



Attribute Identities Matter: Subjective Perceptions of Attribute Characteristics

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Abstract

Recent research indicates that attributes vary along multiple dimensions with implications for how trade-offs are resolved during choice. We present an exploratory study of the dimensionality underlying naïve subjects' ratings of attributes on the characteristics commonly discussed in the literature on tradeoff resolution and decision difficulty. Factor analysis of attribute characteristic assessments indicates that subjects view decision attributes in a multi-dimensional fashion, including an importance/loss aversion dimension, an emotional potential/protection from tradeoffs dimension, and a cognitive difficulty dimension. These results suggest that a one-dimensional measure of attribute characteristics, such as a standard attribute importance rating, may obscure some factors determining individual responses to attributes during decision processing. However, the results also suggest that developing a relatively succinct set of scales in order to characterize the dimensions along which subjects respond to attributes is a viable goal for future research.

Key words: Attribute characteristics, decision difficulty

1. Introduction

Marketing research, like many other areas of study, typically defines preference objects as bundles of valued attributes, e.g., a car might be described in terms of horsepower, comfort, safety, and cost. A major consumer research issue is the degree to which variations in one attribute's value (e.g., increasing a car's horsepower from 130 to 200) alters how that attribute is traded-off against others in choice (e.g., whether increased horsepower counteracts increased cost in a choice between two car models). This influence of attribute values on underlying preference is most typically addressed as attribute importance, and often a single scale rating of importance or a single importance weight revealed through choice patterns is used to summarize consumer preference (e.g., in attitude survey research or conjoint analysis respectively).

However, recent theoretical and empirical work suggests that perceptions of product attributes are richer and more nuanced than is captured by a singular conception of

importance. For example, Baron and Spranca (1997) demonstrate that protected values, and therefore by direct extension the decision attributes reflecting these values, are associated with deontological rules for behavior and therefore resist tradeoffs, regardless of the importance of other conflicting attributes. Similarly, Luce (1998) and Luce, Payne and Bettman (1999) demonstrate that attribute-level loss aversion and direct measures of attribute emotionality add precision to models predicting choice shares using attribute importance measures only.

In this paper, we present an exploratory study aimed at understanding *consumer perceptions of attribute characteristics*, attempting to uncover the underlying dimensions along which naïve decision makers categorize attributes. In order to do so, we ask subjects to rate a series of attributes according to measures reflecting seven sets of characteristics proposed in the consumer behavior and behavioral decision theory literatures as likely to affect attribute tradeoffs. Our study indicates that attributes vary along three main dimensions (importance/loss aversion, emotional potential/protection from tradeoffs, and cognitive difficulty) and thus a one-dimensional view of attribute importance gives up some precision as compared to the richer categorization that naïve subjects use. We believe these results provide a starting point for work attempting to predict behaviors (e.g., consumer choice) based on multiple attribute characteristics.

2. Prior work on attribute characteristics

Several literatures contain either implicit or explicit hypotheses regarding the various attribute characteristics to which decision makers may respond. Below, we consider several potential attribute characteristics and discuss some of the various ways these characteristics may relate to one another. We focus on characteristics that seem likely to have an impact on the process of resolving choice tradeoffs, as our ultimate interest is in better understanding consumer choice in multiattribute situations.

Attribute importance is often the only dimension along which attribute variability is conceptualized or measured. Importance is typically conceptualized as the derivative of an attribute value function at a given (usually the present) point. Variations in the value of more important attributes are expected to have a greater impact on estimated alternative value and therefore on choice. Although importance is often inferred from actual or hypothetical actions (e.g., in conjoint analysis), this attribute characteristic is also commonly addressed through simple scale measures. We focus on the latter, scale measurement of importance in our exploratory study; however, we will discuss implications for derived importance in the general discussion.

Even the relatively narrow literature on attribute importance assessment acknowledges that importance may be conceptualized locally, reflecting marginal rates of substitution with a particular alternative set, or globally, reflecting overall attitudes towards abstract concepts associated with the alternatives (e.g., Goldstein 1990). For instance, revealed preference for one attribute over another has been demonstrated to vary depending on whether the relevant preference assessment task elicits global versus local importance

notions (Fischer 1995). Thus, it seems possible that decision makers will distinguish their importance assessments into **global importance** and **local importance**.

