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CONSEQUENCES IDENTIFICATION IN
FORECASTING AND ETHICAL DECISION-MAKING

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF PSYCHOLOGY

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Abstract

This study examined how the number and types of consequences considered impacts 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 and environmental conflict were manipulated within the problem scenarios. The results indicated that forecast quality was associated with decision ethicality, and the identification of the critical consequences of the problem was associated with both higher quality forecasts and more ethical decisions. Additionally, the identification of a larger number of consequences was associated with higher quality forecasts. Neither performance pressure nor environmental conflict impacted forecast quality or ethicality of decisions. Theoretical and practical implications of these findings are discussed.

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

Consequences Identification in Forecasting and Ethical Decision-making

Professionals in all fields experience ethical problems; ethical breaches abound in government, industry, science, and academia (Steneck, 2004). There has been a focus on ethical decision-making in scientists, due to the billions of federal dollars received by scientists and academics each year for research (National Institutes of Health, 2009). These researchers are accountable for the integrity of their work, which in turn leads to intense scrutiny of their conduct in research. Moreover, unethical conduct on the part of researchers is particularly problematic, as it undermines the intent of the scientific endeavor and, furthermore, breeds distrust of science and research. Unfortunately, ethical breaches appear to be rather common in the sciences. Although egregious ethical breaches, such as data falsification and mismanagement of clinical trials, leading to the death of participants (Bechtel & Pearson, 1985; Kochan & Budd, 1992; Marshall, 1996) may be more visible, due to the media coverage of such incidents, mundane, day-to-day forms of unethical behavior, such as improper authorship order and questionable data trimming (Martinson, Anderson, & De Vries, 2005; Steneck, 2004) are also significant due to their prevalence (DeVries, Anderson, & Martinson, 2006) and the potential for these instances to serve as precursors to more severe instances of misconduct.

Because of the significant impact of ethical misconduct, there has been an increase in research examining such misconduct and attempting to elucidate the processes involved in ethical decision-making. Furthermore, a number of training programs designed to educate professionals about ethical issues have been developed (National Institute of Medicine, 2002; Steneck, 2004). Mumford and colleagues (2008)

developed an ethics training program that focuses on training participants about the underlying cognitive processes involved in making ethical decisions and strategies that facilitate the execution of these processes.

The cognitive processes trained in this program are based on the Mumford and colleagues' (2008) sensemaking model of ethical decision-making. Sensemaking is a complex cognitive process in which individuals develop an understanding of a dynamic situation by creating a mental representation of important elements in the situation. This mental representation facilitates decision-making and action (Drazin, Glynn, & Kazanjian, 1999; Hogarth & Makridakis, 1981; Walsh, 1989; Weick, 1995). The Mumford, et al. (2008) sensemaking model addresses the complexities involved in ethical decision-making. The model focuses on the cognitive processes involved in ethical decision-making, while acknowledging the importance of the role that the knowledge of the relevant rules and guidelines plays in ethical decision-making and the potential role emotions may have on ethical decision-making. The model stresses that a base knowledge of the rules and guidelines relevant to the situation is important, but that an active analysis of the problem situation is a critical element, in order to come to a thorough understanding of the problem situation, including the relevant causes, potential courses of actions, and potential outcomes for all of the people involved, to make the most effective decision possible (Brown, 2007; Mumford et al., 2008; Trevino & Brown, 2004; Webley & Werner, 2008). Thus, Mumford and colleagues' (2008) model of ethical decision-making delineates several key psychological processes held to be critical to ethical decision-making.

It is important to remember that decision-making involving ethical issues can be viewed as solving complex and ill-defined problems (Frederiksen & Ward, 1978). Ethical decisions involve responding to a socio-technical problem where multiple, often competing, goals and motives are involved (Werhane, 2002). It is apparent that ethical decision-making 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 guidelines provided by ethical principles and current professional practice when making decisions with ethical implications (Miner & Petocz, 2003). Thus, Mumford, et al. (2008) propose that forecasting, or predicting the potential consequences of future actions, is likely to be an important cognitive process involved in ethical decision-making. Forecasting may be especially important in ethical decision-making 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 an ethical dilemma.

