

Contextual Influences on Judgment Based on Limited Information

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When judging objects described by incomplete evidence, people often make judgments on the basis of what is known and fail to adjust for what is unknown. However, contextual factors may increase sensitivity to the limited weight of the given information. Consistent with this hypothesis, four experiments show that sensitivity to the limitations of the evidence and the likelihood of judgmental moderation increases when (a) a target is judged in the context of a similar object described on dimensions different from those used to describe the target, or (b) a target is judged in the context of a completely different type of object described by a relatively large amount of information. Considered together, the results suggest that judgment is moderated when contextual objects or cues alert judges to specific omissions or when contextual cues imply a general lack of information. The findings illuminate the diverse effects that even context objects of a different category have on information integration judgment. Context objects may affect the weighting as well as the valuation of the evidence about targets described by limited information and thereby contribute to judgmental moderation. Finally, the findings illustrate the contextually sensitive nature of the weighting criteria that guide information integration. © 1997 Academic Press

Judgment often requires the gathering, assessment, and integration of multiple pieces of information. Perhaps more often than not, the information that is available for these types of judgments is limited or incomplete. Consequently, most information integration judgments must be made without complete knowledge of all the relevant attributes or qualities. Thus, cars are assessed without knowledge of the warranty and repair record, and academic job candidates similarly are evaluated in the absence of information about administrative and supervisory skills.

According to a number of theorists (e.g., Ajzen & Fishbein, 1980; Anderson, 1981, 1982; von Neumann & Morgenstern, 1947), information integration judgments are an additive or averaging function of the evaluative implications and weights of the information about a target. Knowledge of the value and the importance or diagnosticity of each of the known attributes is integrated to form an overall judgment. In many instances, information integration judgments are adjusted for the amount or set size of the evidence that is available. Demonstrations of the “set size effect” have shown that when information about important attributes is missing, the overall judgment of an object or issue is often moderated. Evaluations become less extreme as the amount of information described decreases, even when the value (the evaluative implications) of each piece of information is held constant (Anderson, 1967, 1981, 1982; Kaplan, 1981; Sloan & Ostrom, 1974; Yamagishi & Hill, 1981, 1983).

Interestingly, though, judgments are not always adjusted for the amount of information given. Recent work

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suggests that in many instances, objects described by limited evidence are evaluated more extremely than is warranted (Kardes & Gurumurthy 1992; Kardes & Sanbonmatsu, 1993; Sanbonmatsu, Kardes, & Herr, 1992; Sanbonmatsu, Kardes, & Sansone, 1991. See also Griffin & Tversky, 1992). For example, Sanbonmatsu, Kardes, and Herr (1992) presented varying amounts of attribute information about a target camera to participants differing in levels of prior knowledge about cameras. Participants of low and moderate camera knowledge exhibited strong judgments across set size conditions. Objects described by a limited amount of positive evidence were evaluated as extremely and confidently as objects described by a considerably greater amount of positive evidence, even though the discrepant information was important. Thus, often judgment is insensitive to the limitations of the given information; people treat even a small sample of information as if it was highly complete and form extreme and confident judgments regardless of how much is known about the target.

One contributor to the tendency to form overly extreme evaluations of objects described by limited information may be the overweighting of the given evidence. In a recent experiment by Sanbonmatsu, Kardes, Ho, Houghton, & Posavac (1997), participants read brief descriptions of the attributes of a particular car model. When information about the appearance and acceleration of the car was presented, participants tended to report these attributes as being particularly important in the overall evaluation of an automobile. However, when the reliability and gas mileage of the car were described, these attributes were reported as particularly important. Thus, the importance or diagnosticity of the presented evidence was overestimated. Further analyses indicated that the overweighting of the given information contributed to overly extreme judgments of the automobile; judgments were based largely upon the evaluative implications of the presented attributes and little adjustment was made for the limited amount of information presented.

In sum, the literature indicates that sometimes judgments are moderated due to the limitations of the presented evidence and sometimes they are not. The question that remains, then, is when are judgments sensitive to limited information? That is, when do people form moderate vs extreme judgments of objects described by a small amount of evidence? One important determinant of sensitivity to the amount of information presented may be the judgmental context. In many instances, the information about nonfocal objects present in a context may increase sensitivity to the limited weight of the evidence for the target and contribute to more moderate overall target evaluations.

The targets and events of interest to people are not judged in a vacuum. The judgmental context invariably is rich with extraneous information about other objects that may affect the assessment of a target. Often a focal target is judged in the context of information about objects of the same category. For example, an assessment of a Maytag dishwasher may take place after an examination of a General Electric dishwasher. In other instances, a focal target is judged in the context of information about objects of a different category. An assessment of a Maytag dishwasher, for example, may take place after reading a description of a Pioneer stereo. Interestingly, both context objects of the same category and context objects of a different category may have a marked influence on how a target is evaluated. One of the aims of the present study was to investigate how and when contextual objects or cues increase sensitivity to the limitations of evidence about a focal target and moderate information integration judgments.

THE EFFECTS OF CONTEXT ON THE WEIGHTING OF INFORMATION

Ideally, the criteria used in evaluating objects of a particular category are invariant or consistent across contexts. The standards used in assessing one automobile model, for example, should be identical to the standards used in assessing other models of the same class. This commensuration, of course, ensures that evaluations can be used to compare the relative worth of different objects of the same category. Unfortunately, one of the more robust findings in the social cognition and judgment literatures is that people are often inconsistent in the standards that they use in judgment. Demonstrations of assimilation and contrast (e.g., Herr, Sherman, & Fazio, 1983; Parducci & Wedell, 1986; Petty & Wegener, 1993), preference reversal (e.g., Tversky & Kahneman, 1981; Lichtenstein & Slovic, 1971), and the "change of standard" effect (e.g., Higgins & Lurie, 1983; Higgins & Stangor, 1988) indicate that the criteria that are used in evaluation and the resulting judgment often vary markedly as a function of the situation. As a consequence, judgments formed in one context are sometimes of limited applicability or usefulness because they are not commensurate with those formed in others.

