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Strategies in Forecasting Outcomes in Ethical Decision-making: Identifying and Analyzing the Causes of the Problem

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Abstract

This study examined the role of key causal analysis strategies in forecasting and ethical decision-making. Undergraduate participants took on the role of the key actor in several ethical problems and were asked to identify and analyze the causes, forecast potential outcomes, and make a decision about each problem. Time pressure and analytic mindset were manipulated while participants worked through these problems. The results indicated that forecast quality was associated with decision ethicality, and the identification of the critical causes of the problem was associated with both higher quality forecasts and higher ethicality of decisions. Neither time pressure nor analytic mindset impacted forecasts or ethicality of decisions. Theoretical and practical implications of these findings are discussed.

Keywords

forecasting; ethical decision-making; causal analysis; time pressure; problem-solving

Ethical decision-making is critical for professional work in all fields, but it has been given particular attention in the sciences and academia. Unfortunately, ethical breeches appear to be rather common in the sciences. These cases may be as egregious as outright falsification of data and failure to manage clinical trials appropriately, leading to the death of participants (Bechtel & Pearson, 1985; Kochan & Budd, 1992; Marshall, 1996), or they may be as low-profile as improper authorship order and questionable data trimming (Martinson, Anderson, & De Vries, 2005; Steneck, 2004). Despite the significance and visibility of dramatic events, more mundane, day-to-day forms of unethical behavior are also significant due to their prevalence and the likelihood for these issues to operate as precursors to more severe instances of misconduct. Given 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 conduct in research. Moreover, unethical conduct ultimately undermines the intent of the scientific endeavor and breeds distrust of science and research.

Interest in minimizing ethical breeches has led to increased research examining these events and seeking to understand ethical decision-making. Additionally, a great deal of effort has focused on developing training programs aimed at addressing ethical issues in professional work (National Institute of Medicine, 2002; Steneck, 2004). Mumford and colleagues (2008)

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developed an ethics training program instructing people in how to make better ethical decisions through an understanding of 1) the underlying cognitive processes involved in making decisions of an ethical nature and 2) strategies that facilitate execution of these processes.

This training program is based on a 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). This sensemaking model was developed to address the complexities involved in ethical decision-making. The model takes into account not only the role that the knowledge of the relevant rules and guidelines plays in ethical decision-making, but also the cognitions involved in ethical decision-making, and the potential role emotions may have on ethical decision-making. While having base knowledge of the rules and guidelines relevant to the situation is important, a thorough understanding of the problem situation, including the relevant causes, potential courses of actions, and potential outcomes for all of the people involved, is critical to making an effective decision (Brown, 2007; Mumford et al., 2008; Trevino & Brown, 2004; Webley & Werner, 2008). Thus, Mumford and colleagues' model of ethical decision-making includes several key psychological processes held to be involved in ethical decision-making.

In addressing ethical decision-making as a series of psychological processes, one must first understand that ethical decisions involve responding to socio-technical problems where multiple, often competing, concerns are operating (Werhane, 2002). Thus, decision-making involving ethical issues can be viewed as solving complex and ill-defined problems (Frederiksen & Ward, 1978). In making decisions with regard to these problems, 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 (Miner & Petocz, 2003). Thus, forecasting is held to be an important cognitive process involved in ethical decision-making. Once an ethical problem is detected, the decision-maker must forecast the potential outcomes of possible actions in response to an ethical dilemma. Forecasting the outcomes of the problem situation is important because ethical problems often have major consequences for the decision-maker, his or her workgroup, and the organization involved.

Because an understanding of the context of the problem situation, including the relevant causes, potential courses of actions, and potential outcomes for all of the people involved is held to be critical in making an effective decision, the purpose of this study is to examine the role that forecasting plays in ethical decision-making, especially in terms of the strategies that may prove useful in forecasting. Specifically, this study examines how key causal analysis strategies, including the identification of critical causes and a greater number of causes, involved in an ethical problem 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). Mumford, Schultz, and Van Doorn (2001) indicated that forecasting the outcomes of a person's actions plays a central role in refining plans by allowing the person 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. Additionally, they point out that forecasting is a critical element of cognitive performance when people are confronted with complex, dynamic, demanding tasks that require the coordination of activities. Ethical problem

situations are likely to exhibit these characteristics (Werhane, 2002), thus forecasting can be expected to aid ethical decision-making.