Forecasting has, in fact, been empirically demonstrated to be important to ethical decision-making. Stenmark, et al. (in press) 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 these strategies influence forecasting and ethical decision-making, and 3) the role forecasting plays in ethical decision-making. Additionally, this study examined the impact of two situational variables: time pressure and analytic mindset (deliberative versus implementation mindset) on the forecasting and ethical decision-making

processes. In this study, participants were presented with a series of scenarios describing ethical problems, for which the participants assumed the role of the main character experiencing the problem. Participants were prompted to identify the causes of the ethical problem, forecast the potential outcomes of the problem, and finally to make a decision regarding the ethical problem. First, this study found that higher quality forecasts were significantly positively associated with making 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 ethical decision-making. Identifying a larger number of causes was not related to forecasting or ethical decision-making. Finally, neither time pressure, nor which type of analytic mindset was induced, impacted forecasting or ethical decision-making.

After having demonstrated that forecasting is important to ethical decision-making, and that identifying the most critical causes of an ethical problem contributes to higher quality forecasts and better ethical decision-making, a question remained: How do the number and characteristics of the *consequences* considered in forecasting impact forecast quality and ethical decision-making? Thus, the purpose of the present study is to examine more deeply the role that forecasting plays in ethical decision-making. Specifically, this study examines strategies involved in the identification of consequences in forecasting: how the number, affective tone (positive vs. negative consequences), and timeframe of the potential consequences of the ethical problem considered during forecasting process impact the quality of forecasting and the ethicality of decision-making.

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, by facilitating the generation of problem solutions in a number of ways. Specifically, forecasting allows people to: 1) optimize outcomes, 2) identify interdependencies and conflicts, 3) organize and time actions, 4) identify potential execution problems and backup plans, and 5) specify markers for monitoring progress (Mumford, Schultz, and Van Doorn, 2001). Because ethical problems are likely to be complex, dynamic, socio-technical problems (Werhane, 2002), active engagement in forecasting activities can be expected to aid ethical decision-making.

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 that can facilitate the revision of potential solutions will be critical to ethical decision-making (Mumford et al., 2008). For example, if a decision-maker forecasts significant negative consequences of potential problem solutions, the person can remediate those planned actions in order to avoid as much harm as possible. Additionally, considering potential future outcomes, when revising solutions to a problem, can help the decision-maker to obtain equitable outcomes for as many stakeholders as possible, potentially improving both the technical quality, and the ethicality of the final decision.

Although research examining the role of forecasting in ethical decision-making 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 may play in ethical decision-making. Empirical research has demonstrated that forecasting is, indeed, important for complex cognitive processes. For example, in a planning study, Marta, Leritz, and Mumford (2005) examined a planning model which included a forecasting dimension. In this study, participants working in groups generated plans to solve a complex problem. After the task, the participants answered questions assessing the emergence of a group leader. The results of the study demonstrated that the emergent leaders' planning scores were associated with better products on this group creative problem-solving task. This study suggests that forecasting ability is, indeed, a relevant element in complex problem-solving. Thus, the skills involved in planning, including forecasting skills, are likely to be relevant in the complex problem-solving activity of ethical decision-making.

In a study of creative problem-solving, Osburn and Mumford (2006) trained participants in forecasting strategies. After training on forecasting strategies, participants completed a task which required the development of a curriculum plan for an experimental school. The researchers found that training in forecasting strategies was associated with better plans. In another study of creative problem-solving, Byrne, Shipman, and Mumford (in press) required participants to generate an advertising campaign for a new product. The researchers found that participants' forecasting of the implications of their ideas and the implications of the implementation of their plans was associated with better advertising campaigns. The results of these studies indicate that forecasting is important to creative problem-solving. Because of their complex and ill-defined nature, solving ethical problems is likely to be facilitated by, and may even

require some of the same cognitive strategies as those involved in creative problem-solving (Mumford et al., 2008). Thus, the results of these studies suggest that better forecasting is likely to improve ethical decision-making.

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 above, demonstrate the benefits of forecasting activities in complex problem-solving tasks.

