Separating the Wheat From the Chaff: Does Discriminating Between Diagnostic and Nondiagnostic Information Eliminate the Dilution Effect?

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ABSTRACT

The dilution effect refers to the finding that judgments are often unduly influenced by nondiagnostic information, producing regressive judgment. Because the dilution effect is a problem in various domains, strategies to control the impact of nondiagnostic information were explored by drawing on a perceptual and a conversational account of the dilution effect. Three experiments \((n = 259)\) demonstrate that explicit instructions to discriminate between diagnostic and nondiagnostic information did not reduce the dilution effect. Rather, consistent with a perceptual explanation but not consistent with a conversational explanation, the dilution effect disappeared only when participants engage in perceptual control, that is, when they actively remove nondiagnostic pieces of information before making a judgment. Copyright © 2004 John Wiley & Sons, Ltd.

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People usually have a good sense about what kind of information is relevant or irrelevant to a judgment. For example, although knowing the number of hours a college student spends studying per week may tell you something about her academic performance, most people would not consider the student’s color preferences informative for making such a judgment. Unfortunately, this astuteness to informational relevance is often not reflected in the judgments themselves. Plenty of research has demonstrated that nondiagnostic information routinely dilutes the impact of diagnostic information, producing regressive judgment. In other words, even though the diagnostic information may lend itself to extremely positive (or negative) judgments, the simultaneous presence of nondiagnostic information introduces a shift toward the midpoint of the scale. Nisbett, Zukier, and Lemley (1981) have termed this phenomenon the dilution effect, and argued that it reflects a genuine fallacy of human judgment (see Troutman & Shanteau, 1977, for a precursor of this research). Subsequent psychological research has demonstrated the robustness of the dilution effect across various domains and contexts (Fein & Hilton, 1992; Macrae, Shepard, & Milne, 1992; Peters & Rothbart, 1992).
Moreover, applied research has documented that the dilution effect undermines the quality of accountants’ auditing judgments (Glover, 1997; Hackenbrack, 1992; Hoffman & Patton, 1997; Waller & Zimbelman, 2003), product decisions on the part of consumers (Meyvis & Janiszewski, 2002), hiring decisions (Highhouse, 1997) and jury decision making (Fein, McCloskey, & Tomlinson, 1997) (see Chinander & Schweitzer, 2003, for a related finding).

Even though the potentially harmful consequences of the dilution effect are readily apparent, to date it is unclear how decision makers can avoid this phenomenon. Some findings suggest that years of training and experience make experts less vulnerable to the dilution effect, but these seem to apply only to those at the highest level of expertise (Bhattacharjee & Moreno, 2002; Shelton, 1999). Most research on the dilution effect has focused more on the context in which diagnostic information is presented or the nature of nondiagnostic information, but not on the information processing strategies that mitigate the dilution effect. For example, Fein and Hilton (1992) showed that the dilution effect varied as to whether the nondiagnostic information was perceived to be broadly useful to most social judgments, while Peters and Rothbart (2000) demonstrated that the typicality of the nondiagnostic information can attenuate or even reverse the dilution effect. Such findings may be of only limited value to applied decision makers who have little or no control over the information provided to them for their judgment. Similarly, research on the context of judgments (e.g., Glover, 1997; Tetlock & Boettger, 1989) or the source of information (e.g., Macrae et al., 1992) may be limited in assisting decision makers. Thus, the first goal of this research is to propose a strategy that allows decision makers to control the dilution effect when working with information that otherwise would produce the dilution effect.

My second goal in this research is to test two competing accounts of the psychological mechanisms underlying the dilution effect, namely a perceptual approach and a conversational approach. Nisbett et al. (1981) originally provided what is called here the perceptual approach relating the dilution effect to the perceived similarity between a target stimulus (e.g., Person A) and a referent category (e.g., reckless driver). According to Tversky’s (1977) feature-based model, similarity judgments are a joint function of common and distinct features. Perceivers are sensitive to distinct features in the target in that unique characteristics of the stimulus are likely to reduce the perceived similarity with a referent category. Thus, if the category-relevant (diagnostic) information is kept constant, the addition of category-irrelevant (nondiagnostic) information reduces the perceived similarity between the target and the referent. Consistent with Tversky’s model, Nisbett et al. found that the number of nondiagnostic features predicted the extent to which judgments regressed to the scale midpoint.

