TASK COMPLEXITY IN CONJOINT VIGNETTES: SOME EMPIRICAL FINDINGS WITH MARKETING IMPLICATIONS

Madhav N. Segal, Southern Illinois University--Edwardsville

Abstract

This empirical investigation examines variations in measures of task-complexity as a result of using different conjoint vignettes. The two most commonly used conjoint vignette techniques for stimulus description are comparatively evaluated: Two-Factor-Evaluation and Multiple-Factor-Evaluation Vignette Techniques. The empirical findings on the comparative analysis on task-complexity in conjoint vignettes and their implications for market-researchers and users of conjoint analysis are also discussed.

Introduction

It is often argued that marketing questionnaires and interviews are not apt for studying consumer behavior and attitudes because of unreliable and biased self-reported responses. The reason most frequently cited is that judgments required of respondents are often suspect from an interpretative point of view. To correct this problem in survey research, the use of vignettes--systematic descriptions of concrete situations--is being suggested as a means of producing more valid and reliable measures of respondent opinion than the simpler abstract/ambiguous questions more typical of opinion surveys (Alexander and Becker 1978).

The use of vignettes in survey research is strongly advocated in some social science literature (Nosanchuck 1972; Rossi et al. 1974). To date most uses of vignettes have been confined to certain areas of experimental-social-psychological research. However, in marketing research (with advert of conjoint analysis and related techniques) vignettes have generally come to stand for short descriptions of a product, product concept, and/or consumer/marketing situations which contain precise references to what are thought to be the most critical attributes in the choice-making process of respondents (Hauser and Urban 1977).

The main advantages offered by the use of vignettes in marketing are: (a) simple, abstract, and direct questions about marketing situations are avoided where respondents impute such information themselves, (b) marketing stimuli are made as concrete and detailed as possible, (c) stimuli presentation is standardized across all respondents. Therefore, higher homogeniety of perceptions can be obtained, (d) respondents tend to view the stimuli to be more realistic and their tasks to be more interesting and less fatiguing.

Vignettes in Conjoint Analysis

Most conjoint analysis studies in marketing have utilized vignettes which are generally hypothetical stimulus descriptions. This offers an added advantage of allowing the researcher to compare predicted behavior with the actual respondent behavior toward real products, etc. Also, this may be the only option because of the limited number of brands available in a product category with which a respondent may be familiar. But, perhaps the most interesting aspect of the vignette technique in conjoint analysis is that it makes possible an analysis of the effects on respondents' judgments by systematically varying the attributes used in marketing-situation description. There are two major conjoint vignette techniques used to vary the key attributes for a stimulus description: (a) two-factor-evaluation (TFE) conjoint vignette technique, (b) multiple-factor-evaluation (MFE) conjoint vignette technique.

In the TFE vignette approach, marketing situations/product concepts are described in terms of pairs of attributes and the respondent is required to provide preferences/judgments for all possible combinations of levels generated from a pair of attributes. This vignette methodology is also referred to as the "trade-off procedure" by Johnson (1974). The other parallel method, MFE involves presenting the respondents with a number of vignettes where each one has been described in terms of a specified level for each attribute or factor. Vignette procedure of this type in conjoint analysis has been advocated by Green and Rao (1971) and Green and Wind (1975).

There are different claims being made regarding the superiority of alternative conjoint vignette techniques. Several questions can be raised with respect to differences among the MFE and TFE vignette techniques. For a detailed treatment and discussion on this aspect, the reader is referred to studies by Colberg (1978), Green and Srini vasan (1978), Jain et al. (1979), and Segal (1979). However, the task complexity presented in alternative MFE and TFE vignettes can be a basis of preference for one technique over the other. This is specially true if the response time and its associated field costs are going to be a determining factor in a given research investigation.

The variable of task complexity can be operationalized by using the response time as a proxy variable and to examine differences in response time between the alternative vignette methods. The purpose of this study is to document the existance and distribution of task-complexity presented in alternative conjoint vignettes.

Research Procedure

A convenience sample of approximately 100 undergraduate students was selected for the empirical investigation. Because of 16 incomplete responses, only 84 were usable for data analysis. This represented a 84% response-rate which is what was expected. To enhance the validity of the study, the choice situation selected was determination of student housing preferences for apartments. Three apartment attributes were considered to be important for apartment selection. They were: (a) size of the apartment (described in terms of number of bedrooms), (b) price of the apartment (described in terms of monthly rental fee), and (c) location of the apartment (described in terms of distance to campus).