Numerous studies suggest that a judgmental context may bias the valuation of evidence. Demonstrations of attitudinal contrast (e.g., Herr, Sherman, & Fazio, 1983; Parducci & Wedell, 1986; 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. Thus, context may alter the criteria or standards for

assessing the overall favorability of an object or the favorability of the specific attributes of an object.

Studies similarly suggest that variability exists in how stimuli are weighted (e.g., Ebbesen & Konecni, 1980; Fischhoff, 1991; Fisher & Hawkins, 1993; Kahneman & Miller, 1986; Payne, Bettman, & Johnson, 1992; Shafer, 1986; Tversky, Sattath, & Slovic, 1988). In some instances, individuals appear to *construct* weights on the basis of prior knowledge and situational cues (Kahneman & Miller, 1986; Tversky, Sattath, & Slovic, 1988). We suggest that contextual objects may affect the weighting criteria that are used, that is, the perceived importance, diagnosticity, or probability or the attributes or qualities of a target. Contextual stimuli may alter the standards that are used in the weighting of presented information in either of two ways. In some instances, information about a context object may affect the manner in which specific attributes are weighted, that is, the degree to which specific attribute dimensions are considered to be relevant to a judgment. Alternatively, context may affect assessments of the overall weight or sufficiency of the given evidence. On occasion, contextual information may alter the subjective standards for what constitutes a large vs limited amount of evidence.

A context object is particularly likely to affect the criteria used in an assessment when a definitive set of standards is not readily activated in memory. In these instances, the stimuli in the context often set the evaluative agenda. That is, they serve as cues that determine the attribute dimensions that are weighted or considered in a judgment. Of course, individuals with extensive experience in a particular domain are more apt to have well established criteria that are less influenced by the specific information present in a context.

INCREASING COGNIZANCE OF THE ABSENCE OF SPECIFIC ATTRIBUTE INFORMATION

Our analyses suggest that in judgment based on limited information, contextual cues that heighten cognizance of the absence of specific attribute information should lower the weighting of the given evidence and increase judgmental moderation. In some instances, specific absences or omissions may be cued by other objects that are present in the context. Judgments of a focal target may be particularly likely to be moderated in the context of another object described on dimensions not mentioned in the description of the target.

Studies indicate that judgments of an object described by limited information tend to be overly extreme when the object is judged in isolation (Kaplan, 1981; Sanbonmatsu et al., 1992). In these instances, contextual cues that may prompt the recognition of the absence of specific features are not present. By contrast,

when a target described by limited evidence is judged in the context of other objects, these context objects often alert judges to the absence of relevant information, leading to more moderate judgments. Thus, set size effects have been observed much more frequently in within-subject studies (where the same individuals evaluate objects of varying set size) than between-subjects studies (where different individuals evaluate objects of varying set size).

Although set-size effects are particularly likely when an object is evaluated in the context of another, even within-subject set-size effects may be qualified by contextual factors. One contextual variable that may influence the magnitude of within-subject set-size effects is the type of information used to describe the objects. If two objects have similar attributes, specific omissions may not be readily apparent. However, if two objects have different attributes, the attributes of one object may alert judges to the absence of information about these attributes with respect to the other object. The distinction between similar and different attributes is crucial for understanding comparison processes (Tversky, 1977). *Shared* attributes are features used to describe two objects, whereas *unique* attributes are features used to describe one object but not the other. For example, if one brand of automobile is described by five attributes and another brand is described by a subset of three of the original five attributes, these three attributes are shared by both brands. In this case, the presence of information about two additional attributes in the large set brand (i.e., the brand described by more information) and the absence of information about the two additional attributes in the small set brand (i.e., the brand described by less information) should be highlighted. This should result in greater sensitivity to omissions and more moderate judgments of the small set object.

In some instances, however, there is no overlap between the features of two objects. For example, if one brand of automobile is described by five attributes and another is described by three attributes that are unrelated to the original five, both objects are described by attributes unique to each brand. In this case, the absence of information about the five original features of the large set object should produce judgmental moderation toward the small set object. Similarly, the absence of information about the three features of the small set object in the description of the large set object should produce judgmental uncertainty and moderation toward the large set object. Hence, more moderate judgments of the small set object should be observed in shared attribute conditions, and more moderate judgments of both objects should be observed in unique attribute conditions.

INCREASING COGNIZANCE OF THE GENERAL LIMITATIONS OF THE GIVEN EVIDENCE

Judgments based on limited information may also be affected by contextual cues that increase cognizance of the general limitations of the evidence that is available. In some instances, the presence of a great deal of information about a context object may highlight the small amount of information describing a target object, thus leading to judgmental moderation.

This analysis suggests that the amount of information used to describe a context object may influence perceptions of the amount of information given about a target object, even when the context object is unrelated and described on different dimensions from the target object. Again, people do not always encounter information about multiple objects belonging to the same category (e.g., two automobiles). Sometimes information about objects belonging to different categories (e.g., an ad for a bicycle followed by an ad for a camera) is encountered in a setting. On occasion, the amount of information used to describe an object of one category may influence perceptions of the relative completeness of evidence bearing on another object of a different category. For example, following exposure to a large amount of information about a bicycle, people may be more sensitive to the limited information presented about a camera. Thus, the set size of a description of a context object may influence subsequent judgments of a completely different target object.