Notions of local importance would include, for instance, the disutility of receiving a specified decrease versus increase in units of an attribute. This concept is closely linked to **loss aversion** (Kahneman & Tversky 1979). While any attribute's values may be framed as a loss versus a gain, there appears to be across-attribute variation in the average degree of loss aversion experienced by decision makers (Hardie, Johnson & Fader 1993; Luce 1998). That is, attributes appear to vary in the steepness of the value function below (as opposed to above) one's current reference point. For example, currency attributes such as price often have high levels of importance, but are often associated with low or even zero levels of loss aversion (e.g., Kahneman, Knetsch and Thaler 1990). The construct of loss aversion is clearly related to local attribute importance, as both constructs address the degree to which movements (e.g., from an average to a very poor rating) alter preferences along attribute dimensions. However, decision makers may not necessarily consider the particular impact of a loss when formulating overall perceptions of importance. Thus, for instance, Luce (1998) was able to develop manipulations holding constant subjects' expressions of overall attribute importance while manipulating expressions of attribute loss aversion.

The contention that lives are more important than money (in the absence of detail regarding amounts of lives or money) is a 'global importance' notion and can be related to the concept of **protected values**, or the idea that accepting losses or tradeoffs on certain attributes is considered unacceptable. Because protected values are thought to be derived from deontological rules for behavior (e.g., "thou shall not kill," see Baron and Spranca 1997), they seem likely to have a moral dimension. Similarly, Tetlock et al.'s (1996) argument that certain tradeoffs are difficult to justify to others reflects the idea that moral, societal rules and norms constrain certain tradeoffs. Note, however, that the class of attributes with links to moral rules is likely to represent a mere subset of the attributes that decision makers value, and therefore protected values may be distinct from important attributes. For instance, in practice decision makers may often choose more powerful and enjoyable, but higher polluting options (e.g., sporty automobiles) even while expressing the protected nature (e.g., global dominance) of the environment over money.

A more general theoretical construct that may be related to attribute tradeoffs is threat or anticipated **negative emotion**. Because attributes define the potential consequences of a decision situation, they are likely to have a major impact on cognitive appraisals regarding which goals are implicated in that decision. These appraisals are thought to be a primary determinant of negative emotion (Lazarus 1991). In particular, attributes may have implications involving higher-level (terminal) goals that are very basic to an individual's goal hierarchy (e.g., survival) or they may have implications involving lower-level (instrumental) goals (e.g., avoiding exposure to a common cold). Attributes with links to higher-level goals should generate cognitive appraisals of threat (and therefore negative emotion) in choice situations where the decision maker is required to think about giving up these attributes in return for some other benefit(s). These attributes may often be experienced as sacred, as opposed to profane (e.g., Belk, Wallendorf & Sherry 1989).

Note that attribute emotionality is conceptually distinct from protected attributes, as moral implications are not necessary for emotionality. For instance, in his overall theory of emotion elicitation, Lazarus (1991) distinguishes between negative emotions that are associated with moral imperatives (e.g., shame) and those that are associated with potential non-attainment of valued outcomes (e.g., fear and anxiety). Thus, some attributes may be threatening (e.g., a personal safety attribute invoking fear of injury) but not necessarily protected (e.g., a worker safety attribute invoking one's duty to others).

It has long been recognized that individuals may resist tradeoffs due to more cognitive considerations (e.g., Payne, Bettman and Johnson 1993). For instance, attributes may vary in cognitive difficulty due to the degree to which attribute information is inherently easy to consider or **comprehend**. A related notion in economics characterizes attributes as search, experience, or credence depending upon the ease with which the attribute's value can be ascertained (Nelson 1970; Darby and Karni 1973). Cognitive difficulty is also likely to vary with aspects of the decision maker, for instance the degree to which the decision maker is **familiar** with the relevant information. For instance, even given very technical (and therefore difficult to comprehend) attribute information, increased familiarity may be associated with reduced cognitive load and therefore a greater ability to compute tradeoffs (Alba & Hutchinson 1987).

