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The simplistic form of linear compensatory attitude modeling includes a number of significant research questions involving concepts, measurement, and analysis. Results and conclusions of marketing research on the model are summarized for each issue and directions for further development are suggested.

Issues In Marketing's Use Of Multi-Attribute Attitude Models

INTRODUCTION

The pointed debates [3, 12, 63, 67] in recent issues of this journal highlight the involvement of marketing researchers in summative attitude models of the type originally proposed by Rosenberg [55] and Fishbein [21]. Interest in the area is increasing; over forty marketing studies have been reported in the past three years.[1] Although it is now clear that marketing applications have substantially altered the formulations originally employed in social psychology, it is less apparent that marketing studies have themselves differed significantly. In the absence of commonly agreed-upon theory, investigations frequently differed in model conceptualizations, semantics, measurement and analysis methods, criteria, and conclusions. A number of significant issues remain for future research. This article will raise these issues, summarize results and perspectives from recent marketing research, and suggest areas for future consideration of a cumulative nature.

Because of the specialized research focus of the article, it is assumed that the reader is familiar with the fundamental rationale for the compensatory multi-attribute attitude model. The model at issue is compositional in approach; an excellent comparison with *decompositional* attitude models is presented by Day [17, 18]. Arguments favoring decomposition models are provided by Green and Wind [25]. Comprehensive theoretical ties and proposals for managerial relevance of composition models have been discussed by Cohen [10], Hughes [32], Ginter and Pessemier [24], and Lunn [41].

THE BASIC MODEL

Unidimensional attitude scales (e.g., "overall like-dislike") offer measurement efficiencies in that instruments can be short, structured, and provide a summary measure of brand affect. A multi-attribute object (e.g., product or brand) is viewed as a bundle of attributes leading to costs and benefits of differential desirability to individuals or segments of the market. Overall affect is posited to reflect the net resolution of an individual's cognitions (beliefs) as to the degree to which given objects possess certain attributes weighted by the salience (importance) of each attribute to the individual. Given that the marketing manager can control to some extent the physical characteristics and associated images of his brand, careful assessment of cognitive structures offers a natural approach to formulating important aspects of a marketing strategy.

The potential advantage of multi-attribute models over the simpler "overall affect" approach is in gaining understanding of attitudinal structure. *Diagnosis* of brand strengths and weaknesses on relevant product attributes can then be used to suggest specific changes in a brand and its marketing support. The extent to which this potential advantage is realized, however, depends on the strength of the model and the measurements used by the marketing researcher. As noted above, there are a number of operational issues currently in dispute. Discussion of these issues is provided within the framework of a basic model. Since this terminology is chosen merely

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[1] A number of similar studies conducted in England are not reviewed in this article, see Tuck [70].

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to facilitate communication, differences in concepts and semantics will appear as specific issues are discussed.

The basic linear compensatory model is seen to be:

$$A_{jk} = \sum_{i=1}^{n} I_{ik} B_{ijk}$$

where:

i = attribute or product characteristic,
j = brand,
k = consumer or respondent,

such that:

A_{jk} = consumer k's *attitude* score for brand j,
I_{ik} = the *importance* weight given attribute i by consumer k, and
B_{ijk} = consumer k's *belief* as to the extent to which attribute i is offered by brand j.

In the following section, research issues are categorized by each component of the basic model. Some more general, fundamental questions are also raised within the context of this format.

MARKETING USE OF THE MULTI-ATTRIBUTE MODEL

Recent marketing work with the model has tended to move beyond simple tests of the relationship of A_{jk} with external criteria in order to examine issues related to model inputs, structure, and functioning for situations involving two or more competitive attitude objects. Objects studied include grocery stores, restaurants, personalized rapid transit, hair dryers, television shows, analgesics, soft drinks, instant breakfast, automobiles, detergents, toothpaste, mouthwash, and other frequently purchased consumer goods. In general, results have been consistent across products; the multi-attribute model yields attitude scores which are significantly related to measures of purchase or purchase predisposition. While one might be able to choose better predictors of these dependent variables (e.g., last period purchases), diagnostic benefits often are not offered by the better predictors (M42), [37].[2] The basic purpose of the multi-attribute model is to gain understanding of purchase predisposition. Assessment of its performance in this respect requires a closer look at research issues.

This section deals specifically with marketing applications of the basic model. Forty-two empirical studies plus insights from a number of commentary articles are analyzed with respect to selected issues, see the figure. Variations in conceptualizations, operationalizations, and results are discussed and evaluated to summarize progress and focus attention on key questions for future research. Issue areas derived from the basic model are listed vertically, and include specific problems for each area. The 42 empirical studies are arranged horizontally in approximate chronological order such that temporal tracking of progress is possible. Cell entries reflect representative positions taken on an issue, or that discussions (*) and/or empirical tests (**) are undertaken in the article. Blank cells indicate no substantial mention of an issue, while question marks indicate that no data on an issue are reported, although one would infer that a position was taken. A more detailed key is available at the end of the figure to clarify abbreviations.

Discussion of the matrix is row-wise, reflecting our primary interest in issue analysis rather than article summarization. Because of the complex relationships between model components, much of the summarization is nonevaluative. A critical review and proposals appear in closing statements. "Attribute" issues are discussed first, followed by Importance Weights, Beliefs, Model Structure, and Model Tests. Within each section the rows of the figure provide issues for discussion.

I. ATTRIBUTES (i)

Attributes provide the basic dimensionality of the model and are clearly of crucial theoretical importance. Little guidance from Rosenberg [55] or Fishbein [21] in selection of attributes is available for marketing studies. Issues in this area are concerned with desired characteristics of attributes, generation of attribute lists, inclusion of attributes in the model, and the number and communality of those included.

A primary distinguishing characteristic of the composition model is the assumption that dimensional inputs are known and measured by the researcher. The restrictive nature of this assumption is especially apparent when the model is compared to decomposition approaches. In a research sense, however, the attribute generation problem operates at two levels: *initial specification* of attributes in data gathering and *inclusion* of attributes in the model, which can reflect either direct use of raw data or the results of reworking the raw data in some manner.

A. *Initial Specification:* Research decisions on attribute specification to respondents effectively bound subsequent model analyses in terms of maximum structure dimensionality. Basic criteria for specification of attribute lists require that they be exhaustive, semantically meaningful, subject to unidimensional interpretation, and reflect possible variations in choice or use contexts (M25), [25, 50]. Methods for attribute generation include expert judgment and unstructured group or depth interviews in combination with procedures such as Kelly's repertory grid [57].

