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Forecasting and ethical decision-making: What matters?

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Abstract

This study examined how the number and types of consequences considered are related to forecasting and ethical decision-making. Undergraduate participants took on the role of the key actor in several ethical problems and were asked to forecast potential outcomes and make a decision about each problem. Performance pressure was manipulated by ostensibly making rewards contingent on good problem-solving performance. The results indicated that forecast quality was associated with decision ethicality, and the identification of the critical consequences of the problem and consequences for others were associated with both higher quality forecasts and more ethical decisions. Additionally, the identification of a larger number of consequences was negatively associated with ethical decision-making. Performance pressure did not impact forecast quality or ethicality of decisions. Theoretical and practical implications of these findings are discussed.

KEYWORDS: forecasting, consequences, ethical decision-making, performance pressure, problem-solving

Forecasting and ethical decision-making: What matters?

Professionals in all fields experience ethical problems. Indeed, ethical breeches abound in government, industry, science, and academia (Steneck, 2004). Decision-making involving ethical issues can be viewed as solving complex, ill-defined problems (Frederiksen & Ward, 1978), because such situations involve socio-technical problems with multiple, often competing, goals and motives (Werhane, 2002). Ethical decision-making (EDM) requires a number of complex cognitive processes, as people must evaluate the effectiveness of alternative courses of action in the context of their understanding of the problem and the relevant rules and guidelines involved (Miner & Petocz, 2003). Thus, forecasting, or predicting the potential consequences of future actions, is likely to be an important cognitive process involved in EDM (Mumford, et al., 2008). Forecasting may be especially important in EDM because ethical problems often have significant consequences for the people and groups involved in the problem situation. Once an ethical problem is detected, the decision-maker must forecast the potential outcomes of possible actions in response to the ethical problem.

Indeed, forecasting has been empirically demonstrated to be important to EDM. [Removed for Review], et al. (2010) performed a study examining 1) two key causal analysis strategies involved in forecasting (identifying the most critical causes of the problem situation, and identifying a larger number of causes), 2) how the use of these strategies is related forecasting and EDM, and 3) the role forecasting plays in EDM. Additionally, this study examined the impact of two situational variables: time pressure and analytic mindset (deliberative versus implementation mindset) on the forecasting and EDM processes. The results of this study suggested that higher quality forecasts are significantly positively associated with better ethical decisions. Additionally, this study found that the causal analysis strategy of

identifying the most critical causes of the problem situation contributed to both better forecasting and better EDM. Identifying a larger number of causes was not related to forecasting or EDM. Finally, neither time pressure, nor which type of analytic mindset was induced, impacted forecasting or EDM.

After having demonstrated that forecasting is important to EDM, and that identifying the most critical causes of an ethical problem contributes to higher quality forecasts and better EDM, a question remained: How are the number and characteristics of the *consequences* considered in forecasting related to forecast quality and EDM? Thus, [Removed for Review], et al. (2011) performed a follow-up study to examine more deeply the role that forecasting plays in EDM. Specifically, the follow-up study examined several strategies involved in the identification of consequences, including 1) the number, 2) affective tone (positive vs. negative consequences), and 3) timeframe of the potential consequences of the ethical problem, considered during the forecasting process.

The results of this follow-up study suggested the following conclusions: 1) better quality forecasting is associated with better EDM, 2) the identification of the critical consequences of the ethical problem is associated with *both* better forecasts, and more ethical decisions, 3) the identification of a larger number of consequences is associated with better quality forecasts, 4) the identification of positive consequences is associated with better quality forecasts, and 5) the situational variable performance pressure did not appear to influence forecasting or EDM in this study.

Thus, in both of the previous forecasting studies, the manipulated situational variables did not impact the forecasting or EDM processes. The manipulations may not have been as salient or personally relevant to participants, because the participants did not directly experience the

pressure; they merely read about how the characters in the vignettes were experiencing this situational variable. The findings from these and other forecasting studies (Byrne, Shipman, & Mumford, 2010), however, may indicate that forecasting is a particularly "internal" cognitive process, that is relatively unaffected by situational variables.

Thus, in order to address the idea that the previous situational manipulations failed to demonstrate an impact on forecasting and EDM due to their relative lack of salience during the problem-solving process, the present study was designed to provide an examination of these processes in the context of a different type of manipulation of pressure Specifically, the present study utilized an "external" source of performance pressure, in which the participants actually experienced performance pressure, as opposed to simply reading about pressure in the hypothetical problem-solving scenario. Additionally, the present study examines the role of several forecasting strategies, in the processes of both forecasting and EDM, including: 1) considering a larger number of consequences, 2) considering the consequences for the self vs. others, and 3) considering the most critical consequences.

