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BASE RATES, REPRESENTATIVENESS, AND THE LOGIC OF CONVERSATION: THE CONTEXTUAL RELEVANCE OF "IRRELEVANT" INFORMATION

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According to the cooperative principle of conversation that governs social discourse in everyday life, listeners expect speakers to be relevant, truthful, and informative. In studies on judgmental biases, researchers frequently violate this principle by presenting information that is neither informative nor relevant in a communicative context that suggests otherwise. However, subjects have no reason to doubt the relevance of the presented information and try to make sense of it, as they would be expected to do in everyday life. In Experiment 1, the applicability of the cooperative principle was varied to explore the impact of conversational principles on the apparent overreliance of individuals on nondiagnostic person information at the expense of base-rate information. Nondiagnostic person information was presented either as a statement written by a psychologist or as a random sample of information drawn by a computer. As predicted, subjects relied on the personality information rather than on base-rate information to a greater extent in the former

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than in the latter case, presumably because a human communicator (but not a computer) is supposed to conform to conversational norms and to provide information that is informative, truthful, and relevant. In addition, subjects relied more on individuating information when the framing of the task implied that psychologists provided correct estimates than when it implied that statisticians provided correct estimates and when the individuating rather than the base-rate information was varied as a within-subjects factor (Experiment 2).

Social cognition research has frequently been criticized as being asocial in nature. Although the information processing paradigm, to which social cognition research is committed (Ostrom, 1984), stimulated an enormous research productivity in social psychology, its concentration on individuals as isolated information processors fostered a neglect of the social context in which human judgment occurs. As Forgas (1981) observed, "social psychology found itself transformed into a field now mainly concerned not with human social action, but with human beings as thinkers and information processors about social stimuli" (p. 3). In the present article, we argue that even the study of "human beings as thinkers and information processors" is likely to suffer from this neglect, and we suggest that social cognition research may greatly benefit from a fuller consideration of the social context of human judgment. Using Grice's (1975) maxims of conversation as a starting point, we will illustrate our argument with an analysis of the conversational dynamics underlying one of the now classic studies on human judgmental biases (Kahneman & Tversky, 1973).

THE COOPERATIVE PRINCIPLE OF SOCIAL DISCOURSE

As a large body of psycholinguistic research documents (see Clark, 1985; Higgins, 1981; Sperber & Wilson, 1986; for reviews), social discourse proceeds according to a "cooperative" (Grice, 1975) or "relevance" (Sperber & Wilson, 1986) principle. This principle holds that speakers should "try to be informative, truthful, relevant, and clear" and that listeners interpret the speakers' utterances "on the assumption that they are trying to live up to these ideals" (Clark & Clark, 1977, p. 122). This principle can be expressed in the form of four maxims. There is a maxim of quality that enjoins speakers not to say anything they believe to be false or lack adequate evidence for and a maxim of relation that enjoins speakers to make their contribution relevant to the aims of the ongoing conversation. In addition, a maxim of quantity requires speakers to make their contribution as informative as is required but not more informative than is required, and a maxim of manner

holds that the contribution should be clear rather than obscure, ambiguous, or wordy. Accordingly, "communicated information comes with a guarantee of relevance" (Sperber & Wilson, 1986, p. vi), and the listener is entitled to assume that the speaker tries to be informative, truthful, relevant, and clear.[1]

These basic assumptions, which underlie social discourse in everyday settings, are routinely violated in studies on judgmental biases. In these studies, experimenters as social communicators often introduce information that is neither informative nor relevant. However, subjects have no reason to doubt the relevance of information provided to them in a serious research setting and are likely to assume that the utterance reflects a particular "communicative intention" (Grice, 1975) on the part of the experimenter. To recognize the experimenter's informative intention, subjects go beyond the literal meaning of the sentence and are "likely to seek relevance in any experimental message" (Kahneman & Tversky, 1982, p. 502). As a consequence, they are likely to treat irrelevant information as relevant, resulting in judgmental errors relative to normative models that consider only the literal meaning of the utterance but not the implications of the communicational context. Note, however, that these errors are due to violations of conversational norms on part of the experimenter and may be unlikely to be obtained under circumstances that conform to conversational norms.