Few marketing articles discuss desired characteristics of attributes. Sheth (M4), [61], Hansen (M5), [28], and Pessemier (M17, M25), [49, 50] agree that attributes must reflect consumer perceptual dimensions rather than product characteristics directly measurable and controllable by the marketing manager. In contrast, Heeler et al. (M38), [30] utilize objective product characteristics in a study of new product selections by supermarkets.

[2] The designation (M42) refers to the matrix number in the figure.

ARTICLES: $A_{jk} = \sum_{i=1}^{n} I_{ik} B_{ijk}$	Tigert (1/66)	Myers & Alpert (10/68)	Bass & Talarzyk (7/69)	Sheth (8/69)	Hansen (11/69)	Sampson & Harris (3/70)	Sheth (4/70)	Hughes (12/70)*	Talarzyk & Mainpour (12/70)	Cohen & Houston (1/71)	Lehmann (2/71)	Bass, Pessemier, & Lehmann (4/71)	Alpert (5/71)	Bass & Talarzyk (5/71)	Weinreich (5/71)	Sheth & Talarzyk (6/71)	Pessemier (7/71)	Schendel, Wilkie, & McCann (8/71)
ISSUES: MATRIX NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I. Attributes (i)																		
A. Initial Specification[a]	INT	INT	INT	INT	?	INT	INT	INT	INT	INT	INT	INT	INT	INT	?	INT	N/A	INT
B. Characteristics:		*			*	*							*				*	
1. Controllable by Marketer					NO												NO	
2. Common to All Respondents	YES	YES	YES	YES	**	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3. Independence				YES			YES	YES	MDS						MDS		*	
C. Number (n)[b]	11/6		5	7/2	v/3	14	7/1	3	9	5	6	7	37/6	5	7	5	N/A	20/11
D. Salience vs. Importance		*				**							**				*	
II. Importance Weight (I_{ik})				N/A			N/A										N/A	
A. Stability					NO													
B. Measurement:																		
1. Product or Brand Specific	P	P	P		P	P		P	P	P	P	P	P	P	P	P		P
2. Instrument	**		RNK		-,+	-,+		**	1-6	1-9	**	1-6	1-5	RNK	1-10	1-6		**
C. Normalization			YES		NO	NO		V	NO	NO	NO	NO	NO	YES	NO	NO		V
III. Beliefs (B_{ijk})	N/A																	N/A
A. Measurement:																		
1. Scale			1-6	1-7	V	**	1-7	**	1-6	1-9	1-6	1-6	1-7	1-6	1-7	1-6	*	
2. Ideal Point Used			NO	NO	NO	NO	NO	NO	MDS	NO	**	**	NO	NO	MDS	NO	YES	
3. Pre- or Post - I_{ik}			POST	N/A	V	**	N/A	POST	PRE	?	?	POST	POST	POST	PRE	POST	POST	
4. Within i or j			I	I	?	N/A	I	?	?	i	I	I	I	I	I	I	I	
B. Halo Effects Found																		
IV. Model Structure	N/A	N/A									YES	YES		YES				
A. Summation (Σ)													N/A				N/A	N/A
B. Use of I_{ik}			YES	NO	YES	YES	NO	YES	YES	**	YES	YES	NO		YES	YES		
C. Minkowski Metric			YES	NO	**	YES	NO	*	YES	**	**	**	**		YES	**		
			NO	NO	NO	NO	NO	NO	MDS	NO	**	**	NO		MDS	NO		
V. Model Testing	N/A	N/A	**	**	**	**	**	N/A	**	**	**	**	N/A	N/A	**	**	N/A	N/A
A. Prediction of Behavior[c]			NO	ACT	SIM	NO	ACT		NO	RPT	RPT	ACT			NO	NO		
B. Prediction of Preference[d]			PREF	ATT	NO	ATT	ATT		PREF	NO	PREF	PREF			PREF	PREF		
C. Diagnosis of Structure			NO	*	NO	NO	*		*	*	NO	NO			NO	NO		
D. Comparison With MDS			NO	NO	NO	NO	NO		**	NO	NO	NO			**	NO		
E. Analysis Model:																		
1. Within Indiv. or Cross section			IND	CS	IND	CS	CS		IND	CS	IND	IND			IND	CS		
2. Primary Test[e]			CM	REG	H/M	CORR	REG		r_s	REG	r_s	r_s			r_s	REG		
F. Summary Conclusion[f]			+	+	+	+	+		+	+	+	+			-	-		

[a] INT = Group interviews.
[b] Number used in instrument / Minimum number found useful.
[c] ACT = Actual choice; SIM = Simulated choice; RPT = Self report of behavior
[d] PREF = Preference; ATT = Undimensional attitude or affect.

