

## Overestimating the Importance of the Given Information in Multiattribute Consumer Judgment

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Consumer judgment often is based on incomplete or limited knowledge of the relevant attributes. We performed 3 experiments to investigate why these judgments are often insensitive to set size and why evaluations based on limited information tend to be stronger (more extreme and confident) than is warranted. The findings indicate that the importance of the given or known attributes is often overestimated, leading to evaluations that are overly extreme. The experiments also revealed important factors moderating this insensitivity to limited information. The overweighing of the given evidence was attenuated when participants were knowledgeable of the target domain. Overweighing and the formation of extreme judgments based on limited information was also diminished when participants considered their judgmental criteria prior to evaluating a target or when a comparison target described by different attributes was present.

Judgment often requires the gathering, assessment, and integration of multiple pieces of information. The evaluation of job candidates, for example, entails the summarization of evidence about the various qualifications of each applicant. Automobile assessments similarly require the integration of knowledge about various features such as styling, engine size, and repair record. A variety of different models have

been developed to understand and predict these multiattribute judgments (e.g., Anderson, 1974; Savage, 1954; Tversky & Kahneman, 1981). Although the details of the models vary considerably, nearly all postulate that judgment is an integration of the weights (i.e., subjective probability, importance, “diagnosticity,” or reliability) and valuations of the presented or known attributes, outcomes, or specific pieces of evidence.

The information that is available for such integration is often limited. Perhaps more often than not, evaluations are formed without complete knowledge of all of the relevant at-

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tributes. In some instances, multiattribute judgments are adjusted for the amount or set size of information that is available. *Set size* in this context refers simply to the number of attributes or pieces of information that are presented or described. Demonstrations of the set-size effect have shown that when information about important attributes is missing, the overall judgment of an object or issue may be moderated; people form extreme judgments when they have a large amount of information and moderate judgments when they have a relatively small amount of information, even when the value (the evaluative implications) of each piece of information is held constant (Anderson, 1967; Kaplan, 1981; Yamagishi & Hill, 1983). Thus, judgment may be affected by the valuations and weights of the unknown attributes as well as the known attributes.

Interestingly, research indicates that multiattribute judgments are not always sensitive to the amount of information given (Kardes & Gurusurthy, 1992; Kardes & Sanbonmatsu, 1993; Sanbonmatsu, Kardes, Posavac, & Houghton, 1997; see also Griffin & Tversky, 1992). For example, Sanbonmatsu, Kardes, and Herr (1992) presented varying amounts of attribute information about a target camera to participants varying in camera expertise. Participants of low and moderate knowledge formed similar judgments across set-size conditions. That is, their evaluations of the target camera and their judgmental confidence did not differ when the camera was described by a small as opposed to a large number of positive attributes, even though the missing information was subjectively important and the evaluative implications of the information were controlled. Judgment did not vary as a function of set size primarily because judgments of the target described by a small set of information were overly confident and extreme. In fact, evaluations of targets described by limited evidence were moderated only when participants were made cognizant of the absence of important information. Thus, the set size of evidence often has little impact on the judgment of targets that are evaluated singularly. Extreme judgments are sometimes formed regardless of the number of diagnostic attributes that are presented or described.

Although this tendency to form polarized evaluations of singular targets has been found to be quite robust (for related findings, see Hausman, 1993; Tesser, 1978), relatively little is known about the underlying mechanisms. In this research, we conducted experiments to understand why judgments are sometimes insensitive to the amount of information and why judgments based on limited attribute information are stronger (more extreme and confident) than is warranted.

#### OVERESTIMATING THE IMPORTANCE OF THE GIVEN INFORMATION

One explanation for the tendency to form overly extreme evaluations of singular targets is suggested by work examin-

ing the valuations and weights that are used in integration judgment. Ideally, the criteria for judging the targets of a particular category are invariant across different contexts and targets. The standards used in assessing the performance of one graduate student, for example, should be identical to the standards used in assessing the performance of other graduate students in a program. The consistent application of standards, of course, ensures that the judgments formed in one context are comparable with those formed in another. Unfortunately, people are not always evenhanded in the standards that they apply. Demonstrations of assimilation and contrast (e.g., Herr, Sherman, & Fazio, 1983), preference reversal (e.g., Lichtenstein & Slovic, 1971; Tversky & Kahneman, 1981), and the "change of standard" effect (e.g., Higgins & Lurie, 1983) indicate that the criteria that are used in evaluation and the resulting judgment often vary markedly. Variability may exist in how stimuli are valued. Demonstrations of attitudinal contrast (e.g., Petty & Wegener, 1993), for example, have shown that the presence of an extreme anchor may cause a judged object to be displaced from its more usual position on an attitudinal scale. Inconsistency similarly occurs in the manner in which stimuli are weighed (e.g., Fischhoff, 1991; Fisher & Hawkins, 1993). Variability may exist specifically in the perceived importance or diagnosticity of particular attributes. Additionally, variability may exist in the assessment of the amount or strength of the evidence presented (Sanbonmatsu, Kardes, Posavac, & Houghton, 1997). Studies (e.g., Kahneman & Miller, 1986; Tversky, Sattath, & Slovic, 1988) indicate that characteristics of both the context and the person shape the weights that are used in judgment.