One of the key functions of forecasting is to help the decision-maker reduce uncertainty and gain control in ambiguous situations through the identification of sources of uncertainty 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 ethical decision-making, in particular, forecasting has been demonstrated to be a critical process involved in problem-solving (Stenmark et al., in press), 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 the findings of Stenmark et al. (in press), 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 regarding the identification of consequences in forecasting, including 1) identifying a larger number of consequences, 2) identifying positive consequences, 3) identifying negative consequences, 4) identifying long-term and short-term consequences, and 5) 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 ethical decision-making. 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 warranted:

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

Positive and Negative Consequences. Mumford, Friedrich, Caughron, and Byrne (2007) propose that effectively solving complex problems involves extensive forecasting activities, considering both positive and negative scenarios in forecasting the effects of the problem solution. In fact, the available evidence indicates that effective forecasting involves not only considering a range of potential future situations and outcomes, but particularly considering negative potential consequences (Mumford, Lonergan, & Scott, 2002). In leadership studies, more effective leaders have been found to be better at envisioning multiple consequences of action (Vincent, Decker, & Mumford, 2002), and they envision a wider range of situations, including negative situations in plan formation. Sometimes people may formulate overly optimistic forecasts, thus failing to develop requisite back-up plans (Xiao, Milgram, & Doyle, 1997). Specifically, people often make the error of discounting side effects and negative downstream consequences; more effective forecasts consider pessimistic assumptions about control, change, and situational support (Dorner & Schaub, 2004; Mumford,

Schultz, & Van Doorn, 2001). Finally, in forecasting, more effective leaders will consider both potential changes in the crisis situation and opportunities that might emerge in this situation (Patalano & Seifert, 1997), suggesting that the consideration of positive outcomes of the problem situation may also be valuable in forecasting activities. Thus, it appears that failure to consider negative outcomes can negatively impact forecast quality and ethical decision-making. The consideration of positive outcomes, however, may also contribute to forecast quality and ethical decision-making. Thus, the following research question is warranted:

RQ1: How will the consideration of positive and negative consequences impact forecast quality and ethical decision-making?

Timeframe of Consequences. The timeframe of problem-solving activities is likely to impact the effectiveness of the problem solution (Antes & Mumford, 2009; Mainemelis, 2002). The potential role of the timeframe of the consequences considered in forecasting and ethical decision-making is unclear. As mentioned previously, ethical problems tend to be complex, dynamic, sociotechnical problems involving a number of people; the circumstances involved in the problem are likely to change over time (Werhane, 2002). Thus, not only might the relevant consequences to be considered change over time, but the consideration of long-term versus short-term consequences is likely to impact the quality of the forecast and the quality of the final problem solution. Furthermore, due to the complex, dynamic nature of such problems, focusing on short-term consequences may prove to be an over-simplification of the problem, which can negatively impact problem-solving effectiveness; thus, considering long-term consequences may improve these problem-solving activities (Mumford, Schultz, &

Osburn, 2002). On the other hand, generating long-term consequences may be difficult without making a number of assumptions about the problem situation that may prove to be inaccurate, due to the dynamic nature of these types of problems (Mumford, Schultz, & Van Doorn, 2001). Assumptions such as these may serve to limit problem-solving effectiveness, suggesting that a focus on long-term consequences may not improve forecasting and ethical decision-making. As such, the following research question is proposed:

RQ2: How will the consideration of long-term and short-term consequences impact forecast quality and ethical decision-making?

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 ethical decision-making 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:

H3: Considering critical consequences will be associated with a) higher quality forecasts and b) better ethical decisions.

Contextual Variables

It is important to remember, however, that forecasting and ethical decision-making occur in a context, which may involve a number of different contextual, or situational, variables. In this study, the impact of performance pressure and environmental conflict on forecasting and ethical decision-making were examined.

Performance pressure. Performance pressure has been shown to degrade performance on many different types of tasks, especially cognitively demanding tasks (Baumeister, 1984; Beilock & Carr, 2001; Lewis & Linder, 1997). Ethical decision-making 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 ethical decision-making. 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 breaches 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 ethical decision-making is likely to occur. Finally, Nill, Shibrowsky, and Peltier (2004) found that as competitive pressure increases, students’ unethical decision-making increases. It is clear that performance pressure often has a negative impact on

cognitively demanding tasks, such as ethical decision-making, thus the following hypothesis is warranted:

H4: Performance pressure will negatively impact a) forecasting and b) ethical decision-making.