Furthermore, because ethical problems often have major consequences for the people and organizations involved, the projection of outcomes and the revision of potential solutions is likely to be vital to ethical decision-making (Mumford et al., 2008). One example of how forecasting improves ethical decision-making is that the identification of negative potential outcomes via forecasting allows the decision-maker to remediate planned actions such that harm is avoided as much as possible. Additionally, considering downstream outcomes, or outcomes likely to occur in later stages of the problem situation, when revising solutions to a problem can help the decision-maker to obtain equitable outcomes for as many stakeholders as possible.

While there has not been research examining the role of forecasting in ethical decision-making, research bearing on the importance of forecasting in other complex cognitive processes, especially 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 study of creative problem-solving, Osburn and Mumford (2006) trained participants in forecasting strategies, involving the prediction of a range of different types of outcomes (e.g., long-term and short-term outcomes). Training in forecasting strategies was associated with more creative plans. Because of their complex and ill-defined nature, ethical problems are likely to require some of the same strategies as those involved in creative problem-solving (Mumford et al., 2008). Thus, the results of the Osburn and Mumford (2006) study suggest that forecasting outcomes may improve ethical decision-making.

Additionally, Marta, Leritz, and Mumford (2005) developed a planning model which included a forecasting dimension. In order to test their planning model, they examined creative problem-solving on a task which required participants to work in groups to generate a plan to remediate declines in market share and profits of a car company. After the experimental task, participants answered open-ended questions regarding group interactions designed to assess the emergence of a group leader. The researchers demonstrated that leaders' scores on the planning measure were associated with better quality and more original products on this group creative problem-solving task. This study suggests that forecasting ability is a relevant element in complex problem-solving. Thus, forecasting is likely to be relevant in the complex problem-solving activity of ethical decision-making.

In another study, which took place in a natural work setting, Xiao, Milgram, and Doyle (1997) examined the anesthesiologists' planning activities before surgeries. This examination elicited several strategies involved in these planning efforts, and several of the strategies they identified involved elements of forecasting, including planning for contingencies, which involves preparing and reviewing responses to likely or expected troublesome scenarios, and reviewing options, which involves the evaluation of peculiarities of a case that would change the options available during the examination of potential problems and their solutions. Thus, forecasting is evident in complex problem-solving in natural work settings, in addition to laboratory experiments, again demonstrating the benefits of forecasting in real-world, complex problem-solving activities.

One of the key functions of forecasting is to reduce uncertainty and gain control in ambiguous situations by identifying sources of uncertainty in the environment (Hogarth & Makridakis, 1981). Thus, people are likely to engage in forecasting activities when faced with complex, ambiguous problem situations, such as ethical problems. 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 other complex cognitive processes. For ethical decision-making, in particular, forecasting is likely to be critical, because ethical decisions often have major consequences, both for the decision-maker, and for others involved in the situation, not to mention the organizations involved. Accordingly, the following hypothesis is warranted:

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

Casual Analysis

Having proposed the importance of forecasting in ethical decision-making, it is critical to consider what cognitive strategies might facilitate forecasting activities. Cognitive strategies are useful tactics for executing cognitive processes (Mumford et al., 2008). Causal analysis strategies may prove to be critical in executing forecasting. Mumford, Schultz, and Van Doorn (2001) proposed that the projection of outcomes and revision of solutions requires an individual to 1) identify manipulable causes and contingencies, 2) generate consequences of implementing the plan, and 3) produce a revised, more detailed plan. Thus, causal analysis, which includes the identification and consideration of the causes of the situation, is an important strategy involved in the forecasting process. Research demonstrating that solutions to complex problems are generated through the identification and manipulation of key causes (Hershey, Walsh, Read, & Chulef, 1990) suggests that causal analysis is likely to be particularly important in both forecasting and ethical decision-making. Specifically, researchers have pointed out that the causes embedded in the mental models that people use in solving complex problems provide the basis for forecasting the outcomes of actions (Cavaleri & Sterman, 1997; Maani & Maharaj, 2004).

Additionally, Hayes-Roth and Hayes-Roth (1979) demonstrated that the identification of the relevant causes of a problem allows people to identify the actions they must take to solve the problem and to ensure the successful execution of their plan. Furthermore, qualitative studies of social innovation by Mumford (2003) and Mumford and Moertl (2003) have provided evidence suggesting that the analysis of the causes operating in complex systems may provide the basis for the generation of ideas that lead to social innovation. Thus, causal analysis is an important element in generating solutions to, and ultimately solving, complex problems. This provides further evidence that causal analysis can be expected to play a role in both forecasting and ethical decision-making.

