Information Integration in Consumer Risk Perception: A Comparison of Two Models of Component Conceptualization

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Rules used for integrating components of risk into an overall risk rating were examined for 60 subjects using Anderson's 1970 information integration methodology. Thirty subjects received stimuli based on a model of risk components developed by Bettman and 30 received stimuli based on Cunningham's conceptualization. Results indicated that the theoretically expected combination rule, multiplication of components, was not upheld for either model. The Bettman model, although graphically displaying a diverging fan (multiplicative combination), showed a significant (p < .01) residual interaction after the bilinear portion of the interaction was removed. The Cunningham model showed a converging graphical pattern opposite to that expected, supporting a differential weighted averaging model. The development of a theoretical basis for models of consumer risk perception is proposed as a necessary step for future research.

Although the concept of perceived risk has been prominent in consumer research for a relatively long time (Bauer, 1967), there has been little research directly examining the conceptualization of the model. The purpose of this study was to provide (a) a comparison of different schema for specifying the components assumed to comprise overall perceived risk and (b) an examination of the multiplicative relationship assumed for combining the components.

There are two main studies in the marketing literature that have developed schema for specifying the components of risk: Cunningham (1967) and Bettman (1973). Cunningham specified these components as certainty and consequences, with consequences operationalized as danger in trying a brand not used previously. Bettman developed a model of risk which utilized as components the percentage of brands falling above an acceptable level of quality for a consumer and the importance of making a satisfactory brand choice within the product class. These two conceptualizations, although certainly similar, do differ, and no direct comparison of the two has been carried out.

It has usually been assumed that the components are multiplied to arrive at an overall rating of risk. Although appealing theoretical arguments can be made for a multiplicative relationship (namely, that the absence of either importance or uncertainty would eliminate risk, Hansen, 1972), there has been little empirical testing of the assumed relationship. Cunningham (1967) and most others (e.g., Copley & Callom, 1971) simply assumed multiplication. Bettman (1973) tested linear and multiplicative formulations with a regression approach and found little difference in terms of degree of fit. Research in risk taking in psychology has also been equivocal, with support for both linear (Lanzetta & Driscoll, 1968) and multiplying (Anderson & Shanteau, 1970) relationships. This issue interacts with the previous issue, since how the components are conceptualized may affect how they are combined.

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1 Related research has dealt with the decomposition of risk into types of risk (e.g., Jacoby & Kaplan, 1972). In addition, there is a large body of work in psychology on betting and risk-taking behavior (e.g., Anderson & Shanteau, 1970; Lanzetta & Driscoll, 1968). However, these areas are somewhat tangential to the issues considered in this paper.

2 Bettman (1973) found average correlations of .37 between percentage acceptable and certainty, and .45 between danger and importance over nine product classes for 121 subjects.
Overall inherent risk was measured by the imaginary store method developed by Bettman (1973). For each task, four levels were used for each component, generating 16 profiles, and therefore a complete 4 x 4 factorial design in which each component was a factor.

**Subjects and Procedure**

The subjects, 60 undergraduate students, were run in groups, with each subject receiving a questionnaire to complete. The subjects were randomly assigned to the two tasks by randomly arranging the questionnaires, with half of the subjects receiving the Bettman task and half receiving the Cunningham task. Each questionnaire began with a warm-up task to acquaint subjects with the components utilized in the task (Anderson, 1974). Each subject rated component levels and overall inherent risk for four product categories. This familiarized the subjects with the concept of risk components and with the specific levels used for each, as well as with the use of the 15-point risk scale.

Subjects were next given the profile rating task. Instructions for the profile rating task specifically emphasized that subjects were rating a hypothetical product, not one of those rated earlier; that is, they were asked to consider how they might use information on the two components for products in general. In addition, subjects were told that the two pieces of information in the profile (component levels) were intended to represent their own feelings about the components, not someone else's.

Then, following an example profile, subjects were presented with two replications, or 32 profiles in all, of the 4 x 4 factorial design. Profiles were typed, four to a page. In an attempt to anchor the response scale, the 15-point risk scale used extreme verbal anchors, and the two "extreme" profiles were given first (e.g., "you are almost never certain" and "there is a great deal of danger"). Order of the remaining profiles was randomized. Finally, subjects were asked to describe the procedures they had used for combining the components. Subjects were allowed approximately 30 min to complete the questionnaire. This methodology does depart from that used by Anderson (1970, Note 1) in that the replications were given at the same sitting rather than on different days, and group administration was used. However, in the interests of obtaining more subjects than typically used by Anderson, these procedures were felt to be adequate.

**Analysis of Information Integration Rules**

Anderson (1970, Note 1) has developed in detail methods for classifying the specific type of integration rule subjects appear to have used, so only a brief outline is presented here. There are two main models of risk of interest in this study—adding and multiplying of components to obtain the overall risk.

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8 The certainty and percentage acceptable components were coded so that Level 1 was the most certain and Level 4 the most uncertain.
Figure 1. Mean risk judgments for the Bettman and Cunningham tasks. (Note that importance and danger are spaced on the horizontal according to their functional measurement subjective values.)