Forecasting

Forecasting involves making predictions of potential future outcomes based on observations about the situation at hand (Pant & Starbuck, 1990). Forecasting is a critical element of cognitive performance when people are confronted with complex, dynamic, demanding tasks that require the coordination of activities (Mumford, Schultz, and Van Doorn, 2001). More importantly, ethical problems are likely to have significant consequences for the people and groups involved. Thus, for these types of problems, the forecasting of potential outcomes, which can facilitate the revision of potential solutions, will be critical to EDM (Mumford et al., 2008). For example, if a decision-maker forecasts significant negative

consequences of potential problem solutions, the individual can remediate those planned actions in order to avoid as much harm as possible. Because ethical problems are likely to be complex, dynamic, socio-technical problems (Werhane, 2002), active engagement in forecasting activities can be expected to aid EDM.

Although research examining the role of forecasting in EDM has been limited, research bearing on the importance of forecasting in other complex problem-solving processes can inform our understanding of the potential role forecasting likely plays in EDM. Empirical research has demonstrated that forecasting is, indeed, important for complex cognitive processes, such as planning (Marta, Leritz, & Mumford, 2005) and creative problem-solving (Byrne, Shipman, & Mumford, 2010; Osburn & Mumford, 2006). Because of their complex and ill-defined nature, solving ethical problems is likely to require some of the same cognitive strategies as those involved in planning and creative problem-solving (Mumford et al., 2008). Thus, the results of these studies suggest that better forecasting is likely to improve EDM.

Forecasting activities have been studied in complex problem-solving in both laboratory settings and natural work settings. In a study examining anesthesiologists' planning activities before surgery, Xiao, Milgram, and Doyle (1997) demonstrated the benefits of forecasting in real-world, complex problem-solving activities. The results of this study revealed a number of forecasting strategies that people engage in, in real-world problem-solving situations, including planning for contingencies and reviewing their options for action. The results of this study, along with those of the experimental studies mentioned above, demonstrate the benefits of forecasting activities in complex problem-solving tasks.

Forecasting allows the decision-maker to reduce uncertainty and gain control in ambiguous situations through the identification of sources of ambiguity in the problem situation

(Hogarth & Makridakis, 1981). Consequently, people are likely to engage in forecasting activities when faced with ethical problems, due to their complex, dynamic, ambiguous nature. While most of the available research on forecasting has involved planning and creative problem-solving, it is likely that forecasting is an important element in many complex cognitive processes. For EDM, in particular, forecasting has been demonstrated to be a critical process involved in problem-solving ([Removed for Review] et al., 2010; 2011), perhaps because ethical decisions often have major consequences, for the decision-maker, and often for a number of other people and groups involved in the problem. In keeping with prior research findings, the following hypothesis is warranted:

H1: Higher quality forecasts will be associated with greater ethicality of decisions.

Consequences

It has been argued that the nature and success of people's forecasting efforts will depend on the number and characteristics of the consequences examined (Hammond, 1990; Hershey, Walsh, Read, & Chulef, 1990; Mumford, Schultz, & Van Doorn, 2001; Thomas, Clark, & Gioia, 1993). The present study examined several different strategies, or specific ways of thinking through forecasts, regarding the identification of consequences in forecasting, including: 1) identifying a larger number of consequences, 2) identifying consequences for oneself and others, and 3) and identifying the most critical consequences involved in the problem situation.

Number of Consequences. It is likely that considering a larger number of potential consequences of one's actions and of the broader situation will lead to a better quality forecast and better EDM. Indeed, Krietler and Krietler (1987) argued that the number of alternatives considered in a plan is a viable marker of plan quality. Additionally, Mumford, Schultz, and

Osburn (2002) suggest that considering a wider range of consequences contributes to better quality forecasts in four ways. First, more extensive forecasting implies that a wider range of situations will be considered, resulting in the production of a more robust and stronger forecast for solving the problem. Second, more extensive forecasting allows people to identify resources, contingencies, and restrictions bearing on a potential problem solution. Third, with more extensive forecasting, problems arising in solution implementation can be identified, and the idea can be revised to take these problems into account. Fourth, more extensive forecasting permits the formulation of backup plans that allow for opportunistic exploitation of emergent opportunities (Patalano & Seifert, 1997; Xiao, Milgram, & Doyle, 1997). These propositions suggest that more extensive forecasts are likely to improve both forecast quality and decision ethicality. Thus, the following hypothesis is proposed:

H2: Considering a larger number of potential consequences will be related to a) better ethical decisions and b) higher forecast quality.

Self and Others. One of the defining elements of ethical dilemmas is that they involve other people (Jones, 1991). Ethical dilemmas occur in a social context on a number of levels. First, the decision-maker often considers whether other people will judge their actions as ethical or unethical (Butterfield, Trevino, & Weaver, 2000). Additionally, many people faced with a decision with ethical implications ask other people for advice (Mumford et al., 2006). Finally, and, perhaps most importantly, problems with ethical implications almost always involve consequences for both the self, as well as consequences for other people. In fact, ethical dilemmas often may be characterized as a choice between consequences for oneself vs. consequences for others (Moore & Loewenstein, 2004; Werhane, 2002). Many conceptualizations of ethics and EDM recognize the importance of putting others before oneself,

or, at the very least, considering the possible consequences for others in making the ultimate decision. Indeed, Mumford et al. (2007) argue that decisions that reflect the consideration of consequences for others are representative of better ethical decisions. Thus, the following hypothesis is proposed:

H3: Considering consequences for others, as opposed to for the self, will be associated with both a) better ethical decisions and b) higher quality forecasts.

