Are satisfied employees productive or productive employees satisfied?

How leaders think about and apply causal information

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ABSTRACT

Individuals regularly seek cause-and-effect information to better understand and control their environments (Perales & Catena, 2006). Useful causal information reveals specific cause-and-effect relationships that are relatively stable across situations (S. G. B. Johnson & Keil, 2014). Leaders operate in especially complex environments and so have a particularly challenging task in obtaining high quality causal information. Yet causal information has a pervasive influence on the way leaders attempt to influence their environments and, consequently, on leader performance. In this chapter, I describe research bearing on how leaders retrospectively attribute causal explanations (Martinko, Harvey, & Douglas, 2007) and how these attributions influence the development of descriptive mental models (Strange & Mumford, 2013). These models represent leaders' beliefs about causality in their environments. They also influence prospective causal analysis (Marcy & Mumford, 2010), wherein leaders search for causal information that can be leveraged to achieve their goals. I describe various aspects of prospective causal analysis, including the content of causal information considered and strategies used to apply that information. Prospective causal analysis influences leaders' formation of prescriptive mental models which serve as the basis for goal-oriented behavior such as planning, forecasting, and vision formation. I also describe several practical implications and suggestions for future research on leader causal analysis.

Keywords: Leader cognition; causal analysis; causal reasoning; mental models; systems thinking

Are Satisfied Employees Productive or Productive Employees Satisfied?

How Leaders Think About and Apply Causal Information

Leaders seem to be constantly looking for ways to motivate their followers. One belief is that increasing employees' satisfaction at work will cause higher motivation which, in turn, will lead to higher performance. For example, a report from the Society of Human Resource Management recently tied problems in employee recruitment and retention to low job satisfaction, concluding that "effective employee engagement can perhaps alleviate these issues" and that employee engagement is "the most pressing human capital challenge in today's economic environment" (Society for Human Resources Management, 2016, p. 43). This belief is sometimes supported by correlational data interpreted causally. A report of a recent Gallup study noted that companies with higher employee engagement experienced "17% higher productivity, 20% higher sales, and 21% higher profitability among many other positive metrics resulting from higher engagement levels" (Corbin, 2017). The problem with this perspective is that it incorrectly assumes that employee satisfaction causes higher job performance. More rigorous evidence depicts a different causal relationship between satisfaction and productivity. As summarized by Latham (2008), "The widespread belief that improving employee motivation requires improving job satisfaction is not borne out by the research. Instead, research points to the ability to be productive in one's job as the real heart of motivation…[and] job satisfaction, in turn, typically results from being productive. Thus, if you want motivated employees, you should focus on ways your employees can be high performers, rather than focusing on ways to increase their job satisfaction per se" (p. 85).

The confusion over the causal link between productivity and job satisfaction highlights the role of causal information in leaders' attempts to interpret and influence their environments.

Leaders' naturally seek information about cause-and-effect relationships and then leverage certain causes to obtain desired outcomes (Ahn, Kalish, Medin, & Gelman, 1995; Perales & Catena, 2006). Dissatisfied employees are believed to cost US businesses between $450-550 billion per year (Corbin, 2017). Leaders who believe job satisfaction causes productivity will, understandably look for ways to move the satisfaction lever in order to improve productivity. Leaders who believe satisfaction is a result of productivity will instead make it easier for employees to do their jobs.

The analysis of causal information is one of several leader cognitive skills seen as critical for leader performance yet historically undervalued in both research and practice (Mumford, Todd, Higgs, & McIntosh, 2017). This is concerning given the presence of causal information in nearly all aspects of leader performance. For example, effective execution of Morgeson, DeRue, and Karam's (2010) fifteen team leadership functions likely requires that leaders understand, at least intuitively, causal mechanisms underlying training, performance monitoring, and giving encouragement, to name a few. Causal information is considered integral to leader sensemaking (Balogun & Johnson, 2004; Weick, 1979), mental models (Gary, Wood, & Pillinger, 2012; Hodgkinson, Maule, & Bown, 2004), forecasting and vision formation (Mumford, Steele, McIntosh, & Mulhearn, 2015; Shipman, Byrne, & Mumford, 2010), and planning and goal-setting (Marta, Leritz, & Mumford, 2005; Smith, Locke, & Barry, 1990). To date, however, no synthesis of several research streams bearing on leader causal analysis has been produced.