Marcy and Mumford (2007), in an experimental study of social innovation, trained participants in the analysis of causes, and those participants who received causal analysis training generated more original problem solutions. They concluded that the identification and manipulation of key causes is necessary for idea generation and the effective implementation of ideas. Thus, the identification and analysis of causes is an important element in generating problem solutions, which is an important part of forecasting and ethical decision-making.

In the present study, two key causal analysis strategies were examined: identifying a larger number of causes identified and identifying the most critical causes of the problem. Both of these strategies were expected to benefit forecasting and ethical decision-making. In complex problems, such as ethical dilemmas, there are likely a large number of causes operating at many different levels, and it is possible that the more causes a person identifies, the more informed that person's forecasts and decisions may be. Indeed, causation in social systems is substantially complex (Anderson, 1999), due to the dynamic interaction of multiple causes (Bradbury & Lichtenstein, 2000). Thus, Hogarth and Makridakis (1981) propose that, in order to avoid information acquisition biases in forecasting, it is important to search for relevant information from as wide a base as possible. Because of the complexity and ambiguity involved in ethical problem situations, the fact that complex social systems often involve multiple

causes, and the finding that it may be important to search for information from a wide base in solving such complex social problems, the following hypothesis is warranted:

H2: The identification of more causes of the problem will be associated with: a) higher quality forecasts and b) greater ethicality of decisions.

Additionally, it is likely to be important to identify the critical causes involved in the situation, so that these most critical causes can be addressed in the problem solution. Indeed, in a study of complex decision-making by Maani and Maharaj (2004), the participants who performed the best were those who attempted to gain an understanding of the structure of the system of actors and causes before they developed strategies and actions. Thus, the ability to see the “big picture” was associated with better performance on the task. People who focus on the “big picture” do not focus on minute details; they extract the most critical aspects of the situation when generating a problem solution. Therefore, the identification of the critical causes of a problem is likely to facilitate complex problem-solving, such as forecasting and ethical decision-making. Thus, the following hypothesis is warranted:

H3: The identification of the critical causes of the problem will be associated with:
a) higher quality forecasts and b) greater ethicality of decisions.

Contextual Variables

It is important to remember, however, that causal analysis, 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 time pressure and analytic mindset on forecasting and ethical decision-making were examined.

Time pressure—Time pressure is commonly held to undermine complex cognitive processes, such as ethical decision-making and forecasting, as a result of several mechanisms. First and foremost, ethical decision-making and forecasting require time (Mumford et al., 2008). Second, time pressure induces people to employ simpler, less effective, strategies in process execution (De Dreu, 2003; Ordóñez & Benson, 1997). Third, time pressure may act as a distracter (Runco, 1999). Finally, time pressure may be a factor in real-world ethical decision-making situations (Huber & Kunz, 2007; Kocher & Sutter, 2006), thus examining its role in forecasting and ethical decision-making is central to understanding these processes.

Although time pressure is typically considered to be a negative influence on cognitive processes, it is open to question whether time pressure always has negative effects on complex cognition, such as forecasting and ethical decision-making. For example, Mumford, Baughman, Supinski, and Maher (1996) found that a targeted search for key facts and anomalies was more likely to contribute to creative thought than a search for a range of information. Because time pressure focuses search strategies, it is possible that time pressure may operate in a similar manner, leading to a more focused search for key facts and anomalies, thereby contributing to forecasting and ethical decision-making. Thus, the following research question is warranted:

RQ1: How will time pressure impact forecasting and ethical decision-making?

Analytic mindset—The impact of implementation versus deliberative mindset was examined because this variable has been demonstrated to impact performance on complex problem-solving tasks, and ethical decision-making is, indeed, a complex problem-solving task (Mumford et al., 2006). When in a deliberative mindset, people engage in an abstract, conscious, analysis of relevant causes, contingencies, resources, and restrictions (e.g. Gollwitzer, 1999; Gollwitzer & Brandstatter, 1997). This conscious analysis, however, declines as people begin to engage in implementation activities.