Critical Consequences. Mumford, Friedrich, Caughron, and Byrne (2007) point out that a common error in complex problem-solving is that people tend to focus on only general, superficial features of the problem. Thus, it is likely that identifying and considering the critical consequences when forecasting and EDM will improve these processes. Additionally, forecasting is a time- and resource-intensive activity (Dorner & Schaub, 1994; Moskowitz & Sarin, 1983), thus, it may be vital that people focus on critical consequences in their forecasts, in order to ensure that the most important outcomes are accounted for in the final problem solution. Furthermore, the forecast serves as the foundation for the generation of the final problem solution, guiding the ultimate actions that the problem-solver will take in resolving the problem (Mumford, Schultz, & Van Doorn, 2001). Thus, identifying and considering the most critical consequences allows the problem-solver to generate a higher quality forecast and, ultimately, make a better decision about how to solve the problem. Thus, the following hypothesis is warranted:

H4: Considering critical consequences will be associated with a) better ethical decisions and b) higher quality forecasts.

Contextual Variables

It is important to remember, however, that forecasting and EDM occur in a context, which may involve a number of different situational variables. In this study, the impact of performance pressure on forecasting and EDM were examined.

Performance pressure. Performance pressure has been demonstrated to cause impairments performance on a variety of tasks, especially cognitively demanding tasks (Baumeister, 1984; Beilock & Carr, 2001; Lewis & Linder, 1997). EDM is a prime example of such a cognitively demanding task (Mumford et al., 2006). Furthermore, Fiedler and Garcia (1987) note that stress serves to limit the application of complex cognitive processes; thus environments with undue pressure are likely to be negatively related to EDM. Jasanoff (1993) performed a qualitative analysis of scientific misconduct, and she found that production pressure, among other environmental variables, was associated with ethical misconduct. Similarly, Goldberg and Greenberg (1994) found that scientific professionals perceived production pressures to be the most important cause of ethical breeches they had observed in the course of their work. Furthermore, Malhotra, Ku, and Murnigan (2008) suggest that when people in organizations are pressured to "win at all costs", poor EDM is likely to occur. Finally, Nill, Shibrowsky, and Peltier (2004) found that as competitive pressure increases, students' unethical decision-making increases. Thus, it is clear that performance pressure often has a negative impact on cognitively demanding tasks.

On the other hand, mounting evidence seems to suggest that performance pressure may not impact forecasting and EDM (Byrne, Shipman, & Mumford, 2010; [Removed for Review] et al., 2010; 2011). These studies seem to suggest that these processes are not impacted by this situational variable, despite the fact that many other, similarly complex processes, are, in fact negatively impacted by pressure. Evidence suggesting that people perceive pressure as an

antecedent to unethical behavior (De Vries, Anderson, & Martinson, 2006) may indicate that people use such pressure as an excuse for misbehaving. Because the research is somewhat equivocal on this issue, the following research question is proposed:

RQ1: How will performance pressure impact a) EDM and b) forecasting?

Method

Sample

The sample used to test these hypotheses consisted of 76 (56 females, 18 males, 2 unreported) undergraduate psychology students attending a medium-sized southwestern university, with an average age of 20.77 (*SD* = 5.28).

Experimental Task

The experimental task consisted of a scenario in which the participants assumed the role of a manager of a hypothetical electronics organization. After reading a description of the organization and its current circumstances, the participants read 4 mock emails from different characters in the organization, each presenting different problems and asking for solutions to each problem. These four problems were designed to be representative of each of the 4 major dimensions of ethical problems faced by researchers, according to Mumford, et al. (2006). In response to each e-mail problem, the participants wrote their solution in the form of an e-mail response to the person asking the question. Participants were asked to 1) describe the potential actions to be taken in response to the problem, 2) forecast the potential consequences, or outcomes, of those actions, and 3) describe their final decision in response to the problem. The responses to the questions regarding the potential outcomes were scored by trained judges.

Manipulation

Performance Pressure. The performance pressure manipulation occurred vis a vis both the written instructions and the verbal instructions provided to participants by the experimenters. Participants in the high performance pressure condition were told that the quality of their responses to the experimental task would impact their chances of winning a drawing for a cash prize ($50). Specifically, participants in the top 90 percent of respondents, in terms of solution quality, would receive 9 chances to win, the top 80 percent would receive 8 chances, and so on. Participants in the low performance pressure condition were told that everyone would receive an equal chance of winning the cash prize, as a sign of appreciation for completing the study.

Thus, participants in the high pressure condition believed that their chances of obtaining a reward were dependent on the quality of their performance on the problem-solving tasks, whereas the low pressure condition did not believe that the reward was contingent on the quality of their performance. This manipulation was designed to be more ecologically valid than the performance pressure manipulations in the aforementioned studies because the type of pressure that people often experience in their lives is due to the pressure of performing well in order to obtain desired rewards.