Interestingly, the factor that may sometimes have the greatest influence on the weighing rules that are applied in multiattribute judgment is the target stimulus itself. In singular evaluations, the presented evidence about select attributes or qualities of a target may set the evaluative agenda, thereby biasing the judgment that ensues. Often well-defined criteria for rendering judgment about an object are not readily available in memory. In these instances, the presented features may serve as cues that help to determine which attribute dimensions are considered in an integration judgment. Naturally, the criterial dimensions that are primed for consideration and thus heavily weighed are likely to be those that are represented in the given evidence. Thus, the importance or diagnosticity of the presented attributes may be overestimated relative to those that are not presented. Of course, allowing the target attributes to set the evaluative agenda in this backward fashion may have serious judgmental consequences. When the given information is overweighed, little adjustment may be made for the amount or size of the information set. Instead, judgment may be based primarily on the evaluative implications of the given evidence. Hence, when the limited evidence is positive in valence, judgment may tend to be overly favorable and confident. Conversely, when the limited evidence is negative in valence, judgment may

tend to be overly unfavorable and confident. Thus, the failure to moderate judgments based on limited information may result, in part, from overweighing. When little cognizance exists of the specific omissions and general limitations characterizing the presented evidence, excessive meaning may be drawn, leading to an integration judgment that is overly confident and extreme.

### When Are the Given Attributes Overweighed and Overly Extreme Evaluations Formed?

Our analysis helps to understand not only why but when judgment is insensitive to the limitations of the given evidence. The tendency to overestimate the importance of the given evidence may occur, in part, because the stimulus features of a presented target prime select criteria and set the judgmental agenda. However, when a person is knowledgeable of the judgmental category and has well-developed criteria, the tendency to overweigh the given attributes and form overly extreme evaluations based on limited information may be attenuated. Consistent with this, prior work (Sanbonmatsu et al., 1992) demonstrated that experts are less likely than individuals with low or moderate knowledge to form overly extreme evaluations of products described by limited evidence.

When people are cognizant of the limitations of the given evidence and aware of important omissions, judgments based on limited information may be less extreme. Greater weight and neutral values may be given to missing attributes. Moreover, corrections or adjustments may be made (Schwarz & Bless, 1992; Wegener & Petty, 1997), leading to a more middling overall evaluation. One factor affecting the cognizance of the limitations of the given information may be the presence or absence of comparison objects. Overweighing and the rendering of extreme evaluation may be especially likely to occur when a target is judged singularly. When a multiple of different targets are present and described on alternative dimensions, judges are more apt to be aware of all of the attributes relevant to a judgment and less apt to apply select criteria. Finally, our analysis suggests that when individuals are prompted to actively consider the judgmental criteria to be used prior to exposure to the stimulus target, the overweighing of the presented information may not occur. In this instance, the presented attributes are less apt to set the evaluative agenda as a broader criteria is activated.

Obviously, the overestimation of importance or diagnosticity is also heavily dependent on the nature of the presented attributes. A given attribute is likely to be overweighed only if it is represented a priori as judgment relevant or if it can be inferred to be judgment relevant. A more subtle stimulus characteristic that may affect the likelihood of overweighing may be the valence of an attribute. Because highly positive or negative information tends to be weighed more heavily than information of neutral valence (e.g., Fiske, 1980; Skowronski & Carlston, 1989), overweighing in

multiattribute judgment may be particularly likely to occur when the described attributes are extreme. Finally, some attributes are likely to be considered in rendering a judgment regardless of whether they are present or not in the given information. Many attributes such as the price of a product are so important that people are cognizant of their relevance even when they are not mentioned. Thus, the hypothesis here was not that presented attributes are always weighed more heavily than nonpresented attributes. Rather, attributes are weighed more heavily when they are presented than when they are not presented or when complete information about all of the relevant attributes is given.

## OVERVIEW OF THIS RESEARCH

We conducted three experiments to assess the role of overweighing in consumer judgments based on limited information. Specifically, in these experiments we attempted to show that the formation of extreme judgments based on limited attribute information results, in part, from overweighing. In Experiment 1, we attempted to demonstrate that the importance and sufficiency of the presented attributes tend to be overestimated. In Experiments 2 and 3, we sought to provide evidence that overweighing mediates the formation of overly confident and extreme judgment. In these studies, we also attempted to delineate some of the important conditions under which the overweighing of limited information and the formation of extreme judgment occurs. In Experiment 1, we examined whether the tendency to overweigh is moderated by the valence of the information and the expertise of a judge. In Experiment 2, we investigated whether overweighing and the formation of strong judgment is attenuated by the presence of a comparison target. Finally, in Experiment 3, we examined procedures that may de-bias the tendency to overweigh the given evidence.

### EXPERIMENT 1

In the first experiment, we attempted to demonstrate that given attributes are commonly overweighed in consumer perception. Participants in Experiment 1 were presented with a description of several attributes of a bicycle model. It was anticipated that participants would be more likely to identify an attribute as important when it was presented as opposed to not. In this study we also examined the conditions under which the given attributes are overweighed. Prior investigations of information integration judgment suggest that the weighing of an attribute is not always independent of the extremity, valence, or value of the attribute (e.g., Fiske, 1980; Wyer, 1974). In this experiment we investigated whether the tendency to see the given information as important varies as a function of attribute valence. Finally, we examined the role of expertise in overweighing. We hypothesized that individu-

als with high levels of target domain knowledge would be less apt to report the given attributes as the most important.