Environmental Conflict. Environmental, interpersonal conflict may be another situational variable that impacts the ethicality of a decision (Levenson, 1986). Indeed, Mumford et al. (2007) found that past experience with interpersonal conflict in the workplace was negatively related to ethical decision-making. In this study, the authors surveyed doctoral students about their past experiences and examined how past experience related to ethical decision-making. They found that experienced interpersonal conflict was the only climate dimension in the study to have a strong, consistent (and, in fact, negative) relationship with ethical decision-making. Because interpersonal conflict has been demonstrated to have a negative impact on ethical decision-making, the following hypothesis is warranted:

H5: Environmental conflict will negatively impact a) forecasting and b) ethical decision-making.

Method

Sample

The sample used to test these hypotheses consisted of 104 undergraduate psychology students attending a large southwestern university. These participants received extra credit in their introductory psychology course for participation in this study. Participants were recruited through a website providing an overview of the study where the study was described as an investigation of complex problem-solving in a

brief one-paragraph summary statement. The sample consisted of 63 females and 41 males. Most sample members were in their first year of college and were an average age of 19.29 ($SD = 1.84$). The available demographic data indicated that participants were typical of undergraduate students attending the university.

General Procedures

After reading and signing the informed consent forms, participants proceeded to the primary task employed in this investigation. The primary experimental task consisted of a scenario in which the participants assumed the role of a manager of a hypothetical electronics organization. The participant read a brief description of the organization mentioned in the scenario, including a brief statement about the current circumstances the company was facing. Throughout the remainder of the vignette, the participants read 8 mock emails from different characters in the organization, each presenting different problems and asking for solutions to each problem. 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 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 for the number of consequences considered, the consideration of positive, negative, long-term, short-term, and critical consequences. The responses to the forecasting questions were scored for forecast detail, quality, and complexity. These ratings were aggregated to form the “forecast quality” score for each scenario. Finally, the responses to the decision question were scored for ethicality.

It should be noted that this study did not include scenarios asking the participants to make decisions about committing egregious ethical violations. This is the case for two reasons. First, egregious ethical violations do not appear to be the primary concern of practitioners in businesses and the sciences; they are more concerned with ambiguous ethical concerns faced on a day-to-day basis (DeVries, Anderson, & Martinson, 2006). Second, using the more ambiguous ethical scenarios allows for a more diverse set of responses, because the “right” answer is not immediately apparent to the participants, thus they must work with what they know about the situation and the people involved, to generate a solution.

All experimental manipulations occurred within the context of the hypothetical organization, within the written study materials. After completing the experimental task, participants completed a demographics questionnaire and a post-task survey measuring perceived task difficulty, engagement, and motivation to complete the task.

Experimental Task

The problem scenarios for this task required participants to assume the role of the main character who was experiencing an ethical problem. The problems involved issues related to each of four primary domains of research misconduct: data management, study conduct, business practices, and professional practices (Mumford et al., 2006). There were two problems from each of the four domains, for a total of eight problems. In reading through these problems, participants were asked to assume the role of a leader in a hypothetical electronics firm who was being asked a question about an ethical problem by another member of the organization. Participants were presented with background information describing the circumstances involved in the organization,

including their role as a leader in the organization, information about the other characters involved, and the costs at stake, should the problem not be solved. The participants assumed the role of a manager in the department responsible for testing and designing new products. Each e-mail asked the participant to make a decision about a different problem. Any problem-specific information that participants would have needed in thinking about the problem was included in the stimulus e-mail.

After reading the scenario, participants were asked to respond to prompt questions about the potential courses of action. After identifying the potential courses of action, participants were asked to forecast possible outcomes of those courses of action. It should be noted that participants did not simply forecast the outcomes of the situation assuming that the problem followed the same trajectory it was currently on. They forecasted outcomes to a variety of potential actions that their character could take in response to the problem situation. Finally, after forecasting the likely outcomes of the scenario, participants were asked to make a decision about the problem.