Measurement

Forecast quality. The first set of measured variables was the quality of the forecasts generated. The written answers provided by participants working through the questions following the presentation of each problem scenario served as the material to be scored. All questions were presented in a fixed order following each problem scenario description. Participants responded in one-to-two paragraph written answers. The forecasting question required participants to identify the different possible courses of action in response to the problem. Four judges, all of whom were Masters students in industrial and organizational

psychology, appraised the forecasts provided by participants with respect to the amount of detail provided, the complexity of the forecast, and consideration of the critical elements from the problem scenario. Detail was defined as the extent to which the response covered elements (people, tasks, groups, etc.) in detail. Complexity was defined the extent to which the forecast was composed of multiple, interrelated elements (people, groups, tasks, etc.). Criticality of the forecast elements was defined as the extent to which the response considered the critical aspects of the problem scenario.

It should be noted that the rating of critical aspects in the forecast was distinct from the rating of the identification of the critical consequences in that the critical aspects of the problem scenario include the critical goals, values, and motives of the characters involved, whereas the critical consequences rating involved only the extent to which participants identified the most critical consequences of the problem situation. The judges rated detail, complexity, and criticality of the forecasts on a 5-point rating scale.

Prior to making these ratings of forecast detail, complexity, and critical aspects, judges completed a 20-hour training program. In this training program, judges were initially familiarized with the nature of the problem and the definitions of detail, complexity, and critical aspects being applied, vis a vis benchmarks selected to reflect high, medium, and low levels of performance on the problem at hand. Subsequently, they applied these rating scales in evaluating a set of sample problem solutions, and discussed discrepancies observed in their evaluations. Following training, the interrater agreement coefficients obtained for evaluations of forecast detail, complexity, and criticality were .91, .91, and .88 respectively. As expected, these ratings evidenced the expected pattern of positive correlations, with detail scores being positively correlated with complexity (r = .98), and criticality (r = .93), and complexity scores being

positively correlated with criticality scores (r = .93). The overall forecast quality variable was calculated by averaging the scores for detail, complexity, and criticality.

Consequences. This panel of four judges also appraised the consequences identified by participants. As noted above, these measures were obtained through the written answers provided by participants working through the questions following the presentation of each problem scenario. The consequences question required participants to identify the potential consequences of the courses of action previously identified. For each of the responses, the judges 1) counted the number of consequences identified by the participant, 2) rated the extent to which the participants identified consequences for themselves, 3) rated the extent to which the participants identified consequences for others, and 4) rated the extent to which the participants identified the most critical consequences of each problem scenario, on a 5-point scale. The judges were trained to score these constructs in a 20-hour training program which involved reading through the problem-scenarios, thinking about the problems on their own, and then meeting as a group to reach consensus about the most critical consequences. Following training, the interrater agreement coefficients obtained for evaluations of number of consequences, consequences for self, consequences for others, and critical consequences were .92, .78, .75, and .86 respectively.

Ethical decision-making. Two questions assessed the ethicality of the decision; the first required participants to indicate the decision they would make to solve the problem, and the second required participants to provide a rationale for the decision. For each of the responses, the judges rated the extent to which the response reflected ethicality on a 5-point scale. Markers of ethicality included 1) regard for the welfare of others, 2) attendance to personal responsibilities, and 3) adherence to/knowledge of social obligations. Regard for the welfare of others was defined as the extent to which a participant's response reflected attention and care for the welfare

of others, including decisions that intentionally work to benefit others, and behaving for the benefit of others, even at personal expense. Attendance to personal responsibilities was defined as the extent to which a participant's response reflected actively avoiding bias and being accountable for one's actions and behaviors. Adherence to/knowledge of social obligations was defined as the extent to which a participant's response reflected an understanding and respect of cultural norms and values, including understanding guidelines and the duties of given social roles. The overall ethicality dimension took these subdimensions into account to provide the primary dependent variable in this study. Following training, the interrater agreement coefficient obtained for evaluations of ethicality was .86.

Results

Impact of Performance Pressure on Forecasting and EDM

In order to examine the research question of what impact performance pressure has on forecast quality and EDM, a one-way analysis of variance was computed. This analysis showed that the low pressure condition ($M = 2.75$, $SD = 1.05$) did not differ significantly, $F(1, 74) = .833$, $p > .05$, from the high pressure condition ($M = 2.54$, $SD = 1.03$) in the quality of their forecasts. Additionally, this analysis demonstrated that the low pressure condition ($M = 2.94$, $SD = .87$) did not differ significantly, $F(1, 74) = .009$, $p > .05$, from the high pressure condition ($M = 2.96$, $SD = .96$) in the ethicality of their decisions. Despite the absence of significant group differences, manipulation checks indicated that the participants in the high performance pressure condition ($M=7.92$, $SD=3.78$) did experience significantly more pressure, $t = 2.24$, $p <.05$, than those in the low performance pressure condition ($M=5.97$, $SD=3.80$).

