km}}{2})$ if N_{km} is even; and

$$\frac{2}{(N_{km}-2)} (\overline{CS}_{km} - \frac{N_{km}}{2} - 1) \text{ if } N_{km} \text{ is odd.}$$

A one-sided Z-test can be performed with the statistic, $Z = (R-\overline{CS})/\sqrt{Var(R)}$.

To assess the stability of the preferences of each sub-group one can conduct the intransitivity tests of (19). The larger the significance probability for the rejection of K_0, the less confident should one be in generalizing the empirical utility functions, calibrated in the laboratory, to the ultimate market. In some sense, a high incidence of intransitivity may indicate a propensity for individuals in the corresponding sub-group to switch among brands or alternatives in the actual market.

The advantages of the subgrouping and the concept of the representative consumer may be illustrated with an example. Assume there are six individuals who (each) have evaluated six alternatives in the following manner (preference ranks in body of table).

Alternatives/Individuals	A	B	C	D	E	F
Q	1	2	1	2	3	3
R	2	4	2	4	6	5
S	3	6	3	6	5	6
T	4	1	4	1	2	4
U	5	3	5	3	4	2
V	6	5	6	5	1	1

The dominance matrix SD for these data for the total sample is shown below with zero entries omitted.

	Q	R	S	T	U	V
Q	-	6	6		5	4
R		-	5			4
S			-			
T	4	4	4	-	5	4
U		4	4		-	4
V			4			-

Then, the average consistency score for the total sample = 67/15 = 4.467; equivalently, the $\overline{CS}$/SIZE = 77.4%.

The following subgroupings would yield maximum consistency:

Subgroup	Individuals	$\overline{CS}$	$\overline{CS}$/SIZE
1	A, C	2.00	100%
2	B, D	2.00	100%
3	E, F	1.73	86.5%

In this example, the overall consistency has improved by the process of subgrouping. Maximum consistency is achieved for Subgroups 1 and 2 so that representative consumers clearly correspond to each of the subgroups for the purpose of estimation. The consistency score for Subgroup 3, though not maximum, exceeds that of the total sample so that one could treat the individuals in Subgroup 3 as a single unit as well.

Step D. Estimate the two price effects using the equations (6') and (8') described earlier.

3.5. Summary

The essential aspects of our methodology consist of changes in data collection, aggregation and estimation. These are schematically shown in Figure 1, which is quite self-explanatory.

Figure 1 Here

4. EMPIRICAL ILLUSTRATION

4.1. Overview

To enable an empirical examination of the issues raised by our methodology, we have conducted a small empirical study, patterned after traditional conjoint analysis. In this study, executives evaluated hypothetical profiles of portable microcomputers; it provided an opportunity for the subjects to rely more on price for inferring the qualities of the product. The data collection and other procedures described in the paper are followed in this illustration.

4.2. Study Design

Forty-five executives attending an executive development program at INSEAD, France provided evaluations of twelve hypothetical portable microcomputers in this study. Each microcomputer was described on three attributes in addition to price. The attributes and levels were as follows:

Manufacturer:	IBM; IBM-compatible
Expandability:	Yes; No
Country of Manufacture:	Japan; France
Price (in 000's Francs):	15; 22.5; 30

The unconstrained preferences were obtained under the scenario of a lottery as before and the constrained preferences were obtained using budget amounts estabished idiosyncratically by each respondent. Both the measures were ranks.

4.3. Analysis

The first step in our analysis was to form representative individual consumers and to test for the consistency and transitivity of responses as discussed above. Next, the effects of price--informational and allocative--were estimated using the linear specification of the utility functions.

4.4. Results

We have identified eight representative individuals in these data. The grouping results are displayed in Table 1 show that we have accounted for about one-half of the variation in these data by the disaggregation procedure.

Table 1 Here

The consistency and transitivity tests shown in Table 2 clearly indicate that we have identified the subgroups who are highly homogeneous within and different from one another. In every case, the subgroups pass both the consistency and transitivity tests. In this illustration, the $\overline{CS}$/SIZE for each subgroup is larger than that of the total sample indicating the clear advantages of disaggregation. The Z-statistic for the hypothesis (20) is 5.71, which is very highly significant showing that the subgrouping process has generated subgroups which are more consistent than the total sample.

Table 2 Here

The estimates of informational and allocative effects of price for these subgroups are shown in Table 3. The fits of the model of unconstrained preference are excellent in almost every case.