An integrated view of leader causal analysis could be of great value. Leader causal analysis may function as a core capacity enabling and enhancing the execution of many facets of leader performance (Mumford, Watts, & Partlow, 2015), similar to how general mental ability underlies specific abilities (Schmidt & Hunter, 2004) or how motivation facilitates many aspects of human performance (Deci & Ryan, 2008). The ability of leaders to mentally break down the social and technical environments in which they operate to discover core causal relationships may enable leaders to be more effective in their attempts to influence the human and nonhuman resources within those systems (Mumford et al., 2017).

In this chapter I argue that leader causal analysis is such a core competency for leaders. First, I explain how leaders use mental models to understand their environments and to formulate plans for manipulating causal to achieve desired outcomes. I then provide an integrated view of leader causal analysis by reviewing research from two distinct literatures: causal analysis and causal reasoning. Here I distinguish between retrospective causal attributions, which leaders make to explain causes of past events, and prospective causal analysis, which refers to leaders' application of causal information to guide goal-directed actions. I conclude by noting both directions for future research on leader causal analysis and implications for leadership practice and development.

Mental Models and Complex Systems

Leaders operate in profoundly complex systems—organizations (Katz & Kahn, 1966). From a general systems perspective the entire world is a system comprised of subsystems of subsystems, etc. (Boulding, 1956). While there are many different types of systems in the world—social, biological, mechanical, conceptual, and more—all systems consist of certain components and the relations between those components which make them interdependent (Scott, 2016). Other important characteristics of organizations as systems are that they are goal-directed and dynamic, they transform inputs into outputs, and they change in response to feedback mechanisms, or information produced from cause-and-effect events (Kast & Rosenzweig, 1972). As open systems, the complexity in organizations stems from the number and variety of components as well as the vast interdependence of those components. For example, organizational performance can be traced to at least political, economic, social, and technological subsystems (Aguilar, 1967), each of which is in turn comprised of many layers of subsystems. Leaders operate in complex sociotechnical systems, comprised of various human and technical (nonhuman) subsystems (Cooper & Foster, 1971).

Leadership from a systems perspective refers to the influence a leader exerts on the components or component relationships within the system in the pursuit of some desired outcomes (Katz & Kahn, 1966). The ability to purposefully manipulate system components to achieve one's goals depends in part one's understanding of how components are interrelated. Thus, the way leaders make sense of the complexity in their systems is an important determinant of leader performance (Weick, Sutcliffe, & Obstfeld, 2005).

A particularly useful approach for understanding how leaders make sense of complex sociotechnical systems is to examine the mental models of leaders. Mental models refer to the way people store and structure information about a system and are typically comprised of *concepts*, representing people, places, objects, abstract constructs, etc., and *links*, representing how concepts are related (e.g., this person has authority over that person, people with firm, vigorous handshakes are perceived as more extraverted). Theoretically, mental models underlie most, if not all, human conscious and unconscious behavior (Johnson-Laird, 1980). Individuals may possess mental models for each of the systems in which they operate—work, home, hobby or sport. These mental models, moreover, influence the way people think about and behave within each system. For example, that people from similar cultures possess similar mental models of common social environments such as eating in restaurants or visiting the dentist partially explains why they tend to exhibit similar behaviors in these scripted situations (Bower, Black, & Turner, 1979).

A particularly important feature of mental models is the way individuals represent information about cause-and-effect (Johnson-Laird, 1980). Studies have provided evidence that causal information in mental models influences creative problem solving (Marcy & Mumford, 2007; Mumford et al., 2012), skill acquisition (Frese et al., 1988; Kieras & Bovair, 1984), and teamwork (Mohammed, Ferzandi, & Hamilton, 2010). Numerous studies have provided evidence that leaders use causal information to interpret subordinate performance (see Martinko et al., 2007 for a review). Other studies have demonstrated how leaders use causal information to make strategic decisions (Bateman & Zeithaml, 1989; Gary et al., 2012) and manage innovation (Drazin, Glynn, & Kazanjian, 1999).