Relationships among Forecasting Variables and Ethicality

A series of hierarchical regression analyses were performed to address the hypotheses and research questions. The series of regression analyses was designed to test how the consequences variables predict forecast quality and ethicality, and how forecast quality predicts ethicality, in addition to testing whether or not the quality of the forecast mediates the relationship of the consequences variables and decision ethicality. A Sobel test was performed to examine the significance of the mediating role of forecast quality in the relationship between the consequences variables and ethicality. For each regression analysis, the first block entered consisted of the control measure. Scores on a post-task measure of task motivation were retained as a control variable because they were significantly positively related to forecast quality and decision ethicality. The second block consisted of the situational variables, performance pressure. The third block varied, depending on the hypothesis or research question at hand. It should be noted that the second block, which contains the situational variables, did not add incremental prediction above and beyond the controls. Traditionally, in a hierarchical regression analysis, new steps are not added following a non-significant step. These variables were retained, however, in the second block to control for their potential influence when assessing the impact of the variables entered at the third block.

Relationship of Consequences Variables and Ethicality

The direct effect of the consequences variables on ethicality was examined to address hypotheses 2a, 3a, and 4a. For this analysis, the dependent variable was ethicality, and the third block entered was the number of consequences identified, the identification of consequences for the self and others, and the criticality of the consequences identified (See Table 1). Regarding hypothesis 2a, this analysis demonstrated that the number of consequences identified was negatively associated with ethicality. Additionally, consistent with hypothesis 3a, the

identification of consequences for others predicted ethicality, while the number of consequences identified for the self did not predict ethicality. Finally, hypothesis 4a was also supported, indicating that the criticality of the consequences identified was a significant predictor of decision ethicality. Performance pressure did not predict ethicality, indicating that performance pressure may not influence the processes involved in EDM.

INSERT TABLE 1 ABOUT HERE

Relationship of Consequences Variables and Forecast Quality

The second analysis addressed hypotheses 2b, 3b, and 4b, examining whether the nature of the consequences identified were associated with higher quality forecasts. For this analysis, the dependent variable was forecast quality, and the third block entered was the number of consequences identified, the identification of consequences for the self and others, and the criticality of the consequences identified (See Table 2). This analysis did not provide support for hypothesis 2b, that the number of consequences identified would predict forecast quality. Regarding hypothesis 3b, the identification of consequences for both the self and others significantly predicted forecast quality. Hypothesis 4b was also supported, indicating that the criticality of the consequences identified significantly predicted forecast quality. Additionally, once again, performance pressure did not influence forecast quality. Thus, performance pressure may not influence people's ability to generate quality forecasts in response to an ethical problem.

INSERT TABLE 2 ABOUT HERE

Relationship of Forecast Quality and Ethicality

The analysis for hypothesis 1 examined whether higher quality forecasts were related to greater ethicality of decisions. For this analysis, the dependent variable was ethicality, and the third block entered was forecast quality (See Table 3). This analysis supported hypothesis 1, indicating that higher quality forecasts were, indeed, related to better EDM. Additionally, again, performance pressure did not influence ethicality.

INSERT TABLE 3 ABOUT HERE

Forecast Quality as a Mediator Between the Consequences Variables and Ethicality

After following the steps recommended by Baron and Kenny (1986), determining that the criticality of the consequences identified and the identification of consequences for others were both significant predictors of ethicality and forecast quality, and that forecast quality significantly predicted decision ethicality, regression analyses including forecast quality and those two consequences variables as predictors of decision ethicality were performed, in order to determine if forecast quality is a mediator of the relationship between these consequences variables and ethicality (See Table 4). This analysis, including the predictor (consequences variables) and the potential mediator (forecast quality) demonstrated that when forecast quality was accounted for, the significant prediction provided by the identification of the critical consequences, disappeared. Thus, it appears that forecast quality is a mediator of this relationship. Furthermore, a Sobel test (Preacher & Hayes, 2004) was performed to determine if the mediation suggested by the previous regression analyses was significant. The results of the Sobel test indicated that the criticality of the consequences identified ($z = 1.93$, $p = .05$) does,

indeed, significantly mediate the relationship between forecast quality and decision ethicality. This finding suggests that the strategy of identifying the most critical consequences of the problem situation is associated with decision ethicality vis a vis the overall quality of the forecast.

On the other hand, adding forecast quality to the model (per Baron and Kenny, 1986) did not result in a loss of significant prediction for the identification of consequences for others (See Table 5). Thus, the relationship between ethicality of decisions and the identification of consequences for others does not appear to be fully mediated by forecast quality, therefore, no Sobel test was performed on this relationship.

INSERT TABLE 4 ABOUT HERE

INSERT TABLE 5 ABOUT HERE

Discussion

Before turning to the broader implications of the present effort, certain limitations should be noted. To begin, it should be recognized that the present study was based on an experimental task. While the task employed in this study represents a low-fidelity simulation of a complex, real-world problem involving forecasting and EDM, and that past studies (e.g., Dailey & Mumford, 2005; Marcy & Mumford, 2006) have shown these types of tasks to be interesting and engaging to students, the question remains, concerning the generalizability of these findings to people thinking through ethical problems in the real-world.