The informational (signalling) effects of price are very strong with appropriate signs (i.e., positive) for all but two subgroups. One of these subgroups (#3), is too small to be of any consequence. The signaling effect of price for subgroup #4 is negative indicating that these individuals are generally suspicious of the quality of higher priced concepts.

Table 3 Here

The fits of this model for estimating the allocative effect of price are generally acceptable except one case suggesting that the individuals in that subgroup are price insensitive within the price range presented. The allocative effect is significant for every subgroup, and its sign is negative (as expected) for all Subgroup #4. We have examined closely the preference data for Subgroup (#4) and have found that these individuals most prefer a collection of low priced and higher priced alternatives under the constrained situation. This suggests that the preference functions are probably U-shaped, thus not conforming to the linear functions we have used in the estimation.

5. SUMMARY

This empirical illustration shows the viability of our methodology in dealing with the specification problems raised with regard to conjoint analysis. We have also shown how to segregate a sample of individuals into subgroups, each corresponding to a specific representative consumer, that is, each subgroup has a unique V. Furthermore, we have demonstrated that the informational and allocative effects are <u>not</u> necessarily the same for these subgroups. The illustration also shows that the price effects are very strong when only limited information on the choice alternatives is provided to respondents in the conjoint experiment.

6. DISCUSSION

This paper presented a methodology to deal with the two specification issues relevant to applications of conjoint analysis for testing product concepts. The issues of specification of the set of competing items and incomplete information in the profile description can be handled by collecting two sets of preference data under no constraint and under a budget constraint. While price can be used a proxy for the information not included in the profile, the two effects of price--allocative and informational--are usually confounded. Our methodology shows how these two effects can be separately estimated.

The empirical illustration on portable computers shows how the methodology can be applied to practical problems. The subgrouping procedure and corresponding tests worked very well. The study also showed positive results on the effects of price. The effects of price--informational and allocative--are quite pronounced for all subgroups. One anomaly detected is possibly due to a non-linear preference function for one of the eight subgroups.

Our methodology offers a defensible way of identifying representative individuals (subgroups) since it is based on the complete vectors of preferences for the concepts. This approach is highly consistent with the marketing concept. We have proposed and implemented various tests for preference homogeneity which provide confidence in the stage of estimation.

Several directions for future research may be identified. First, the relationship between the tests on consistency and transitivity and the potential for switching brands should be explored. Once this relationship is established, our test procedure will provide a powerful way of identifying target markets for a new product concept. The effectiveness of the segmentation scheme should be compared to more standard schemes using background characteristics.

Another research direction is to devise additional statistical tests on the preference homogeneity with higher power. While we have utilized only the linear function in estimating price effects, the implications of nonlinear functional forms should be investigated further.

The estimates of allocative and informational effects of price for the representative individuals can be directly employed in identifying market targets. For example, the groups with a negative <u>informational</u> effect may be skeptical consumers prone to feeling "ripped off" in the marketplace while the groups with a positive <u>allocative</u> effect may be gullible consumers. The latter group may be influenced by snob appeal or may place high confidence in products with high prices due to uncertainty of perceptions of concepts.

The investigation of the effects of varying budgets on the constrained preferences for concepts will be another worthwhile pursuit in the future. These studies will show how the allocative effect of price varies with changes in budget arising possibly from borrowing.

Figure 1

ESSENCE OF OUR METHODOLOGY

Issues	Solution of the Methodology
A. SPECIFICATION OF UTILITY	
1. Set of Competing Alternatives is Not Well Defined.	1. Obtain Two Preference Orderings (Unconstrained and under a budget constraint).
2. Information on Alternatives is Not Complete.	2. Use price as a proxy variable.
B. IDENTIFYING REPRESENTATIVE INDIVIDUALS	
3. Methods of Aggregation Using Background Characteristics Are Not Necessarily Consistent With the Precepts of Economic Theory.	1. Two-Stage Grouping Procedure (Pre-Estimation) Using Unconstrained Preferences First, Followed by Constrained Preferences.
	2. Perform Various Diagnostic Tests on the Goodness of Grouping and Identification of Representative Individuals.
C. ESTIMATION OF THE TWO PRICE EFFECTS	
4. The Two Price Effects Are Usually Confounded in the Traditional Methods of Estimation; Separation of Informational and Allocative Effects of Price is Not Apparent.	1. Estimate the Informational Effect of Price from Unconstrained Preference and the Allocative Effect of Price from Difference of Constrained and Unconstrained Preference for the Representative Consumer.