Manipulations

Performance Pressure. The performance pressure manipulation occurred in the organizational background materials presented to the participants. Participants in the high performance pressure group were told that the organization was not performing well, financially. Specifically, the company had recently lost some clients to its greatest competitor. Thus, it was extremely important that the organization develop, market, and sell new, state-of-the art products, in order to keep the organization afloat. Participants in the low performance pressure group were told that the organization was performing

very well, was the top electronics firm in the nation, and was working to develop new products in order to remain the top firm.

Environmental Conflict. The environmental conflict manipulation also occurred in the organizational background materials presented to participants. Participants in the high environmental conflict group were told that two of the organizational units have been feuding lately (IT and Finance), and that the IT department blames some of their technological problems on the fact that money has been allocated to the design and testing department (the department for which the study participants are ostensibly in charge of) for new employees, as opposed to updating the IT equipment. These feuds have caused the IT department not to service computers as effectively as usual. Additionally, there were problems internal to the design and testing department. Participants in the low environmental conflict group were told that the organization was very fortunate in that the employees work well together and very rarely have disagreements.

Measurement

Forecast quality. The first set of measured variables was the quality of the forecasts generated. These measures were obtained through the written answers provided by participants working through the questions following the presentation of each problem scenario. Each question was responded to in a one-to-two paragraph written answer. All questions were presented in a fixed order following each problem scenario description. The written answers provided in response to these questions were presented to a panel of four judges, all of whom were doctoral students in industrial and organizational psychology. These doctoral students were familiar with the ethical

decision-making literature and complex cognitive performance, but not the hypotheses underlying the present study. The forecasting question required participants to identify the different possible courses of action in response to the problem. The judges were asked to appraise the forecasts provided by participants. The forecasts of the likely outcomes of the problem scenarios were a paragraph to two paragraphs in length, and were evaluated 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. 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. Ratings of detail, complexity, and criticality were to be made on a 5-point rating scale where benchmarks were selected to reflect high, medium, and low levels of performance on the problem at hand.

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. Subsequently, they were asked to apply

these rating scales in evaluating a set of sample problem solutions and then meet and discuss and discrepancies observed in their evaluations. Following training, the interrater agreement coefficients obtained for evaluations of forecast detail, complexity, and criticality were .85, .79, and .68 respectively. As expected, these ratings evidenced the expected pattern of positive correlations, with detail scores being positively correlated with complexity ($r = .96$), and criticality ($r = .88$), and complexity scores being positively correlated with criticality scores ($r = .87$). The overall forecast quality variable was calculated by averaging the scores for detail, complexity, and criticality.

Consequences. This panel of four judges, again, all doctoral students familiar with the ethical decision-making literature but not the study hypotheses, 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) counted the number of positive consequences identified, 3) counted the number of negative consequences identified, 4) rated the extent to which the consequences considered were long-term, versus short-term, and 5) rated the extent to which the participants identified the most critical consequences of each problem scenario, on a 5-point scale. Participants who identified all of the most critical consequences received a score of 5, participants who identified some of the most critical consequences received a score of 3, and participants who identified none of the critical consequences received a score of 1. 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, number of positive consequences, number of negative consequences, timeframe of consequences, and critical consequences were .94, .91, .93, .66, and .73 respectively.

Ethical decision-making. The decision ethicality measure was obtained through the written answers provided by participants working through the questions following the presentation of each problem scenario. 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 .81.

Results

We used a series of hierarchical regression analyses to address our hypotheses and research questions. The series of regression analyses was designed to test individually how the consequences variables influence forecast quality and ethicality, and how forecast quality influences 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 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 measures. 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. Gender was also retained as a control variable because it was significantly related to ethicality, such that females tended to be more ethical than males. The second block consisted of the two situational variables, performance pressure and environmental conflict, plus the two-way interaction between them. 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. We, however, retained the situational variables 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 and 3a and research question 2. For this analysis, the dependent variable was ethicality, and the third block entered was the number of consequences identified, the timeframe of the consequences identified, and the criticality of the consequences identified (See Table 1). This analysis did not provide support for hypothesis 2a, that the number of consequences identified would predict ethicality. Additionally, the timeframe of the consequences identified was not associated with the ethicality of the decision. Hypothesis 3a, however, was supported, indicating that the criticality of the consequences identified was a significant predictor of decision ethicality. However, neither performance pressure nor environmental conflict predicted ethicality, indicating that performance pressure and environmental conflict may not influence the processes involved in ethical decision-making.