Leaders obtain and apply causal information through their efforts to make sense of and manipulate the sociotechnical systems in which they operate (Cheng, Park, Yarlas, & Holyoak, 1996; Mumford, Friedrich, Caughron, & Byrne, 2007; Mumford, Steele, et al., 2015; Strange & Mumford, 2005). More specifically, leaders form *descriptive* mental models to understand the way a sociotechnical system operates currently. Descriptive mental models are formed as leaders abstract information from their experiences in a system, experiences which are interpreted vis-à-vis their personal life histories and social feedback (Strange & Mumford, 2013). When confronted with a situation requiring action, leaders rely on these descriptive mental models to identify goals to pursue, causes to manipulate in pursuit of those goals, and additional information relevant to the issue at hand (Mumford et al., 2007).

As leaders analyze system-relevant information they formulate *prescriptive* mental models. Prescriptive mental models can be seen as a form of template plan through which leaders can develop, simulate, and refine specific action plans (Mumford et al., 2007). Notably, prescriptive mental models contain subjective information, such as which goals should be pursued, and objective information, such as what casual variables can be manipulated to achieve those goals. Thus, the basis for leaders' attempts to influence the complex sociotechnical systems in which they operate is the causal information embedded in their descriptive and prescriptive mental models.

Causal Analysis

Causal information includes "identifiable events, activities, or actions that result in or cause downstream events or outcomes, be they immediate or distant" (J. F. Johnson et al., 2012, p. 64). Bettman & Weitz (1983) distinguished between prospective and retrospective reasoning about causal information. Prospective causal reasoning refers to leaders' attempts to "process information in such a way as to maximize future benefits relative to costs" and is focused on "providing accurate explanations of events to enhance control of future outcomes" (Bettman & Weitz, 1983, pp. 165–166). Causal analysis, a form of prospective causal reasoning (Harvey, Madison, Martinko, Crook, & Crook, 2014), is the process whereby leaders make sense of causal information and use it to guide goal-oriented actions (Mccormick & Martinko, 2004; Stenmark et al., 2010).

Retrospective causal reasoning "consists of rationalizing prior behavior in an attempt to make it appear rational" and is focused on "providing [causal] justifications for prior actions" (Bettman & Weitz, 1983, pp. 165–166). Far more research has been conducted on retrospective causal reasoning in leadership. While a full review of this research is beyond the scope of this chapter, such causal attributions play an important role in the way leaders encode causal information into their descriptive mental models. Less research has been conducted on the prospective analysis of causal information by leaders.

Prospective Causal Analysis

Both retrospective and prospective causal analysis are important leadership cognitive processes because although people rely on causal information when solving problems (Hershey, Walsh, Read, & Chulef, 1990), they tend to make many cognitive errors when doing so (Hogarth & Makridakis, 1981; Mumford et al., 2007; Xiao, Milgram, & Doyle, 1997). For example, in one study participants preferred simpler but inaccurate causal explanations and only favored the accurate, more complex explanations when they were provided with *unambiguous* probability information supporting a more complex explanation (Lombrozo, 2007). In the real world, leaders rarely, if ever, operate with unambiguous information. Such findings present an uphill cognitive battle for leaders working in highly complex sociotechnical environments. With its focus on predicting and controlling future events, prospective causal analysis is best understood in terms of the input and processes leaders use to formulate prescriptive mental models.

Causal Content. With regard to the causal information that serves as input into leader causal analysis, the adage “garbage in, garbage out” seems appropriate. Indeed, evidence suggests that not all causal information is equally useful. Johnson and Keil (2014) described two criteria for causal information that would be more useful “as *control variables* for bringing about desired effects” (p. 2224). First, more useful causes are insensitive (invariant, or robust) to background conditions. For example, intelligence has been found to be a very robust predictor (cause) of job performance in jobs requiring problem solving (Ree & Earles, 1992), making it a desirable selection tool in the repertoire of leaders in charge of selection and development. Second, useful causal information is specific—effects can be dissected into cause-and-effect relationships with specific causal variables. For example, the romanticized perspective of creative performance, which holds that creativity is mostly an unknowable, innate talent, is far less useful than scientific perspectives, which trace creative performance to an individual's motivation, creative thinking skills, and domain-specific knowledge (Amabile, 1983; Mumford & Gustafson, 1988), the impact of which is moderated by the context in which an individual is meant to be creative (Amabile, Conti, Coon, Lazenby, & Herron, 1996; Oldham & Cummings, 1996).