In essence, Nisbett et al.’s (1981) model offered a similarity-based approach to the phenomenon of dilution, which can be called perceptual because of the immediacy with which the available information is used. These authors make the important, but implicit, assumption that all information available about the target spontaneously feeds into the mental representation formed about the target, which is then compared to the referent category. The mental representation that arises from the perception of the target is typically not edited, that is, it includes all the pieces of information provided about the target. Put differently, research participants cannot help but use the information provided to them in a quasi-perceptual way. Arguably, this idea is inherent to much subsequent research on the dilution effect. It is also a central characteristic of the recent proposal by Peters and Rothbart (2000), who challenged the adequacy of Tversky’s (1977) model to account for the dilution effect. Instead, Peters and Rothbart (2000) attribute the effect to the perceived goodness-of-fit between a target person and referent category. Yet, both Nisbett et al. (1981) and Peters and Rothbart (2000) presume that research participants spontaneously use all information provided to them.

The account of the dilution effect proposed by conversational theorists is in stark contrast to the perceptual approach. Hilton (1995), Schwarz (1996) and Tetlock and Boettger (1989) argued that the dilution effect is at least in part driven by conversational norms (Grice, 1975). According to this approach, research participants expect the experimenter to be a cooperative communication partner who follows the conversational maxim of relevance, that is, the implicit notion that competent interaction partners only communicate information relevant to the issue at hand. Thus, when the experimenter provides participants with a set of features about a
target person, participants infer that the experimenter considers all pieces of information to be relevant. And, because they are also cooperative interaction partners, participants subsequently use diagnostic and nondiagnostic information in their judgment even though they themselves may or may not consider the information relevant (see Bless, Strack, & Schwarz, 1993, and Hilton, 1995 for a conversational approach to experimental artifacts).

Recent research provides some support for the conversational approach (Tetlock et al., 1996; Slugoski & Wilson, 1998). Tetlock et al. reasoned that the dilution effect should disappear if nondiagnostic information is not presented as part of cooperative communication because participants should not presume that it is relevant, and thus not use it in the judgment at hand. This strategy of eliminating the presumed interaction context has been an important strategy employed by earlier research to demonstrate the conversational bases of apparent reasoning fallacies (e.g., Schwarz et al., 1991). Tetlock et al. informed their research participants that all information about the target had been randomly selected from a database and, hence, the experimenters could not vouch for its relevance. Whereas this manipulation did not yield a main effect, it did eliminate the dilution effect when participants also anticipated having to justify their judgments in a subsequent interview. Thus, Tetlock et al.’s findings only provide partial support for the conversational account. Slugoski and Wilson found that the dilution effect was exacerbated in participants who had scored high on a dispositional measure of conversational skill, which was considered to reflect greater adherence to conversational norms. However, because of its correlational nature it is possible that conversational skill is linked to other person characteristics responsible for increasing or decreasing the use of nondiagnostic information in judgment. In sum, the conversational approach relates the occurrence of the dilution effect to the fact that cooperative research participants assume the experimenter wants them to use nondiagnostic information in their judgment.

In the present series of studies, both the perceptual explanation and the conversational explanation are tested in the context of devising a strategy that allows decision makers to minimize the dilution effect. My approach is based on the obvious necessity of decision makers to discriminate between diagnostic and nondiagnostic information, and to only use diagnostic information when making their judgments. Thus, participants were informed that the very purpose of the research was to examine whether they would be able to distinguish between relevant and irrelevant information because irrelevant information undermined the quality of their judgment, and were explicitly given instructions to discriminate between the two before making their judgment. In Study 1, participants rated the informational relevance of each piece of information, and in Studies 2 and 3 they categorized all available information as ‘relevant’ or ‘not relevant’.

From a conversational perspective, such a manipulation should eliminate the dilution effect because it differs in important ways from previous contexts in which nondiagnostic information may have been rendered relevant in the interaction between experimenter and participants. First, providing participants with the expressed goal to separate the wheat from the chaff strongly (and correctly) implied that both diagnostic and nondiagnostic information would be presented. This was not the case in previous studies in which it remained ambiguous as to whether or not the information presented contained any irrelevant information (e.g., Tetlock et al., 1996). Second, the instruction that the experimenter was interested in the participant’s ability to discriminate relevant from irrelevant information fully justified the presence of nondiagnostic information. Third, because participants were aware that the experimenter knew about the presence of nondiagnostic information and its harmful impact on judgments, they would not presume the relevance of a particular item simply because it was presented to them by the experimenter. Fourth, the explicit warning concerning the use of irrelevant information makes it clear that participants were not expected to use information that they personally believed to be irrelevant to the judgment at hand. In brief, under such instructions, following conversational norms of cooperation should prompt participants to exclude irrelevant information from their judgment.