To this extent, these errors may not generalize to everyday-life contexts outside the social reality of the psychological laboratory. As Funder (1987) pointed out, an "error" (i.e., a judgment of a laboratory stimulus that deviates from a normative model) does not necessarily represent a "mistake" (i.e., an incorrect judgment in the real world). "Detection of an error implies the existence of a mistake only when the process that produces the error also produces incorrect judgments in real life" (p. 76).

In the present article, two studies will be reported that address one central aspect of social discourse in experimental situations, namely, the perceived communicative intention. The impact of this variable will be investigated in the context of a well-known research paradigm that was designed by Kahneman and Tversky (1973) to study biases in human judgment. In such situations, subjects need to understand not only the semantic meaning of the information presented to them but also how this information should be used for the required judgment.

1. Although Sperber & Wilson's (1986) account of the logic of conversation owes much to Grice, they suggest that his four maxims should be reduced to a single maxim of relevance. For our present purposes, it is sufficient to note that any utterance that satisfies Grice's maxims would be considered "relevant" by Sperber and Wilson.

Thus, judges have to infer the intended use of a particular piece of information. The role of conversational norms for such inferences and the resulting judgments will be discussed on the basis of the findings from the present studies. These findings will indicate that a consideration of the communicative context of human judgment allows a better understanding of some classical demonstrations of a presumably pervasive "judgmental error," namely, the overreliance on individuating information.

INFERRING THE COMMUNICATIVE INTENTION

In a well-known study on the use of the representativeness heuristic, Kahneman and Tversky (1973) found that subjects relied heavily on individuating information of little diagnostic value at the expense of more diagnostic base-rate information. For example, subjects in some conditions were told that the target person "shows no interest in political and social issues and spends most of his free time on his many hobbies, which include home carpentry, sailing, and mathematical puzzles." These subjects predicted that the target person is most likely an engineer, independently of whether the base-rate probability for any target's being an engineer was .30 or .70. An analysis of the instructions used in this study proves informative. Specifically, the instructions read (emphases ours):

> A panel of *psychologists* have *interviewed* and administered *personality tests* to 30 (resp., 70) engineers and 70 (resp. 30) lawyers, all successful in their respective fields. On the basis of *this* information, thumbnail descriptions of the 30 engineers and 70 lawyers have been written. You will find on your forms five descriptions, chosen at random from the 100 available descriptions. For each description, please indicate your probability that the person described is an engineer, on a scale from 0 to 100.
>
> The same task has been performed by a panel of *experts* who were *highly accurate* in assigning probabilities to the various descriptions. You will be paid a bonus to the extent that your estimates come close to those of the expert panel.

The first part of the instructions informs subjects that the individuating information was compiled by psychologists on the basis of respected procedures of their profession, namely interviews and tests. Given that laypersons assume psychologists to be experts on issues of personality (rather than base rates), this introduction emphasizes the relevance of the individuating information. Moreover, other experts—most likely psychologists as well, given the present con-

text—are said to be highly accurate in making these judgments, thus further increasing the relevance of the individuating information. The subjects' task is then defined as determining a probability that matches the judgments of the experts. If these experts are assumed to be psychologists, subjects can infer that the experimenter wants them to use the same information that these experts used, which is most likely the personality information compiled by their colleagues.

Finally, as the experiment proceeds, subjects are asked to judge several target persons for whom different individuating information is presented. The base-rate information about the sample from which the targets are drawn, on the other hand, is held constant. This further suggests that the individuating information is of crucial importance because this information provides different clues for each judgment, and in the absence of this information all tasks would have the same solution. We will later return to this issue in more detail (Experiment 2).

In summary, the instructions and procedures of the study allow subjects to infer (however incorrectly) the experimenter's intention that they should base their judgment on the individuating information. It therefore comes as little surprise that subjects relied on it when making their judgment.