Another related limitation involves the sequence in which these cognitive processes were elicited (forecasting potential actions, then potential consequences, and then EDM). More specifically, participants were asked to answer the questions requiring execution of these particular processes in the sequence in which they are held to operate within the model proposed by Mumford, et al. (2008). Although the available evidence supports this model and this sequence of process execution, it may not be the case that all people apply these processes in a serial fashion as they work through ethical problems, analyzing the relevant situational variables at hand.

Additionally, the measured variables of interest in this study were obtained using expert judges' ratings. Thus, the observed relationships among these variables may be due, at least in part, to common method variance. For example, the consequences identification variables accounted for an extremely high amount of the variance in forecast quality. A related limitation concerns the results of the Sobel test; it is possible that the significance obtained for forecast quality as a mediator of the relationship between consequence criticality and EDM. It is possible that the correlations among the variables exaggerated the results. We attempted to alleviate these concerns by specifically defining the different constructs to be rated, and by rating these constructs on different response materials (i.e., responses to separate questions). The fundamental content of forecasts, however, consists of the consequences identified by participants. Thus, the consequences identification variables could be spuriously related to forecast quality. In order to address this issue, however, the forecast quality construct was rated in terms of three separate constructs: detail, complexity, and criticality. As mentioned previously in the measurement section, detail was defined as the extent to which specific details were discussed in the forecast; complexity was defined as the interrelatedness among elements

(people, goals, motives, consequences, etc.) of the forecast, and criticality was defined as the criticality of the elements (people, goals, motives, consequences, etc.) identified in the forecast. Thus, while ratings of forecast quality were likely to be influenced by the way participants discussed the consequences they identified, there was additional, important information garnered from the forecast responses that differentiated ratings of forecast quality from ratings of consequences identification.

Finally, in this effort, performance pressure was the situational variable manipulated. The results of this study suggest that this variable does not impact either forecast quality or EDM. It may be possible that the manipulations used for this study were not salient enough to impact those processes in the study participants. This is unlikely, however, considering the manipulation checks that demonstrated that participants in the high pressure condition perceived significantly higher amounts of pressure. Still, future studies should examine situational variables using other manipulations, in order to determine if these variables do not, indeed, impact the forecasting and EDM processes. It should also be recognized, that other variables, such as expertise and/or experience with similar situations, may also influence forecasting and EDM. Future studies should examine other variables, such as these, that might shape our knowledge of the role of forecasting in EDM. On a related note, it is possible that studying the dynamics of these variables comparing different types of problems, with differing consequential severity might lead to different results. Indeed, with regard to the effects of performance pressure, perhaps solving a problem with more severe consequences would result in more of an impact, than solving problems with less severe consequences. Thus, future studies should examine the impact of performance pressure in different types of problem-solving situations.

Even bearing these limitations in mind, we believe that the results obtained in the present study have noteworthy implications for understanding the role of consequences identification and forecasting in EDM. Based on the results of this study, we can draw the following conclusions: 1) better quality forecasting is associated with better EDM, 2) the identification of the critical consequences of the ethical problem, as well as the identification of consequences for others are associated with more ethical decisions, 3) forecast quality appears to mediate the relationship between critical consequences and EDM, but not the relationship between consequences for others and EDM, 4) the identification of a larger number of consequences is negatively related to ethicality of decisions, 5) the identification of critical consequences, and consequences for both the self and others are associated with better quality forecasts, and 6) performance pressure did not appear to influence forecasting or EDM in this study.

These results have several important implications, both theoretical and practical. First, consistent with [Removed for Review], et al. (2010; 2011), these results indicate that forecasting is critically important to EDM. Ethical problems are likely to have significant outcomes for individuals and groups, at many different levels. Forecasting activities are the basis for forming plans (Mumford, Schultz, Osburn, 2002) designed to solve these problems. Thus, it is critical to consider the various potential outcomes for the people and groups involved, so that the ultimate problem solution addresses those outcomes adequately. Thus, people are more likely to make poor ethical decisions if they fail to consider the potential outcomes of their actions in solving the problem.

Second, it is especially important to think about the most critical consequences of the problem, both in generating forecasts and making decisions. Identifying and considering the critical consequences of the problem likely allows the decision-maker to focus the problem

solution on the most relevant aspects of the situation. Thus, the problem solution is likely to be focused on addressing or changing those variables in the environment which are likely to have the greatest impact on the people and groups involved. Furthermore, consistent with [Removed for Review] et al. (2011), the relationship between critical consequences identification and EDM appears to be fully mediated by forecast quality. Thus, the strategy of identifying critical consequences appears be associated with higher forecast quality, which, in turn, is associated with better EDM.

Furthermore, the consequences considered during forecast activities should include consequences for other people. Because ethical problems occur in a complex social system (Werhane, 2002), it is imperative to consider potential consequences for other people in generating a problem solution. The relationship between considering consequences for others and EDM, however, was not mediated by forecast quality. Thus, while forecast quality may partially mediate the relationship, it appears that consideration of consequences for others separately predicts both forecast quality and EDM.