In summary, our review of the literature on decision behavior, and attribute tradeoffs in particular, uncovers proposals involving seven distinct dimensions of attribute characteristics: global importance, local importance, loss aversion, protected values, negative emotionality, comprehension ease, and familiarity. Several empirical studies have demonstrated that conclusions regarding consumer preference are likely to vary depending on the attribute characteristic under consideration. For instance, Fischer (1995) distinguishes between global versus local reactions to importance, Luce, Bettman and Payne (1999) distinguish between global attribute importance and emotionality, Luce (1988) distinguishes between global attribute importance and loss aversion, and Baron and Spranca (1997) distinguish protected values as a unique attribute characteristic. In all of these studies, results indicate that a researcher would make differing predictions regarding a subject's choice depending on the attribute characteristic that was measured (e.g., Fischer (1995) demonstrates that one would make different choice predictions depending on whether global or local importance was measured). While empirical work supports the above distinctions between attribute characteristics, the degree to which decision makers *themselves* make these distinctions between attribute characteristics is unclear. In particular, it seems quite possible that decision makers will make less fine-grained distinctions than those found in the relevant academic literatures in responding to attribute characteristics. In fact, decision makers may have a one-dimensional view of attribute characteristics, with factors such as increased negative emotionality, more protected values, or greater familiarity simply being associated with higher importance. Note that this one-dimensional view of attribute characteristics is implicitly assumed by most preference assessment techniques (e.g., attitude surveys or conjoint analysis). In the following section, we report an exploratory study aimed at uncovering the dimensions along which naïve subjects categorize attributes. In the general discussion, we will draw implications for further measure development.

3. Experimental methods

Ninety subjects, participating in return for course credit, were randomly assigned to one of three groups. Each subject's task was to use a program run on a personal computer to rate a set of eight attributes on twenty-three verbal scales. One group of subjects ($n = 30$) considered attributes relevant to an automobile purchase context, the second group ($n = 31$) considered apartment rentals, and the third group ($n = 29$) considered choosing health care plans (see Table 1 for attribute descriptions). Note that overall purchase price (e.g., automobile price, apartment rental cost, yearly health plan premium) is absent from each attribute list because some measures specifically ask subjects to consider trading off the relevant attribute against price. Money was used as a comparison attribute because it was expected to be relatively straightforward to tradeoff; therefore, any difficulty expressed regarding a trade-off between a particular attribute and money should largely be a function of the properties of the non-monetary attribute (Luce, Payne and Bettman 1999).

Table 1. Attribute definitions by context

Attribute	Definition
Automobile Context	
Breakdown Frequency	How often the car is expected to require non-routine maintenance
Maintenance Costs	How expensive the car is to maintain and repair
Occupant Survival	The probability that passengers would survive an accident
Pollution Caused	The amount of pollution caused by the car
Routine Handling	The manner in which the car handles during routine driving
Sound System	The quality of the sound system in the car
Worker Health & Safety	Whether worker accidents and hazards are likely during production
Apartment Rental Context	
Commute Time	How long it will take to commute to work
Condition	The interior condition of the apartment
Deposit	The amount of the required cash deposit
Interior Space	The apartment's square footage
Landlord Relations	The likelihood of fair treatment versus problems with apartment management
Safety	The crime rate of the neighborhood in which the apartment is located
Special Features	The presence and quality of "extra" features like high ceilings
Utilities	The estimated monetary costs of utilities
Health Plan Context	
Catastrophic Coverage	Degree to which aggressive, even experimental treatment is covered
Doctor Choice	Degree to which you are restricted to approved doctors
Gatekeepers	Level of red-tape and hassle associated with obtaining medical care
Pre-existing Conditions	Degree to which coverage for pre-existing conditions is provided
Prescription Support	Amount the plan pays towards prescription drug expenses
Preventative Coverage	Amount the plan pays towards preventative care
Routine Co-Pay	Percentage of cost for normal, routine medical care that is paid by individual
Specialist Co-Pay	Percentage of cost for specialized care that is paid by individual

Note: Attribute descriptions were longer than those above, including estimates of best and worst attribute values where this might be unclear.