The prediction based on the perceptual approach is somewhat less clear, primarily because the two current models (Nisbett et al., 1981; Peters & Rothbart, 2000) are not specific as to whether diagnostic
and nondiagnostic features are weighted differently. However, it is doubtful that the above instructions would affect the occurrence of the dilution effect. As previously mentioned, when participants read about a target, they are likely to form a spontaneous mental representation that includes all features presented to them, regardless of whether they are diagnostic or nondiagnostic. That is, just as one’s perception of a chair cannot exclude the color of the seat cushion even though this characteristic is utterly nondiagnostic for its categorization as a chair, participants are unable to edit nondiagnostic aspects from their perception of a target stimulus—even if they may know that a particular aspect is irrelevant. In sum, with regard to the explicit instruction to participants to separate diagnostic and nondiagnostic information, the conversational approach and the feature-similarity approach offer competing predictions.

STUDY 1

The first two studies employed a frequently used prediction task to study the dilution effect, in which participants are asked to predict the likelihood that a target person was a child abuser (e.g., Nisbett et al., 1981; Tetlock & Boettger, 1989). First, I manipulated the direction of the relevant information with half of all participants receiving diagnostic information, i.e. evidence that is considered typical for child abusers, and the other half receiving counterdiagnostic information, i.e. evidence that is particularly atypical for child abusers. Crossed with this manipulation was whether participants received diagnostic/counterdiagnostic information only (no-dilution condition), or whether they also received nondiagnostic information (dilution condition). Lastly, and importantly, participants were either assigned to a replication condition or a discrimination condition. In the discrimination condition, participants were informed about the detrimental impact of irrelevant information on judgment, and given the explicit goal to distinguish between relevant and irrelevant information. To facilitate and reinforce this process, participants rated the relevance of each piece of information before making their prediction. To allow for a comparison, participants in the replication condition provided similar relevance ratings, but did so in a surprise task following their prediction. This resulted in a 2 (Direction: diagnostic vs. counterdiagnostic information,) × 2 (Dilution: no dilution vs. dilution) × 2 (Instructions: replication vs. discrimination condition) between-groups design.

METHOD

Participants
A total of 133 undergraduate students at a Midwestern public university participated in the experiment.

Materials
Participants’ task was to predict the likelihood that the target person was a child abuser. The material included two pieces of diagnostic information, which was perceived to be typical of child abusers (‘John is sexually aroused by violent sadomasochistic fantasies’; ‘John has a serious drinking problem’). Similarly, there were also two pieces of counterdiagnostic information, which were considered indicative that the target person was not a child abuser (‘John has no trouble getting involved in deep and meaningful relationships’; ‘John does volunteer work at a neighborhood school to promote good race relations’). In the no-dilution condition, participants only received these two items. In the dilution condition, participants received an additional four pieces of information, which in pretests were found to be unrelated to a person’s child abuser status (‘John has an IQ of 110,’ ‘John injured his back in a skiing accident,’ ‘John likes to tell jokes,’ ‘John is strong-minded and rarely willing to back off on an issue of principle’). Except for the first piece of counterdiagnostic information, all items were adapted from Tetlock and Boettger (1989) and their pretests as well as my own confirmed their status as diagnostic, counterdiagnostic and nondiagnostic items.
Procedure
I used a 2 (Direction: diagnostic vs. counterdiagnostic information) × 2 (Dilution: no dilution vs. dilution) × 2 (Instructions: replication vs. discrimination) between-groups design. The present study was introduced to participants as concerned with predicting human behavior. Participants were informed that they would be presented with information about an adult, middle-class psychotherapy patient and asked to make predictions concerning certain characteristics of this person. It was ensured that participants worked on all material in the order in which it was provided to them. Participants had as much time as they wanted to work on the task, but it took the majority between 5 and 7 minutes to complete.

Participants in the replication condition received instructions modeled after Tetlock and Boettger (1989). Specifically, they learned that they might or might not find the information useful in making their predictions, and were explicitly given the option of not using the provided information to make predictions. Instructions encouraged participants to give their best guess. Participants then read the person description and predicted how likely it was that the target person was a child abuser using an 11-point scale, with 1 not at all likely and 11 very likely. Instructions specified that if participants felt they had no useful information to make a guess, they should simply circle the midpoint of the likelihood scale (6), which was labeled not more or less likely than anyone else. Subsequently, participants indicated their confidence that their prediction is accurate, again using an 11-point scale with 1 not at all confident and 11 very confident. On the final page of the questionnaire, participants received the surprise instruction to go back to the person description and indicate how relevant each piece of information was with regard to their prediction. Using a scale ranging from 1 not at all relevant to 11 highly relevant, participants placed their rating next to each piece of information listed in the person description.