UNDERMINING PERCEPTIONS OF COMMUNICATIVE INTENTION

The above analysis suggests that subjects' reliance on individuating personality information should be greatly attenuated when the experimenter's intention to communicate the relevance of this information cannot be inferred from the social context of the experimental situation, that is, when the usual rules of social discourse are suspended. A similar effect should be obtained if the task is framed so that the source of the individuating information, and the experts who provide accurate predictions, are not experts on individuating information (like psychologists) but experts on base-rate information (like statisticians).

To test these hypotheses, a modified replication of Kahneman and Tversky's (1973) study was conducted. As in the original study, subjects estimated the probability that a target person randomly drawn from a sample was either an engineer (base rate 30%) or a lawyer (base rate 70%). Following a 2 × 2 factorial design, the task was either presented in a psychology framework (replicating Kahneman and Tversky's instructions) or in a statistics framework. In the latter, the

nonspecific term "researcher" was substituted for "psychologist" in the instructions given above, and "statisticians" were said to be the experts who can solve the task accurately. Based on the assumption about subjects' knowledge that statistical inferences are based on distributional but not on single-case information, it was expected that subjects would infer that the experimenter wants them to base their judgment to a lesser degree on the individuating information than under the original context. As a result, smaller deviations from the base rates would be obtained when the problem is framed as a statistical rather than a psychological task. In a related vein, Zukier and Pepitone (1984) demonstrated in another variation on Kahneman and Tversky's (1973) study that subjects relied more on individuating information when the task was framed as one pertaining to "clinical judgments," and subjects were explicitly asked to call on their "general knowledge, sensitivity, and empathy" in understanding "the individual's personality, profession, inclinations and interests" (p. 353), than when they were asked to make their judgment like "a scientist analyzing data."

More central to the key point of the present article, the applicability of the cooperative principle of social discourse was manipulated in the present study. Some subjects were told that the person description was written by a human communicator, namely, a psychologist or a nonspecified researcher, replicating the instructions used by Kahneman and Tversky (1973). This entitles the recipient to assume that the presented information obeys the normative rules of communication and reflects a particular communicative intention on the part of the experimenter. Other subjects were told that the identical description was compiled by a computer that drew a random sample of descriptive sentences bearing on the target person. Obviously, the cooperative principle does not directly apply to the resulting communication, and the communicative intention cannot be unambiguously inferred. Whereas the database from which the computer drew the sentences was said to have been compiled by psychologists or nonspecified researchers, the collection drawn by the computer is of dubious relevance. Moreover, its perceived relevance may depend on the framing of the task.

When the task is framed as a *psychology problem*, subjects may expect a thoughtful expert statement about the individual's personality. Facing what is said to be a random sample drawn from a pool of expert statements, they may question the usefulness of the selection, in particular when the information presented is of little informational value. Thus, they may be less likely to "make sense" of this information than when it was presented as a narrative by a psychologist, who presumably tried to be informative and relevant. Therefore, they should

rely less on the individuating information when it was drawn by a computer rather than presented by a psychologist.

When the task is framed as a *statistics problem*, however, the predictions are less clear. On the one hand, the framing of the problem may render the individuating information irrelevant, independent of who compiled it. On the other hand, random sampling is a valued statistical procedure that is assumed to result in a representation of the population from which the sample is drawn. To the extent that the framing of the task as a statistics problem activates this concept of random sampling, subjects may consider a random sample of sentences a stochastic event that results in a description of greater diagnosticity than a thumbnail description provided by a researcher whose particular expertise on personality issues is unknown. If so, they may rely *more* on what is purportedly a "representative" sample of descriptive information, resulting in a more pronounced impact of the individuating information under random sampling conditions.

In summary, these predictions hold that subjects' use of individuating and base-rate information depends on the inferred communicative intention of the experimenter. Although this prediction is in line with previous research that demonstrated that base-rate information will be used if it seems highly relevant to the task (for reviews, see Higgins & Bargh, 1987; Trope & Ginossar, 1988), the present theorizing suggests that its relevance is not only a function of explicit task characteristics. Rather, the perceived relevance of individuating and base-rate information is hypothesized to depend on the conversational context of the judgment. Thus, Kahneman and Tversky's (1973) original findings may not reflect a universal human deficiency but the product of a specific social interaction that is guided by effective rules of conversation. In this perspective, the "neglect of base-rate information" should replicate only under contextual conditions that allow corresponding inferences about the experimenter's communicative intention about which information should enter into the subjects' judgment and that grant the nondiagnostic individuating information a high degree of relevance.