Third, considering a larger number of consequences was actually associated with poorer EDM. This is consistent with the [Removed for Review], et al. (2010) study, which found that considering a larger number of causes was not related to forecast quality or ethicality of decisions. Additionally, in the [Removed for Review], et al. (2011) study, considering a larger number of consequences was not found to be related to better ethical decisions. These findings imply that, as suggested in the [Removed for Review], et al. (2011) study, with EDM, it is important to focus on a limited amount of key information, because ethical problems are complex, dynamic problems, often involving a number of other people.

With regard to forecasting, not surprisingly, the identification of the most critical consequences was associated with higher quality forecasts. This is consistent with the idea that considering these critical consequences allows forecasting efforts to be concentrated on the most important elements of the problem situation. Additionally, the consideration of both consequences for the self and consequences for others were associated with better quality forecasts. Because ethical problems are likely to impact other people (Jones, 1991), in order to have a better, more comprehensive forecast, one must consider the potential consequences for other people. It appears, however, that one should also consider the potential consequences for him or herself in forecasting activities. Indeed, ethical problems often involve some sort of tradeoff between the needs of oneself and those of others (Moore & Loewenstein, 2004; Werhane, 2002). Because many ethical guidelines emphasize the greatest good for the most people, it is not surprising that the consideration of consequences for others is associated with both higher quality forecasts and better EDM. On the other hand, at least when forecasting, one must consider the potential outcomes for him or herself. This is likely to allow for the most comprehensive consideration of possible outcomes for all people involved. Additionally, on some level, ethicality toward the self must be taken into consideration. Perhaps sublimating one's own needs and always putting others first is not always the best way of viewing ethical dilemmas. Thus, in order to generate a higher quality forecast, people should consider outcomes for others, but they should not neglect considering outcomes for themselves.

Finally, in this study, as in the [Removed for Review], et al., (2010; 2011) studies, the manipulated situational variable did not impact the forecasting or EDM processes. The findings from these and other forecasting studies (Byrne, Shipman, & Mumford, in 2010), however, may indicate that forecasting is a particularly "internal" cognitive process, that is relatively unaffected

by situational variables. There are a number of explanations for why situational variables may have failed to impact forecasting in empirical studies, and how these studies may differ from real-world problem-solving. First, in forecasting studies, participants may be simply "making up stories" about the possible future actions of the characters involved in the vignettes. In other words, they may not associate these possible futures with themselves and/or their own actions, making situational variables less relevant to their forecasting activities. Along related lines, in the forecasting studies discussed, participants did not actually have to implement their forecasted actions, take action to solve the problem, or make a real decision to address the problem solution. Thus, there may not be a sense of finality in their forecasting activities, which may diminish the impact of situational variables, whereas these variables may impact real-world forecasting and decision-making.

Finally, these situational variables may be more likely to impact forecasting in real-world decision-making when people are following the natural course of these problem-solving activities, as opposed to responding to specific, written prompts in the laboratory. In other words, when people solve problems in the real world, while they are likely to engage in forecasting activities, they may not proceed in the order required of them in these studies (e.g., forecast potential actions, followed by identifying consequences, followed by making the final decision). Furthermore, they are unlikely to isolate themselves and physically write down their forecasted actions, consequences, and decisions. Thus, simply by the nature of studying these processes, the impact of certain situational variables may be lost in the laboratory.

More research is needed on situational variables and their influence on forecasting and EDM. It is important to know if these variables indeed, do not impact these important processes in EDM, or if there is something about the nature of the way they are being studied that does not

allow for the true nature of the effect to be measured. The studies cited here involve, admittedly, a limited context (experimental tasks involving low-fidelity simulations), looking specifically at the cognitive aspects of EDM (not affect or behavior). It is possible that under other circumstances, some situational variables may impact forecasting and/or EDM.

Thus, future studies would do well to determine better the dynamics of these processes as they relate to situational variables. Studies involving different manipulations of the situational variables would be useful, to determine if different levels of those variables and/or different levels of personal involvement with the manipulated variables (i.e., reading about characters experiencing performance pressure, vs. actually inducing performance pressure in the participants) may impact forecasting and EDM.

Additionally, future studies should examine the impact of how participants think about and process the forecast and decision-making activities at hand. Specifically, this research should examine whether or not inducing real-world stakes for poor forecasting or decision-making changes how people engage in these processes. It may be that taking away the hypothetical nature of the way these processes have been studied thus far may allow the situational variables to have more of an impact. Additionally, by requiring some sort of implementation of the forecasted actions and ultimate decision could change the dynamics of the situational variables on these cognitive processes.

Furthermore, the results of this study, taken together with those from the [Removed for Review], et al. (2010; 2011) study indicate that both causal analysis and the identification of consequences are critical processes involved in forecasting and EDM. Each of these studies examined these processes separately, as they relate to forecasting and EDM. Future research should examine both of these processes together, to determine if they impact each other, and how

variations in these processes, when combined, impact forecasting and EDM. Additionally, future research may examine the temporal order of these forecasting activities. Does causal analysis always occur before consequences identification? How is the quality of the processes impacted by switching the order of the two? Future research examining how these forecasting activities interact with each other will be useful in elucidating the most effective means of generating a forecast, which will allow for more effective ethical decisions.