Participants in the discrimination condition learned that past research had shown that human predictions are often flawed because people do not adequately discriminate between information that is relevant and information that is irrelevant to a particular decision or judgment. It was also pointed out that people often use irrelevant information, which would seriously diminish the quality of their predictions. The instructions explicitly urged participants to make an effort to separate relevant pieces of information from irrelevant pieces of information, and to only make their prediction once they had first established the relevance of the information provided. Participants in the discrimination condition were then asked to examine the person description and rate on the 11-point scale how relevant each piece of information was with regard to predicting the likelihood of the target person being a child abuser. Participants placed a number in a space provided next to each piece of information. After completing the relevance ratings, participants indicated their predictions and their confidence levels on the same response scales as used in the replication condition.

RESULTS
Predictions
A three-way ANOVA was used to analyze prediction and confidence data. Replicating the dilution effect, the predicted Dilution × Diagnosticity interaction emerged, $F(1, 125) = 7.17, p < 0.009$. When diagnostic information was presented alone, participants considered it more likely that the target person was a child abuser as compared to when diagnostic information was diluted by nondiagnostic information ($M = 8.19, SD = 1.35$ vs. $M = 7.38, SD = 1.52$), $F(1, 125) = 5.56, p < 0.02, d = 0.56$. Conversely, when participants only received counterdiagnostic information they thought it somewhat less likely that the target person was a child abuser as compared to when diagnostic information was diluted ($M = 5.38, SD = 1.82$ vs. $M = 4.34, SD = 1.89$), $F(1, 125) = 2.78, p < 0.10, d = 0.40$. Not surprisingly there was also a Diagnosticity main effect, $F(1, 125) = 173.54, p < 0.001, d = 2.27$, but no other effect approached statistical significance. In particular, the three-way interaction predicted by the conversational logic account of the dilution effect was not reliable, $F < 1$. This result is consistent, though, with a perceptual account of the dilution effect.
Confidence
Overall, participants felt somewhat confident when making their predictions, $M = 7.28$ on the 11-point scale. However, confidence did not vary as a function of experimental condition, all $Fs < 1$.

Perceived relevance of information
For all participants, I combined ratings of the two diagnostic pieces of information or the ratings of the two counterdiagnostic pieces of information. Similarly, for participants in the dilution condition, I averaged the relevance ratings for the four nondiagnostic items. Because of missing data the degrees of freedom in the denominators are reduced. Note that in this research the terms diagnostic and counterdiagnostic refer to the a priori diagnosticity of the information as it was established by Tetlock and Boettger (1989) and myself. By contrast, the terms relevant and irrelevant refer to judgments of relevance on the part of research participants, which can be understood as perceived diagnosticity.

First, I examined whether the rated relevance of diagnostic/counterdiagnostic information varied across conditions using the above three-way ANOVA design (including participants from all experimental conditions). The only significant effect was a main effect of Direction, $F(1, 114) = 34.44, p < 0.001, d = 1.01$, showing that overall diagnostic information ($M = 8.27, SD = 2.23$) was rated more relevant than counterdiagnostic information ($M = 5.41, SD = 3.05$). Second, an analysis of participants in the dilution condition only confirmed that they considered diagnostic/counterdiagnostic information more relevant to their prediction than nondiagnostic information ($M = 7.06, SD = 3.00$ vs. $M = 4.00, SD = 1.59$), $F(1, 61) = 104.97, p < 0.001, d = 1.27$. Third, again focusing on participants in the dilution condition, I used a 2 (Direction) × 2 (Instructions) ANOVA to analyze relevance ratings of nondiagnostic information, but none of the effects approach significance, all $Fs < 1$. Thus, regardless of whether or not participants were given the explicit goal to discriminate between relevant (i.e. diagnostic or counterdiagnostic) and irrelevant (i.e. nondiagnostic) information, the perceived relevance to the judgment at hand did not vary.