EXPERIMENT 1

METHOD

Forty-four German college students who visited the open house of the Psychology Department of the University of Heidelberg participated in the experiment. Their task was to estimate the probability that a

target person, who was randomly drawn from a pool of 30 engineers and 70 lawyers and described to them in a short paragraph, was an engineer.

In the *Human Communicator* conditions, a German translation of Kahneman and Tversky's (1973) instructions was used with the following alterations: In the *Psychology Framing* conditions these instructions were identical to the ones reproduced above, except that the reference to "experts" in the second paragraph was changed to refer explicitly to "psychologists." In the *Statistics Framing* conditions, the first paragraph of the above instructions referred nonspecifically to "researchers," whereas the second paragraph specified "statisticians" as the experts who can solve the task correctly.

In the *Computer Communication* conditions, subjects were told that a computer had randomly drawn several pieces of information from the psychologists' (or researchers') file pertaining to the target person.

All subjects were presented the same description, again adapted from Kahneman and Tversky (1973) with minor alterations. The description read:

> Hans K. is 45 years old. He is married and has four children. Hans K. is generally conservative, careful, and ambitious. He shows no interest in social and political issues. He spends most of his time on his many hobbies, which include working on his house, sailing, and solving mathematical puzzles.

This description was followed by the dependent variable, which read: "The probability that Hans K. is one of the 30 engineers in the sample of 100 is——%."

In the Human Communicator conditions, the person description was presented as one typewritten paragraph. In the Computer Communication conditions, the identical text was presented on one sheet of computer printout, with each new sentence beginning on a new line. In addition, an arbitrary number appeared in parentheses at the beginning of each sentence. Following the experiment, all subjects were completely debriefed and probed for suspicion. None of the subjects doubted the truthfulness of the cover story, including the computer manipulation.

RESULTS

Table 1 shows subjects' estimates of the probability that the target person was an engineer as a function of the experimental conditions. Analysis of variance revealed a significant interaction of framing and

TABLE 1
Estimated Probability of Target's Being an Engineer as a Function of Conversational Context

	INDIVIDUATING INFORMATION	
FRAMING	WRITTEN BY RESEARCHER	COMPILED BY COMPUTER
Psychology problem	.76	.40
Statistics problem	.55	.74

Note. N is 11 per cell. The base-rate probability is .30.

presentation format, F (1, 40) = 11.89, $p < .002$, and no main effects, Fs < 1.

When the task was framed as a psychology problem and the personality description was purportedly written by a psychologist, subjects assumed that the target person was an engineer, $M = .76$, despite the low a priori probability of .30. More important, the impact of the individuating information was greatly attenuated when it was said to be drawn at random by a computer, $M = .40$, F (1, 40) = 9.97, $p < .005$, for the simple effect. This finding suggests that subjects relied less on the individuating information when it lacked the "guarantee of relevance" that characterizes most of human communication. When the task was framed as a statistics problem, on the other hand, subjects weighted the individuating information more, $M = .74$, when it was drawn at random from a larger sample of descriptive information rather than written by a nonspecified researcher, $M = .55$, F (1, 40) = 2.95, $p = .10$. This presumably reflects that random sampling is a valued procedure in a statistical framework. Accordingly, subjects for whom the task was introduced as a statistics problem may have assumed that they were supposed to use the "random sample of descriptive information" in making their judgment.

In addition, a comparison of both Human Communicator conditions indicates that subjects relied more on the personality information when it was presented by a psychologist, $M = .76$, than by a nonspecified researcher, $M = .55$, F (1, 40) = 3.53, $p < .08$, for the simple effect, much as the psychologist's expert status and the framing of the task would suggest.