These findings also have implications for ethics training programs. First, these results provide further support for the [Removed for Review], et al. (2010) proposition that ethics training programs should include information about the importance of forecasting the potential outcomes of a person's actions and potential decisions before making their final decision about ethical problems. Many ethics training programs focus on teaching participants what the relevant ethical guidelines are in their fields of work (Antes et al., 2009; Waples et al., 2009). Although these guidelines may provide rules for avoiding some critical consequences of unethical decisions, they do not provide guidance on how to analyze ethical problems to identify the important situational variables involved in the problem, such as the causes, goals, and consequences of the problem. The results of this study suggest that ethics programs should emphasize the cognitive processes, including forecasting, that are involved in EDM. Additionally, because forecasting is difficult for people, especially in ambiguous, complex systems (Dorner & Schaub, 1994; Moskowitz & Sarin, 1983) it is especially important for ethics training to include instruction on this critical process.

The findings from this study, along with the idea that people are notoriously poor at forecasting, suggest that training people in forecasting will contribute to forecast quality and EDM (Mumford, Baughman, & Sager, 2003; Scott, Leritz, & Mumford, 2004). In providing

training with respect to forecasting, an emphasis should be placed on thinking about the critical consequences of the ethical problem situation, in order to improve forecasting, leading to a better, more informed decision. Moreover, training should emphasize that, in order to improve forecasting, people should consider a large number of consequences, including consequences for both themselves and others.

In conclusion, EDM is complex process, likely involving a number of cognitive processes, in response to a dynamic, complex, ambiguous problem. An improved understanding of the EDM process has the potential to help practitioners to make better ethical decisions when they are faced with situations that could lead to serious ethical breeches, or even more minor, day-to-day situations that may lead to violations of ethical or professional conduct. The findings of the present study suggest that high quality forecasting, including identifying and considering the downstream consequences and outcomes inherent in a given situation, is an important process in making an effective, ethical decision. Because people are prone to a number of assumptions and errors in predicting outcomes, training people in valuable cognitive strategies regarding consequences identification strategies is likely to improve forecasting quality and, ultimately, EDM. Findings in this study further suggest that when individuals identify the critical consequences of potential problem solutions, they generate higher quality forecasts and make more effective, ethical decisions. Additionally, when people identify both consequences for themselves and others, forecast quality improves. Interestingly performance pressure impacted neither forecasting nor EDM. Overall, this study demonstrates the importance of examining the cognitive processes involved in EDM, particularly forecasting and those cognitive strategies that may be used to facilitate these processes. A better understanding of these processes can help preclude ethical misconduct and inform specific interventions to improve EDM.

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Appendix

Table 1
Predicting Ethicality from Performance Pressure and Consequences Variables

		β	R^2	Δ R^2
Block 1			.13**	
	Motivation	.19*		
Block 2			.15	.02
	Performance Pressure	-.06		
Block 3			.43	.23**
	No. of Consequences	-.39*		
	Self	.0		
	Others	.53**		
	Critical Consequences	-.53**		

Note: *$p < .05$; **$p < .01$. Low Performance Pressure = 0, High Performance Pressure = 1

Table 2
Predicting Forecast Quality from Performance Pressure and Consequences Variables

		β	R^2	Δ R^2
Block 1			.08**	
	Motivation	.13**		
Block 2			.09	.01
	Performance Pressure	-.12		
Block 3			.89	.88**
	No. of Consequences	.14		
	Critical Consequences	.57**		
	Self	.32**		
	Others	.23*		

Note: *$p < .05$; **$p < .01$. Low Performance Pressure = 0, High Performance Pressure = 1

Table 3
Predicting Ethicality from Performance Pressure and Forecast Quality

		β	R^2	Δ R^2
Block 1			.13**	
	Motivation	.19*		
Block 2			.15	.02
	Performance Pressure	-.05		
Block 3			.33	.18**
	Forecast Quality	.32**		

Note: *p < .05; **p < .01. Low Performance Pressure = 0, High Performance Pressure = 1

Table 4
Forecast Quality as a Mediator Between the Criticality of the Consequences and Ethicality

		β	R^2	Δ R^2
Block 1			.13**	
	Motivation	.20*		
Block 2			.15	.02
	Performance Pressure	-.06		
Block 3			.33	.31**
	Forecast Quality	-.21		
Block 4			.33	.00**
	Critical Consequences	.13		

Note: *p < .05; **p < .01. Low Performance Pressure = 0, High Performance Pressure = 1

Table 5

Forecast Quality as a Mediator Between the Identification of Consequences for Others and Ethicality

		β	R^2	Δ R^2
Block 1			.13**	
	Motivation	.17*		
Block 2			.15	.02
	Performance Pressure	-.07		
Block 3			.33	.27**
	Forecast Quality	-.19*		
Block 4			.37	.00**
	Others	.38*		

Note: *p < .05; **p < .01. Low Performance Pressure = 0, High Performance Pressure = 1