## Method

**Participants.** One hundred seventy-one undergraduates enrolled in an introductory marketing or psychology course at two public universities participated in exchange for course credit. Participants were randomly assigned to an experimental condition.

**Procedure.** Participants in a study of “product perception” read comments that were made about a bicycle model labeled “Brand H.” The comments ostensibly were made by bicycling enthusiasts who test drove the bicycle. Brand H was described as a touring bicycle that is “manufactured by a reputable firm and carries a price that is average for a bicycle of its class.” One of two sets of four comments about the Brand H bicycle were presented to participants to read. One set described the cornering, riding comfort, frame strength, and paint job and styling of the bicycle. The other set described the components (i.e., gears and brakes), warranty, weight, and ride of the H bicycle. The comments were either entirely favorable (e.g., “The frame of the Brand H Bicycle is superior to most models in strength and durability”), middling (e.g., “The frame ... is of moderate strength and durability”), or unfavorable (e.g., “the frame ... is below average in strength and durability”).

Participants were instructed to simply read the comments and evaluate the bicycle. After 90 sec of reading time, the description was removed and measures of attribute importance were taken. Participants were specifically instructed to “write down the attributes or features that you believe are the most important to consider in evaluating a bicycle.” They were told to list at least four attributes and not more than eight attributes and to explain why they listed each attribute as important. Participants then completed a test of bicycle knowledge. This expertise measure was adopted from a test used by Sanbonmatsu et al. (1992) and consisted of eight multiple-choice and open-ended questions (e.g., “What is a *derailleur*?”).

## Results and Discussion

A criterion similar to that applied by Sanbonmatsu et al. (1992) was used to categorize the bicycle expertise of participants. Participants who correctly answered three or fewer questions were categorized as “low knowledge,” whereas participants correctly answering four or five questions were categorized as “moderate knowledge.” Only participants who correctly answered six or more questions were considered to be of “high knowledge.” As expected, relatively few participants ( $n = 18$ ) were highly knowledgeable about bicycles.

In the analysis, we examined the extent to which participants reported the presented attributes (as opposed to the nonpresented attributes) to be important in the evaluation of a bicycle. An assistant who was unaware of the experimental hypotheses recorded the number of attributes from the presented description that were mentioned as important and the number of attributes from the nonpresented description that were mentioned as important. Nonpresented attributes were specifically defined as the attributes in the description that was not presented to the participant. The counterbalancing of the sets of attributes describing the bicycle was ignored in the reported analyses, as it was not of primary theoretical interest and did not interact significantly with valence or expertise. Table 1 presents participants’ perceptions of the importance of the presented and nonpresented attributes. A  $2 \times 3 \times 3$  (type of attribute: presented vs. not presented by description valence by expertise) mixed-design analysis of variance (ANOVA) revealed that the presented attributes were much more likely to be reported as important than those that were not presented ( $M = 2.25$  vs.  $M = 1.23$ , respectively),  $F(1, 162) = 13.14$ ,  $p < .001$ , mean square error ( $MSE$ ) = 1.94. Further analyses examined whether this tendency was moderated by the valence of the attributes and the expertise of the participants. The Description Valence  $\times$  Attribute Type interaction was not significant,  $F = 1$ . Hence, the tendency to perceive the given information to be important was not affected by the favorableness of the presented information. As expected, though, the Expertise  $\times$  Attribute interaction was significant,  $F(2, 162) = 3.67$ ,  $p < .03$ ,  $MSE = 1.94$ . Planned contrasts revealed that low- and moderate-knowledge participants but not high-knowledge participants tended to report the presented attributes to be more important than the nonpresented

TABLE 1  
Experiment 1: Effects of Expertise and Valence of Description on the Frequency of Presented and Nonpresented Attributes Reported to Be Important in the Evaluation of a Bicycle

Valence	Attributes Reported to Be Important	
	Presented	Nonpresented
Low knowledge <sup>a</sup>		
Negative	2.81	0.69
Moderate	1.85	1.42
Positive	2.38	0.81
Total	2.31	1.00
Moderate knowledge <sup>b</sup>		
Negative	2.25	1.58
Moderate	2.10	1.14
Positive	2.18	1.53
Total	2.18	1.42
High knowledge <sup>c</sup>		
Negative	1.57	3.00
Moderate	2.29	1.86
Positive	2.38	1.25
Total	2.22	1.78

<sup>a</sup> $n = 91$ . <sup>b</sup> $n = 62$ . <sup>c</sup> $n = 18$ .

attributes: low,  $t(162) = 6.36, p < .001$ ; moderate,  $t(162) = 3.07, p < .01$ ; high,  $t < 1$ . The three-way interaction was also significant,  $F(4, 162) = 2.76, p = .03, MSE = 1.94$ . It appears that the tendency to perceive the given attributes as important was diminished primarily when the participant was highly knowledgeable and the description was unfavorable. The small cell sizes in the high-knowledge participant conditions, though, make exact interpretation of these findings difficult.

In sum, the findings demonstrate that the importance of the presented information is often overestimated in multiattribute judgment. Only experts were relatively evenhanded in their weighing of the presented and nonpresented attributes.

## EXPERIMENT 2

In the second experiment, we examined the role of overweighing in information integration judgment. Specifically, we attempted to show that the overweighing of the presented information contributes to extreme and confident judgments of targets described by limited evidence. We also investigated how and why evaluations of a small set-size target are affected by the presence of a comparison target. We hypothesized that targets described by limited evidence are evaluated more moderately in the context of a comparison target than alone because of diminished weighing of the presented attributes.