DISCUSSION

In summary, the findings of Experiment 1 indicate that subjects based their judgment on information that corresponded to the presumed

communicative intention of the experimenter that was inferred from the particular context. Thus, they weighted irrelevant personality information more when they were told that psychologists are good at solving the task than when they were told that statisticians do well. More important, however, the impact of the format in which the individuating information was presented depended on the framing of the task. When the framing of the task suggested that it was a *psychology problem*, subjects relied on personality information more when it was presented as a thumbnail description written by an expert on personality—whose communication they could believe to be informative, truthful, and relevant—than when it was randomly drawn by a computer. In contrast, when the framing of the task suggested that it was a *statistics problem*, subjects tended to rely more on information drawn by a computer, presumably because in a statistical framework random sampling suggests that the resulting selection is representative of the population of descriptive information from which it is drawn. In combination, this pattern of findings indicates that subjects relied on the information that seemed most relevant in the context of the respective frame.

Note that these weighting decisions were perfectly reasonable if the information provided to subjects were indeed relevant. What renders these weightings dubious is only the violation of basic conversational norms on part of the experimenter: The experimenter intentionally constructed a message that was not informative and that was irrelevant to the task at hand but presented this message in a context that suggested otherwise. The subjects' "error" was to pay attention to the context in addition to the information, rather than to rely on the implications of the information's content per se, irrespective of its context. However, one hesitates to consider this a serious error; after all, the expertise and thoughtfulness of a source is an appropriate aspect to consider in the evaluation of information. To this extent, the "error" produced in the laboratory is unlikely to result in "mistakes" in the real world, where communicators are likely to conform to conversational norms and where recipients are expected to make use of the context of an utterance should the communicator not live up to the ideal.

Finally, it is informative to compare the present study with Zukier and Pepitone's (1984) study on "social roles in prediction." These authors presented Kahneman and Tversky's (1973) problem either as a study on "an individual's general sensitivity and intuitive understanding of another person" (p. 353) or as a study on "how much people will use scientific thinking when making decisions on the basis of a few pieces of information" (p. 352). In the former condition,

subjects were instructed to act like clinicians: "to understand the individual's personality, professional inclinations and interests" and to call on their "general knowledge, sensitivity, and empathy" (p. 353). In the latter condition, they were asked to assume the role of a scientist and were instructed: "Make your judgment as if you were a scientist analyzing data. Do not simply indicate whether you believe that the person described is an engineer. Instead, try to indicate the objective probability that the description belongs to one of the 30 engineers in the sample" (p. 353).

The results obtained under these instructions parallel the findings under the Human Communicator conditions of the present experiment. In both studies, subjects relied more on the individuating information when the instructions defined the task as a psychology rather than a statistics problem. Zukier and Pepitone (1984) concluded from this finding that a "scientific orientation will enhance the relative influence of base-rate information, whereas the clinical orientation will enhance the influence of the information about the individual case" (p. 350). The findings obtained under the Computer Communication conditions of the present study qualify this conclusion, which would predict a main effect of task framing rather than an interaction effect of framing and source of the individuating information. Specifically, when the individuating information was selected by a computer rather than by a human communicator, subjects made less use of it when the task was framed as a psychology problem than when it was framed as a statistics problem, for the reasons outlined above. Although a random sample of information selected by a computer was discounted by subjects who may have adopted a "clinical" orientation, it was considered diagnostic by subjects who may have adopted a "scientific" orientation that implies that random sampling results in a representative selection.

It is conceivable that this differential reliance on individuating information under both judgmental orientation conditions of the present study was further facilitated by differences in presentation mode. Specifically, the individuating information was presented as a narrative under Psychology Framing conditions but as a series of separate sentences, with an arbitrary number appearing in parentheses at the beginning of each sentence, under Statistics Framing conditions. As Higgins (1981) observed, individuals rely more on a given piece of information if it is presented in a mode that is consistent rather than inconsistent with their expectations. If so, the match between task framing (psychology vs. statistics problem) and presentation mode (narrative vs. categorical) may have contributed to subjects' differential use of individuating information by increasing their reliance on in-

formation that was presented in a style consistent with task framing. From the Gricean perspective offered here, such a process would suggest that the choice of a presentation format may contribute to recipients' inferences about the communicator's intentions, allowing stronger inferences with regard to the intended meaning if the presentation style matches the framing of the task.