The research on analytic mindset does not clearly suggest which mindset would be better for forecasting and ethical decision-making. Strange and Mumford (2005) found that deliberation helps people analyze causes and generate coherent solutions. Thus, deliberative mindset could benefit forecasting and ethical decision-making in allowing for a more thorough causal analysis and better solutions. On the other hand, Dailey and Mumford (2004) found that people in an implementation mindset tend to focus on the practical aspects of implementing a solution. These findings suggest that implementation mindset would be more beneficial to forecasting and ethical decision-making, as it focuses attention on the more critical aspects of solving the problem, including contingencies, restrictions, and goals (Dailey & Mumford, 2004). Thus, we will examine the following research question:

RQ2: How will analytic mindset impact forecasting and ethical decision-making?

Method

Sample

The original sample used to test these hypotheses consisted of 97 undergraduate psychology students attending a large southwestern university. Ten participants were dropped due to failure to complete at least 75% of the experimental task, leading to a final sample of 87 participants. 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 23 males, with one unknown. Most sample members were in their first year of college and were an average age of 19.76 ($SD = 1.63$). The available demographic data indicated that participants were typical of undergraduate students attending the university.

Procedures and Tasks

After reading and signing the informed consent forms, participants were asked complete a timed psychometric measure to be described below. This measure was administered to provide a control for a relevant individual differences variable. Once participants had completed this measure, they were asked to proceed to the primary task employed in this investigation. Before beginning the task, however, all participants were presented with a brief written training describing how to identify causes in a situation. This training was presented so that participants would be familiar with causal identification prior to beginning the experimental task. The training exercise described the nature of causes, and instructed them in how to identify causes of problems. This training exercise is presented in an appendix¹ available from the author.

After reading through the causal identification training, participants proceeded to the primary experimental task, which consisted of a series of problem scenarios about which the participants were asked a series of questions to be described below. The problem scenarios for this task were adapted from Mumford et al.'s (2006) ethical decision-making measure in order to be meaningful and relevant to undergraduate students. An example problem scenario is presented in the appendix.

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. For each problem, participants were asked to assume the role of the primary character experiencing the ethical problem. The main characters in these problems ranged from students,

¹Interested readers, please contact Cheryl Beeler at cherylbeeler@gmail.com for the materials contained in the appendix.

to administrators, to scientists. Participants were presented with background information describing the circumstances involved in each problem scenario, including the other characters involved, the consequences at stake, and several potential causes of the problem.

After reading the one-page description of the problem, participants were asked a series of questions designed to elicit the identification and description of the causes (causal analysis) that the participants identified in the problem scenario. These questions required participants to list the causes of the problem and to answer a series of questions about the causes they identified. Following the causal analysis questions, participants were asked to forecast possible outcomes of the scenario by responding to a question prompting them to describe possibilities for how the situation could progress or conclude. 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 they generated) 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. For the ethical decision-making portion of the task, participants were required to select two response options from a series of eight options of varying levels of ethicality (high, medium, or low), in response to a question regarding what decision they would make in the situation. This portion of the experimental task was based on an adaptation of the Mumford et al. (2006) measure of ethical decision-making to be described below. The time pressure manipulation occurred via verbal instructions provided by the study administrator, and the analytic mindset manipulation occurred in the written task instructions. Both manipulations were restated throughout the study to ensure that they remained salient to the participants.

It should be noted that this study did not include scenarios asking the participants to make decisions about egregious ethical violations. This is the case for two reasons. First, there is evidence to suggest that egregious ethical violations are not the primary concern of academic and practitioners (De Vries, Anderson, & Martinson, 2006). Indeed, these practitioners are much more concerned with the more ambiguous ethical concerns that they face on a daily basis, such as how to handle outlying data points or assign authorship with integrity. Second, in order to effectively assess ethicality, complexity and ambiguity in the nature of the ethical problem must be present in order to simulate how real-world ethical decision-making takes place and to avoid transparency in terms of what is the “correct”, or ethical, answer. Thus, the participants must work with what they know about the situation and the people involved in order to generate a solution.

Additionally, it should be noted that there were no explicit ethical rules or guidelines provided to participants to aid them in making their forecasts and ethical decisions. This is due to the emphasis in this study on using an understanding of the problem situation, including the relevant causes and potential consequences, in forecasting and ethical decision-making. The ethical problems were chosen such that the average undergraduate student could reasonably be expected to understand the underlying ethical principles (e.g., outright lying about data is inappropriate, failing to give authorship credit where deserved is inappropriate), without making them explicit.