Half of the participants in Experiment 2 judged an automobile described by limited information singularly, whereas others judged this target in the context of another automobile described by a larger amount of information. After reading the description or descriptions, they indicated which attributes generally are the most important in automobile assessment. We predicted that when the automobile was judged singularly, participants would overestimate the importance of the described attributes and form extreme and confident evaluations. The presence of the large set-size target in the context, however, was expected to lower the extremity of judgments of the target automobile by reducing the perceived importance of the known attributes. Thus, we anticipated that differences in the perceived importance of the Model A attributes would mediate the differences in evaluations between the singular and comparison conditions.

### Method

**Participants.** Eighty-three introductory psychology students at a public university participated in the experiment in exchange for extra course credit. Students participated individually or in groups of 2 to 4 and were randomly assigned to an experimental condition.

**Procedure.** Participants in a study of “product perceptions” read a transcript from a fictional radio program called the “Auto Spot.” The program was allegedly sponsored by

Bob’s Motors—a local car dealership. The transcript provided descriptions of either one or two brands of automobiles that were being promoted by the dealer. Participants were told that the program had been transcribed exactly except that the name or names of the automobile model(s) had been replaced with pseudonyms. All participants received a description of a compact car model labeled “Brand A.” Brand A was always described in terms of price (under \$12,000) and three positive attributes (e.g., “... powered by a peppy, 168 horsepower engine for quick acceleration,” and “... one of the most reliable cars on the road; over a five year period it had one of the best repair records in its class.”). The three positive attributes describing Brand A were varied, with one of three different sets of three attributes being presented. Participants in the singular condition read about Brand A only. Participants in the comparison condition also received a description of a second compact labeled “Brand B.” Brand B was described in terms of price (under \$12,000) and six positive attributes. The six attributes describing Brand B were the six positive attributes that were not mentioned in the specific Brand A description read by the participant. Thus, Brand A and Brand B were described by differing amounts of information and on different attribute dimensions.

Participants were instructed to simply read the transcript at their own pace and evaluate the automobile(s). In the comparison condition, the two descriptions were passed out simultaneously and in a random order. After participants read the transcript, measures of attribute importance were taken. Participants specifically were instructed to write down the attributes or features that they believed are the most important to consider in evaluating an automobile. They were told to list at least four attributes and not more than eight attributes and to explain why they listed each attribute as important.

Afterward, participants evaluated the automobile(s) on two different measures. The first was a 9-point scale ranging from  $-4$  (*very unfavorable*) to  $+4$  (*very favorable*). The second was a comparative scale that asked participants to assess the automobile relative to other compact cars in its price; the 9-point scale ranged from  $-4$  (*one of the worst*) to  $+4$  (*one of the best*). The midpoint was labeled *average*. Participants then indicated their confidence in their evaluations of each automobile on 9-point confidence measures ranging from  $-4$  (*not at all confident*) to  $+4$  (*highly confident*). Finally, participants assessed the extent to which the information provided was sufficient to evaluate each of the automobiles on a 10-point scale ranging from 0 (*not at all enough*) to 9 (*highly sufficient*). To avoid confusion regarding the Brand A and B labels, the descriptions of the automobiles were available to participants during the evaluations.

### Results and Discussion

The counterbalancing of the sets of attributes describing the automobile was once again ignored in the reported analyses, as it was not of primary theoretical interest and did not

interact significantly with the manipulation of context to affect any of the primary measures. In the initial analysis, we examined the extent to which participants reported the attributes describing Model A to be important (relative to those not describing Model A). Nonpresented attributes again were defined as the attributes in the two descriptions that were not used to describe Model A. There were, of course, twice as many nonpresented as presented attributes. To facilitate the comparison of the reported presented and nonpresented attributes, the number of nonpresented attributes reported by each participant was halved. Table 2 presents the mean perceived importance of the presented and nonpresented attributes. A  $2 \times 2$  (attribute type: presented vs. nonpresented by context) mixed-design ANOVA indicated that the attributes describing Model A were more likely to be reported as important than the attributes not describing Model A ( $M = 1.43$  vs.  $M = 1.07$ , respectively),  $F(1, 81) = 6.92, p < .01, MSE = 0.63$ . As expected, though, the interaction was significant,  $F(1, 81) = 7.51, p < .01, MSE = 0.63$ . The attributes describing Model A were perceived to be more important than the attributes not describing Model A when Model A was judged singularly,  $F(1, 81) = 16.05, p < .001, MSE = 0.63$ , but not when Model A was judged in the presence of Model B,  $F < 1$ .

In the next set of analyses, we examined the evaluations of the Model A automobile in the singular and comparison conditions. Note that analyses of the differences in judgment between Model A and Model B in the comparison condition are not reported here because they are not surprising nor of great theoretical value. The correlation between the two evaluation scales was very high ( $r = .71$ ). Consequently, an overall index averaging the absolute and comparative evaluations was created. Analyses of the overall evaluations revealed that singular assessments of Model A were significantly more extreme than assessments of Model A in the presence of a comparison brand ( $M = 1.29$  vs.  $M = 0.66$ , respectively),  $F(1, 81) = 4.32, p = .04, MSE = 1.85$ . Although there was a tendency to judge Model A more confidently in the singular condition than in the comparison condition, this difference was not significant,  $F(1, 81) = 1.19, MSE = 3.76$ . Unexpectedly, the description of Model A was also not perceived to be more sufficient when it was presented alone (as opposed to in the context of

Model B), although again the difference approached significance,  $F(1, 81) = 1.97, MSE = 3.49$ .