	Hughes & Guerrero (8/71)	Cohen & Antola (8/71)	Hansen & Bolland (8/71)	Scott & Bennett (9/71)	Monpour & MacLachlan (9/71)	Lutz & Howard (1971)	Pessemier (1/72)	Ginter (1/72)	Winter (1/72)	Bass & Talarzyk (2/72)	Cohen & Houston (2/72)	Sheth & Talarzyk (2/72)	Wilkie & McConn (3/72)	Russ (4/72)	Wilkie & Weinreich (6/72)	Monpour & Wiley (8/72)	Lutz (11/72)	Monpour & Wiley (11/72)	Churchill (11/72)	Heeler, Kearney, & Mehaffey (2/73)	Wright (3/73)	Beckwith & Lehmann (5/73)	Bass & Wilkie (8/73)	Kraft, Granbois, & Summers (8/73)
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
	?	INT	?	?	INT	INT	N/A	INT	INT	INT	INT	INT	INT	?	?	INT	INT	?	?	*	INT	INT	INT	INT
							*																	
							NO														YES			
	YES	YES	YES	**	YES	YES	YES	YES	YES	YES	YES	YES	YES	N/A	**	**	YES	YES	**	YES	YES	YES	YES	YES
			MDS				*																	
	12/3	5	9/3	21/5	9	12/3	*	5	6	5	5	5	6	4	**	**	13	10/3	**	13/4	5	6	5	4
	**						*								**									
							N/A													N/A	N/A			
	NO																							
	P	P	P	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P			P	P	P
	V	1-9	1-10	1-7	1-6	1-3		1-6	1-6	RNK	1-9	1-6	1-5	?	1-10	1-6	**	1-6	1-4			V	1-6	1-5
	V	NO	NO	NO	NO	NO		**	**	YES	NO	NO	NO	?	NO	NO	NO	NO	NO			NO	**	NO
	V	1-9	1-10	1-7	1-6	1-7	-,+	1-6	1-6	1-6	1-9	1-6	1-7	?	1-7	1-6	1-7	1-6	1-7	*	1-7	1-6	1-6	1-5
	NO	NO	NO	NO	NO	NO	*	**	**	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO
	POST	?	POST	PRE	PRE	POST	POST	POST	POST	POST	?	POST	POST	?	PRE	PRE	?	?	POST	N/A	N/A	?	POST	?
	i	i	i	?	i	i	i	i	i	i	i	i	**	?	I	i	N/A	?	N/A	N/A	N/A	I	i	?
		YES									YES		**						*			YES		
							N/A				N/A													
	V	**	YES	NO	YES	NO		YES	YES	YES		YES	YES	YES	YES	YES	V	NO	YES	NO	NO	V	V	YES
	**	**	**	**	**	**		**	**	**		**	**	?	**	**	V	NO	**	*	*	**	**	YES
	NO	NO	MDS	NO	NO	NO	*	**	**	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	**	NO	NO
	**	**	**	**	**	**	N/A	**	**	**	N/A	**	**	**	**	**	**	**	**	**	**	**	**	**
	RPT	RPT	RPT	NO	NO	ACT		ACT	ACT	NO		NO	NO	SIM	NO	NO	NO	NO	NO	ACT	NO	NO	NO	ACT
	NO	NO	PREF	ATT	PREF	V		PREF	PREF	PREF		PREF	PREF	PREF	PREF	PREF	ATT	PREF	PREF	NO	PREF	PREF	PREF	NO
	*	*	*	*	NO	*		NO	NO	NO		NO	NO	N/A	*	NO	*	*	NO	*	*	NO	*	NO
	NO	NO	**	NO	NO	NO		NO	NO	NO		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	CS	CS	IND	CS	BOTH	CS		IND	IND	BOTH		CS	IND	IND	IND	IND	CS	CS	CS	CS	IND	IND	**	BOTH
	REG	MDA	H/M	REG	V	CC		REG	REG	V		REG	r_s	H/M	r_s	r_s	V	REG	CORR	REG	REG	V	V	H/M
	+	+	+	+	–	–		+	+	+		–	+	–	–	–	+	–	–	+	–	–	–	–

[e] CM = Confusion matrix; REG = Multiple regression; H/M = Hit - Miss; CORR = Pearson r; r_s = Spearman rho; MDA = Discriminant analysis; CC = Canonical correlation.

[f] + = Basic model supported; – = Basic model questioned.

* = Issue discussion.
** = Issue tested.
N/A = Issue not applicable to article.
? = Information not in article.
V = Varies (usually > 1 study in article).
MDS = Issue specific to multidimensional scaling.

As evidenced in row IA of the figure, most marketing studies have used informal interviews to generate attribute lists; no utilization of repertory techniques is reported. All instruments presented a common attribute list to all respondents; the number of attributes presented is shown as the first entry in each cell of row IC. In general, marketing studies have initially specified few attributes and thus generated restricted ranges of data available for model analyses.

B. *Attribute Inclusion.* As shown by single cell entries in row IC, most marketing studies have directly entered all attributes from the measuring instrument into the model. A number of studies have, however, showed effects of utilizing subsets of original attribute lists for inclusion; subset size is reported as the second cell entry in the row. These studies have concerned three basic issues: attribute independence, "salience versus importance" of attributes, and the minimum number of attributes descriptive of attitudinal structures.

1. *Independence assumptions* are desired in the basic model in order to avoid double-counting biases in score summation and confounded interpretations of dimensionality. The original proposals of Rosenberg [55] and Fishbein [21] fail to discuss independence; row IB3 reflects the extent to which the issue is neglected in most marketing studies. Researchers comparing the composition model with multidimensional scaling approaches do raise the issue in providing 3-space or less MDS solutions (M9, M15, M21), [29, 68, 72]. Prior factor analyses reducing attribute lists to three attributes for model inclusion are reported by Hughes and Guerrero (M19), [35] and Lutz (M35), [42]; a factor analytic-type procedure reducing seven attributes to two and one dimensions is presented by Sheth (M4, M7), [61, 62]. Moinpour and Wiley (M36), [46] select three attributes by brand from factor analysis and demonstrate approximately equal model performance compared with use of a ten-attribute list. Pessemier (M17, M25), [49, 50] presents strong arguments for independence requirements in suggesting that prior MDS analysis as well as factor analysis may be appropriate.

2. The *salience versus importance* issue concerns the performance of measured importance ratings in reflecting salient attributes—those which are actually utilized by consumers in evaluating alternative choice objects. All researchers agree that only salient attributes should be included in the model; most then proceed with the assumption that their original list is sufficiently and exhaustively "salient" for all respondents. Operational definitions of salience are rarely undertaken.

This issue is noted by Day [18], who presents five reasons why importance ratings may not represent salience. Sampson and Harris (M6), [58] and Wilkie and Weinreich (M33), [76] report empirical model results supportive of this contention. The latter study compared stated importance weights with other criteria for successively entering attributes to the model and found importance to perform relatively poorly. Sampson and Harris tested the rank order of 14 attributes' actual correlations with affect against stated importance ranks and report a Spearman rho correlation of $-.06$. This evidence is sufficient to call closer attention to the loose conceptualization of "salience" and its representation by importance ratings.

3. The question of *number of attributes* to be included in the model is significant in terms of parsimony, diagnosis of attitudinal structure, predictive efficiency, and perhaps for assessment of saliency. Analysis of this issue has been conducted both cross-sectionally and within individuals. Disaggregated (i.e., models in which attribute ratings are not summed) multiple regressions have been most utilized (M4, M13, M21, M22, M38, M41), [1, 8, 29, 30, 60, 61] with analysis usually made for each brand separately using cross-sectional inputs. The number of attributes with significant coefficients is sought and considerable shrinkage is typically experienced with this approach. Results range from only 2 significant attributes of 9 original (M21), [29] to 8 of 37 (M13), [1]. As demonstrated by Bass and Wilkie (M41), [8], however, cross-sectional methods are highly susceptible to data assumptions; the number of significant variables in this study moved from 3 to all 5 of 5 with only minor analytical improvements.