Results

Graphical Analysis

The effects of the two components on mean risk ratings for each task are shown in Figure 1. Note that the components are spaced on the horizontal axis according to the subjective scale values obtained by functional measurement procedures (Anderson & Shanteau, 1970). This allows a rough graphical assessment of whether or not subjects follow a multiplying model. Recall that if a multiplying model is being used, a diverging fan of straight lines should result. For the Bettman task, there is a slight diverging fan but also a hint of nonlinearity in the lines for each level of percentage of acceptable brands. For the Cunningham task, there are hints of a problem with the formulation; the lines tend to converge, rather than diverge, particularly for the first three levels of certainty. The deviations from parallelism do not appear large, however, so statistical analysis was undertaken to more rigorously examine the results.

Statistical Analysis

A first analysis was made at the group level, with results shown in Table 1. Note that in both tasks the main effects and interactions are significant at $p < .05$. Analysis of the interaction term at the group level to assess whether the multiplying model holds is complex; Anderson develops the methodology needed in detail, so it is not presented here (Anderson, Note 1, pp. 25–30). For the Bettman task the bilinear component approached significance, $F(1, 29) = 3.94$, $p < .06$. However, as Figure 1 suggests, the residual interaction was significant, $F(8, 232) = 4.13$, $p < .01$. Thus, there are significant nonlinear deviations from the multiplying model, although the graphical results show they are not substantial. For the Cunningham task, the bilinear component was significant, $F(1,$
TABLE 1
SUMMARY ANALYSIS OF VARIANCE FOR BETTMAN AND CUNNINGHAM TASKS

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bettman task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance (I)</td>
<td>3</td>
<td>130.48**</td>
</tr>
<tr>
<td>Percentage acceptable (PA)</td>
<td>3</td>
<td>88.47**</td>
</tr>
<tr>
<td>I x PA</td>
<td>9</td>
<td>4.02**</td>
</tr>
<tr>
<td>Cunningham task</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danger (D)</td>
<td>3</td>
<td>161.94**</td>
</tr>
<tr>
<td>Certainty (C)</td>
<td>3</td>
<td>57.51**</td>
</tr>
<tr>
<td>C x D</td>
<td>9</td>
<td>1.99*</td>
</tr>
</tbody>
</table>

Note. Listed degrees of freedom are for the numerator. Each source has its own error term with 29 times as many degrees of freedom.

* p < .05.
** p < .01.

29) = 5.19, p < .05, and the residual component was nonsignificant, F(8, 232) = 1.46. Thus the statistical tests for multiplying are met; however, as mentioned above, there is a serious deviation from expectations in the graphical results with the converging fan form.

DISCUSSION

Thus, the results from both tasks are ambivalent. The Bettman conceptualization does not show a strong diverging fan and yields a significant residual interaction. The Cunningham conceptualization shows a converging fan of straight lines. One might argue that the convergence in the Cunningham task is a more serious theoretical departure. There are theoretical reasons for expecting risk components to multiply (Hansen, 1972). If the formulation is, theoretically, Risk = Uncertainty x Danger, and if both uncertainty and danger are measured on positive scales, then the expectation from the algebra of the model is that there will be greater effects of uncertainty at the higher levels of danger, that is, a diverging fan. However, in the Cunningham

*Although two replications may be inadequate, individual level analyses were performed. In the Bettman task, 23 subjects appeared to add, 3 to multiply, and 4 used some other pattern. In the Cunningham task, 22 appeared to add, 5 to multiply, and 3 fell into other patterns. Thus the individual level results, although they must be interpreted cautiously in light of the small number of degrees of freedom for error (16), only add to the lack of confirmation for the models in both cases.

 task the danger scale seems to dominate. When there is a great deal of danger, certainty does not matter to subjects in subjectively assessing risk. This converging fan result supports a differential weighted averaging model for the components, in which higher levels of danger receive greater weight (Oden & Anderson, 1971). Thus, neither Bettman’s nor Cunningham’s model produces results in line with expectations.

These results could potentially be due to data problems. Group analyses were used because of the insufficient data for single subject analysis. However, the deviations observed at the group level appear in many of the individual subject data plots. Perhaps a more fruitful direction would be to examine the “theory” being tested. As pointed out by Ross (in press), there is little theoretical basis for the various conceptualizations of consumer risk perception. There is an enormous variety of components and constructs in the literature, all seemingly related to risk perception—importance, involvement, arousal, conflict (Hansen, 1972), danger, uncertainty, percentage of acceptable brands. In addition, there is nothing but seemingly intuitive notions about why components should be multiplied; there is no theoretical network. There is no theory which specifies what the relative weights of the components should be, or how they might vary across situations. Finally, there is no validated criterion measure for risk itself (Ross, in press). Use of a behavioral criterion rather than an overall risk rating criterion to validate such major conceptual issues as the method of component integration might result in different conclusions than those cited here. These problems suggest that the major research priority in consumer perception of risk is to build a firm theoretical base which would (a) delineate differences among the various available constructs or components; (b) specify rules by which constructs combine; and (c) develop criterion measures of risk itself based on the theory.

Then the information integration approach utilized in this study would be extremely useful in testing the theory, to examine whether components are combined as the theory specifies. However, at present, perceived risk is an
ill-defined concept with ad hoc underlying component conceptualizations and assumptions. Future consumer research using risk seems fruitless unless some of the major conceptual problems raised are dealt with.

REFERENCE NOTE


REFERENCES


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