As a part of the research experiment, each respondent supplied rank ordered preference judgments for all pairs of apartment-attribute-levels (TFE vignette procedure). Each respondent was also asked to take a note of the time when they started the task and also to make a note of the ending time. All these respondents also provided data via MFE vignette method by sorting and arranging all possible combinations of apartment vignettes (given on a 3x5 card) in their order of preference. respondents

also took a note of beginning and ending times for the MFE vignette task. Both vignette tasks were randomly assigned so as to avoid any order bias. Each respondent performed an intervening task (filling out a short questionnaire on background information) prior to supplying data via each vignette method. It was hoped this will prevent the halo effect resulting from responding to several variations of vignettes on the same topic.

Data Analysis and Results

The data analysis assumes that the variable of response time is directly proportional to the underlying variable of task-complexity. The higher (lower) the amount of time taken by the respondent to complete a task, the higher (lower) the complexity related to that task or vignette. Vignette complexity is defined from the respondent's point of view.

Summary measures on response times for alternative vignette techniques are displayed in Table 1. As shown

TABLE 1

SUMMARY COMPARISON OF DIFFERENCES IN LEVELS OF RESPONSE TIME (IN MINUTES) AND PAIRED t-TEST FOR DIFFERENCES BETWEEN MFE-RESPONSE TIME AND TFE-RESPONSE TIME
(n=84)

Variable*	Mean	St. Error	t-Value	Significance** =0.01	=0.05
RTMFE	11.09	0.49	NA	NA	NA
RTTFE	5.14	0.22	NA	NA	NA
DIFTIME	5.95	0.46	12.75	sig.	sig.

* RTMFE = Response time for MFE vignettes
RTTFE = Response time for TFE vignettes
DIFTIME (d_t) = Difference in response time (RTMFE-RTTFE)

** Significance is tested with the following t critical values (two-tailed tests):

t_c (= 0.01 and 60 d.f.) = 2.660

t_c (= 0.05 and 60 d.f.) = 2.000

in the table the mean response time value for the MFE vignette procedure is 11.09 minutes and the comparative average time taken by subjects for the TFE vignette procedure is 5.14 minutes. Therefore, on an average, respondents took approximately twice as much time to complete the MFE vignette task as they did for the TFE vignette task.

The maximum time taken by a subject to complete the MFE vignette was 25 minutes. However, the least amount of time taken by a subject to complete either task was only two minutes. This indicates that there were variations and individual differences with respect to the time taken by a respondent to complete either task. Therefore, some measures of relative dispersion in response time must also be examined. The Coefficient of Variation ( ) as a measure of dispersion reported in Table 1 is very comparable for both vignette techniques: 40.16% for MFE and 39.16% for TFE. This indicates that the degrees of dispersion in response time as a percent of the average response time for both techniques were comparable.

Even though no specific null and alternative hypotheses were formulated, the differences in response times for alternative conjoint vignette techniques can be statistically evaluated. A paired t-test was used for this purpose and the difference in response time (d_t) was calculated for each respondent by using the equation: d_t = (response time for MFE vignette task--response time for TFE vignette task). Under the null hypothesis (H_0) $\bar{d}_t = 0$. All relevant statistics to perform the t-test and the results of the test are reported in Table 1.

The mean difference ($\bar{d}_t$) between the levels of two response times is 5.95 minutes with a standard deviation of 4.27 minutes. The null hypothesis is tested for both assumed alpha risk levels of 0.01 and 0.05. Null hypothesis (H_0) is rejected at each level of significance and as a result alternative hypothesis (H_A) is accepted. Therefore, results from the paired t-test indicate that the levels of response time reported for the MFE and TFE vignette tasks differ significantly (on an average basis). As a result of this, it can be said that levels of task complexity presented in each conjoint vignette set vary significantly.