OVERVIEW OF THE EXPERIMENTS

Four experiments investigated the effects of contextual factors on judgment based on limited information. The experiments attempted to demonstrate that sensitivity to the limitations of evidence and the likelihood of judgmental moderation is increased when (1) a target is evaluated in the context of a object described on judgment relevant dimensions different from those used to describe the target and (2) a target object is judged in the context of an object described by a relatively large amount of information. In the latter demonstration, we specifically attempted to show that the amount of information describing a context object may influence judgment even when the object is of a different category than the target. More generally, the experiments attempted to provide insight into *how* contextual cues affect information integration judgment. We sought to provide evidence that context may affect judgments based on limited information by: (1) heightening cognizance of specific absences or omissions and (2) generally increasing sensitivity to the overall sufficiency of the evidence.

A broader aim of the experiments was to illuminate the diverse effects that the objects present in a context, even objects of a different category from the target, can have on information integration judgment. Everyday judgments typically take place in a rich context of persons, objects, activities, and events. These contextual objects may not only affect the valuation of the evidence about a focal target, but also influence the weighting of evidence, and thereby contribute to more moderate judgments based on limited information. Finally, the study attempted to illustrate the contextually sensitive nature of the criteria that are used in judgment. The weighting of evidence is not invariant or fixed; in some instances, contextual objects may have a dramatic effect on assessments of the importance or sufficiency of the available evidence about a target.

Experiment 1 examined the judgmental effects of evaluating a target in the context of an object described on relevant but different attribute dimensions. We anticipated that the information about the context object would increase sensitivity to the absence of specific knowledge about the target, and contribute to more moderate judgments of the target. Experiments 2 and 3 attempted to demonstrate cross category set size effects. A target was evaluated in the context of a large or small amount of information about a object of a different category. We anticipated that a lengthy and detailed description of one object would make a brief description of a target seem incomplete, even if the target and the object belong to completely different categories. Consequently, judgments of the target described by limited information should be moderated. Finally, Experiment 4 examined the mediating role of the perceived sufficiency or weight of the evidence in judgments based on limited information. The experiment attempted to provide direct evidence that the amount of information about a context object moderates judgments of a target by affecting subjective assessments of the sufficiency of the available evidence.

EXPERIMENT 1

In Experiment 1, participants received descriptions of two similar objects (e.g., two automobiles) and the type of information to describe the objects was manipulated (i.e., shared vs unique attributes). The valence of the descriptions was also varied. The main prediction was that less extreme judgments (i.e., evaluations closer to the midpoint) would be observed in unique (vs. shared) attribute conditions, because sensitivity to omissions should be greater when two objects are described in terms of different attributes. Again, it was anticipated that the unique attribute descriptions

would alert perceivers to the absence of relevant information about each of the targets and thus lower the weighting of the given evidence about each of the targets.

Method

Participants. The participants were 100 undergraduates enrolled in an introductory marketing course at the University of Cincinnati or an introductory psychology course at the University of Utah who participated in exchange for course credit. Participants were randomly assigned to conditions.

Procedure. The study was described as an investigation of product perceptions. Participants received written descriptions of two automobiles (Brand Q and Brand S), one of which was described by five attributes (the large set object) and the other by three attributes (the small set object). The descriptions of both products were presented together on the same page in a questionnaire booklet, and the descriptions were either all favorable (e.g., slightly above average fuel economy) or all unfavorable (e.g., slightly below average fuel economy). A pilot test showed that the manipulation of attribute favorability was effective.¹ The statements describing the small set object were either a subset of the list of attributes describing the large set object (shared attribute conditions) or not a subset (unique attribute conditions).

The large set object was described by one of two sets of five attributes (ABCXY or FGXY), and the small set object was described by one of two sets of three

¹ The two large sets of favorable automobile attributes were guaranteed rustproofing, good acceleration, air conditioning, cloth upholstery, cruise control versus power brakes, good acceleration, slightly above average fuel economy, cloth upholstery, smooth ride. The two large sets of unfavorable automobile attributes were slightly below average acceleration, slightly uncomfortable seats, cruise control unstable on hills, slightly below average rustproofing, slightly thin bumper guards versus slightly below average fuel economy, slightly uncomfortable seats, AM/FM radio with slightly below average reception slightly below average rustproofing, slightly bumpy ride. A pilot test indicated that the favorable attributes were rated more favorably (on a scale from 1 = very bad to 7 = very good) than the negative attributes ($M_s = 5.54$ vs 2.55 , $t[14] = 16.53$). The two sets of favorable pen attributes were writes smoothly, guaranteed to write every time, special grip to ensure precision and control, available in a wide variety of colors, does not skip versus nonsmear ink, guaranteed to write every time, durable tungsten ball tip, available in a wide variety of colors, writes on a variety of surfaces. The two sets of unfavorable pen attributes were writes only on paper, ink smears readily, tip breaks with excessive pressure, not attractively styled, writes unevenly versus becomes uncomfortable with prolonged use, ink smears readily, grip can become slippery, not attractively styled, not long lasting. A pilot test indicated that the favorable attributes were rated more favorably than the negative attributes ($M_s = 5.55$ vs 2.08 , $t[14] = 14.88$, $p < .001$).

attributes (ABC or FGH). In unique attribute conditions, the list of attributes describing the small set object did not overlap with the list describing the large set object (i.e., ABC paired with FGXY). In shared attribute conditions, the list of attributes describing the small set object was a subset of the list describing the large set object (i.e., ABC paired with ABCXY, or FGH paired with FGXY). Thus, in one shared attribute counterbalance condition, the small set object was identical to the small set object in the unique attribute condition, whereas in the other shared attribute counterbalance condition, the large set object was identical to the large set object in the unique attribute condition. The same types of profiles and the same counterbalance conditions were also used for pens (Brand Y and Brand Z). A pilot test showed that there were no significant differences in how the small and large sets were evaluated.²

After reading the descriptions, participants evaluated each brand on a 15-point scale anchored by -7 = extremely unfavorable and $+7$ = highly favorable. After completing the automobile judgment task, participants performed a pen judgment task using the same experimental condition, procedures, and measures as those used for the automobile judgment task.