INSERT TABLE 1 ABOUT HERE

Relationship of Consequences Variables and Forecast Quality

The second analysis addressed hypotheses 2b and 3b and research question 2, 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 and the criticality of the consequences identified (See Table 2). This analysis provides support for hypothesis 2b, that the number of consequences identified would predict forecast quality. Hypothesis 3b was also supported, indicating that the criticality of the consequences identified significantly predicted forecast quality. The timeframe of the consequences identified, however, was not associated with forecast quality. Additionally, once again, neither performance pressure, nor environmental conflict influenced forecast quality. Thus, performance pressure and environmental conflict 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 ethical decision-making. Additionally, again, neither performance pressure, nor environmental conflict influenced ethicality.

INSERT TABLE 3 ABOUT HERE

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

After determining that the criticality of the consequences identified significantly predicted ethicality, the criticality of the consequences identified significantly predicted forecast quality, and that forecast quality significantly predicted decision ethicality, a regression analysis including the criticality of the consequences and forecast quality as predictors of decision ethicality was performed, in order to determine if forecast quality is a mediator of the relationship between criticality of consequences and ethicality (Baron & Kenny, 1986) (See Table 4). This analysis, including the predictor (criticality of consequences) and the potential mediator (forecast quality) demonstrated that forecast quality remained a significant predictor of ethicality, even after controlling for the identification of the critical consequences. Thus, it appears that forecast quality is a mediator of this relationship. Furthermore, a Sobel test (Preacher & Hayes, 2004) was performed to determine if forecast quality was a significant mediator of the relationship between the criticality of the consequences identified and decision ethicality. The results of the Sobel test indicated that the criticality of the consequences identified does, indeed, mediate the relationship between forecast quality and decision ethicality ($p < .01$). This finding suggests that the ability to identify the most critical consequences of the problem situation influences decision ethicality vis a vis the overall quality of the forecast.

INSERT TABLE 4 ABOUT HERE

Relationship of Positive and Negative Consequences Identification on Forecast Quality

After determining that the number of consequences identified significantly predicted forecast quality, we examined research question 1, regarding how the identification of positive versus negative consequences influenced forecast quality. For this analysis, the dependent variable was forecast quality, and the third block entered included the number of positive consequences identified, the number of negative consequences identified, the timeframe of the consequences identified, and the criticality of the consequences identified (See Table 5). This analysis demonstrated that the number of positive consequences identified significantly predicted forecast quality, while the number of negative consequences identified did not significantly predict forecast quality. This finding suggests that the consideration of potential positive consequences is important to generating high quality forecasts.

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 ethical decision-making, the question remains, concerning the generalizability of these findings to people thinking through ethical problems in the real-world. Additionally, the participants were undergraduate students. It is possible that older adults might have

different points of view regarding ethical behavior, or they may differ in their stages of cognitive or moral development. Thus, older adults may perform differently on similar tasks or in real-world decision-making situations than people of other developmental levels. Additional research is necessary to address this question.

Another related limitation involves the sequence in which these cognitive processes were elicited (forecasting potential actions, then potential consequences, and then ethical decision-making). 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. We attempted to alleviate this concern by specifically defining the different constructs to be rated, and by rating these constructs on different response materials (i.e., responses to separate questions). For example, the fundamental content of forecasts consists of the consequences identified by participants. Thus, the consequences identification variables could easily 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 and environmental conflict were the situational variables manipulated. The results of this study suggest that these variables do not impact either forecast quality or ethical decision-making. It may be possible, however, that the manipulations used for this study were not salient enough to impact those processes in the study participants. Specifically, these variables were manipulated vis a vis the written background materials presented to the participants, as opposed to manipulations external to the participants, in which the participants actually experienced the pressure and conflict. Thus, future studies should examine these variables using other manipulations, in order to determine if these variables do not, indeed, impact the forecasting and ethical decision-making processes. It should also be recognized, however, that other variables, such as expertise and/or experience with similar situations, may also influence forecasting and ethical decision-making. Future studies should examine other variables, such as these, that might shape our knowledge of the role of forecasting in ethical decision-making.