Within-individual analysis is a preferable approach to this issue (M23, M40, M41), [8, 9, 44], as are provisions for allowing individuals to differ in the number and nature of attributes included. Four articles offer varying methodologies and results. Evidence on the former point is provided by Scott and Bennett (M22), [60]. Regression estimates for two hypothesized industrial segments are shown to differ significantly; estimates for the total sample do *not* adequately express key attributes for one of the two segments. With respect to the latter, Hansen (M5), [28] demonstrates that including only the 3 most important attributes to each respondent in the model yields predictions as strong as those with all 24 values. Wilkie and Weinreich (M33), [76] reinforce this notion in reporting that individual differences clearly exist in the number of attributes needed to maximize preference prediction of the model; many respondents peaked at only 1 or 2 attributes entered by a "determinism" (M2), [48] criterion, while others required all 7. On average, 3.6 of 7 attributes were utilized and inclusion of all 7—as in typical model tests—yielded *lower* predictability. Moinpour and Wiley, in contrast, (M34), [45] report weaker predictions using only "important" attributes than those resulting from inclusion of all attributes.

C. *Discussion—Attributes (i):* Hughes [34] has noted that attribute specification is the weakest part of composition models. The brief summary of issues above demonstrates that this area is underconceptualized. Wright [80] has pointed out that it is not yet clear whether attributes are understood to be dimensions or specific point estimates. It is not likely that answers are available from

other disciplines; psychologists are in similar disagreement.

There does seem to be agreement that attributes are perceptual rather than objective product constructs, that reasonable candidate lists can be generated by combining unstructured interviews with techniques such as the repertory grid, and that structured lists can be presented to respondents. A systematic approach to identification and presentation of attributes which accounts for use contexts has been developed by Pessemier (M25), [50]. Independence should be tested before attributes are included to the model, and it is reasonable to expect that only few attributes will dominate a model's predictive/explanatory power.

Complex problems remain, however, in the sense that hard theory on attributes in the consumer context is incomplete. Empirical potential is limited because of a necessity of trading off theoretical gains (e.g., allowing for individual differences through removal of structure in measuring instruments and/or allowing differing number and types of attribute inclusion in the model) against practical losses (e.g., difficulties in coding and assembling data and/or summarizing results). In addition, all results and conclusions with the model are interdependent. Empirical study of issues such as "salience" or number of attributes are forced to rely upon predictive tests which assume control of all other issues of the model. As these other issues are discussed it should become apparent that theoretical development is preferable.

II. IMPORTANCE (I_{ik})

Importance weights—also termed "value importance," "evaluative aspect," or "saliencies"—provide for individual respondent differences in stress placed on various attributes. As measures of an attribute's contribution to satisfaction, these measures can be useful in market segmentation research [73, 74]. Four model issues related to importance weights are summarized in this section: conceptualization, generality, measurement, and normalization. The question of whether or not importance weights should be included in the basic model is discussed in detail under "model structure" issues.

A. *Conceptualization:* In contrast to the lack of theoretical concepts for attributes, several thoughtful articles have provided insights on alternative views of the importance variable. Cohen, Fishbein, and Ahtola [12] and, in a more recent article, Cohen [10] clarify distinctions between the "V" (value) term of a proposed "expectancy-value" model and the importance term of the basic model used in most marketing studies. The essential point appears to be that "importance" can be an ambiguous term which might reflect either prominence *or* value. Misleading results may appear if, for example, prominence of a dimension is used to indicate measured value on that dimension. Whether this potential difficulty is realized, however, depends significantly on methods of attribute specification and presentation as well as measurements used to gather brand beliefs (expectancies). Although further comments on this issue are deferred to the concluding section of the article, note that only 1 of the 42 empirical marketing studies (M6), [58] has operationalized the "value" concept in any form resembling its description.

B. *Generality:* This issue refers to the extent to which measured importance or value weights can be considered invariant. Three aspects of invariance arise: test-retest reliability, differences over use or choice contexts, and the likelihood of true change in reaction to exogenous stimuli. None of the 42 papers report tests of reliability such that no evidence is available on this issue. One study measured changes in I_{ik} associated with the provision of additional stimuli. Hughes and Guerrero (M19), [35] found significant changes at attribute levels but not for the summed score after a balanced set of 27 messages were presented to respondents. Hansen (M5), [28] reports data from three studies which show 10 of 22 I_{ik} to change significantly after presentation of situational choice environment descriptions.

Although little evidence is available on generality issues, it does appear that future research should begin with the recognition that I_{ik} may vary by context and also consider importance weights as an alternative candidate to brand belief for marketing actions designed to change brand attitudes. Krugman [38] posits that this strategy is *more* realistic due to low respondent involvements in typical marketing areas. This approach is also discussed by Howard and Sheth [31] and Cohen and Ahtola (M20), [11].

C. *Measurement:* Measurements of importance are aimed at providing meaningful variations both within and between respondents. All papers reviewed measured importance weights as applied to an entire product class. As seen in IIB2 of the figure, only two studies utilized scales with positive and negative poles as proposed by both Rosenberg and Fishbein; most obtain I_{ik} on bipolar rating scales which range from 1 to 5, 6, or 7.

Four studies have compared alternative measuring instruments. Tigert (M1), [69] tested importance rankings on 11 attributes of toddler tops obtained via paired comparisons ("which of these two attributes is more important?") against rankings derived from respondents' ordering preferences for envelopes containing product information on each attribute. The two methods yielded substantial agreement (Spearman rho = .82) for aggregate importance rank indicating substantial agreement between instruments. Lehmann (M11), [39] reports very little difference between inclusion of rank orders of I_{ik} versus measures obtained on a 1 to 6 bipolar scale in terms of model performance in predicting television show preference. Hughes (M8), [33] studied a 1 to 7 semantic differential versus a constant sum scale in which the respondent allocated 100 importance points to 3 automobile attributes; his analysis of correlations between the I_{ik} and B_{ijk} as measured by each scale leads to the con-

clusion that the constant sum is superior to the semantic differential in that it forces tradeoff variations among attributes.

Schendel, Wilkie, and McCann (M18), [59] support this conclusion in a study investigating 5 possible instruments for measuring I_{ik}. A comparison of yes/no, rank order, 1 to 6 rating, and 100-point constant sum scales indicated high agreement in aggregated rank orders of importance for shampoo and deodorant. The coefficients of concordance were .88 and .96, respectively. Although the different measurement properties of the scales hampered comparison, significant differences were found in the number of attributes termed important (yes/no < constant sum < 1 to 6 bipolar). The multiplicative and summative data manipulations of the model call for ratio- or interval-scaled data. Given the difficulty of making constant sum judgments, the researcher may wish to have subjects perform simple warm-up tasks or substitute direct magnitude estimation (M18), [52, 59].