Results

Evaluative extremity of automobile judgments. Evaluations as a function of the amount of information presented (small or large set size), the type of attribute information given (shared or unique attributes), and attribute valence (favorable or unfavorable) is presented in Table 1. The analyses focused on the extremity of judgment in the direction of the valence of the described information. Thus, evaluations in the negative valence conditions were reverse scored to provide a measure of extremity commensurate with those in the positive valence conditions. A $2 \times 2 \times 2$ mixed-model analysis of variance with one within-subject factor (set size) and two between-subject factors (valence and type of attributes) was performed on evaluation extremity

² A pilot test indicated that evaluations of the two large sets of favorable automobile attributes were equally favorable ($M_s = 5.51$ vs 5.57 , $t[14] < 1$). The two small sets were also equally favorable ($M_s = 5.67$ vs 5.78 , $t[14] < 1$). Evaluations of the two large sets of unfavorable automobile attributes were equally unfavorable ($M_s = 2.53$ vs 2.41 , $t[14] = 1.13$, *ns*). Evaluations of the two small sets tended to be equally unfavorable ($M_s = 2.89$ vs 2.42 , $t[14] = 1.96$, $p = .07$). Evaluations of the two large sets of favorable pen attributes were equally favorable ($M_s = 5.68$ vs 5.43 , $t[14] = 1.51$, *ns*). Evaluations of the two small sets were equally favorable ($M_s = 5.82$ vs 5.40 , $t[14] = 1.51$, *ns*). Evaluations of the two large sets of unfavorable pen attributes were equally unfavorable ($M_s = 2.15$ vs 2.01 , $t[14] < 1$). Evaluations of the two small sets were equally unfavorable ($M_s = 2.11$ vs 1.89 , $t[14] < 1$).

TABLE 1

Evaluations of the Target Object as a Function of Amount of Information, Attribute Valence, and Type of Attributes (Experiment 1)

Amount of information	Positive attributes		Negative attributes	
	Shared attributes	Unique attributes	Shared attributes	Unique attributes
Automobile judgments				
Small amount	2.73	2.58	-2.39	-0.32
Large amount	4.39	3.73	-4.08	-2.46
Pen judgments				
Small amount	3.50	3.39	-3.12	-1.36
Large amount	5.19	4.62	-5.15	-3.50
	(<i>n</i> = 26)	(<i>n</i> = 26)	(<i>n</i> = 26)	(<i>n</i> = 22)

for the automobile stimuli. This analysis yielded a significant main effect for the type of attributes presented, $F(1, 96) = 8.65$, $p < .005$, $MS_e = 7.26$.³ As predicted, judgments were more extreme when shared attributes were presented than when unique attributes were presented.

Significant main effects for valence, $F(1, 96) = 7.51$, $p < .01$, $MS_e = 7.26$, and for set size were also observed, $F(1, 96) = 62.68$, $p < .001$, $MS_e = 2.18$. Evaluative extremity was greater in favorable (vs unfavorable) attribute conditions and in large (vs small) set size conditions. A marginally significant attribute type by valence interaction also emerged, $F(1, 96) = 3.55$, $p < .07$, as the type of attribute effect tended to be more pronounced in unfavorable attribute conditions. No other effects were observed ($ps > .20$).

Evaluative extremity of pen judgments. Evaluations of the pen in the negative valence conditions were reverse scored to provide a measure of extremity commensurate with those in the positive valence conditions. A $2 \times 2 \times 2$ mixed-model analysis of variance with one within-subject factor (set size) and two between-subject factors (valence and type of attributes) was performed on the extremity of the evaluations of the pens. This analysis yielded a significant main effect for the type of attributes presented, $F(1, 96) = 6.99$, $p < .01$, $MS_e = 7.46$. As predicted, evaluative extremity was greater when shared attributes were presented than when unique attributes were presented. Significant main effects for valence, $F(1, 96) = 5.28$, $p < .03$, $MS_e = 7.46$, and for set size were also observed, $F(1, 96) = 46.00$, $p < .001$, $MS_e = 3.40$. Evaluative extremity was greater

³ To examine the effectiveness of the counterbalance manipulation, 2×2 (shared attribute set 1 or shared attribute set 2, positive or negative valence) analyses of variance were performed on target evaluations for each set size condition and for each target object. No main effects for the counterbalance manipulation and no interactions were observed (all $F_s < 1$).

in favorable (vs unfavorable) attribute conditions and in large (vs small) set size conditions. A marginally significant attribute type by valence interaction also tended to emerge, $F(1, 96) = 3.07$, $p < .09$, as the type of attribute effect tended to be more pronounced in unfavorable attribute conditions. No other effects were observed ($ps > .20$).

Discussion

The results of Experiment 1 replicate previous research and show that more moderate judgments are formed toward an object described by a small amount of information than toward an object described a large amount of information. More importantly, less extreme judgments are formed toward an object described by a large amount of information as well as toward an object described by a small amount of information when each object is described by unique, non-overlapping attributes. Attributes unique to one object imply a lack of information about these specific attributes regarding the other object. Detecting specific omissions (i.e., specific attributes for which no information is provided) should increase awareness of the specific limitations of the given evidence and result in more moderate judgment. Hence, information concerning one object provides a context for assessing the sufficiency of the specific evidence provided for another object.