The 23 scale measures were chosen to reflect aspects of the seven attribute properties (with implications for tradeoff resolution) uncovered in our literature review and discussed above. Multiple items were developed where the relevant constructs seemed potentially multi-dimensional. We constrained ourselves to scale measures (e.g., as opposed to utility assessment using decision analysis techniques) in order to try to minimize the degree to which our factor analysis results reflected method variance. However, we think that integration of these additional techniques presents an important opportunity for future research. Questions were presented in an individually randomized order for each subject and attributes were presented in an individually randomized order within each question. Each scale measure was scored on a scroll bar with (only) verbal labels visible to subjects; scale endpoints corresponded to the values 0 and 100 (see Table 2 for question wordings).

Two specific scale measures assessed attribute **global importance** (*Importance of decision, Care about decision*) and two measures addressed **local importance** (*Importance*

Table 2. Scale variables used to rate attributes

Variable	Summary of Definition	Left End (= 0)	Right End (= 100)
<i>Importance of decision</i>	How importance decisions involving the attribute are	Not important at all	Extremely important
<i>Care about decision</i>	How much the decision maker would care about an overall decision involving the attribute	I would care very little	I would care very much
<i>Importance of attribute</i>	How important the value on each attribute is to you when making a decision	Not important at all	Extremely important
<i>Value of attribute</i>	How much value the attribute has for the decision maker	Very little value	Very much value
<i>Unwillingness to give up attribute</i>	Relative degree of unwillingness to give up the best value of the attribute for the worst value	Less unwilling to give up	Extremely unwilling to give up
<i>Point assessment of tradeoff difficulty</i>	Assign 0 to 100 points to each attribute according to difficulty of giving up the best value for the worst in order to save money	n/a	n/a
<i>Distress of monetary tradeoff</i>	The amount of unpleasant or distressing feelings associated with giving up each attribute in order to save money	Not stressful at all	Extremely stressful
<i>Difficulty of best-worst tradeoff</i>	How difficult it would be to cope if confronted with a trade off of the best attribute value for the worst attribute value	Very easy to cope	Very difficult to cope
<i>Anger associated with trading off</i>	The amount of anger one would feel at the prospect of trading off the attribute for money (e.g., like the anger elicited by a hospital's selling organs to the highest bidder)	Not angry at all	Extremely angry
<i>Degree of moral considerations</i>	The degree to which decisions about the attribute involve moral/ethical considerations	No moral component at all	Strong moral component

(continued)

Table 2. (continued)

Variable	Summary of Definition	Left End (= 0)	Right End (= 100)
<i>Sacred versus profane nature</i>	The degree to which the attribute is sacred (set apart from everyday life, respected) or profane (ordinary)	Extremely sacred	Extremely profane
<i>Affect other people</i>	The degree to which the consequences of a decision regarding the attribute might affect individuals other than the decision maker	Affects only the decision maker	May affect others
<i>Difficulty justifying tradeoffs</i>	How difficult it would be for a decision maker to justify (to someone else) trading off the attribute	Somewhat difficult to justify	Extremely difficult to justify
<i>Severity of worst potential consequence</i>	Severity of worst possible consequences associated with attribute	Not severe at all	Extremely severe
<i>Likelihood of negative outcomes</i>	How likely it is that a very negative outcome will result from choosing an alternative with a poor value on the attribute	Not likely at all	Extremely likely
<i>Degree of threat</i>	How threatening (involving potential for unwanted outcomes or consequences) decisions involving each attribute could be	Not threatening at all	Extremely threatening
<i>Reversibility of consequences</i>	The degree to which negative consequences associated with the attribute are reversible	Not reversible at all	Extremely reversible
<i>Attribute fungibility</i>	The degree to which the attribute can be appropriately traded in a market (like money) or not (like friendship)	Not fungible at all	Extremely fungible
<i>Cognitive difficulty</i>	The degree to which the attribute is defined in terms of information that is difficult to combine mentally (technical, hard to understand, poorly-formatted, etc.)	It is cognitively easy	It is cognitively hard
<i>Comprehension of attribute</i>	How easy it is to comprehend or understand attribute information	Difficult to comprehend	Easy to comprehend
<i>Credence properties</i>	The degree to which attribute information can be gained through search (in the store), experience (after purchase), or credence (only by experts). (Note: Middle scale label specified "experience")	Attribute involves primarily search	Attribute involves primarily credence
<i>Attribute familiarity</i>	How familiar are you with each attribute	Not at all familiar	Extremely familiar
<i>Vividness of consequences</i>	Vividness (ease imagining/picturing) of consequences	Not at all vivid	Extremely vivid