EXPERIMENT 2

Much as communicators in everyday settings are expected to use the context of a conversation to determine the communicator's intention, we may expect subjects in a psychological experiment to use the experimental context to define the task they are meant to perform. In this regard, the effects of framing the task as a psychology problem or as a statistics problem in Experiment 1, as well as the results of the Zukier and Pepitone (1984) study described above, indicate that the task presented by Kahneman and Tversky (1973) needs to be interpreted for appropriate action—that is, the required judgment. Experiment 1 demonstrated that the conversational dynamics underlying the original instructions elicit an interpretation of the task as a personality problem. We will now turn to the impact of another feature of Kahneman and Tversky's (1973) methodology, namely, the use of a within-subjects design.

In their study, subjects received descriptions of five different persons who were all said to be drawn from the same sample. Thus, the individuating information was varied, but the base rate was held constant. If subjects use the experimental context to determine the exact nature of their task, this procedure implicitly suggests that the judgment should be based on those aspects of the information that varies in the course of the experiment. Specifically, this "variation principle" indicates to the subjects that the experimenter is interested in how well they can discriminate between persons who are differentially likely to be lawyers or engineers. This interpretation may be particularly suitable because the task would otherwise result in identical solutions for each of the five targets drawn from the same sample, and it may be hard to see why "experts" (and most notably, psychologists) are needed to do well.

A reversal of the procedure illustrates our point. Assume that subjects are provided with the description of a single person and asked to estimate the probability that this person is an engineer (a) if drawn from a sample of 10 engineers and 90 lawyers, or (b) if drawn from a sample of 30 engineers and 70 lawyers. It seems likely that

subjects would construe their task as pertaining to the impact of base rates on the likelihood of the target person's being an engineer and, accordingly, would utilize the base-rate information presented to them.

The general point made here is that the use of information does not depend on its diagnosticity per se but on the subject's perception of the experimenter's communicative intention (i.e., what subjects believe they are supposed to do), which is inferred from both the literal instructions and the context of the situation. The cooperative principle of social discourse requires participants to be sensitive to such cues. To explore the possibility that the variation of one type of information over time may serve as a cue to use it for the judgment, either the individuating information or the base-rate information was varied as a within-subjects factor in Experiment 2. It was expected that varying the individuating information within subjects would increase the impact of the individuating information by suggesting to subjects that differences between the target persons are of interest. On the other hand, varying the base rate information within subjects should decrease the impact of the individuating information by suggesting that differences between the sample are of interest.

This hypothesis was tested in a 3 × 2 factorial design, in which subjects received either a description of one person or descriptions of two persons drawn from a sample of 30 engineers and 70 lawyers and estimated the probability of the target person's being an engineer. A third group of subjects received only one person description but estimated the probability of the target's being an engineer if drawn from two samples with different base rates. In addition, the task was presented in either a psychology framework or a statistics framework to provide a partial replication of Experiment 1.

METHOD

Forty-eight psychology undergraduates at the University of Illinois participated as part of a class requirement and were randomly assigned to conditions. Subjects in the Psychology Framing conditions received Kahneman and Tversky's (1973) original instructions, whereas subjects assigned to the Statistics Framing conditions received the modified instructions described in Experiment 1. All subjects estimated the probability that a target person drawn from a sample of 30 engineers and 70 lawyers was an engineer. The description was taken from Kahneman and Tversky and read:

> Jack is a 45-year-old man. He is married and has four children. He is generally conservative, careful, and ambitious. He shows no interest in

political and social issues and spends most of his free time on his many hobbies which include home carpentry, sailing, and mathematical puzzles.

Subjects in the *One Target* conditions received only this description. For subjects in the *Two Targets* conditions, this description was preceded by a nondiagnostic description of another target person (Dick), also taken from Kahneman and Tversky. Finally, subjects in the *Two Base Rates* conditions first estimated the probability of Jack's being an engineer if drawn from a sample of 10 engineers and 90 lawyers and subsequently estimated the probability of Jack's being an engineer if drawn from a sample of 30 engineers and 70 lawyers.