Correlational analyses examined the extent to which the relative importance of Model A attributes was predictive of the perceived sufficiency of the information, automobile evaluations, and participants' confidence in their evaluations. The relative importance of the presented attributes was specifically defined as the number of Model A attributes perceived to be important minus the number of attributes not describing Model A that were perceived to be important. As expected, the relative importance of the given information was correlated with the overall evaluation of Model A ( $r = .36, p < .001$ ) and the perceived sufficiency of the Model A description ( $r = .22, p < .05$ ). The relative importance of the presented information was not correlated with the confidence characterizing judgments of Model A ( $r = .05$ ). Thus, as the tendency to overweigh the information increased, the tendency to form extreme evaluations increased.

In the final analysis, we examined the extent to which the effects of the context manipulation on evaluations of the Model A automobile were mediated by the differential weighing of the Model A attributes. Again, the presence or absence of Model B in the judgmental context significantly affected the perceived importance of the attributes describing Model A. Moreover, the presence of a comparison target significantly affected evaluations of Model A. A covariation analysis was performed to examine whether the effect of context on evaluations was altered if the perceived relative importance of the Model A attributes was controlled. In this analysis, we repeated the simple one-way ANOVA but included relative importance as a covariate. The relative importance of the Model A attributes was strongly correlated with Model A evaluations,  $F(1, 80) = 9.59, p = .003, MSE = 1.67$ . As expected, the previously significant effect of context (the presence vs. absence of a comparison object) on evaluations of Model A was nonsignificant when relative importance was controlled,  $F(1, 80) = 1.66$ . Thus, it appears that the presence of the comparison target moderated evaluations of Model A by diminishing the perceived importance of the presented Model A attributes.

Experiment 2 replicated the findings of Experiment 1 and demonstrated that the given information is overweighed in multiattribute judgment. More importantly, the findings suggest that this overweighing contributes to the overly extreme and confident judgments that have been demonstrated in prior research (e.g., Sanbonmatsu et al., 1992). Judgmental extremity and confidence increased as the weighing of the presented attributes relative to the nonpresented attributes increased. Finally, the findings indicate that the presence of a comparison target described by a large amount of information contributes to more moderate judgment of targets described by limited information by attenuating the overweighing of the known attributes. This, of course, is not the only process through which the presence of a large set-size object may moderate evaluations of a small-set tar-

TABLE 2  
Experiment 2: Effects of the Presence or Absence  
of a Comparison Target on the Reported  
Importance of Presented and Nonpresented  
Attributes

Condition	<i>n</i>	Presented Attributes	Nonpresented Attributes
Singular	46	1.53	0.88
Comparison	37	1.30	1.31

get. For example, an anchoring and adjustment process may also occur in which a highly favorable or unfavorable comparison target serves as an extreme judgmental anchor.

### EXPERIMENT 3

The purpose of the final experiment was to investigate a de-biasing technique that may diminish the tendency to overweigh the given information and form extreme judgments. In addition, we sought to replicate the previous two demonstrations of overweighing using a different measure of perceived importance. Participants received positive information about an automobile model then estimated the importance of various automobile attributes using a percentage scale on which the percentage reflected the proportional influence or weight of an attribute. Afterward, they evaluated the automobile. In the full list condition, participants judged the importance of a relatively complete list of attributes. In the pruned list condition, participants judged the importance of the presented attributes. In addition, all participants assessed the importance of “all other attributes”—the attributes that were missing.

The manipulation and measures used in the experiment were similar to those featured in studies of fault trees (e.g., Hirt & Castellan, 1988; Russo & Kolzow, 1994). In this research, participants typically are asked to assess the probability or relative frequency of listed possible causes of an outcome. Past fault-tree studies have shown that people tend to overestimate the relative frequency of the listed causes at the expense of causes that are not listed. For example, Fischhoff, Slovic, and Lichtenstein (1978) asked participants to estimate the relative frequency with which each of several problems (e.g., battery charge insufficient, fuel system defective) caused an automobile to fail to start in 100 starting failures. Some participants were given a list of six problems and a seventh “all other problems” category. Other participants were given a pruned fault tree consisting of three problems and the all other problems category. If participants in the pruned tree condition were cognizant of the omission of the three branches, they would and should have allocated the probability associated with each omitted branch to the all other problems category. However, they demonstrated insensitivity to omissions and instead assigned greater frequencies to the remaining branches.

The findings of Experiment 3 were expected to parallel those of the fault-tree studies. Normatively, when the list is pruned, the percentage importance assigned to the presented attributes should be largely the same as in the complete list, with the percentage importance of the omitted attributes being assigned to the all other attributes category. However, following the fault-tree studies, we expected that the percentage importance assigned to the presented attributes in the pruned list would increase substantially. Moreover, we anticipated that the inflated importance assigned to the presented attrib-

utes in turn would lead to extreme evaluations of the target automobile. In contrast, evaluations in the complete list condition were expected to be more moderate. The presentation of the complete list was expected to serve as a de-biasing manipulation that would increase participants’ cognizance of the judgment-relevant criteria and diminish the tendency to overweigh the given attributes. Finally, following Experiment 2, we anticipated that the differences in evaluation between the complete and pruned list conditions would be mediated by the differences in the perceived importance of the given attributes.