D. *Normalization:* Once importance weights have been obtained, the important issue becomes how to include them in the model. The normalization issue (figure, IIC) refers to the problem of defining the set of I_{ik} weights which enter the model. Stated in simple concrete terms, can one consumer bring "more" importance to the model than another consumer or are attribute importance weights solely a within-consumer relative weighting of attributes? When different respondents operate at different importance levels, idiosyncratic response biases may be present so the researcher may need to normalize the importance weights. If true differences in product class involvement exist which can be captured by the model, and subject responses to importance weights reflect this property of consumers, then no steps need to be taken. Most model tests in the marketing setting, however, have constrained the dependent variable by comparing several competing brands.

It should be noted that importance weight normalization is *not* an issue common to all research on the model but depends upon I_{ik} instruments and model comparisons undertaken. Constant sum scales provide normalized data, as do importance ranks, whatever the validity of their measurement assumptions. Regardless of importance scale used, normalization is not a problem when *static comparisons* of the model are made at the *individual* level. It need be seriously considered only when comparisons are made *across individuals* as in typical applications of correlational analyses at the attribute or brand level *and* when the rating scale does not provide already normalized data.

Ginter (M26), [23] and Winter (M27), [77] compared normalized and nonnormalized model adaptations in longitudinal individual-level regressions and found significantly higher r^2 with normalized data in all four product classes studied. Bass and Wilkie (M41), [8] report substantial increases in r^2 associated with normalization of brand-level, cross-sectional regressions across six product categories. While it is not possible to conclude that r^2 will always increase, it is concluded that normalization is always appropriate and possibly essential when cross-sectional analysis is used.

III. BELIEFS (B_{ijk})

Brand beliefs (also termed "expectancy," "perceived instrumentality," or "valence") effect the entry of brand-specific judgments and differences into the model. Three model issues of the belief component are summarized in this section: conceptualization, measurement, and halo effects.

A. *Conceptualization:* Considerable attention has been paid to the question of what belief measures are and are not intended to represent. There is general agreement that the purpose of this variable is to reflect a respondent's perceptions of the association between a particular attribute and a given brand. Controversy has arisen over the nature of "association" elicited in marketing studies —whether the association should represent pure cognition or combine affective and cognitive aspects. The former view is espoused by Cohen and associates [10, 12] in suggesting that "expectancy" should measure only the probability that a brand is associated with or possesses an attribute. The latter approach, in contrast, can include measures of the amount of attribute possession and/or the degree of satisfaction associated with this amount. "Taste," for example, can presumably be measured in terms of the probability of its relationship with brand x, the categories of relationship (e.g., "brand x is sweet-sour, spicy-bland, etc."), or the satisfaction provided through relationship (e.g. "brand x tastes good-bad").

The question of the nature and measurement of attribute beliefs is significant in terms of its impact on other model issues, particularly when the model is applied in the brand-competitive consumer environment. If it is clear the subject is playing the role of a consumer, judgments will likely be biased by the desired levels of the attribute in some context or mix of contexts. As noted in a following section, the desired or ideal level has been formally recognized in model research. Subjects were asked to judge how a brand deviated from the ideal level or where the ideal lies along the attribute continuum.

The nature of attributes (i) specified is also likely to differ among approaches. Importance weights (I_{ik}) are more likely to improve explanatory power when only cognition is measured in B_{ijk}, while it is yet unclear whether the cognitive method will yield variance in B_{ijk} across individuals or brands for highly similar consumer products. Only 1 of the 42 marketing studies has utilized an expectancy measure of B_{ijk} (M6), [58]; almost all have operationalized the third approach which incorporates satisfaction in the B_{ijk} rating.

B. *Measurement:* Summary characteristics of belief measurement approaches are given in section IIIA of

the figure. Bipolar rating scales have typically been used, ideal points have been infrequently included, beliefs have been measured after importance weights, and brands have been competitively rated within each attribute rather than rating all attributes within brand.

Probabilistic scales, as suggested in "expectancy" proposals, have not typically been utilized in marketing studies. Sampson and Harris (M6), [58] test "true-false" versus "probable-improbable" operationalizations of probabilistic measures and find no significant differences. They note, however, that "true-false" may tend to produce polarity in B_{ijk}, that "probable-improbable" poses comprehension problems for older, less educated consumers, and that Fishbein's proposal of "likely-unlikely" is preferable to either alternative.

Another investigation of belief scales is provided by Hughes (M8), [33], who concludes that a 1 to 7 rating scale confounds I_{ik} and B_{ijk} by allowing or encouraging incorporation of importance into the belief measure such that B_{ijk} is more extreme for more important attributes. Supporting evidence on this point is provided by Beckwith and Lehmann (M40), [9]. Thus the constant-sum scale appears preferable for B_{ijk} measurement as well as for importance weights. However the use of within-attribute normalization or standardization may be an appropriate data reduction strategy.

A third approach to belief measurement is the use of "ideal" points for those attributes defined such that "more" is not necessarily better (e.g., sudsiness, sweetness, price, humor). Ideal points offer the additional advantage of fixing a base for measurement of brand differences, and are widely employed in multidimensional scaling approaches which infer their position. In the present context, ideal levels of each attribute are elicited from respondents, as are perceived brand levels. Deviations are entered to the model as B_{ijk}. Typical use of bipolar rating scales, on the other hand, assumes that "more is better" and effectively calculates distance from the end points of the scale.

Four papers report six tests of the model using stated ideal points versus typical belief measures assuming that more is better. Lehmann (M11), [39] (television show preference), Bass, Pessemier, and Lehmann (M12), [4] (soft drink preference), Ginter (M26), [23] (spray disinfectants and detergents), and Winter (M27), [77] (scouring pads and facial tissues) all found the typical approach to perform slightly better than the use of ideal points. They do *not* conclude, however, that ideal points are not useful; considerable difficulty was experienced with respondent comprehension of ideal point questions and is believed to have led to the disappointing results. Pessemier (M25), [50] discusses these problems and presents an alternative methodology for obtaining belief measures based upon resource constrained, purchase ideal points controlled for use context.