DISCUSSION
This study demonstrates that the dilution effect is stable even when participants are explicitly told to discriminate between relevant and irrelevant information. The perceived relevance ratings are particularly interesting because they document that participants were clearly able to distinguish the various types of information provided to them. This produced the somewhat ironic pattern that participants told the experimenter which information was useless, but then went on to use this information in their judgments. Because the experimenter clearly stated that the purpose of the experiment was to distinguish relevant and irrelevant information and to avoid using irrelevant information, it appears that participants were unable to exclude nondiagnostic information from their judgment. This finding is inconsistent with the conversational account of the dilution effect but agrees well with the idea that the dilution effect reflects a perceptual phenomenon.

STUDY 2
Study 1 was clearly a failure with regard to generating a strategy to control the dilution effect, but its results were consistent with a perceptual approach but not a conversational approach. One might wonder, however, how strict a test it really was. It is possible that participants in the dilution condition of Study 1 recognized that nondiagnostic features were of clearly lesser relevance, yet considered this type of information still relevant enough to include in their judgment. Relevance ratings of nondiagnostic items were obviously above the lower limit of the scale ($M = 4.00$ on an 11-point scale), and participants may have assigned them weights greater than 0 when integrating them into their judgments. In other words, it is possible that the discrimination manipulation in Study 1 was not potent enough as it did not force participants to categorically distinguish
between relevant and irrelevant information, and assign weights of 0 to the irrelevant features. Hence, the procedures used in Study 2 required participants to categorize all features into relevant and irrelevant features.

Yet, based on a perceptual explanation of the dilution effect, even such categorization instructions should not be sufficient to eliminate the dilution effect. A perceptual approach assumes that participants’ impression of the target person includes all available information, regardless of how relevant or irrelevant it is thought to be. This leads one to suspect that it may be imperative for participants not only to distinguish between diagnostic and nondiagnostic information, but also to physically remove nondiagnostic features from the set of information considered. This seems to be a particularly promising strategy in light of the original work by Nisbett et al. (1981). These authors demonstrated that the dilution effect is a function of the nondiagnostic features included in the total set of features that the experimenter provided to participants (see also Peters & Rothbart, 2000). Hence, in order to curb the dilution effect, decision makers may need to edit the set of features by eliminating those that are considered irrelevant. If one assumes that target impressions are continuously updated when the information changes, exercising perceptual control seems to be the most promising strategy to eliminate the dilution effect.

Study 2 explored whether categorization alone was sufficient to remove the dilution effect or whether exercising perceptual control was necessary. I revised the discrimination condition of Study 1 and asked participants to categorize all features provided based on their relevance by using two different techniques. In the identification condition, participants were given a highlighter pen and asked to highlight only those features that they considered for the judgment at hand, and to base their judgment only on these highlighted features. If categorization of features according to their relevance was sufficient, the dilution effect should disappear. However, if perceptual control is necessary to eliminate the dilution effect, this condition essentially resembled the discrimination condition of Study 1, and a reduction of the dilution effect is not expected. In the perceptual control condition, however, participants were given a black permanent-marker pen and instructed to black out those features that they considered irrelevant. According to a perceptual account, this information removal technique should eliminate the dilution effect if participants’ judgments are driven only by the information in front of them. In Study 2, I dropped the replication condition as well as the counterdiagnostic information condition; hence, using a 2 (Dilution: no dilution vs. dilution) × 2 (Instructions: identification condition vs. perceptual control condition) between-groups design.

METHOD

Participants
A total of 41 undergraduate students at a Midwestern public university participated in the experiment (roughly 63% female).

Materials and procedure
I used the same material as in Study 1, but dropped the counterdiagnostic information condition. Experimental procedures were similar to the ones used in the discrimination condition of Study 1, except that participants were asked to categorize rather than rate the relevance of the information provided. Participants in the identification condition received a pink highlighter marker and were asked to identify and highlight the information that was clearly relevant to the prediction at hand and that they wished to use as the basis of their judgment. Participants in the perceptual control received a black permanent marker and were instructed to completely black out all pieces of irrelevant information. In both conditions, graphic illustrations reinforced verbal instructions.
RESULTS

Predictions
In a two-way ANOVA the main effect for dilution approached significance, $F(1, 37) = 4.06, p < 0.06, d = 0.62$, whereas the predicted interaction effect did not reach significance, $F(1, 37) = 1.33, p < 0.26$. However, because the contrast weights of a conventional interaction term do not test the prediction that the dilution effect would occur in one condition but not in the other, I followed up with univariate tests. In the identification condition, the dilution effect replicated, $F(1, 19) = 5.17, p < 0.04, d = 0.95$. Judgments were more extreme when only diagnostic information was presented as compared to when it was diluted with nondiagnostic information ($M = 8.20, SD = 1.48$ vs. $M = 6.73, SD = 1.49$). By contrast, there was no reliable difference in the perceptual control condition ($M = 7.60, SD = 1.35$ vs. $M = 7.20, SD = 1.62$), $F(1, 18) = 0.36, p < 0.56, d = 0.26$.