Table 1

SOME STATISTICS ON GROUPING FOR COMPUTER DATA

Stage 1. Unconstrained Preferences

Number of Groups	% Trace	Size			
1	100	45			
2	75.6	33	12		
3	58.1	18	18	9	
*4	47.4	18	8	12	7

*Used in subsequent analysis.

Stage 2. Constrained Preferences

	Number of Subgroups					
	2		3		4	
Group	% Trace	Sizes	% Trace	Sizes	% Trace	Sizes
1	47.8	9*,9*	40.7	9,6,3	29.4	8,5,3,2
2	59.8	2*,6*	31.9	5,2,1	27.0	5,1,1,1
3	54.7	4*,8*	43.6	8,3,1	33.3	7,3,1,1
4	47.7	3*,4*	20.0	4,2,1	15.3	3,2,1,1

*Used as representative individuals.

Table 2

CONSISTENCY AND TRANSITIVITY TESTS FOR SUBGROUPS FOR COMPUTER DATA

		CONSISTENCY TEST			TRANSITIVITY TEST		
Subgroup	SIZE	$\overline{CS}$	Z	$\overline{CS}$/SIZE	STRONG	MODERATE	WEAK
1	9	8.33	3.03	92.5%	-6.70	-8.41	-8.56
2	9	7.99	2.64	88.8	-6.07	-8.25	-8.56
3	2	2.00	1.41	100.0	-8.56	-8.56	-8.56
4	6	5.22	1.89	87.0	-0.31	-8.10	-8.10
5	4	3.67	1.72	91.8	-2.02	-7.63	-7.78
6	8	7.47	2.86	93.4	-3.58	-8.56	-8.56
7	3	2.34	0.21	78.0	2.34	-7.01	-7.16
8	4	3.65	1.69	91.3	-4.52	-8.10	-8.10
All	45	29.86	2.33	66.3	7.94	-4.05	-6.38

Table 3

ESTIMATES OF INFORMATIONAL AND ALLOCATIVE EFFECTS OF PRICE BY SUBGROUP FOR COMPUTER DATA

Subgroup	Size	Informational Effect		Allocative Effect	
		Estimate (t-value)	R^2 (F;P-value)	Estimate (t-value)	R^2 (F;P-value)
1	9	.05 (2.86)	0.91 (255.4;0.0001)	-0.06 (-2.40)	0.05 (5.77;0.018)
2	9	.10 (4.23)	0.82 (114.3;0.0001)	-0.51 (-11.62)	0.56 (134.96;0.0001)
3	2	-0.13 (-∞)	1.0 (∞;0.0001)	-0.35 (-3.90)	0.41 (15.18;0.0008)
4	6	-0.25 (-7.28)	0.75 (51.09;0.0001)	0.20 (3.63)	0.16 (13.15;0.0005)
5	4	0.20 (5.94)	0.84 (56.28;0.0001)	-0.64 (-10.40)	0.70 (108.15;0.0001)
6	8	0.13 (5.71)	0.85 (127.49;0.0001)	-0.15 (-4.57)	0.18 (20.92;0.0001)
7	3	0.28 (2.85)	0.23 (2.26;0.0418)	-0.16 (-2.12)	0.12 (4.47;0.0001)
8	4	0.47 (12.56)	0.81 (45.77;0.0001)	-0.96 (-17.99)	0.88 (323.76;0.0001)
All	45	0.09 (5.560)	0.55 (165.11;0.0001)	-0.28 (-12.91)	0.24 (166.56;0.0001)

ACKNOWLEDGEMENTS

Thanks are due to Eric Wruck, a doctoral student in marketing at Cornell University, for his assistance in analysis. The authors are also grateful to the constructive criticisms of Daniel McFadden on an earlier version of this paper.