RESULTS

Subjects' probability judgments are shown in Table 2 as a function of the experimental variables. As in the Human Communicator conditions of Experiment 1, subjects relied more on the individuating information and less on the base-rate information if psychologists were described as the source of the information and as the experts who do well, $M = .69$, than if nonspecified researchers were given as the source and statisticians as the experts, $M = .56$, $F(1, 42) = 3.47$, $p < .07$, for the main effect.

In addition, the impact of individuating and base-rate information depended on which information was varied within subjects, $F(2, 42) = 3.36$, $p < .05$, for the main effect. Specifically, subjects relied more on the individuating information if two target persons were presented, $M = .73$, than if only one target person was presented, $M = .62$. Their reliance on individuating information decreased, on the other hand, if two different base rates were presented for the same target person, $M = .51$, although this estimate still reflects an underutilization of base-rate information.

TABLE 2
Estimated Probability of Target's Being an Engineer as a Function of Framing and Within-Subjects Variation

	WITHIN-SUBJECTS VARIATION			
FRAMING	2 PERSONS, 1 SAMPLE	1 PERSON, 1 SAMPLE	1 PERSON, 2 SAMPLES	
Psychology	.82	.69	.55	.69
Statistics	.65	.56	.48	.56
	.73	.62	.51	

Note. N is 8 per cell. The base rate probability is .30

DISCUSSION

As predicted by the cooperative principle of social discourse, subjects used the context of the experimental procedures to determine the exact nature of their task (i.e., on which information they were meant to base their judgment). As in Experiment 1, they relied more on the individuating information if it was presented by a psychologist rather than a nonspecified researcher and when psychologists rather than statisticians were said to be the experts who do well. In addition, subjects were more likely to use the information that was varied in the materials presented to them, presumably because the variation principle served as a contextual cue that helped them define the exact task they were supposed to perform. Receiving descriptions of two persons drawn from the same sample emphasized differences in the features of these persons as an appropriate data base, whereas receiving one description with base-rate information pertaining to two different samples may have suggested that differences between the samples were of interest.

These results are consistent with other findings that subjects are more likely to use base-rate information if it is varied within subjects rather than between subjects (Fischhoff, Slovic, & Lichtenstein, 1979). Like us, Fischhoff et al. attribute this behavior to experimental demand effects. They write: "Asking subjects to make the same judgment several times while varying the value imputed to one variable contains an implicit demand that they change their responses somehow. Refusal to change makes a strong statement regarding the irrelevance of the varied piece of information" (p. 340). However, Fischhoff et al. did not attribute the source of this demand to the operation of conversational principles but to a form of "subjective sensitivity analysis." This logic seems to require that the subject be exposed to multiple values on the same variable. However, as we have shown, it is possible to obtain a similar pattern of results by using a simpler procedure that implies only one single contrast. This suggests that the present analysis provides a more parsimonious account of the processes that underlie the differential impact of the same information when presented in a between-subjects rather than a within-subjects design.

GENERAL DISCUSSION

In combination, the present findings imply that the study of human judgmental biases may have yielded an overly pessimistic portrayal of decision makers. The results of the present studies suggest that some demonstrations of presumably pervasive "judgmental biases"

may not reflect universal shortcomings of the human species but may result from the application of discourse rules in a specific situational context. Unfortunately, the communicative context of human judgment has been neglected by many researchers in the area, who treat the subject as an isolated information processor who is supposed to rely solely on the literal meaning of the information provided by the experimenter. The subject, however, is likely to perceive the experiment as an instance of social discourse. Accordingly, subjects apply the rules that govern social discourse in everyday life to the experimental setting. Thus, they expect the experimenter to provide only information that is informative, truthful, and relevant, and they use the context of the conversation to determine the experimenter's communicative intention, much as they are supposed to do in everyday life (see Higgins, 1981, for a related discussion).