B. *Halo Effects:* This potential problem for the inclusion of B_{ijk} in the model is concerned with the extent to which belief ratings vary across attributes for a given brand. Halo effects have long been recognized in personality and psychological testing as potential suppressors of important variation. The presence of halo effects in the marketing model, while not necessarily affecting predictive tests, will confound investigations as to the dimensionality of attitude structure and impair diagnostic analyses of brand strengths and weaknesses. Since halo effects are presumed to reflect a spread of brand affect across dimensions, B_{ijk} measures incorporating satisfactions are most susceptible.

As shown in row IIIB of the figure, every marketing study investigating this issue has found clear evidence of halo effects in B_{ijk} measures. Lehmann (M11), [39] reports highly significant correlations between attribute beliefs for television shows. Bass, Pessemier, and Lehmann (M12), [4] observe a "slight halo effect" across soft drink attributes. Bass and Talarzyk (M14), [6] report a "completely consistent pattern of more favorable belief ratings given by respondents who prefer a particular brand" in their study of 50 such measurements for toothpaste and mouthwash. Cohen and Ahtola likewise report a "thirty for thirty" pattern on toothpaste brands and attributes from a different data bank (M20), [11]. Most researchers have explained these findings as reflectors of cognitive consistency operators in the brand evaluation process. Cohen and Houston (M29), [14] extend this explanation by positing a "cognitive reevaluation" process for brand-loyal consumers.

The magnitude of observed halo effects might also, however, depend in part upon measuring instruments. Wilkie and McCann (M31), [75] studied this possibility by varying the order and instructions in measurement instruments to encourage or discourage halo effects. Because halo is inferred from data, and may be presumed to operate only under conditions of polar affect, a measure of B_{ijk} dispersion is preferable in operationalization. Their results show significant differences in dispersion by instrument, indicating that the researcher can control, to some extent, the variation in B_{ijk} as reported by respondents. Dispersions were *higher* for polar brands, indicating that marketers should pay particular attention to handling of mid-rated brands for which respondents may have less interest and information. A comparison with typical instruments indicates that B_{ijk} measures can be improved by including warm-up instructions which discourage yea-saying, by rating all brands within attribute, and by reducing opportunities for comparison of responses with prior ratings.

IV. MODEL STRUCTURE

The multiplicative, summative, and implicit linear manipulations of the basic model characterize it as a *linear compensatory* attitude model. Both belief ratings and importance weights are presumed to add explanatory power; belief ratings contribute brand differences while importance weights provide differential stress on attri-

butes. Within attribute each unit is assumed to provide equal marginal utility; brands can achieve given attitude scores by compensating for low ratings on one attribute with high ratings on another.

Model structure issues are seen to be essentially internal or external in nature. Internal issues accept the basic assumptions of composition and compensatory models but question the specific manipulations of multiplication of two components, summation over all attributes, and the linear Minkowski metric. External issues concern the value of the present model as compared to alternative approaches exemplified by conjunctive, disjunctive, lexicographic, or decomposition models. The three internal issues of summation, inclusion of I_{ik}, and alternative Minkowski metrics are discussed prior to consideration of alternative models.

A. *Summation:* Row IVA of the figure shows that most studies have utilized the summed score approach suggested in the basic model. Note, however, that summing logarithmic or other transformations of the elements of the model may be appropriate. Some version of "disaggregation" in which attributes retain their separate metrics are possible, and conceptual discussions favoring this latter approach have appeared in several articles. Sheth (M7), [62] makes four major points for disaggregation: (1) summation is not theoretically explained by its advocates, (2) summation of ratings obtained on bipolar scales leads to a compromise (average) value, (3) summation of positive and negative ratings assumes that one cancels out another, and (4) his previous empirical studies regressing affect on beliefs have shown summation to consistently lower predictive power as compared to keeping beliefs separate in multiple regression. Cohen and Houston (M10), [13] agree with Sheth's position and add that the disaggregated approach is especially appealing in terms of diagnosis of bases of consumer attitudes and in analysis of attitude change. Lutz and Howard (M24), [43] concur in pointing out that summation results in considerably less utilization of the very information which had such intuitive appeal for marketers in the first place.

Empirical analyses of disaggregation versus summation are few. Cohen and Ahtola (M20), [11] report higher classification rates in disaggregated multiple discriminant analysis, while Cohen and Houston (M10), [13] and Bass and Wilkie (M41), [8] found little difference in r^2 between summated and disaggregated multiple regressions. Related work by Green, Carmone, and Wind using conjoint measures yielded similar conclusions [27].

The essence of this issue should be recognized to include requirements of analysis. The proponents of disaggregation correctly point out that the identity of individual attributes is preserved such that diagnosis of attitude structure is enhanced. While it is possible to perform disaggregated analysis at the individual level, most disaggregated analyses have utilized cross-sectional techniques. These techniques can be used only at the cost of assuming respondent homogeneity in scale measurement, in attitude dimensionality, and in functional relationships of attitudes to brand preference or choice behavior. It should therefore be noted that cross-sectional disaggregation *gives up* an intrinsically appealing aspect of the basic model—that of a unidimensional measure of affect which is idiosyncratic to the individual.

B. *Inclusion of I_{ik}:* The question of whether or not importance weights belong in the basic model has received more attention in marketing studies than any other issue. As seen in row IVB of the figure, 25 of the 42 empirical articles explicity discuss or test this issue.

Two related questions have occurred with respect to contributions from importance weights: whether or not explanatory power is reduced (i.e., "suppression" effects of I_{ik}) and why it is not raised. Empirical evidence and conceptual discussions of these questions are summarized in a recent JMR article by Bass and Wilkie (M41), [8] and therefore are not reviewed here.

The weight of evidence on suppression results indicates that importance weights are not likely to reduce explanatory power of the model (M41), [8]. Neither, however, do they add strikingly to prediction. Measurement explanations for this lack of power center on the variance of I_{ik} weights and their relationship with belief measures. Sheth and Talarzyk (M16, M30), [64, 65] and Hughes (M8), [33] hypothesized that respondents might implicitly incorporate importance into belief ratings; Beckwith and Lehmann (M40), [9] demonstrate that respondents do tend to spread belief ratings more on attributes rated as important. Cohen and Ahtola (M20), [11] point out that I_{ik} often yield high mean values with little variation available for explanatory power. Wilkie and McCann (M31), [75] and Beckwith and Lehmann (M40), [9] discuss the impact of halo effects in belief ratings; highly correlated B_{ik} would allow little additional explanation by importance weights. Given these positions it appears that the importance or value component should continue to be included in the model. Arguments favoring these measures include some aspects of model theory (M20), [11], selected diagnostic objectives (M41), [8], and the requirements of future studies utilizing cognitive-type beliefs (i.e., expectancy studies which may require importance components). Pessemier, however, favors cognitive/affective attribute data that include judged or implied ideal points and importance weights (if used) that are specific to selected purchase use contexts [54].