(FOOT)NOTES

1. Further, it is assumed that the consumer has no opportunity for resale of the item.
2. While we have used linear functional forms here, the general argument will extend to other forms as well. For example, in a model with interactions between Z_1 and P, there will be two effects of price--main allocative effect, $\beta_2 - \alpha_2$ and its effect on the interaction, $\beta_3 - \alpha_3$ where α_3 and β_3 are the coefficients for the product term, Z_1P.
3. We briefly examined the role of budget in our study on portable computers. Each respondent was asked to indicate the amount of budget they would allocate to buying a portable computer (conditional upon buying one); the choice set consisted of five items: stereo, television, winter vacation, summer vacation and portable computer. Then each individual later indicated whether (s)he would choose the most preferred profile of portable computer or the budget specified earlier. In all, sixteen individuals chose the product in preference to the cash budget. Further, there was considerable variation in this preference among the eight subgroups identified earlier. This result points to the importance of considering budget in choice models designed to predict market share of a new product.

REFERENCES

[1] Anderberg, M.R., Cluster Analysis for Applications (Academic Press, New York, 1973).

[2] Beggs, S., Cardell, S., and Hausman, J., Journal of Econometrics 16 (September, 1981) 1.

[3] Coombs, C.H., A Theory of Data (John Wiley & Sons, New York, 1964).

[4] Corstjens, M. and Gautschi, D.A., Management Science 29 (December, 1983) 1393.

[5] Deaton, A. and Muellbauer, J., Economics and Consumer Behavior (Cambridge University Press, Cambridge, 1980).

[6] Gabor, A. and Granger, C.W.J., Econometrica 33 (1966) 43.

[7] Green, P.E. and Rao, V.R., Journal of Marketing Research 8 (1971) 355.

[8] Green, P.E. and Srinivasan, V., Journal of Consumer Research 5 (1978), 103.

[9] Green, P.E. and Wind, Y., Harvard Business Review 53 (1975), 107.

[10] Hagerty, M.R., Journal of Marketing Research 22 (May, 1985), 168.

[11] Hartigan, J.A., Clustering Algorithms (John Wiley & Sons, New York, 1975).

[12] Hauser, J. and Simmie, P., Management Science 27 1 (1981) 33.

[13] Hauser, J. and Urban, G., Prelaunch Forecasting of New Consumer Durables: Ideas on a Consumer Value-Priority Model, in: Srivastave, R. and Shocker, A., (eds.), Analytic Approaches to Product and Marketing Planning (Marketing Science Institute, Cambridge, Massachusetts, 1982) pp. 276-296.

[14] Kotler, P., Marketing Management: Analysis, Planning and Control (Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1984).

[15] Lancaster, K., Consumer Demand: A New Approach (Columbia University Press, New York, 1971).

[16] Levitt, T., Harvard Business Review 38 (1960) 24.

[17] McConnell, J., Journal of Marketing Research 5 (1968) 300.

[18] McFadden, D., Conditional Logit Analysis of Qualitative Choice Behavior, in: Zarembka, P., (ed.), Frontiers in Econometrics (Academic Press, New York, 1974).

[19] McFadden, D., Annals of Economic and social Measurement 5 (1976) 363.

[20] Moore, W.L., Journal of Marketing Research 17 (November, 1980) 516.

[21] Rao, V.R., Conjoint Measurement in Marketing Analysis, in: Sheth, J., (ed.), Multivariate Methods for Market and Survey Research (American Marketing Association, Chicago, 1977) pp. 257-286.

[22] Rao. V.R., A Model for Brand Choice Under Price-Quality Hypothesis (Combined Proceedings of the American Marketing Association, Chicago, Illinois, 1972) pp. 366-371.

[23] Rao, V.R. and Gautschi, D.A., The Role of Price in Individual Utility Judgments, in: McAlister, L., (ed.), Choice Model for Buyer Behavior, Research in Marketing, Supplement 1 (JAI Press, 1982) pp. 57-80.

[24] Ratchford, B., Journal of Marketing Research 17 (February, 1980) 14.

[25] Romesburg, H. Charles, Cluster Analysis for Researchers (Lifetime Learning Publications, Belmont, California, 1984).

[26] Shepard and Srinivasan, (1969)

[27] Silk, A. and Urban, G., Journal of Marketing Research 15 (May, 1978) 171.

[28] Spence, M., Journal of Economic Theory 7 (1974) 296.

[29] Srinivasan, V., Comments on the Role of Price in Individual Utility Judgments, in: McAlister, L., (ed.), Choice Models for Buyer Behavior, Research in Marketing, Supplement 1 (JAI Press, 1982) pp. 81-90.

[30] Stafford, J.E. and Enis, B.M., Journal of Marketing Research 6 (1969) 456.

[31] Tull, D., Boring, R., and Gonsior, M., Journal of Business 37 (1964) 186.

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