After completing the experimental tasks, participants completed the remaining, untimed, control measures, a demographics questionnaire, and a survey that provided manipulation checks examining perceptions of time pressure and task motivation. The responses to the causal analysis questions were scored by trained judges for the number of causes identified and the extent to which the participants identified the most critical causes of the problem scenario. The forecasts provided by participants were scored by judges for amount of detail provided,

complexity of the forecast, and the inclusion of the critical elements from the problem scenario. These ratings were aggregated to form the “forecast quality” score for each scenario. Finally, the response options of the ethical decision-making questions were scored as high ethicality, medium ethicality, or low ethicality.

Manipulations

Analytic mindset—The mindset manipulation, which was an adaptation of a standard manipulation of analytic mindset (e.g., Gollwitzer, 1999), occurred through the instructions given to participants concerning solving the problems presented in the scenarios. In the deliberative mindset condition, participants were asked to consider all different aspects of the scenario in solving the problem. In the implementation mindset condition, participants were asked to focus on generating a concrete, workable solution. These instructions were presented before each of the eight problem scenarios, to ensure that they remained salient throughout the experimental task.

Time pressure—The second manipulation was intended to induce time pressure during task completion. The basis for this manipulation was a pilot study of 20 undergraduate students. In this pilot study, the time required to complete the experimental exercises where no time constraints were imposed was determined. Based on these findings, a 30% reduction in time (Antes & Mumford, 2009) was determined in order to allow adequate time for providing responses but no excess. In the time pressure condition, participants were instructed to complete their responses to the exercises within this 30% time reduction. In the no time pressure condition, participants were allowed to work at their own pace. A content review of the responses revealed that participants in the time pressure condition were able to fully respond to all of the questions and that their responses were of comparable length to those in no time pressure condition. Furthermore, the manipulation check questions indicated that participants in the time pressure condition ($M = 3.30$, $SD = .93$), as opposed to the no time pressure condition ($M = 2.19$, $SD = .70$), perceived greater time pressure in completing the tasks ($t(84) = -6.02$, $p < .001$).

Measurement

Intelligence—Participants completed the 30-item Employee Aptitude Survey (EAS; Ruch & Ruch, 1980) as a control measure for general intelligence. The items consists of six sets of facts, about which participants are required to select conclusions of true, false, or not enough information provided, based on the description of the scenario. This measure yields internal consistency coefficients in the .80s. Validation evidence for this measure can be found in Ruch and Ruch (1980).

Planning skills—Participants completed the 75-item Planning Skills test as a control measure for planning skills. This measure developed by Marta, Leritz, and Mumford (2005) consists of a series of scenarios to which individuals are asked to select multiple-choice responses answering questions regarding planning related issues such as identification of key causes, restrictions, downstream consequences, use of opportunistic implementation strategies, and effective environmental scanning. Evidence for the construct validity of this measure can be found in Marta et al. (2005).

Causal analysis—The first set of measured variables was the causal analysis variables. These measures were obtained through the written answers provided by participants working through the causal analysis exercises following the presentation of each problem scenario. Each question was responded to in a one paragraph written answer. All questions were presented in a fixed order following each problem scenario description. These questions can be found in the appendix. The first question participants were asked to answer was used to determine if the

participants understood the problem scenario. The second question examined the number of causes identified by the participants. The remaining questions examined whether or not the participants identified the most critical causes of the problem.

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. For each of the response, the judges 1) counted the number of causes identified by the participant and 2) rated the extent to which the participants identified the most critical causes of each problem scenario, on a 5-point scale. Participants who identified all of the most critical causes received a score of 5, participants who identified some of the most critical causes received a score of 3, and participants who identified none of the critical causes 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 causes.

Forecast quality—This panel of four judges, again all doctoral students familiar with the ethical decision-making literature but not study hypotheses, was 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 of the problem (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 considers 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 causes, in that the critical aspects of the problem scenario include the critical goals, values, and motives of the characters involved; moreover, the two constructs were rated on different response material. 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 (Redmond et al., 1993). The appendix provides the benchmark rating scales applied by judges in evaluating detail, complexity, and critical aspects of the forecast.

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.