Although the pattern of results was consistent with our hypothesis in both valence conditions, there was a marginally significant tendency for the effect of context (unique vs shared) to be stronger in the negative valence condition than in the positive valence condition. Many of the attribute dimensions on which the pens and automobiles in the positive valence conditions were described were different from those in the negative valence conditions. It is possible that the unique attribute dimensions in the negative valence conditions were more important or diagnostic than those in the positive valence conditions. Consequently, the recognition of the absence of information may have had a greater effect in the negative valence conditions than in the positive valence conditions. For example, many of the positive attributes used to describe the automobiles may have been attributes that are assumed to be present in most new automobiles. Many people may assume that new automobiles have air conditioning, rustproofing, and cruise control, or view these attributes as being of less importance. Information consistent with people's assumptions is not particularly diagnostic, and nondiagnostic omissions should not be weighed heavily in judgment.

Experiment 1 examined the judgmental effects of evaluating an object in the context of another object

described on different attribute dimensions. Information about the unique attributes of the context object increased sensitivity to the absence of information about these specific attributes in the description of the target. In Experiment 1, the context object and the target object were members of the same object category (i.e., both were automobiles or both were pens). By contrast, Experiment 2 examined the judgmental effects of evaluating a target object in the context of another object belonging to an entirely different category (i.e., a bicycle and a camera). Because objects belonging to different categories are often described on attribute dimensions that are irrelevant to one another, the context object is less likely to cue the absence of specific attribute information about the target. Nevertheless, context object descriptions may affect perceptions of the general sufficiency or adequacy of the presented target information.

EXPERIMENT 2

The amount of information used to describe a context object (the first object to be evaluated) was manipulated to examine the effects of this contextual variable on judgments of a target object (the second object) belonging to a different category. It was predicted that context object set size would have no effect on judgments of the context object itself because this object would be judged in isolation. However, judgments of the target object should become less extreme as the amount of information used to describe the context object increased. We anticipated that after reading a lengthy and detailed description of one object, a brief description of another object may seem incomplete, even if the two objects belong to completely different categories. In this case, people are unlikely to be alerted to specific unknown attributes. Instead, the context may lead to a lowering of the overall weight or perceived sufficiency of the given evidence and adjustment toward moderation.

Method

Participants. Sixty-seven University of Utah undergraduates participated to obtain extra course credit in an introductory psychology course. Students participated in groups of two to four and were randomly assigned to an experimental condition.

Procedure. The study was described as an investigation of product perceptions. Participants read about two products—the “Brand A Camera” and the “Brand I Bicycle.” Half of the participants read about the camera first, whereas the remaining subjects read about the bicycle first. The statements describing both products were all positive (e.g., “The frame of the Brand I Bicycle

is superior to most other models in strength and durability,” “The Brand A Camera is easier to load and operate than most comparable models”) and were allegedly made by experts. Both products were generally described as averaged-priced and manufactured by a reputable firm. The number of specific statements describing the first object (the context object) was varied as either 4, 8, or 12 statements were presented. The 12 statements presented in the large set-size condition were divided into three different subsets of 8 for the medium set-size conditions. Furthermore, the 12 statements were subdivided into three different subsets of 4 for the small set-size conditions.

The second object (the target object) was always described by the same four bicycle statements or the same four camera statements. The Brand A bicycle served as the target object in half of the conditions, and the Brand I camera served as the target object in the remaining half. Participants were provided with up to 90 s to read about each product. Each brand was evaluated on a 9-point scale anchored by $-4 =$ very unfavorable and $+4 =$ very favorable.

Results

Judgments of the target object. Evaluations of the context (first) and target (second) objects as a function of the amount of information used to describe the context object are presented in Table 2. A 2×3 (Product category of the target object \times Set size of the context object) between-subjects analysis of variance of the evaluations of the target object revealed a main effect of the set size of the context object, $F(2, 61) = 5.11, p = .009, MS_e = 1.72$. As expected, evaluations of the target object became less extreme as the amount of information describing the context object increased. A planned contrast revealed that evaluative judgments were less extreme when the first product was described by 12 as opposed to 8 attributes, $t(61) = 2.25, p < .02$. Evaluations were similarly less extreme when the context object was described by 8 as opposed to 4 attributes. However, this trend was not significant ($t < 1$). The product

TABLE 2
Evaluations of the Context and Target Objects as a Function of the Amount of Information Describing the Context Object (Experiment 2)

Object	Amount of information describing the context object		
	Small	Moderate	Large
Context	2.30	2.81	2.70
Target	2.04 ($n = 23$)	1.76 ($n = 21$)	0.87 ($n = 23$)

category (i.e., cameras vs bicycles) had no main or interactive effects (both $F_s < 1.7$, *ns*).

Judgments of the context object. A 2×3 (Product category of the target object \times Set size of the context object) analysis of variance indicated that evaluations of the context object were not affected by the amount of information presented for the context object, $F(2, 61) = 1.03$, *ns*, $MS_e = 1.51$. Thus, as expected, evaluations of the context object did not become more extreme as more positive evidence about this object was provided. Between-subject judgments of a single object judged in isolation are often insensitive to set size, presumably because the limitations of the evidence are often not perceived even when the set size is small (Sanbonmatsu et al., 1992). Finally, there was no main effect or interaction as a function of the product category of the initial object (both $F_s < 1$).

Discussion

As expected, more moderate judgments of the target object were formed as the amount of information used to describe the context object increased. Hence, the amount of information used to describe a context object appears to influence sensitivity to the limitations of the evidence about subsequently considered stimuli. Interestingly, this pattern was observed even though the context (first) object and the target (second) object were members of different categories. Because objects belonging to different categories are generally noncomparable, information about one object often has little direct bearing for judging the other.