Conclusions and Implications

Results from this empirical investigation can now be summarized. Major findings on the issue of conjoint vignette task-complexity are: (a) on an average basis, respondents took approximately twice as much time to complete the MFE vignette task as they did for the TFE vignette task, (b) the degree of variability is response time as a percent of average time was equivalent for both conjoint vignettes, and (c) the levels of task-complexity in alternative conjoint vignettes vary significantly and a MFE conjoint vignette is found to be more complex than a TFE conjoint vignette.

The empirical findings on the comparative analysis on task-complexity in conjoint vignettes are conclusive and have implications for the applied market researchers that must be noted carefully. Since, the respondents, on the average, took twice as long to complete the MFE task (as they did to complete an equivalent TFE task), the MFE conjoint vignette is found to be more complex than the TFE vignette task. These findings are in congruence with the ones reported by Colberg (1977). Since the response time (and associated interviewing costs) can be a critical factor, it is recommended that market researchers should use the TFE conjoint vignettes to gather conjoint data. However, it is possible to cut response time and associated interviewing costs for the MFE vignette techniques by using some sort of fractional factorial designs (Green 1974).

Even though the results of this empirical investigation are conclusive, but any generalization must be tempered with caution because of several reasons. First, criteria other than response time must also be considered before any particular conjoint vignette technique is recommended (Segal 1979). Second, response time (task-complexity) is clearly a function of the number of attributes and the levels per attribute used in the study. Therefore, generalizations must be limited to the problem-context and size of the empirical investigation. Lastly, operationalization of the variable of task-complexity via response time may be oversimplified. Future researchers must evaluate the issue of task-complexity from consumers' information-processing point of view.

References

Cheryl S. Alexander and Henry J. Becker, "The Use of Vignettes in Survey Research," Public Opinion Quarterly, vol. 42, No. 1 (1978) pp. 93-104.

Roger T. Colberg, "Validation of Conjoint Measurement: A Simulation and Empirical Investigation," unpublished dissertation, University of Washington (1977).

Roger T. Colberg, "A Monte Carlo Evaluation of Metric Recovery of Conjoint Measurement Algorithms," Research Frontiers in Marketing: Dialogues and Directions, series 43, Chicago: American Marketing Association Proceedings (1978).

Paul E. Green, "On the Design of Choice Experiments Involving Multifactor Alternatives," Journal of Marketing Research, 1 (September 1974) pp. 61-68.

Paul E. Green and V.R. Rao, "Conjoint Measurement for Quantifying Judgmental Data," Journal of Marketing Research, 8 (1971) pp. 355-363.

Paul E. Green and Yoram Wind, "New Ways to Measure Consumers' Judgments," Harvard Business Review, vol. 53 (1975).

John R. Hauser and Glen L. Urban, "A Normative Methodology for Modeling Consumer Response to Innovation," Operations Research, 25 (1977) pp. 579-619.

Arun K. Jain, Franklin Acito, N.K. Malhotra, and Vijay Mahajan, "A Comparison of the Internal Validity of Alternative Parameter Estimation Methods in Decompositional Multiattribute Preference Models," Journal of Marketing Research, vol. XVI (1979) pp. 313-322.

Richard M. Johnson, "Trade-off Analysis of Consumer Values," Journal of Marketing Research, 11 (1974) pp. 121-127.

T.A. Nosanchyk, "The Vignette as an Experimental Approach to the Study of Social Status: An Exploratory Study," Social Science Research, vol. 1 (1972) pp. 107-120.

Peter H. Rossi, William A. Simpson, and Christine H. Bose, "Measuring Household Social Standing," Social Science Research, vol. 2 (1974) pp. 169-190.

Madhav N. Segal, "An Empirical Investigation of Reliability of Input Preference Judgments and Reliability of Estimated Parameters for the Trade-Off Method of Conjoint Analysis," Proceedings of the American Institute of Decision Sciences, Las Vegas (forthcoming) (1980).

Madhav N. Segal, "Variation Among Conjoint Measurement Solutions: An Empirical Examination of the Effect of Data Collection Differences," Unpublished Doctoral Dissertation, University of Texas at Arlington (1979).

Madhav N. Segal and Roger H. Gates, "An Empirical Examination of Predictive Validity of Alternative Conjoint Data Collection Procedures," Developments in Marketing Science: Proceedings of the Academy of Marketing Science, vol. III, Dallas, Texas (1980) pp. 234-238.