### Method

*Participants.* Ninety-eight undergraduate business students at a public university participated in the experiment as part of a class assignment. The participants were randomly assigned to either the complete or pruned attribute list condition and to one of three automobile descriptions.

*Procedure.* The experimental procedures and stimuli were similar to those used in Experiment 2. Participants again read a transcript from a radio program describing a “Model A” automobile. The description of Model A was varied, with participants receiving one of three descriptions that presented positive statements about three attributes of Model A. Preceding each attribute statement was an underlined label of the attribute dimension (e.g., “reliability”). After receiving the transcript, participants were given the task of estimating the percentage importance of each attribute on a list. They were told the following:

Features are weighed differently in the evaluation of an automobile. Some attributes or features are assigned a great deal of importance and have considerable impact on an evaluation, whereas others are weighed less heavily and have less impact on an overall evaluation. Listed below are various attributes of automobiles. Please assess the importance of each attribute using a percentage scale, where a high percentage indicates that an attribute is heavily weighted in your overall evaluation and a low percentage indicates that an attribute is not an important determinant of your overall evaluation of an automobile. In addition, please assess the importance of attributes that are not mentioned. Using the “all other attributes” category, please indicate the extent to which attributes that are not listed are important to your overall assessment of an automobile.

In the complete list condition, participants estimated the percentage importance of the nine attributes describing the Model A automobile across the three description conditions. In the pruned list condition, participants estimated the percentage importance of the three attributes describing Model A in the description that they were given. In addition, the per-

centage importance of all other attributes was assessed in both conditions. Participants were instructed not to consider price in their assessments of percentage importance. It was explained that price is of obvious importance to everyone and that the interest was in participants' perceptions of other attributes. Participants were told that the sum of the percentage weights assigned to the attributes had to total 100%. After completing the attribute rating task, participants evaluated the Model A automobile, indicated their confidence in their evaluation, and assessed the sufficiency of the information presented on scales identical to those used in Experiment 2.

## Results and Discussion

As in our previous experiments, the counterbalancing of the sets of attributes describing the Model A automobile did not moderate any of the predicted results and was ignored in the primary analyses. Table 3 presents the mean reported evaluations, confidence, and perceived sufficiency. As expected, participants who assessed the importance of the complete list of attributes evaluated the Model A automobile less positively than those who assessed the pruned list of attributes ( $M = 1.65$  vs.  $M = 0.31$ , respectively),  $F(1, 97) = 20.37, p < .001, MSE = 2.18$ . Thus, increasing cognizance of all of the attributes relevant to the judgment led to more moderate evaluations. Although the evaluations tended to be made with less confidence in the complete list condition than in the pruned list condition, this difference was not significant ( $M = 0.88$  vs.  $M = 1.18$ , respectively),  $F < 1$ . Finally, the presented information was perceived to be less sufficient when the list of attributes assessed was complete as opposed to pruned ( $M = 3.12$  vs.  $M = 3.90$ , respectively),  $F(1, 96) = 3.83, p = .05, MSE = 3.85$ .

The analysis of the estimations of percentage importance focused on the summed percentage importance assigned to the presented attributes, that is, the sum of the percentage importance that was given to the three attributes describing Model A by each participant. As expected, the total percentage importance assigned to the presented attributes was substantially higher in the pruned list condition than in the complete list condition ( $M = 80.8\%$  vs.  $M = 34.7\%$ , respectively),  $F(1, 96) = 233.3, p < .001, MSE = 223.4$ . Thus, the importance of the given attributes was overestimated when the list of rated attributes was pruned but not when participants were made cognizant of a broader criterion through the presentation of the complete list. Correlational analyses revealed that the estimated percentage importance of the given attributes was significantly correlated with evaluations,  $r = .41, p < .001$ ; and the perceived sufficiency of the information,  $r = .22, p < .05$ ; but not with confidence,  $r = .16$ .

In the final analysis, we examined the extent to which the percentage importance assigned to the given attributes mediated the effects of attribute list length (the task of estimating the percentage importance of attributes on the pruned vs. complete list) on evaluations. As we reported previously,

TABLE 3  
Experiment 2: Automobile Evaluations,  
Judgmental Confidence, and Perceived  
Sufficiency as a Function of the Presence  
or Absence of a Comparison Target

Variable	Singular Condition <sup>a</sup>	Comparison Condition <sup>b</sup>
Model A automobile		
Absolute evaluation	1.62	0.97
Comparative evaluation	0.96	0.32
Judgmental confidence	1.58	1.11
Perceived sufficiency	3.31	2.73
Model B automobile		
Absolute evaluation		2.17
Comparative evaluation		1.33
Judgmental confidence		1.69
Perceived sufficiency		4.67

<sup>a</sup> $n = 46$ . <sup>b</sup> $n = 37$ .

both the percentage importance assigned to the given attributes and evaluations were significantly affected by attribute list length. We performed a covariation analysis to examine whether the effect of the list length on evaluations was changed if the percentage importance assigned to the presented attributes was controlled. In this analysis, we repeated the simple one-way ANOVA but included percentage importance as a covariate. The percentage importance of the given attributes was correlated with evaluations when the list length was controlled,  $F(1, 95) = 2.59, p = .11, MSE = 2.15$ , although this relation was only marginally significant. As expected, the previously significant effect of list length on evaluations was nonsignificant when percentage importance was controlled ( $F < 1.5$ ). Thus, it appears that the effects of considering the importance of a complete versus pruned list of attributes affected the perceived importance of the presented attributes, which in turn guided evaluations.