We suggest that the amount of information used to describe the context object diminished the weighting of the description of the target object. When noncomparable objects are described by a large amount of information, people may realize that they have limited information about a briefly described target. This realization may not require the detection of specific missing attributes. A general sense that information is limited may be sufficient to lead to judgmental moderation.

Although bicycles and cameras are not likely to have many shared attributes, some overlap may exist—especially along abstract dimensions, such as reliability or quality (Johnson 1984). Hence, there may be some possibility that the presence of information on a particular dimension of one object may have cued judges to the absence of information on this dimension concerning another object, analogous to the unique attribute effects examined in Experiment 1. Experiment 3 sought to rule out this possibility by presenting information about completely different objects that share few attribute dimensions (soybeans and cameras).

Another possible interpretation of the results of Experiment 2 is that the shift in judgments of the target object observed as a function of the amount of information describing the context object may have stemmed from a change in the criteria used in the valuation of the evidence. Extreme (large set size) descriptions of the context object may have contributed to an evaluative contrast effect (Herr, Sherman, & Fazio, 1983; Parducci & Wedell, 1986; Petty & Wegener, 1993; Wedell, 1991, 1994; Wegener & Petty, in press) in which the context object evaluation served as a reference point or anchor from which the target object was shifted away to a more moderate position.

Experiment 3 attempted to demonstrate that an alteration in the perceived weight of the evidence rather than an alteration of the perceived valuation of the evidence may mediate the effects of the set size of the description of a context object on evaluations of a target object. In Experiment 3, varying amounts of information was presented about a relatively neutral context object—soybeans. Because information about soybeans is relatively neutral, any effects of set size are unlikely to stem from a change in the standards used to value the target object evidence.

EXPERIMENT 3

Amount of information presented about a neutral context object (soybeans) and description valence of an unrelated target object (a camera) were manipulated to examine the effects of amount of contextual information on judgments of a target object. It was predicted that target judgments should become more moderate as the amount of contextual information presented increases.

Method

Participants. Fifty-one University of Utah undergraduates participated to obtain extra course credit in an introductory psychology course. Students participated in groups of two to four and were randomly assigned to an experimental condition.

Procedure. The study was described as an investigation of product perceptions. Participants read either 4 or 15 statements about soybeans (e.g., “Soybeans are planted in May or early June,” “The oil obtained from the soybean is used in making food products such as margarines and various chemical extracts”). They were given up to 90 s to read the statements. Afterwards, they were asked to answer two questions about soybeans and indicate the extent to which the statements increased their knowledge of soybeans.

Participants then read about the “Brand A Camera.” Brand A was described as an average-priced, 35-mm camera manufactured by a reputable firm. Subjects were presented with either four positive (e.g., “The Brand A Camera is easier to load and operate than most comparable models”) or four negative statements (e.g., “The Brand A Camera is slightly heavier and less compact than some other 35mm cameras”) about the attributes of the camera that were allegedly made by camera experts. Evaluations of the Brand A camera were assessed on a 9-point scale anchored by $-4 =$ very unfavorable and $+4 =$ very favorable.

Results and Discussion

Target object evaluations as a function of context object set size and target description valence are presented in Table 3. The analyses focused on the extremity of judgment in the direction of the valence of the described information. As in Experiment 1, evaluations in the negative valence condition were reverse scored to provide a measure of extremity commensurate with that in the positive valence condition. A 2×2 (Set size of the context object \times Valence of the description of the target object) analysis of variance of the camera evaluations revealed a significant main effect of set size, $F(1, 47) = 5.38, p = .025, MS_e = 1.91$. As expected, evaluations of the Brand A camera were more extreme when a small as opposed to a large amount of soybean information was presented. The interaction was not significant, $F < 1$, indicating that the effect of the amount of soybean information on the extremity of the camera evaluations did not vary as a function of the valence of the information. The valence main effect was also highly significant, $F(1, 47) = 9.27, p < .005, MS_e = 1.91$, as evaluations of the Brand A were generally less extreme when the descriptions were negative than when descriptions were positive ($Ms = .92$ vs 2.12).

As expected, less extreme judgments (judgments that were less extreme in the direction implied by the valence of the description) of a target were formed

when the context object was described by a relatively large (vs small) amount of information. The overall pattern of results observed in Experiments 1–3 are consistent with our notion that a context object may contribute to judgmental moderation by affecting the perceived weight or sufficiency of the information. Nevertheless, direct evidence for the mediating role of the perceived sufficiency of the given information is lacking. A fourth experiment was designed to test the mediation hypothesis. Experiment 4 examined the effects of the amount of information used to describe a neutral context object on target judgment extremity, perceived sufficiency of evidence, and confidence. It was predicted that perceived sufficiency should mediate the effect of context object set size on target judgment extremity. As perceived sufficiency decreases, extremity should decrease.

EXPERIMENT 4

Amount of information presented about a neutral context object (soybeans) was manipulated and judgments of an unrelated target object (a bicycle) were measured. Several dimensions of judgment were examined, including extremity, perceived sufficiency of evidence, and confidence. It was hypothesized that perceived sufficiency mediates the effects of the amount of information provided about a context object on judgments of a target object.

Method

Participants. The participants were 52 undergraduates enrolled in an introductory marketing course at the University of Cincinnati who participated in exchange for course credit. Participants were randomly assigned to conditions.

Procedure. The study was described as an investigation of product perceptions. Participants read either 4 or 12 statements about soybeans and were given up to 90 s to read the statements. Afterward, they were asked to answer two questions about soybeans and indicate the extent to which the statements increased their knowledge of soybeans.