NOTE: Actual questions presented to subjects were often longer and often included examples. For instance, the full question text for the *Distress of monetary tradeoff* measure in the car context was: "Some aspects of decisions evoke more unpleasant or distressing feelings than others evoke. One might call these feelings 'negative emotional stress.' If you had to give up each of the attributes below in order to get a lower price for a car, how much negative emotional stress would you feel as a result of that trade-off?" Further, note that definitions of terms such as attributes, alternatives, consequences, and trade-offs were provided during the study introduction.

of attribute, *Value of attribute*). Two measures addressed notions of **loss aversion** through direct ratings of unwillingness or difficulty in accepting losses on an attribute (*Unwillingness to give up attribute*, *Point assessment of tradeoff difficulty*). Two measures related to loss aversion assessed the negative feelings and expected coping difficulty related to accepting losses (*Distress of monetary tradeoff*; *Difficulty of best-worst tradeoff*); these measures combine notions of loss aversion with notions of cognitive appraisals relevant to negative emotion.

Several measures addressed **protected values**. One such measure was directly based on Baron and Spranca's (1997) definition (*Anger associated with trading off*); two additional measures tap constructs related to their theoretical development (*Degree of moral considerations*, *Sacred versus profane nature*). Similarly, one measure assessed the potential for consequences affecting individuals other than the decision maker (*Affect other people*), as treatment of others is a common aspect of basic moral rules. One measure directly addressed the difficulty of justifying a trade-off, consistent with Tetlock et al.'s work (1996; *Difficulty justifying tradeoffs*).

Some measures directly addressed the potential for **negative emotion** associated with the relevant attribute. Three measures were adapted from Lazarus' work on cognitive appraisal of emotion, addressing the three appraisal components most directly related to threats generated by the prospect of giving up valued attributes in choice (*Severity of worst potential consequence*, *Likelihood of negative outcomes*, *Degree of threat*). A measure assessing the degree to which likely attribute consequences were considered reversible was included (*Reversibility of consequences*), consistent with the intuition that less reversible negative outcomes would be associated with heightened potential threat. Similarly, the economic notion of fungibility (*Attribute fungibility*), that is the degree to which the attribute reflected values that were properly and typically exchanged (money) versus those that were not (friendship), was assessed. Less fungible attributes were expected to be associated with less reversible, and more potentially threatening, consequences.

Finally, attribute characteristics likely to be associated with more cognitive difficulty were addressed. Two measures assessed **comprehension** or likely difficulty processing attribute information (*Cognitive difficulty*, *Comprehension of attribute*; see Bettman, Johnson & Payne 1990). The economic notion of whether attributes had search, experience or credence properties was also measured (*Credence properties*), as it seemed that the relevant information would be more difficult to process for credence attributes. Finally, **familiarity** was addressed directly (*Attribute familiarity*) and also through the degree to which consequences associated with an attribute were considered vivid (*Vividness of consequences*), as it seemed that more familiarity with an attribute would lead to a greater ability to imagine the relevant consequences.

4. Experimental results

4.1. Overall factor analysis

The experiment resulted in 720 (90 subjects \times 8 attributes) observations on 23 scale measures. For the primary analyses reported below, we use this 720 by 23 data matrix,

standardized across each subject's eight observations such that the mean of the eight relevant observations was zero. This mean centering was used to ensure that individual differences (e.g., general tendencies to report high versus low scale responses) would not obscure relationships among scale measures. Mean centering by subject also removes main effects due to product class (apartments versus cars versus health care plans), as subjects are nested within products.