C. *Minkowski Metric:* A third internal model structure issue concerns the question of how the model converts belief importance ratings into a resulting attitude score. More specifically, we are concerned with how belief distinctions made between attributes and brands should be represented in appropriate psychological metrics describing affect and/or preference. In economic

theory terms we are interested in the behavior of marginal utility as more or less of an attribute is offered.

Since the basic model implicitly assumes a Minkowski metric = 1 (i.e., a linear system), it is useful to rewrite our basic formula to explicate this assumption:

$$A_{jk} = \left[\sum_{i=1}^{n} | I_{ik}B_{ijk} |^r\right]^{1/r},$$

where r = Minkowski metric = 1.

The judgment that $r = 1$ assumes that the marginal utility of an attribute deviation or level remains unchanged across all product classes, attributes, and consumers (before adjusting for idiosyncratic importance weights). This simplifying assumption of the model is not based on strong theoretical arguments nor have alternative formulations been fully developed and tested. The issue remains open to further development and empirical examination. Other metrics or different values of the Minkowski content may be preferred; $r < 1$ will give lower B_{ijk} proportionately greater weights, while $r > 1$ gives higher B_{ijk} proportionately more influence on A_{jk}. Multidimensional joint-space models, for example, require that a distance measure be calculated to represent the proximities of B_{ijk} to the subjects' ideal points. Here, typically $r = 1$ or $r = 2$ (city-block or Euclidean distance) measures are used. The more widely used Euclidean model gives larger deviations proportionately greater weight for A_{jk}. Other distance functions have been suggested by Pessemier which have some appealing theoretical properties (M25), [50].

Returning to the basic model, weights apply typically to beliefs recorded as deviations from the lower end of bipolar scales which assume a "more the better" attribute scale. A clearer instance of the need for deviation weights occurs with use of "ideal" points for attributes whose preferred levels might lie anywhere on the scale (e.g., sudsiness). Does attractiveness decrease linearly as brands move away from the ideal level, or at some faster or slower rate? Exponential and power models reflecting these assumptions are discussed in Einhorn and Gonedes [19], Schönemann and Wang [66], and Pessemier (M25), [50].

Four articles have compared city-block to Euclidean distance for within-individual analyses in studies that used an ideal point formulation of the traditional additive model. Lehmann (M11), [39] found average Spearman rank correlations of .72 versus .68 (for $r = 1$ and $r = 2$ respectively), while Bass, Pessemier, and Lehmann (M12), [4] report averages of .70 against .68 for a beliefs-only version of the model. In both cases other measures of performance also favored $r = 1$, but it is not likely that statistical significance was reached. Separate analysis of variance studies by Ginter (M26), [23] and Winter (M27), [77], however, found $r = 1$ provided significantly better preference predictions.

In the case of the simple model and the more widely used types of attribute measurements, the available evidence supports the implicit city-block distance function. The narrow base of investigations, however, indicates that more researchers should explicitly recognize and investigate this issue.

D. *Alternative Models:* The purpose of Minkowski metrics is to provide for differential *intra-attribute* weights in a manner similar to the inter-attribute stresses provided by importance weights (M39), [79]. Several significant alternative models extend this notion by positing that not all attributes need be considered; that perceptions of a brand's position on an attribute are used as criteria to narrow the dimensionality of choice [18]. *Conjunctive* models reflect extreme stress on the negative end of attribute scales; brands are rated high only if minimum levels on *all* attributes are exceeded. *Disjunctive* models place stress on the positive pole; brands are rated high only when seen as superior on one or more relevant attributes. *Lexicographic* models posit sequential attention to the order of salience of attributes; preference for a brand is established through consideration of only the most salient attribute. Equivalence of two or more brands on this dimension introduces them to the next most salient attribute and so on until the choice is clear.

Several studies have compared these alternatives with the basic (linear compensatory) model. Russ (M32), [56] reports tests of several formulations of the lexicographic model which outperform the basic model in information processing tasks. Heeler, Kearney, and Mehaffey (M38), [30], in contrast, found the compensatory model superior to both conjunctive and disjunctive models in predictions of new product acceptances and rejections by supermarket buyers. Wright (M39), [79] also found the linear model better than either conjunctive or disjunctive forms in tasks "reconstructing" brand belief systems, while nonlinear models performed better for active information processing tasks.

The distinction between models of information processing and models of processed information is an important one, since post-decision cognitive structure might vary from that utilized in active decision making as a function of time pressure (M39), [79], risk variables [22], cognitive consistency operators (M29), [14], and experimental factors. The basic linear compensatory model was developed in social psychology as a static approach for describing an existing attitudinal structure. Most marketing studies have adopted this perspective of the model. The difference in purpose between this model and dynamic utility or decision models suggests that results from the basic model must be carefully evaluated before translations to information processing tasks are made.

V. MODEL COMPARISONS

A. *Purpose:* Model comparison issues involve the manner in which the researcher utilizes data and model structure in order to reach conclusions regarding the

multi-attribute attitude model. Four basic questions have been investigated in marketing studies: (1) comparisons of model performance against non-attitudinal predictive models (e.g., chance, market share, demographic predictions), (2) comparisons of the basic model against purely affective measures, (3) comparisons of the model against predictions generated by the alternative methodology of nonmetric multidimensional scaling (MDS), and (4) comparisons of model structures within the basic model framework.

Section V of the figure summarizes approaches taken in the testing process. Row VF reports the summary conclusion of each article on the viability of the traditional model on the major question tested in each study. Most articles have studied the model's performance against non-attitudinal predictions and without fail report positive results. There is little question that brand attitudes will predict brand preferences or controlled choice behavior significantly better than chance assignments of preference or choice. All authors implicitly or explicitly express approval of the general nature of the approach; this is *not* an issue in these articles.

The negative signs in row VF of the figure represent arguments that the basic model can be improved through alteration. Three studies test the traditional composition model against MDS (decompositional) predictions; results are mixed, with Talarzyk and Moinpour (M9), [68] finding the traditional model superior, Hansen and Bolland (M21), [29] reporting conflicting results for two product classes, and Weinreich (M15), [72] obtaining better predictions with MDS.