Confidence
Overall, participants felt somewhat confident when making their predictions, $M = 5.76$ on the 11-point scale. However, confidence did not vary as a function of experimental condition, all $Fs < 1$.

Perceived relevance of information
In order to compute the number of features considered relevant, I counted the number of highlighted features in the identification condition, and the number of not-blackened-out features in the perceptual control condition. (Because there was no ambiguity in which features were marked or unmarked, there were no discrepancies between two independent coders.) Analyzing participants in the diluted information condition only, it was confirmed that participants considered a larger proportion of diagnostic information relevant to their predictions than nondiagnostic information ($M = 0.73, SD = 0.37$ vs. $M = 0.36, SD = 0.36$), $F(1, 20) = 10.07, p < 0.006, d = 0.98$. Second, the proportion of diagnostic information considered relevant did not vary across condition, all $Fs < 1$. Lastly, surprisingly participants in the perceptual control condition considered more nondiagnostic items relevant than participants in the identification condition ($M = 2.30, SD = 1.42$ vs. $M = 0.64, SD = 0.92$), $F(1, 19) = 10.34, p < 0.006, d = 1.32$.

DISCUSSION
This study yielded a successful strategy to control the dilution effect. To the extent that when participants not only categorize information into irrelevant and relevant features, but also physically remove those features recognized as irrelevant, the dilution effect is eliminated. By contrast, in the identification condition the dilution effect persisted. Based on a perceptual account of the dilution effect, this is not surprising as all irrelevant information was still within participants’ visual field, and hence, contributed to the target person impression.

In this regard, it is particularly instructive to consider that the dilution effect was removed in the perceptual control condition, even though the data suggest that participants in the identification condition considered fewer nondiagnostic items relevant than in the perceptual control condition. In other words, in the perceptual control condition participants seemed to distinguish less accurately between diagnostic and nondiagnostic information than in the identification condition. While it is unclear what specifically caused this difference, this finding militates against the idea that participants can exclude features from their judgment even when they consider them irrelevant to the task at hand. Rather, this finding strengthens the perceptual explanation of the dilution effect because participants in the perceptual control condition removed about half of all
nondiagnostic features from the information they considered, whereas all nondiagnostic features were still visible and, hence, were used in the identification condition.

STUDY 3

The main purpose of the third study was to replicate the findings of Study 2 using different material and addressing potential shortcomings. First, participants in Study 2 were asked to distinguish between relevant and irrelevant information, which implied the presence of both types of information. The fact that in the no-dilution condition only diagnostic information was presented could thus be viewed as a breach of the conversational norm to be truthful (Grice, 1975). To remedy this potential problem, Study 3 provided nondiagnostic information in every experimental condition, but varied its amount, expecting a stronger dilution effect when more nondiagnostic information was presented (Nisbett et al., 1981; Peters & Rothbart, 2000). Study 3 also compared the perceptual control manipulation with a different categorization technique. Where participants were previously asked to identify and highlight relevant information, participants in the study were asked to classify each single piece of information as relevant or irrelevant to the task at hand (discrimination condition). Lastly, because the confidence rating had not yielded any significant effects, it was dropped.

METHOD

Participants
A total of 85 undergraduate and graduate students at a Western public university participated in the experiment (roughly 65% female). Participants were randomly assigned to a 2 (Amount of nondiagnostic information: 1 piece vs. 4 pieces) × 2 (Instructions: discrimination condition vs. perceptual control condition) design.

Materials
Participants’ task was to predict the grade point average (GPA) of an undergraduate student. I provided all participants with one piece of diagnostic information, namely, that the target person studied on average 31 hours per week, which previous studies had shown to be diagnostic of a high GPA (Tetlock & Boettger, 1989; Tetlock et al., 1996). Participants were also provided with nondiagnostic information, which included ‘is widely regarded by his friends as being honest,’ ‘plays tennis or racquetball about three or four times a month,’ ‘describes himself as a cheerful person,’ and ‘two months is the longest period of time he has dated one person’ (from Tetlock & Boettger, 1989). In the high dilution condition, all four pieces of nondiagnostic information were presented along with the diagnostic information. In the low dilution condition, only one piece of nondiagnostic information was included. Different versions of the materials of this condition were generated to ensure that all pieces of nondiagnostic information would appear equally often.