An initial principal components analysis indicated a three-factor solution (first three eigenvalues: 9.40, 2.63, 1.20). The data were re-analyzed using maximum likelihood factor analysis, and factor scores were rotated using the varimax method for orthogonal (uncorrelated) factors and the promax method for oblique (correlated) factors. All three factor analysis methods resulted in substantively identical factor patterns. We focus on the promax solution reported in Table 3, because we believe that the underlying attribute characteristics are correlated. Finally, we ran an oblique principal component cluster analysis on the three average factor scores for each of our 23 scales, constraining the

Table 3. Factor scores from analysis of mean-centered data, promax rotation

	Factor 1 ("Importance")	Factor 2 ("Emotion")	Factor 3 ("Cognition")
<i>Value of attribute</i>	1.00	-0.16	-0.04
<i>Importance of attribute</i>	0.97	-0.10	-0.06
<i>Importance of decision</i>	0.96	-0.03	-0.10
<i>Care about decision</i>	0.94	-0.04	-0.10
<i>Point assessment of tradeoff difficulty</i>	0.84	-0.03	0.06
<i>Difficulty of best-worst tradeoff</i>	0.70	0.13	0.08
<i>Distress of monetary tradeoff</i>	0.69	0.10	0.13
<i>Unwillingness to give up attribute</i>	0.56	0.12	0.26
<i>Likelihood of negative outcomes</i>	0.42	0.26	0.21
<i>Degree of moral considerations</i>	-0.15	0.70	-0.15
<i>Severity of worst potential consequence</i>	0.38	0.58	0.00
<i>Degree of threat</i>	0.35	0.55	0.08
<i>Attribute fungibility</i>	-0.22	-0.49	0.07
<i>Affect other people</i>	-0.13	0.48	-0.12
<i>Credence properties</i>	0.02	0.44	-0.27
<i>Difficulty justifying tradeoffs</i>	0.19	0.42	0.23
<i>Anger associated with trading off</i>	0.32	0.42	0.06
<i>Sacred versus profane nature</i>	-0.11	-0.38	0.05
<i>Reversibility of consequences</i>	-0.06	-0.31	0.08
<i>Cognitive difficulty</i>	0.00	0.24	-0.58
<i>Attribute familiarity</i>	0.11	-0.15	0.55
<i>Comprehension of attribute</i>	0.02	-0.14	0.46
<i>Vividness of consequences</i>	0.32	-0.01	0.46

These factor scores are equivalent to standardized regression coefficients for predicting the variables from the factors. Boldface type reflects the groups to which scales were assigned by an oblique principal component cluster analysis of average factor scores across the 23 scales.

analysis to three clusters to match the number of factors uncovered. The resultant clusters simply summarize the factor structure by assigning each scale to a cluster representing the factor in which that scale loads most clearly. We interpret these factors next.

4.2. Interpretation of factors

Factor 1 represents the two most common attribute characteristics discussed in the literature on preference measurement and choice behavior, namely importance and loss aversion. Clearly, *Importance of attribute* and *Importance of decision* directly reflect local and global attribute importance, while *Value of attribute* and *Care about decision* are closely related. *Unwillingness to give up attribute* and *Point assessment of tradeoff difficulty* directly assess loss aversion, and *Distress of monetary tradeoff* and *Difficulty of best-worst tradeoff* are closely related. Note that two of the 'loss aversion' scales (*Point assessment of tradeoff difficulty* and *Distress of monetary tradeoff*) specify consideration of a trade-off against money, while the other two do not. Finally, *Likelihood of negative outcomes* seems least directly related to Factor 1, as that scale was based on work addressing cognitive appraisal in negative emotion. In summary, although a priori it seemed possible that subjects would distinguish between importance and loss aversion, an analysis of Factor 1 indicates that these basic attribute characteristics are closely intertwined.