The nature of dependent variables used in analysis is indicated in VA and VB of the figure. An encouraging number of studies have moved toward choice behavior through panel data, laboratory simulated choices, or self-reports of past purchasing behavior. A recent article by Kraft, Granbois, and Summers (M42), [37], for example, compares the predictive ability of the basic model against several alternative predictors of actual choice behavior. Many studies employed more than one criterion variable and testing approach; in these cases the approach closest to the traditional format is noted.

It is evident that predictive comparisons are advantageous criteria in empirical work with the model. "Diagnosis" of the underlying attitude structure is commonly cited as another advantage of the basic model. Entries in row VC indicate relatively few studies present a diagnosis of structure, and none use this as a central element in appraising results. Not much attention has been devoted to the difficulties which might arise when diagnostic criteria are used to judge the value of a model. A distinct and important connection exists between diagnostic discussions and model structures utilized in the test process.

B. *Analysis Model:* As mentioned earlier in discussion of model structure, proponents of the disaggregate model typically utilize cross-sectional test methodologies. As shown in section VE of the figure, the disaggregative model structure typically leads to multiple regression, multiple discriminant analysis, and canonical correlation models and the associated test statistics.

The original operationalizations of Rosenberg [55] and Anderson and Fishbein [2] also utilized cross-sectional analyses, but in these cases only one attitude object was tested. Most marketing studies, however, obtain data on several (5–8) *competing* brands as attitude objects and therefore need not resort to cross-sectional analysis (M3, M28), [5, 7].

Evidence from several studies points out potential difficulties with cross-sectional assumptions. Scott and Bennett (M22), [60] show significant differences in regression functions for two segments of an industrial sample; assumptions of homogeneity in the entire sample lead to considerably poorer predictions with the disaggregative model. Bass and Wilkie (M41), [8] present a comparison of cross-sectional and within-individual analyses which shows the individual level methodology to provide a much higher rate of correct preference predictions. These results add some support to arguments against the use of cross-sectional analyses in marketing studies. In the absence of natural homogeneity or prior clustering of respondents, three arguments are convincing:

1. The underlying theories of attitude are obviously theories of idiosyncratic cognitions and affects (M23), [44].
2. Interpersonal utility comparisons cannot be given rigorous meaning [3].
3. Marketing strategies derived from cross-sectional results may be misdirected toward an artificial "average" (M39), [79].

It is important to recall, however, that homogenous behavior of subgroups of consumers (market segments) have always been of central concern to marketing scholars and practitioners. Therefore, finding groups that are "homogenous enough" for cross-sectional analyses may be as important as improving the ways in which individual behavior may be more accurately modeled.

Diagnostic analysis of brand/attribute relationships *is* possible with individual level techniques. Disaggregated individual level regressions can be run with temporal measures (M26, M27), [23, 77] or when a number of alternative objects are available (M11, M39), [39, 79] to estimate idiosyncratic attribute weights. When fewer brands are under study, sequential attribute introduction techniques as proposed by Wilkie and Weinreich (M33), [76] can yield individual differences in the number and nature of attributes. When differential attribute stresses are suspected for both individuals and brands, clustering followed by multi-staged estimation procedures described by Pessemier (M25), [50] are appropriate. Also, single subject reduced-space configurations based on

discriminant methods can yield detailed attribute analyses of brand perceptions and/or preferences at the individual level [51].

A final point on model comparisons concerns theory and hypothesis testing. The multi-attribute attitude model as presently constituted is not a falsifiable theory, hence the theory is not testable. The direction of cumulative research and thought on this model is, however, moving toward the sort of construct specifications characteristic of mature theoretical disciplines.

SUMMARY CONCLUSIONS

This article has presented an analysis of significant issues facing application of an important type of multi-attribute attitude model to the brand competitive marketing environment. The model is directed toward one subset of marketing considerations—providing valid measures of purchase predispositions within the consumer context. Forerunners of marketing applications of this model are found in social psychological studies of attitude, but it is clear that marketing adaptations have significantly departed from the original proposals of Rosenberg [55] and Fishbein [21].

A systematic review of empirical studies and discussions on marketing's use of this model is useful in providing an additional perspective on research issues. This review demonstrates the rapid advance from uncritical model application to a present atmosphere of controversy and cumulative analyses on specific issues. The significance and difficulty of model formulation is apparent. Reactions to published applications of the model have underlined this conclusion and contributed useful new findings.

The position one takes about the potential long-run value of this particular compensatory multi-attribute model heavily depends upon each investigator's beliefs about how the issues covered in this article will be resolved. At least three related areas need further research and development: model conceptualization, component measurement, and testing methodologies.

Criterion for Future Development of Multi-Attribute Choice Theory and Related Models

To evaluate properly the research presented here, a broad view is needed of the purpose for developing multi-attribute models. Since many unidimensional models will efficiently measure affect and/or predict choice behavior, the principal justification for multi-attribute models must be found elsewhere. Kernan has succinctly stated the problem as it relates to much of the multi-attribute research reported in this article: "Affect = f (affect) isn't much of a model" [36].

The unique contributions which multi-attribute theories of preference and choice can make are found in the area of *design*. A model which cannot help analysts and decision-makers improve the characteristics of choice objects and/or their delivery systems is prone to be theoretically vacuous. On the other hand, a model that links the characteristics of choice objects and/or their associated delivery program to manifest preferences increases understanding and the capacity for favorable action. Control is also enhanced if the model encourages the development of natural taxonomies of individuals which admit efficient action. For example, it is much more useful to have homogeneous consumer segments with common model coefficients when these segments also have other common properties which make them accessible to feasible design decisions. Finding a small group of consumers who would prefer a redesigned product may be of little value if the individual members of the group do not share other properties such as media exposure, geographic location, or shopping habits since it may be impractical to efficiently deliver the product.

Therefore, scholars and practitioners should prize models that yield understanding and suggest feasible procedures for favorable control. Several composition models which have not been discussed here may offer more promise than the one which has been discussed. Analysis of variance models, especially conjoint measurement models that develop part worth functions by using monotone methods such as Kruskal's MONANOVA Algorithm, may prove to be highly useful approaches [16, 20, 26, 27]. The Discriminant/PREFMAP procedures discussed by Pessemier [24, 40, 53] and the hierarchical threshold model proposed by Montgomery and others also appear promising [47, 71]. These models yield richer functional and/or spatial representations of multi-attribute judgments. They also lend themselves naturally to applied design and segmentation studies. Whether these or other directions, e.g., [34, 78], being actively explored by other investigators will prove to be theoretically satisfying and fully effective in applied work must await considerable additional model development and testing.

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