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 ethical decision-making. Based on the results of this study, we can draw the following conclusions: 1) better quality forecasting is associated with better ethical decision-making, 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 variables performance pressure and environmental conflict did not appear to influence forecasting or ethical decision-making in this study.

These results have several important implications, both theoretical and practical. First, consistent with Stenmark, et al. (in press), these results indicate that forecasting is critically important to ethical decision-making. Ethical problems are likely to have significant outcomes for people and groups of people 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.

Third, similar to the Stenmark, et al. (in press) study, which found that considering a larger number of causes was not related to forecast quality or ethicality of decisions, in the present study, considering a larger number of consequences was not related to better ethical decisions. Considering a larger number of consequences was, however, related to better quality forecasts in the present study. These findings imply that, as suggested in the Stenmark, et al. (in press) study, with ethical decision-making, 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 forecasting, however, consistent with other forecasting research (Byrne, Shipman, & Mumford, in press; Krietler and Krietler, 1987; Mumford, Schultz, and Osburn, 2002; Patalano & Seifert, 1997; Xiao, Milgram, & Doyle, 1997), generating an extensive forecast, which considers a large number of consequences, is most effective. Indeed, there is research to suggest that considering a wide breadth of information improves cognitive processes by limiting the chances for information acquisition errors (Hogarth & Makridakis, 1981).

Additionally, this study found that the identification and consideration of positive consequences, as opposed to negative consequences, was associated with higher quality forecasts. While most of the research on planning and forecasting

consequences has suggested that it is important to consider, and thus make plans for, negative consequences (Dorner & Schaub, 2004; Mumford, Friedrich, Caughron, & Byrne, 2007; Mumford, Schultz, & Van Doorn, 2001; Mumford et al., 2002; Vincent et al., 2002), the results of this study suggest that it is also important to consider positive consequences. In this study, participants were more likely to identify negative consequences than positive consequences, but those participants who identified positive consequences produced higher quality forecasts. Considering potential positive consequences may be important for preparing for and recognizing emergent opportunities in the problem situation. Additionally, with forecasting, the old adage of “if you can’t say anything nice...” might be true. If people are unable to identify positive consequences of their potential future actions taken to solve a problem, it may be likely that the solution they have identified to address the problem is not the best way to approach the problem. Taken together, these results indicate that, while it may, indeed, be important to consider negative consequences, in order to have a well-rounded, high-quality forecast, people must also consider the potential positive consequences of the actions taken to solve the problem at hand.

The timeframe of the consequences identified was not related to either forecast quality or ethicality in this study. This is consistent with the findings of Byrne, Shipman, and Mumford (in press), who found that the timeframe of forecasting activities was not related to the effectiveness of the forecast or the quality of the overall problem solution. It may be that ethical problems are too complex and dynamic (Werhane, 2002), thus, neither a focus on long-term nor short-term consequences aids forecasting or ethical decision-making. What appears to be most important is

considering a larger number of consequences, and the most critical consequences, in order to generate a comprehensive, extensive, effective forecast and an ethical decision.

Finally, in this study, as in the Stenmark, et al., (in press) study, the manipulated situational variables did not impact the forecasting or ethical decision-making processes. As mentioned previously, in this study, the manipulations may not have been as salient or personally relevant to participants, because the participants did not directly experience the pressure and conflict; they merely read about how the characters in the vignettes were experiencing these variables. The findings from these and other forecasting studies (Byrne, Shipman, & Mumford, in press), 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.

Thus, it is important to remember that more research is needed on situational variables and their influence on forecasting and ethical decision-making. It is important to know if these variables indeed, do not impact these important processes in ethical decision-making, 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 ethical decision-making (not affect or behavior). It is possible that under other circumstances, some situational variables may impact forecasting and/or ethical decision-making.

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 ethical decision-making.