Participants then read about the “Brand I Bicycle,” which was described as an average priced 10-speed bicycle. Participants were randomly assigned to one of three description conditions. Each description consisted of four positive statements (e.g., “The Brand I is one of the most comfortable riding bicycles”) that were allegedly made by experts.

TABLE 3

Evaluations of the Target Object as a Function of the Amount of Information Describing the Context Object and Target Description Valence (Experiment 3)

Target object description	Amount of information describing the context object	
	Small	Large
Positive	2.46 (<i>n</i> = 13)	1.75 (<i>n</i> = 12)
Negative	-1.46 (<i>n</i> = 13)	-.38 (<i>n</i> = 13)

Judgmental extremity was assessed on a 9 point scale anchored by $-4 =$ highly unfavorable and $+4 =$ highly favorable. Perceived limitations of evidence was measured on scale on which subjects were asked to "indicate the extent to which the information presented about the Brand I Bicycle was sufficient or adequate for making a sound judgment." A 9-point scale anchored by $-4 =$ not at all enough and $+4 =$ completely sufficient was employed. Judgmental confidence was assessed on a scale on which subjects were asked to indicate how confident they were that their evaluations were accurate. A 13-point scale anchored by $0 =$ not at all confident and $12 =$ completely confident was employed.

Results and Discussion

It was postulated that the effect of the amount of information used to describe the context object on judgments of the target object would be mediated by the perceived sufficiency of evidence. As expected, the results showed that judgments of the target object (the Brand I Bicycle) were more moderate when this object was described in the context of a neutral object (soybeans) described by a large (vs small) amount of information ($M_s = 1.50$ vs 2.14 ; $n_s = 24$ vs 28), $F(1, 50) = 3.64$, $p = .06$, $MS_e = 1.47$. Moreover, there was a main effect for perceived sufficiency, $F(1, 50) = 3.94$, $p = .05$, $MS_e = 3.40$. The perceived sufficiency of the evidence was lower when the context object was described by a large (vs. small) amount of information ($M_s = -.38$ vs $.64$).

Correlational analysis revealed that perceived sufficiency was related to evaluative extremity ($r = .74$, $p < .001$). We next examined whether the effect of context object set size on target object judgments was changed if the perceived sufficiency of the information was controlled. To test this, we repeated the one-way analysis of variance on target object judgments but this time included perceived sufficiency as a covariate. The previous effect of context object set size on target judgment extremity was reduced from an F of 3.64 ($p = .06$) to an F of $.44$ ($p > .50$) when perceived sufficiency was included in the analysis as a covariate. Thus, the analysis suggests that perceived sufficiency of the evidence represents an important mediator of the effect of the amount of contextual information presented on judgments of the target object.

Target judgment confidence also tended to be weaker when the context object was described by a large (vs small) amount of information ($M_s = 7.08$ vs 7.93), but this effect was nonsignificant, $F(1, 50) = 1.74$, $p = .19$, $MS_e = 5.31$. Confidence was significantly correlated with extremity ($r = .50$, $p < .001$) and with perceived sufficiency ($r = .62$, $p < .001$).

Considered together, the results suggest that the perceived sufficiency of evidence mediates the effects of exposure to limited information on judgment. The effect of the amount of information used to describe a context object on judgments of a target object is reduced when variance due to perceived weight or sufficiency is controlled. When a target object is judged in the context of another object described by a larger (vs smaller) amount of information, perceived sufficiency decreases and more moderate judgments are formed.

GENERAL DISCUSSION

The experiments further our understanding of when information integration judgments are moderated for the limitations of the given information. Previous research indicates that sensitivity to missing information is affected by processing goals (Sanbonmatsu *et al.*, 1991), time of judgment (Sanbonmatsu *et al.*, 1991), level of prior knowledge (Sanbonmatsu *et al.*, 1991, 1992), and the direction of comparison (Kardes & Sanbonmatsu, 1993). The present findings extended prior work by examining the characteristics of contextual objects that influence information integration judgment. The experiments demonstrated that sensitivity to the limitations of evidence and the likelihood of judgmental moderation increase when (1) a target is evaluated in the context of a object described on judgment relevant dimensions different from those used to describe the target or (2) a target is judged in the context of a completely different type of object described by a relatively large amount of information. Thus, contextual objects, even objects of a different category, may influence judgments of targets described by limited evidence. Our findings indicate that the effect is dependent on the type and amount of information about the context object that is provided.

How Do Contextual Cues Affect Information Integration Judgment?

Perhaps more importantly, the study furthers our understanding of how contextual cues affect judgments based on limited information. Experiment 4 demonstrated that as the amount of information used to describe a context object increased, the perceived sufficiency of the target evidence decreased, as did the extremity of the target judgment. Thus, the effects of information about a context object on target extremity were mediated by changes in the perceived weight or sufficiency of the evidence.

Context may affect the weighting of information in at least two ways. The findings suggest that contextual information may alert people to specific omissions when

comparable objects are described on different dimensions (Experiment 1). In this situation, information about attributes unique to one object increases sensitivity to a lack of information about these specific attributes concerning the other object. In other instances, however, context may increase cognizance of the general limitations of the evidence about a judged object. A small amount of information about a target seems especially limited and incomplete following exposure to a large amount of information about a completely different object (Experiments 2–4). In this case, it is unlikely that the context cues or highlights specific omissions because the objects are noncomparable and information about one object has no direct bearing on judgment of the other. Instead, the context appears to lower the perceived overall sufficiency or weight of the given information, thus leading to more moderate judgments.