The second factor appears to address the degree to which attributes are protected from tradeoffs and/or are associated with negative emotion. *Anger associated with trading off* and *Difficulty justifying tradeoffs* were developed directly from work on protected values. Similarly, the measures *Degree of moral considerations* and *Affect other people* are directly related to moral rules for action. The scales *Severity of worst potential consequence*, *Degree of threat*, and *Likelihood of negative outcomes* were taken directly from work on cognitive appraisal of negative emotion. The measures *Attribute fungibility* or *Sacred versus profane nature* almost by definition assess whether an attribute is associated with more instrumental (versus more terminal) goals. For example, money, generally considered maximally fungible, is valued because it acts as a proxy through which one can obtain valued outcomes (and therefore is associated with more instrumental goals). Less reversible attributes seem likely to be associated with more emotional potential as well, because it is more difficult to anticipate effectively coping with an irreversible bad outcome. Finally, the *Credence properties* scale unexpectedly loaded on Factor 2, although we conceptualized this scale as reflecting more cognitive issues of attribute search. It is possible that subjects misunderstood our intent with this scale; it is also possible that *credence properties* attributes, which cannot be evaluated in normal use, tend to be attributes with links to higher-level goals and therefore with a greater tendency to generate negative emotion when traded off. In summary, and inconsistent with notions that moral threats are separable from other threats (e.g., Lazarus 1991), our subjects appeared to combine characteristics related to moral imperatives with characteristics relating to emotional potential more generally.

The composition of Factor 3 is relatively straightforward, involving attributes reflecting the cognitive ease associated with processing attribute information. The variables *Comprehension of attribute* and *Cognitive difficulty* directly address this construct. The variable *Attribute familiarity* is clearly related in that processing ease should increase with *attribute familiarity*. Finally, the *Vividness of consequences* measure's loading on Factor 3 may indicate that one way to comprehend or process an attribute is by imagining associated outcomes. Note, however that our subjects did not appear to distinguish between attribute- and person-specific aspects of cognitive decision difficulty.

Thus, our factor analysis results indicate that subjects distinguish the relevant attribute characteristics along three dimensions, apparently addressing the underlying importance, emotionality, and cognitive difficulty of attributes. Correlations between Factor 1 ("Importance") and both Factor 2 ("Emotion"; $r=0.55$) and Factor 3 ("Cognition"; $r=0.72$) are reasonably high. However, note that Luce, Bettman & Payne (1999) found that considering attribute emotionality explained additional variance in consumer choice beyond that attributable to importance alone. Factor 2 and Factor 3 correlate less strongly with one another ($r=0.28$).

4.3. Cluster analysis of attributes

A different approach to factor interpretation is to cluster attributes based on the average loading of each attribute on each factor (see Table 4). We performed an average-linking method cluster analysis of the three average factor scores across our 24 attributes to summarize these relationships. Six clusters are represented in the table, the largest solution for which there are no one-attribute clusters. These clusters have some intuitive appeal, particularly in terms of average Factor 1 and Factor 2 scores. Cluster 1 (denoted "Safety" in the table) contains the two attributes with the highest loading on both Factors 1 (importance) and 2 (emotion); it seems intuitive that these attributes are both personally important and likely to elicit negative emotion if traded off. Cluster 2 (Commodities) attributes are related to time, space, and money; these attributes have relatively low emotion-factor scores and average importance-factor scores. Cluster 3 (Catastrophes) attributes have implications for extremely rare, but potentially catastrophic outcomes; these attributes have relatively high emotion-factor scores, given their average importance-factor scores. Cluster 4 (Consumption) attributes are related to routine consumption, and involve medium-to-high importance factor scores and medium-to-low emotion factor scores. Cluster 5 (Extras) attributes have low ratings on both the importance and emotion factors, and the relevant attributes would likely be described as non-essentials with little real personal or societal import. Finally, Cluster 6 (Moral Issues) attributes have medium emotion factor scores but very low importance factor scores; consistent with the factor scores, these attributes seem to reflect outcomes with relatively low personal import, but some moral relevance due to the potential for societal impact.