## GENERAL DISCUSSION

Prior research has established that multiattribute judgments are often insensitive to set size (e.g., Sanbonmatsu et al., 1992; Sanbonmatsu et al., 1997). In some instances, targets described by a small amount of positive or negative evidence are judged as extremely and confidently as targets described by a large amount of evidence. This study helps to explain why. The findings from all three experiments demonstrate that when the evidence describing a target is limited, the importance or weight of the given attributes may be overestimated. This overweighing, in turn, contributes to the formation of overly extreme evaluations (Experiments 2 and 3). The research also helps to explain why set size effects are observed in within-subjects but not between-subjects judgments. The presence of a large set-size target diminishes the overweighing of the information describing a small-set tar-



get, thereby reducing the extremity of judgments of that target (Experiment 2).

The experiments also delineated several important boundary conditions under which information is overweighed and overly confident, and extreme judgments of targets described by limited attribute evidence are formed. In general, overweighing appears to be a robust tendency that takes place when the valence of the information is neutral or negative as well as positive (Experiment 1). Nevertheless, overweighing and the rendering of extreme judgment of a target is diminished when a comparison target is present (Experiment 2) or when people are knowledgeable of the target category (Experiment 1). Finally, in Experiment 3 we demonstrated that the *a priori* consideration of criteria may serve as a de-biasing technique that effectively combats the overestimation of the importance of the given information and the formation of overly extreme judgment.

### The Nature of Overweighing

At an operational level, our demonstration of overweighing is not altogether surprising. Participants, perhaps predictably, reported the attributes that were described as those that are important in making a judgment. Gas mileage was declared to be important if gas mileage was described, and reliability similarly was declared to be important if reliability was described. At a theoretical level, though, this finding runs counter to classical conceptions of judgment. Traditionally it has been assumed that judgmental tasks are approached with a fixed criteria or set of evaluation rules that guide information search and the assessment of evidence. However, our findings follow previous work in suggesting that the proverbial cart often leads the horse in multiattribute judgment. When individuals are not highly knowledgeable of the target domain, the described attributes lead the judgmental process by guiding the criteria that are used in the assessment of evidence. Instead of operating with a preexisting sense of how attributes should be weighed, individuals allow their sense of what is important to be dictated by what is presented, mentioned, or primed. Our findings demonstrate that this biased sense of what is important in turn determines to a significant degree the overall evaluation that forms. Thus, the findings are consistent with previous research suggesting that preferences and weights are often derived during judgment on the basis of prior knowledge, task demands, and contextual cues (e.g., Kahneman & Miller, 1986; Tversky et al., 1988).

Although an explicit measure of weighing (the reported importance or estimated percentage importance of attributes) was used in our study, we do not theorize that the conscious assessment of weights typifies information integration judgment. Instead, the weighing of information typically is a much more automatic process that is implicit in affective reactions to evidence and the influence that a piece of evidence has on overall evaluation. Nevertheless, people may have both explicit and implicit knowledge of the relevance of at-

tributes to a judgment. Thus, reported importance may be an apt indication of the weight or influence that an attribute has on judgment.

### Why Is the Given Information Overweighed?

An important set of factors that may play a significant role in the weighing and integration of evidence are the rules governing social discourse. Research (e.g., Grice, 1975; Strack, Schwarz, & Wanke, 1991) has shown that conversation typically proceeds according to cooperative maxims in which speakers try to be truthful, informative, relevant, and intelligible, and their listeners assume that messages are governed by these principles. In our experiments, participants may have assumed that these cooperative principles were operating and inferred that the presented evidence was relevant. That is, they may have overweighed the given attributes on the assumption that the communicator and experimenter would provide only the most pertinent information. Some facets of our results, however, suggest that this could not have been the only mechanism contributing to overweighing. The explanation does not account for the individual differences that were observed in Experiment 1. It seems unlikely that low- and moderate-knowledge participants would assume that cooperative principles of communication were operating and overweigh the given evidence but that high-knowledge participants would not. Moreover, in the attribute importance measure of the first two experiments, participants were instructed to list at least four attributes and up to eight attributes "that you believe are the most important" in evaluating the target. Thus, it was communicated to them that the given attributes were not necessarily the most important and that other attributes (in addition to the given four) were likely to be important.

This suggests that more fundamentally cognitive processes also underlie the overweighing demonstrated in our experiments. Many individuals lack differentiated weighing rules that define the relative weight or importance of an attribute to the overall judgment. Instead, they have only a general sense that various attributes are relevant. Because many attributes are represented as such, any given subset of them may be weighed heavily. Consequently, the attributes that are activated or primed by the given information tend to be treated as important and serve to guide the evaluation. In fact, in some instances, the partial list of given attributes may even obstruct the activation of additional criteria (see Alba & Chattopadhyay, 1986; Rundus, 1973). Individuals having considerable experience with the target domain, of course, tend to have well-developed and accessible criteria that specify the appropriate weight of a given attribute. Moreover, these experts often have a readily activated "checklist" of features or prototype against which a target can be directly compared. As a result, experts are more apt to recognize the limitations of the given evidence and draw inferences on the

basis of prior knowledge that lead to an adjustment of the overall evaluation.