Procedure
Instructions were similar to Study 2, with two exceptions. First, it was stated explicitly (and correctly) that the set of information that the participant would receive contained both relevant and irrelevant information. Second, participants in the discrimination condition were instructed to put a ‘+’ next to each item they considered relevant to their prediction, and to put a ‘−’ next to each item that they considered irrelevant. It was emphasized that all items needed to be categorized in this manner. The perceptual control condition was
identical to Study 2. Subsequent to their evaluation of information relevance, participants provided their predictions of the target person’s GPA in an open-ended format. The question mentioned, however, that the average student’s GPA was 3.0.

RESULTS

Predictions
As in Study 2, the two-way interaction in the ANOVA did not reach conventional levels of significance, $F(1, 81) = 2.70, p < 0.11$, but univariate analyses revealed the predicted pattern. In the discrimination condition a greater amount of nondiagnostic information rendered judgments less extreme ($M = 3.48, SD = 0.27$ vs. $M = 3.30, SD = 0.35$), $F(1, 40) = 3.88, p = 0.056, d = 0.56$. However, in a conceptual replication of the findings from Study 2, the amount of nondiagnostic information had no effect when participants exercised perceptual control ($M = 3.47, SD = 0.41$ vs. $M = 3.50, SD = 0.23$), $F(1, 41) = 0.13, p > 0.71, d = 0.09$.

Perceived relevance of information
Similar to Study 2, I assessed the proportion of diagnostic and nondiagnostic information that participants considered relevant or irrelevant and analyzed. As before, diagnostic information was considered much more relevant than nondiagnostic information ($M = 0.96, SD = 0.19$ vs. $M = 0.25, SD = 0.30$), $F(1, 84) = 354.98, p < 0.0001, d = 2.03$. Next, I explored whether perceived relevance varied across conditions, using separate two-way ANOVAs for diagnostic and nondiagnostic information. For diagnostic information, there was a main effect for condition. In the discrimination condition, diagnostic items were considered slightly less relevant than in the perceptual control condition ($M = 1.00$ vs. $M = 0.93$), $F(1, 81) = 3.34, p < 0.08, d = 0.39$. At the same time, a larger proportion of nondiagnostic items was considered relevant in the perceptual control condition than in the discrimination condition ($M = 0.31$ vs. $M = 0.20$), $F(1, 81) = 4.49, p < 0.04, d = 0.46$. To the extent that the correspondence between $a$ priori diagnosticity and perceived relevance is interpreted as accuracy, participants in the perceptual control strategy were less accurate in their identification of diagnostic and nondiagnostic information than participants in the discrimination condition. Lastly, regardless of condition a greater proportion of nondiagnostic items was considered relevant when four items were presented as compared to when only one such item was presented ($M = 0.05$ vs. $M = 0.42$), $F(1, 81) = 49.43, p < 0.001, d = 1.52$—a pattern that is likely to reflect unsystematic error in the classification of a small vs. a larger set of nondiagnostic items. No other effects approached significance.

DISCUSSION

Study 3 replicated the finding that a perceptual control strategy eliminates the dilution effect and extends this to a different domain. Similar to Study 2, the present data indicate that this strategy is effective in spite of the fact that it produced a less-accurate distinction between diagnostic and nondiagnostic information. Yet, again this indicates that removing a smaller proportion of the nondiagnostic information is a more effective strategy in controlling the dilution effect than merely keeping in mind that a larger proportion is irrelevant.

GENERAL DISCUSSION

The present research had two goals. First, a perceptual and a conversational account of the dilution effect were tested against each other. Second, the present research aimed at generating a strategy to control
effectively the dilution effect in decision-maker’s judgments. With regard to the first goal, there was no evidence to support a conversational perspective on the dilution effect. In contrast to earlier research that demonstrated the operation of conversational principles by undermining the presumed relevance of nondiagnostic information on the part of the experimenter, this research tried to employ the same conversational principles to eliminate the dilution effect. Instructions in all three studies were designed to avoid a contradiction between conversational norms of cooperativeness and the exclusion of nondiagnostic information from judgment. Specifically, the experimenter’s explicit goal of finding out how well participants could discriminate between diagnostic and nondiagnostic information should have encouraged cooperative participants to remove the impact of those pieces of information they themselves said were not relevant. These results are compatible with those by Chinander and Schweitzer (2003) who found that experimental participants relied on nondiagnostic information even though they said that they should not or did not use it. In a similar vein, Fein et al. (1997) showed that jurors relied on nondiagnostic information even though they had been instructed to disregard it. These findings, as well as the present results, indicate that at its heart the dilution effect is not a conversational phenomenon, but rather a perceptual one.