Table 4. Average factor scores by attribute cluster and attribute

	Attribute	Factor 1 ("Importance")	Factor 2 ("Emotion")	Factor 3 ("Cognition")
Cluster 1 (Safety)	Occupant Survival	0.95	1.15	0.55
	Safety	0.93	1.37	0.50
Cluster 2 (Commodities)	Commute Time	0.14	-0.22	0.35
	Deposit	-0.40	-0.43	-0.18
	Gate Keeper	-0.41	-0.32	-0.17
	Interior Space	0.00	-0.47	0.13
	Routine Co-Pay	0.00	-0.57	0.35
	Specialist Co-Pay	-0.21	-0.47	-0.08
	Utilities	-0.05	-0.16	-0.10
Cluster 3 (Catastrophes)	Catastrophe Coverage	0.07	0.76	-0.46
	Landlord Relations	-0.21	0.72	-0.36
	Pre-Existing Conditions	-0.49	0.33	-0.47
Cluster 4 (Consumption)	Breakdown Frequency	0.97	0.39	0.48
	Doctor Choice	0.48	0.20	0.40
	Condition	0.75	0.31	0.67
	Maintenance Costs	0.79	-0.04	0.58
	Prescription Coverage	0.33	-0.18	0.55
	Preventative Coverage	0.24	0.24	-0.13
	Routine Handling	0.48	0.06	0.09
Cluster 5 (Extras)	Sound System	-0.95	-1.39	-0.14
	Special Features	-1.18	-1.12	-1.01
	Styling	-0.63	-1.17	0.12
Cluster 6 (Moral Issues)	Pollution Caused	-0.67	0.44	-0.68
	Worker Health & Safety	-0.94	0.56	-1.01

Notes: Clusters were uncovered using an average-linking method analysis of the three average factor scores across each of the 24 attributes listed above. Refer to Table 1 for attribute definitions and contexts.

5. Summary and discussion

This paper reports an exploratory study addressing the underlying dimensionality of subjects' responses to attribute characteristics. A review of the relevant theoretical and empirical literature reveals at least seven broad types of attribute characteristics. We also note recent empirical evidence that choice outcomes are altered in systematic ways in reaction to attribute characteristics over and above importance (e.g., Baron & Spranca 1997; Fischer 1995; Luce 1998; Luce, Payne & Bettman 1999). For instance, Fischer (1995) finds that revealed preference differs depending on whether task characteristics encourage subjects to consider global versus local notions of importance. The exploratory factor analysis reported in this paper begins to uncover the dimensionality of these additional attribute characteristics in naïve subjects' minds. Subjects in the current study respond to attributes along three dimensions (importance/loss aversion, protection from tradeoffs/emotional potential and cognitive difficulty), collapsing over many of the

dimensions found in the literature. Thus, our results indicate that subjects' reactions to decision attributes appear to blur several theoretical distinctions. However, our results also indicate that a simple, one-dimensional view of an attribute's likely impact on choice may give up some precision as compared to the richer categorization of attributes that naïve subjects appear to utilize. The finding that importance and loss aversion (Factor 1) are generally separable from emotionality or protection from trading off higher-level goals (Factor 2) seems particularly interesting. For instance, the current results suggest that direct ratings of attribute emotional potential (e.g., measures such as *Degree of moral considerations* or *Degree of threat*) may be particularly useful for uncovering such effects of negative emotion on choice. Finally, the cognitive ease associated with attribute information (Factor 3) also appears to be distinguishable from importance and potential emotionality. Below, we make some specific suggestions regarding how we believe the current results may inform the study of tradeoff resolution in decision making.

6. Future work

Given the exploratory nature of the study reported above and the potential impact of attribute characteristics on decision processes, we believe that this is a domain deserving of future research. First, while we attempted to base our scale measures on a comprehensive review of research on tradeoff resolution, several additional measures are possibly relevant. For instance, it would be interesting to assess whether subjects consider potential for positive emotion (e.g., potential opportunity as opposed to threat) as a separable dimension of attribute characteristics and whether this dimension influences decision behavior. In addition, it would be interesting to conduct research linking measures related to the three attribute dimensions we uncover to consumer behaviors. We believe that the most appropriate criterion measure would involve direct preference assessments such as choice shares or attribute weights collected via a conjoint analysis design. Finally, understanding the underlying dimensionality of attribute characteristics may help us better describe and group decision attributes themselves, particularly when attributes are pitted against one another in tradeoffs. We believe that our cluster analysis of attributes is a beginning step in this direction. For instance, there is some evidence that quality is given more weight than price in choice (versus matching), even when price is rated as more important. Because this distinction seems likely to follow from relatively high emotion-to-importance ratio for some quality attributes (see Luce, Payne & Bettman 1999), it seems that this effect may occur particularly for some quality attributes (e.g., the attributes in clusters 3 and 6). More generally, by indicating that attribute identities matter, the factor analysis results reported in this paper suggest several avenues for enriching current approaches to preference assessment.

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