Ethical decision-making—The ethical decision-making measure utilized in this study was adapted from Mumford et al.'s (2006) validated measure of ethical decision-making. This measure consists of a series of problem scenarios, followed by a list of eight, multiple-choice responses indicating a potential decision made in response to the problem scenario. For this study, the problem scenarios from the ethical decision-making measure were used for the

experimental task described above by expanding them to a length of one page in order to provide enough detail for variation in the identification of causes and forecasting. For the ethical decision-making task, participants were presented with a list of eight response options of varying levels of ethicality, of which they were asked to choose two. These response options were scored by four graduate student expert judges familiar with the ethical decision-making literature. The response options were scored on ethicality as being high (3), medium (2), or low (1). The scoring from the original measure was retained where possible. It should be noted that the responses presented to participants in this study purposely do not include examples of egregious ethical violations. Again, because of the complexity and ambiguity involved in ethical problems, the response options range from “more” to “less” ethical in order to better represent the types of responses individuals are most likely to be faced with in the real world (De Vries, Anderson, & Martinson, 2006). Additionally, this helps to ensure that none of the responses is obviously the “wrong” choice, allowing for a greater diversity of responses endorsed by participants. The appendix provides a description of the markers used to score these response options for ethicality. The two options chosen by the participants were averaged to form the decision ethicality score for each problem scenario.

Results

We used a series of hierarchical regression analyses to address our hypotheses and research questions. For each analysis, the first block entered consisted of the control measures. Scores on the intelligence measure were retained as a control variable because they were significantly positively related to forecast quality. Scores on the planning skills measure were retained as a control variable because they were significantly positively related to decision ethicality. The second block consisted of the two situational variables, time pressure and analytic mindset, 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 Forecast Quality and Ethicality

The analysis for the 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 1). This analysis supported Hypothesis 1, indicating that higher quality forecasts were, indeed, related to better ethical decision-making. However, neither time pressure nor analytic mindset predicted ethicality, indicating that time pressure and analytic mindset may not influence the processes involved in ethical decision-making.

Relationship of Causal Analysis and Forecast Quality

The second analysis addressed Hypotheses 2a and 3a, examining whether the causal analysis strategies were associated with higher quality forecasts. For this analysis, the dependent variable was forecast quality, and the third block entered was the number of causes identified and the criticality of the causes identified (See Table 2). This analysis did not provide support for Hypothesis 2a, that the number of causes identified would predict forecast quality. Hypothesis 3a, however, was supported, indicating that the criticality of the causes identified significantly predicted forecast quality. Additionally, once again, neither time pressure, nor analytic mindset influenced forecast quality. Thus, time pressure and analytic mindset may not influence people’s ability to generate quality forecasts in response to an ethical problem.

Relationship of Causal Analysis and Ethicality

After determining that forecast quality was, indeed, associated with ethicality, and that the criticality of the causes identified was a significant predictor of forecast quality, the direct effect of the causal analysis variables on ethicality was examined to address Hypotheses 2b and 3b. For this analysis, the dependent variable was ethicality, and the third block entered was the number of causes identified and the criticality of the causes identified (See Table 3). This analysis did not provide support for Hypothesis 2a, that the number of causes identified would predict forecast quality. Hypothesis 3b, however, was supported, indicating that the criticality of the causes identified was a significant predictor of decision ethicality. Additionally, again, neither time pressure, nor analytic mindset influenced ethicality.

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 paradigm. Although the task employed in this study represents a low-fidelity simulation of a real-world problem calling for forecasting and ethical decision-making, the question remains, nonetheless, concerning the generality of our findings to people making real-world ethical decisions. A related limitation is that the participants in this study were undergraduate students, most in their first year of college. It is possible that older participants might have different perspectives on ethical behavior, or they may differ in cognitive development or moral development, and as a result may perform differently on the experimental task. Additional research is necessary to address the generalizability of these findings to other populations.

Another potential limitation relates to the procedure applied for judging the participants' responses. All of the judges were Industrial/Organizational Psychologists. Although these judges were familiar with the general ethical decision-making literature and norms for ethical conduct across a range of professional fields, it is possible that their personal and professional frames of references may differ from practitioners in other fields. Thus, future studies using these procedures might utilize judges in different fields to address this issue.