The results presented here are very much consistent with a perceptual approach. The critical feature of such an approach is that people spontaneously use all information available to them in generating a mental representation of the target. I argue that this has the consequence that participants use all features regardless of whether they personally believe that they are relevant or irrelevant to the judgment. This approach served as a guideline for identifying a strategy that allows decision makers to eliminate the dilution effect. Assuming that mental representations of a target are updated dynamically whenever the available information changes, I hypothesized that it is critical to exercise control over the information considered. Consistent with this idea of perceptual control, dilution effect disappeared when participants first physically removed irrelevant information before making their judgment.

Admittedly, the perceptual approach as presented here is not specific to the models presented by Nisbett et al. (1981) and Peters and Rothbart (2000). Whereas Nisbett et al. (1981) assumed that representation of the target person is merely a composite of independent features, Peters and Rothbart (2000) suggested that people attempt to integrate all information provided into a coherent impression. I characterized both approaches as perceptual because they are predicated on participants spontaneously relying on all the available information when forming a representation of the target. None of these approaches mention that participants are able to edit the information on which they base their impression.

On the one hand, critics might suggest that the present findings with regard to an effective strategy to control the dilution effect are not particularly enlightening. After all, Nisbett et al. (1981) and Peters and Rothbart (2000) have already demonstrated that fewer nondiagnostic features lead to a weakening of the dilution effect. On the other hand, if editing the information based on relevance were indeed such an intuitive strategy, it is unlikely that the dilution effect would be as pervasive as it is inside and outside the laboratory (see Waller & Zimbelman, 2003, for a review). It is highly plausible that many applied decision makers do indeed evaluate the relevance of information before rendering a judgment, but consistent with the present findings there is good evidence that even professionals routinely fall prey to the dilution effect (Glover, 1997; Hackenbracht, 1992; Highhouse, 1997; Hoffman & Patton, 1997; Shelton, 1999; Waller & Zimbelman, 2003). The lesson from the present research is that thinking ‘irrelevant’ is not enough to eliminate the dilution effect. Any differential weighting that decision makers might attempt in their mind is likely doomed to failure. Rather, contaminating evidence has to be completely removed from consideration to avoid that a decision maker inadvertently relies on it. Thus, this research provides a simple strategy to control the dilution effect.

Even though the present results are not in line with a conversational explanation, I do not deny the possibility that conversational dynamics may sometimes have an impact on the dilution effect. Tetlock and colleagues (1996) demonstrated that holding participants accountable generally increases the dilution effect, but that accountability decreased the dilution effect when it is clear that the information provided does
not come with a guarantee of relevance. The cue that the diagnosticity of all information is uncertain along with the need to justify one’s judgments seems to be potent enough to overcome the spontaneous usage of all information predicted by a perceptual approach. Converging evidence for this idea comes from unpublished research indicating that group discussion eliminates the dilution effect (Kemmelmeier, 2004; but see Young, Price, & Claybrook, 2001). That is, Tetlock et al. (1996) and Kemmelmeier (2004) show that the dilution effect disappears when two conductions are simultaneously met: the informativeness of the information is in question (either because it is randomly selected or because of disagreements among group members); and individuals need to justify their judgments to others. These characteristics, thus, seem to be limiting conditions of a perceptual approach to the dilution effect.

Additional limiting conditions concern the use of perceptual control as an effective strategy to minimize the dilution effect. First, exercising perceptual control is only effective to the extent that decision makers have sufficient knowledge and resources to remove nondiagnostic information. Second, to the extent that a decision maker construes otherwise nondiagnostic information as relevant and informative in the context in which it is presented, he or she should be disinclined to remove it when using a perceptual control strategy. For example, to the extent that in the mind of the decision maker cheerfulness is associated with academic success (e.g., because it is viewed as a proxy for self-confidence), perceptual control is unlikely to curb the dilution effect. Third, importantly, the perceptual control strategy only works when the representation of the target is computed in an online manner, that is, if the mental representation of the target changes with the available information (cf. Hastie & Park, 1986). If one’s impression of the target is based on information recalled from memory, physically editing the information that is in front of the decision maker is ineffective by definition. Despite these limitations of the perceptual control strategy I surmise that it is likely to be applicable and successful in many situations in which decision makers do not seem to have any defense against the impact of nondiagnostic information.

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REFERENCES

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