Thus, both a general sense that information is limited and the detection of specific omissions may lead to judgmental moderation. These findings illustrate that a crucial determinant of judgmental extremity is not simply the actual amount of information given, but the *perceived* amount of evidence or the *perceived* weight of the evidence. Context may affect judgments by altering perceptions of the amount of diagnostic evidence that is available even when the objective amount of information presented is held constant. This suggests that in some contexts, judgments of a target described by a relatively complete set of information may be unjustifiably weak because of contextual cues that lead to the erroneous perception that information is limited. Moreover, in some instances where important information is missing, contextual cues may contribute to the misperception that the evidence is relatively complete, leading to more extreme and confident judgments than are warranted.

Context effects on the perceived sufficiency of information have important implications for understanding judgment based on limited evidence. Judgments differ markedly when people are sensitive as opposed to insensitive to the limitations of the evidence. Although people are frequently required to rely on incomplete or fragmentary evidence, omissions are easily overlooked when contextual cues implying that the presented information is limited are unavailable. Under these circumstances, judgments tend to be based primarily on the implications of the presented information. Ideally, judgments and decisions should be based on all relevant information, regardless of its immediate presence or absence at the time of judgment. However, insensitivity to the weight of the evidence encourages people to base their judgments on information that happens to be present when the judgment or decision is rendered.

Why does a decrease in the perceived sufficiency of evidence contribute to more moderate judgment? There are several reasons why judgmental extremity decreases in response to a lowering of the subjective weighting of the given information. Relatively moderate judgments are frequently more accurate than extreme judgment when the available evidence is of limited reliability or validity (Griffin & Tversky, 1992). Moreover, less extreme judgments can be updated readily as new information subsequently becomes available (Cialdini et al., 1973; Jaccard & Wood, 1988). In addition, extreme judgments are not 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).

Additional processes mediate the tendency to form less extreme judgments when information is recognized to be missing or limited. One way people deal with incomplete evidence is by drawing inferences that go beyond the information given and that fill gaps in knowledge (Bruner, 1957). Often average values (or slightly below average values) are inferred for missing attributes and these inferences contribute to less extreme overall evaluations (Ganzach & Krantz, 1990, 1991; Huber and McCann, 1982; Jagacinski, 1991, 1994; Johnson, 1987; Johnson & Levin, 1985; Meyer, 1981; Ross & Creyer, 1992; Slovic & MacPhillamy, 1974; Yamagishi & Hill, 1981, 1983; Yates, Jagacinski, & Faber, 1978). Unknown attributes are often assumed to have typical or middling values because people are frequently reluctant to draw extreme inferences when they recognize that information is limited (Sanbonmatsu *et al.*, 1991). However, the attribute inferences that are drawn and the impact that they have on judgment varies markedly (Connolly & Srivastava, 1995). In some instances, extreme inferences and extreme overall evaluations may form (e.g., Levin, Johnson, Russo, & Deldin, 1985), particularly if the unknown attributes are perceived to be correlated with the known attributes (Kardes & Sanbonmatsu, 1993).

The present findings are consistent with recent work that has examined the role that rules or principles of discourse play in social inference. Psycholinguistic (e.g., Grice, 1975) and recent social cognitive (e.g., Delany & Hilton, 1991; Schwarz, Strack, Hilton, & Naderer, 1991; Strack, Schwarz, & Wanke, 1991) research has found that conversation typically proceeds according to "cooperative" principles or maxims. Speakers try to be truthful, informative, relevant, and intelligible and their listeners generally assume that the message is governed by these principles. Participants in our experiments

may have generally inferred that the information presented was important and informative. However, the presence of much greater information about a context object (large set size conditions) may have lead participants to question the informativeness of the given evidence. As a consequence, they may have moderated their judgments. Thus, the amount of information describing the context object may have influenced judgment by altering the assumptions that were made about the intended importance or informativeness of the evidence about the target object.

Context and the Weighting of Evidence

Contextual cues are rich and informative. The context in which information is received often supplies important reference points and standards for judgment. In the present set of studies, context-induced shifts in judgments of the target object were observed when direct comparisons between the target and context objects were unlikely and when favorable or unfavorable target objects were judged in the context of an unrelated neutral object. These results are inconsistent with a valuation-based contrast effect interpretation of context-induced shifts in judgment. Instead, the results imply a different type of context effect: contextual information provides a frame of reference for determining whether sufficient information for generating an informed opinion is available in a given situation. We suggest that context may alter the reference point used in assessing the weight of the evidence. The presence of an object described by substantial information may influence judgments of a target described by limited information by raising the standard for the amount of information needed to form a strong opinion.

This type of context effect has important implications for persuasion and social influence. It suggests that the effectiveness of a persuasive communication containing a limited number of arguments may be tempered by the context in which it is received. Communicators may wish to avoid contexts in which the paucity of information being presented might be made evident by preceding or following messages containing a greater amount of information.

Obviously, there are limits to the influence that a contextual object may exert on the weighting of target evidence. In many instances, information about a context object will have no effect on judgment because there are few or no overlapping attribute dimensions with the target. Gathering a large amount of evidence about a horse, for example, is unlikely to affect the evaluation of a television because the features of a horse are not likely to cue the absence of information about a key

television attribute such as picture quality. Any discrepancies in information about a context object and target must be apparent and perceived. The weighting of target evidence is particularly likely to be affected when information about a context object is presented in the same medium (e.g., print) and format, and by the same communicator as the target object.

The experiments extend previous findings suggesting that the criteria that are used in judgment are malleable rather than fixed (Kahneman & Miller, 1986; Tversky, Sattath, & Slovic, 1988). Both the weighting and the valuation of evidence in information integration judgment are sensitive to the context. Our findings indicate that contextual objects can significantly affect assessments of the importance or sufficiency of the available evidence about a target and the subsequent integrative judgment that is rendered.

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