Another limitation involves the sequence in which these cognitive processes were elicited (causal analysis, followed by forecasting, and then ethical decision-making). More specifically, participants were asked to answer the questions bearing on process execution in the sequence in which these processes are held to operate within the model proposed by Mumford et al. (2008). Although the available evidence supports this model and the sequence of processing operations implied by this model, it may be true that not all people apply these processes in a serial fashion as they think about ethical decision-making.

Finally, in this effort, time pressure and analytic mindset were manipulated. It should be recognized, however, that other variables, such as expertise, may also influence forecasting and ethical decision-making. Future studies should examine expertise, and other variables, 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 causal analysis 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 causes of the ethical problem is associated, with *both* better forecasts, and more ethical decisions, 3) there does not appear to be a difference between implementation and deliberative mindset in forecasting or ethical decision-making, and 4) time pressure does not appear to impact a person's ability to forecast or to make ethical decisions in this study.

These results have several important implications, both theoretical and practical. First, these results indicate that forecasting is critically important to ethical decision-making. Because ethical problems tend to carry major consequences for all of the people, groups, and organizations involved, it is important for people to consider the outcomes of their actions and the actions of others when making decisions in these types of situations. Stated simply and directly, if people do not think about potential outcomes of their actions, they are more likely to make unethical decisions. Furthermore, it is especially important to think about the most critical causes of the problem in generating forecasts and making decisions.

Second, in this study, considering a larger number of causes was not related to better quality forecasts or more ethical decisions. While some research suggests that considering a wide breadth of information improves cognitive processes by limiting the chances for information acquisition errors (Hogarth & Makridakis, 1981), other researchers suggest that in forecasting, simplicity is usually better than complexity (Pant & Starbuck, 1990).

Third, the results of this study suggest that what is most important in considering the causes of a problem is not considering a large number of causes, but focusing on a limited number of key causes. This is consistent with the findings of Calori, Johnson, and Sarnin (1994), who found that, in framing problem solutions, leadership performance appears to require the “boiling-down” of complex systems to identify a limited number of key causes relevant to address the issues at hand. The identification of the causes of a problem situation is a difficult, demanding activity (Feldman, 2003), and people manage their working memory load by working with a limited number of key causes (Hogarth & Makridakis, 1981). Indeed, Mumford and Van Doorn (2001) pointed out that although the complex analysis of causes may sometimes be desirable, in complex systems, it actually may not be desirable to frame solutions in terms of a complex set of causes. Instead, people should focus on a small number of key causes in thinking about solutions to complex problems, such as ethical problems.

Specifically, the causes that should be of primary focus in forecasting and ethical decision-making are those which were the critical causes of the ethical problem situation. Identifying and considering the critical causes 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 caused the problem in the first place.

Interestingly, while a great deal of research indicates that time pressure can be detrimental to complex cognitive processes (e.g., Carstensen, Isaacowitz, & Charles, 1999; De Dreu, 2003; Ordóñez & Benson, 1997), this study suggests that time pressure may not impact forecasting or ethical decision-making, either negatively or positively. In cases of ethical misconduct, for people may provide the excuse that they ran out of time, and thus could not think through the problem. These results suggest that time pressure is no excuse. In fact, this study suggests that as long as a person can identify the critical causes, forecasting and ethical decision-making improves. Indeed, some research has demonstrated that crisis situations actually induce people to identify critical causes; the pressure allows them to focus only on what is most important. Thus, time pressure is not detrimental to all cognitive activities, under all circumstances; there are times when this pressure can be helpful (e.g., Antes & Mumford, 2009). This reasoning is consistent with the findings of Liberman and Trope (1998) that, while time pressure may limit the use of complex cognition, it leads people to focus on immediate, practical issues with regard to the execution of a solution.

It is important to remember, however, that more research is needed on time pressure and other situational variables and their influence on ethical decision-making. This is, admittedly, a limited context (70% of the typical amount of time needed.), that is looking specifically at the

cognitive aspects of ethical decision-making (not affect or behavior). It is possible that under other circumstances, time pressure and mindset may impact forecasting and/or ethical decision-making.