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 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 Stenmark, et al. (in press) study indicate that both causal analysis and the identification of consequences are critical processes involved in forecasting and ethical decision-making. Each of these studies examined these processes separately, as they relate to forecasting and ethical decision-making. 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 ethical decision-making.

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 Stenmark, et al. (in press) 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 ethical decision-making. 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 ethical decision-making (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 the potential positive consequences of their problem solutions.

In conclusion, ethical decision-making is complex process, likely involving a number of cognitive processes, in response to a dynamic, complex, ambiguous problem. An improved understanding of the ethical decision-making 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, ethical decision-making. 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 a larger number of consequences, particularly positive consequences, forecast quality improves. Interestingly, neither performance pressure, nor environmental impacted forecasting or ethical decision-making. Overall, this study demonstrates the importance of examining the cognitive processes involved in ethical decision-making, 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 ethical decision-making.

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Appendix

Table 1
Predicting Ethicality from Performance Pressure, Environmental Conflict, and Consequences Variables

	β	R^2	ΔR^2
Block 1		.17**	
Gender	.16		
Motivation	.28**		
Block 2		.19	.013
Performance Pressure	-.19		
Environmental Conflict	-.03		
Perf Press x Env Conf	.14		
Block 3		.34	.16**
Number of Consequences	.08		
Critical Consequences	.48*		
Timeframe	-.21		

Note: * $p < .05$; ** $p < .01$. No Performance Pressure = 0, Performance Pressure = 1; Low Environmental Conflict = 0, High Environmental Conflict = 1; Short-term Consequences = 1, Long-term Consequences = 5

Table 2

Predicting Forecast Quality from Performance Pressure, Environmental Conflict, and Consequences Variables

	β	R^2	ΔR^2
Block 1		.11**	
Gender	.07		
Motivation	.12**		
Block 2		.14	.02
Performance Pressure	-.00		
Environmental Conflict	-.07		
Perf Press x Env Conf	.09		
Block 3		.82	.70**
Number of Consequences	.28**		
Critical Consequences	.60**		
Timeframe	.01		

Note: * $p < .05$; ** $p < .01$. No Performance Pressure = 0, Performance Pressure = 1; Low Environmental Conflict = 0, High Environmental Conflict = 1; Short-term Consequences = 1, Long-term Consequences = 5

Table 3
Predicting Ethicality from Performance Pressure, Environmental Conflict, and Forecast Quality

	β	R^2	ΔR^2
Block 1		.17**	
Gender	.14		
Motivation	.22**		
Block 2		.19	.01
Performance Pressure	-.18		
Environmental Conflict	-.03		
Perf Press x Env Conf	.11		
Block 3		.37	.18**
Forecast Quality	.46**		

Note: * $p < .05$; ** $p < .01$. No Performance Pressure = 0, Performance Pressure = 1; Low Environmental Conflict = 0, High Environmental Conflict = 1

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

		β	R^2	ΔR^2
Block 1			.17**	
	Gender	.12		
	Motivation	.21*		
Block 2			.19	.01
	Performance Pressure	-.18		
	Environmental Conflict	.00		
	Perf Press x Env Conf	.10		
Block 3			.34	.16**
	Number of Consequences	-.06		
	Critical Consequences	.17		
	Timeframe	-.22		
Block 4			.39	.04*
	Forecast Quality	.51*		

Table 5

Predicting Forecast Quality from Performance Pressure, Environmental Conflict, the Number of Positive and Negative Consequences, Critical Consequences, and Timeframe of Consequences

	β	R^2	ΔR^2
Block 1		.11**	
Gender	.09*		
Motivation	.14**		
Block 2		.14	.02
Performance Pressure	-.00		
Environmental Conflict	-.07		
Perf Press x Env Conf	.05		
Block 3		.84	.71
Number of Positive Consequences	.22**		
Number of Negative Consequences	.12		
Critical Consequences	.64**		
Timeframe	.02		

Note: * $p < .05$; ** $p < .01$. No Performance Pressure = 0, Performance Pressure = 1; Low Environmental Conflict = 0, High Environmental Conflict = 1; Short-term Consequences = 1, Long-term Consequences = 5