On occasion, the communicated evidence may also persuade an individual of the importance of the described attributes. For example, text about the monetary savings to be gained from the excellent gas mileage of an automobile may lead a consumer to weigh gas mileage more heavily in the assessment of the model. Thus, presented evidence may not only activate select criteria but also argue for their importance, thus contributing to overweighing. Finally, a small set of attributes may have undue influence because judgment is "category-based" as opposed to "piecemeal" (see Fiske & Pavelchak, 1986). On occasion, a strong judgment may be derived on the basis of limited evidence because the configuration of attributes is representative of the prototype of a judgmental category. Thus, a highly favorable overall evaluation may ensue when a target is described by a small number of positive attributes because the target resembles a highly favorable category member.

In sum, a number of different processes may contribute to the overweighing of evidence and the formation of extreme evaluation. Although this research demonstrated the mediating role of overweighing in the singular evaluation of targets described by limited evidence, future research will need to examine the exact mechanisms through which overweighing occurs. This is important because of the diverse range of judgmental effects that may be mediated by overweighing (see the following).

### Judgmental Consequences

Many, and perhaps most, everyday judgments are based on limited information. Global assessments of consumer products, job candidates, and even romantic partners often are based on terribly incomplete knowledge of the relevant attributes. When the limitations of the given information are recognized and the correct weighting rules are applied, judgments based on limited evidence are moderated.<sup>1</sup> Judgmental moderation is appropriate and functional for many reasons. Moderate, middling, or typical judgment is frequently more accurate than extreme judgment when the available evidence is of limited reliability or validity (Griffin & Tversky, 1992). Moreover, less extreme judgment can be updated readily as

new information subsequently becomes available (Cialdini, Levy, Herman, & Evenback, 1973). In addition, less extreme judgment is easily justified, and the ability to justify one's judgmental position to oneself and others is important for self-esteem maintenance, regret minimization, and protection from retaliation (Shafir, Simonson, & Tversky, 1993; Tetlock, 1992). Consequently, when individuals are cognizant of important omissions, they adjust their judgments appropriately.

Unfortunately, people often lack well-defined criteria and cognizance of the limitations of the given evidence. This, of course, may have a variety of significant costs. It leads to evaluations of consumer brands, romantic partners, prospective employees, and other targets that are more extreme and confident than is warranted. Moreover, it contributes to judgment that is not commensurate with those formed in other contexts. The confident and extreme judgments resulting from overweighing also may contribute to insufficient search; in some instances, the seeking of additional information may be prematurely terminated because of the assumed importance and sufficiency of the given evidence. Finally and perhaps most troubling of all may be the poor decisions that ensue. The extreme evaluations of singular targets or response alternatives based on limited information formed in one context may contribute to poor choices in subsequent contexts (Hastie & Park, 1986; Kardes, 1986; Sanbonmatsu & Fazio, 1990).

We suggest that many of the biases that have been observed in studies of social cognition and judgment may result, in part, from a process of overweighing. Specifically, the overvaluations and polarized evaluations that have been demonstrated in diverse work on contingent valuation (e.g., Hausman, 1993; Kahneman & Knetsch, 1992) and attitude formation and change (e.g., Tesser, 1978) may be mediated by the overweighing of evidence. Overweighing similarly may underlie the tendency to overestimate the probability of a test hypothesis or focal outcome that has been demonstrated widely in research on hypothesis testing and prediction (e.g., Teigen, 1974; Van Wallendael & Hastie, 1990). The strength of the evidence for the test hypothesis or focal outcome may be overestimated (relative to the evidence for alternative hypotheses), thus contributing to confirmation (see Sanbonmatsu, Posavac, Kardes, & Mantel, 1998).

Not surprisingly, the tendency to overweigh the given information and form overly extreme and confident judgment is exploited in everyday life. Often communicators present information on select dimensions, confident that their listeners will be oblivious to holes and gaps in the evidence that is cited. Marketers, for example, successfully promote products that are only moderately good because many consumers never catch on to the products' limitations. Similarly, politicians persuasively present select arguments that favor their position, influencing listeners who are oblivious about the omissions. To avoid the mistake of overweighing and extreme judgment, people should set the evaluative agenda and not allow the given

<sup>1</sup>Moderation of judgment is not an inevitable consequence of lowered weighting of the presented attributes (and heightened weighting of the nonpresented attributes). Much may depend on the sort of inferences or assumptions that are sometimes made about the nonpresented attributes. Although average values (or slightly below average values) are typically inferred for missing attributes (e.g., Huber & McCann, 1982; Johnson & Levin, 1985; Meyer, 1981; Ross & Creyer, 1992), on occasion extreme inferences are made about unknown attributes (e.g., Levin, Johnson, Russo, & Deldin, 1985; Sanbonmatsu, Kardes, & Sansone, 1991) that contribute to extreme and confident overall evaluation. Thus, the overweighing of the given information is not the only mechanism contributing to extreme judgments of targets described by limited information.

stimuli to guide how they weigh evidence in multiattribute judgment. Our findings indicate that deliberate consideration of the judgmental criteria prior to exposure to evidence may help to ensure greater consistency in weighing. The results also indicate that comparisons with other targets should be drawn when possible. Finally, and most important, may be the development of judgment-relevant expertise. It appears that there is nothing better than a readily accessible and well-defined set of criteria to ensure reliable and valid judgment.

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