These findings also have implications for ethics training programs. First, these results indicate that ethics training programs should include information about the importance of forecasting potential outcomes of a person's actions and potential decisions before making their final decision about ethical problems. While ethical guidelines, which are the focus of many ethics training programs (Antes et al., 2009; Waples et al., 2009) provide rules for avoiding some critical consequences of unethical decisions, they do not provide guidance on how to analyze ethical problems to identify the critical causes of the problem and forecast potential actions and the outcomes of those actions. Thus, ethics training programs should emphasize the individual cognitive processes, like forecasting, that are involved in ethical decision-making. Additionally, forecasting is difficult for people, especially in ambiguous, complex systems (Dorner & Schaub, 1994; Moskowitz & Sarin, 1983). Consequently, it may be especially important for ethics training to include instruction on this critical process, as people are not naturally good at forecasting in complex situations.

These observations, along with the findings from this study, suggest that training people to forecast using key causal analysis strategies will contribute to forecasting 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 causes of the ethical problem situation, in order to facilitate forecasting and a better, more informed decision. Moreover, training should emphasize that it is less important that people think about a large number of causes when considering an ethical problem situation, but what is most important is that they consider the most critical causes.

It should be noted that people are not especially skilled in analyzing causes (Dorner & Schaub, 1994). People, moreover, seem to have a rather poor understanding of causes and the operation of causes in complex social systems (Moskowitz & Sarin, 1983). The findings from the present study, along with those of the Marcy and Mumford (2007) study, suggest that causal analysis training might prove to be a useful supplement to more traditional training methods. Marcy and Mumford (2007) found causal analysis strategy training to be especially effective when people were working with unfamiliar situations or perceived a large risk of consequences resulting from implementing the problem solution. These results suggest that causal analysis training would be especially useful for ethics training, because ethical problems are often unfamiliar territory with a great deal of risk associated with making the "wrong" decision.

In conclusion, ethical decision-making is a complex process, in response to a complex, ill-defined problem. Advancing our knowledge of the ethical decision-making process has the potential to help scientists, academics, and practitioners recognize and prevent situations in which egregious cases of misconduct may occur, but can also help them avoid a range of unethical decisions, from egregious to more minor or even honest mistakes that may lead to violations of ethical or professional conduct. The findings of the present study suggest that high quality forecasting, that is, thinking about the potential downstream consequences and outcomes in a given situation, is an important process in making an ethical decision. Given that people are notoriously poor at predicting outcomes, training that improves forecasting quality is likely to also improve ethical decision-making. Findings in this study further suggest that when individuals identify the critical causes of an ethical problem they also generate higher quality forecasts, but, more importantly, they make better ethical decisions. Interestingly, neither time pressure nor analytic mindset impacted these processes. Taken together, these findings imply that examining the cognition involved in ethical decision-making is important

for understanding and preventing ethical misconduct and offers suggestions for specific interventions, such as training.

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Table 1

Predicting Ethicality from Time Pressure, Mindset, and Forecast Quality

	β	R^2	ΔR^2
Block 1		.18**	
Gender	.22*		
Intelligence	-.06		
Planning	.28**		
Block 2		.22**	.03
Time Pressure	.23		
Mindset	.08		
Time Pressure $\times$ Mindset	-.15		
Block 3		.28**	.07**
Forecast Quality	.28**		

Note:

*
 $p < .05$;**
 $p < .01$.

No Time Pressure = 0, Time Pressure = 1; Deliberative Mindset = 0, Implementation Mindset = 1

Table 2

Predicting Forecast Quality from Time Pressure, Mindset, and Causal Analysis Variables

	β	R^2	ΔR^2
Block 1		.09*	
Gender	-.07		
Intelligence	.10		
Planning	.12		
Block 2		.11	.02
Time Pressure	.04		
Mindset	.10		
Time Pressure $\times$ Mindset	-.09		
Block 3		.29**	.19**
Number of Causes	.05		
Critical Causes	.43**		

Note:

*
 $p < .05$;**
 $p < .01$.

No Time Pressure = 0, Time Pressure = 1; Deliberative Mindset = 0, Implementation Mindset = 1

Table 3

Predicting Ethicality from Time Pressure, Mindset, and Causal Analysis Variables

	β	R^2	ΔR^2
Block 1		.18**	
Gender	.19*		
Intelligence	-.08		
Planning	.25*		
Block 2		.21**	.03
Time Pressure	.18		
Mindset	.05		
Time Pressure $\times$ Mindset	-.11		
Block 3		.30**	.09**
Number of Causes	-.12		
Critical Causes	.41**		

Note:

*
 $p < .05$;**
 $p < .01$.

No Time Pressure = 0, Time Pressure = 1; Deliberative Mindset = 0, Implementation Mindset = 1