In line with these assumptions, subjects in the present studies were found to consider the context of the experiment in addition to the literal meaning of the information provided to them. Accordingly, they were more likely to rely on individuating information of low diagnosticity at the expense of base-rate information when the individuating information was provided by a psychologist rather than a nonspecified researcher (Experiments 1 and 2). In addition, their use of individuating information depended on the framing of the task and the alleged source. When the task was framed as a psychology problem, subjects relied more on personality information when it was selected by a human communicator (whom they could assume to comply to conversational norms) than when it was selected by a computer. In contrast, they relied more on a random sample of descriptive information drawn by a computer when the framing of the task as a statistics problem matched that presentation style, presumably implying representativeness of the randomly sampled information (Experiment 1). Moreover, subjects used variations in the information provided to them to determine the focus of the task and relied more on individuating information when the task seemed to pertain to differences between persons; but they relied more on base-rate information when the task seemed to pertain to differences between samples (Experiment 2), although the latter manipulation was not sufficient to eliminate fully the underutilization of base-rate information.

In summary, then, subjects in our studies, as well as in related studies (see Higgins & Bargh, 1987; Trope & Ginossar, 1988, for reviews), used the information that seemed relevant to the judgment at hand at the expense of other information. Although previous research demonstrated that the use of base-rate information varies as a function of explicit task characteristics, the present studies indicate that subjects'

inferences about the nature of their task and the relevance of the presented information depend on the specifics of the communicative context. Where their judgments deviated most clearly from normative models, they did so because subjects went beyond the literal meaning of the information given and used the communicative context to determine the nature of the task and the relevance of the various sources of information. The errors that they committed by doing so are unlikely to result in mistakes in everyday contexts, in which communicators try conform to conversational norms, provide information that is relevant to the judgment at hand, and make the task one that is clear rather than ambiguous—and in which recipients are indeed expected to use contextual cues to disambiguate the communication should the communicator not live up to the standard. Thus, the behavior that may lead to errors in the experimental context may be adaptive in everyday settings. As Funder (1987) recently noted in a related context, "It seems ironic that going beyond the information given in this way is so often interpreted by social psychologists as symptomatic of flawed judgment. Current thinking in the field of artificial intelligence is that this propensity is exactly what makes people smarter than computers" (p. 82).

To acknowledge this special potential of human information processors, social cognition research will need to pay closer attention to the social context of inference processes. As Markus & Zajonc pointed out (1985), social cognition research will need to extend the "flowchart model of information processing that presents us only with a unilateral input/output paradigm that stops short of reciprocity" (p. 212). Incorporating aspects of conversational pragmatics into "pragmatic" approaches to inference processes (Holland, Holyoak, Nisbett, & Thagard, 1986; Srull & Wyer, 1986), which emphasize the goal-directedness of cognitive processes but have so far not paid attention to the role of communicative contexts in determining the goals, may provide a good starting point for this endeavor.

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CONVERSATIONAL IMPLICATURE, CONSCIOUS REPRESENTATION, AND THE CONJUNCTION FALLACY

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This study examined judgments in four of Tversky and Kahneman's (1983) conjunction tasks, applying Gricean principles of conversational implicature and an analysis of the subjects' conscious representations. Conversational inference is itself a form of judgment under uncertainty, and hearers often venture interpretations of a speaker's intention, constrained by assumptions embodying rules of conversation. For a conjunction effect to be a fallacy, we argue, subjects must interpret the key conjunct extensionally; fallacious reasoning consists of deficient mental operations on one's own mental contents. We therefore assessed interpretations of the conjunct with reports or induced them with elaborative information, distinguishing extensional interpretations from those that absolve the judgment of fallacy. In Experiment 1, subjects most often formed absolving interpretations of the conjunct where they were most likely to judge the conjunction more probable than the conjunct. In Experiment 2, the conjunct was most often given the absolving interpretation that evidence was insufficient for saying more. Experiment 3 elaborated these results with experimentally induced interpretations. In Experiment 4, reports of representativeness were strongly related to conjunction effects and to reports of nonextensional interpretations, and there was no evidence of conjunction fallacies. Over these experiments, we estimate the incidence of genuine conjunction fallacies as between 0% and 18%, in contrast with the 85% and 90% Tversky

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