Some support for this conceptualization of more and less useful causal information can be found in a study by Shipman, Byrne, and Mumford (2010). They asked 252 undergraduates to assume the role of leader (principle) of a new high school and design a plan for running the school and to write a vision to communicate their plan to students, parents, and teachers. Prior to producing their plans and vision statements participants were provided with three successful case studies of similar schools. The focus of information to be extracted from these examples was manipulated, with some participants being induced to focus on isolated facts from the cases and other participants being induced to think about specific implications, or consequences, or case material. In a second manipulation, participants were then induced to focus their vision statements either on their goals for the school or on the causes of school performance. A medium size effect was found indicating that better vision statements were produced when participants focused their analysis on specific cause-and-effect relationships (causes + implications) compared to when they focused on causes and isolated facts. It appears that causal information was more useful when it focused on specific cause-and-effect relationships.

In a similar study, Strange and Mumford (2005) asked 212 undergraduates to engage in the same educational leadership task. This time, participants were exposed to either three strong or three weak case studies before creating their plans. Strong versus weak case studies were identified by asking secondary school teachers to rate a sample of cases on several dimensions which, together, reflect the robustness of the causal information contained in them (e.g., How pedagogically sound was the program? How much difference would the program make in school achievement?). Like the Shipman, et al. (2010) study, participants were also induced to focus on either their goals for the school or on specific causes of performance. The large effects found in this study indicated that when participants focused on specific causes and had access to robust causal information, they created vision statements that produced stronger affective reactions and were perceived as more useful by student, teacher, and parent judges. The same focus on robust causal information also led to higher ratings of plan effectiveness.

One implication of asserting that specific and invariant causal information is more useful is that leaders must understand the scientific principles driving the social and technical causes operating in their systems. This includes the science of human behavior at individual, group, and organizational levels and the scientific principles underlying the technical work in which they are engaged be it insurance sales, battery production, or hospitality. Scientific information tends to be more specific and more focused on revealing cause-and-effect relationships than non-scientific information such as industry publications or expert analysis (Rousseau, 2006; Rousseau, Manning, & Denyer, 2008). Moreover, it is unlikely that leaders will be able to reach the same level of effectiveness on their own that they might otherwise achieve with the use of scientific evidence to inform their mental models (Rousseau & McCarthy, 2007).

Another, more practical implication of identifying more and less useful causal information is that leader development programs may greatly benefit from assessing leaders' mental models of their sociotechnical systems. By identifying specific knowledge gaps, and then designing instruction or experiences that will provide targeted high quality information development programs may better prepare leaders to reach exceptionally high levels of performance (Ericsson & Moxley, 2012). Such an approach may prove both more useful and more cost effective than providing a general principles of leadership intervention to leaders with potentially different causal knowledge gaps.

It is important to consider the temporal nature of leaders' mental models and, specifically, how causal information may be acquired over time. Mental models are built incrementally over time and with experience (Albrecht & O'Brien, 1993; O'Brien & Albrecht, 1992) in part because causal information is complex and can easily overwhelm people's simplicity-preferring processing capacities (Lombrozo, 2007). Complexity, however, is relative to an individual's current mental model of a system. Compared to leaders with years of varied experience, new leaders are likely to be more overwhelmed by longer lists of unfamiliar social and technical causes pertaining to their new organization. Johnson et al. (2012) studied the relationship between causal analysis and ethical decision making in a sample (graduate students from various scientific fields) more closely representing novice rather than experienced leaders. They manipulated the complexity of causal information embedded in the experimental case material. Participants were asked to make decisions and forecast outcomes of those decisions, both critical leadership tasks. The authors found a medium effect for the cause complexity manipulation where better forecasts were produced when participants were given less versus more complex causal information. Participants in the high causal complexity condition produced significantly more favorable forecasts than participants in either the low or control conditions (medium effects), reflecting a common problem-solving error where individuals ignore negative information to predict overly optimistic outcomes of their own decisions (Xiao et al., 1997).

The above evidence suggests that when presenting causal information to leaders, it is better to focus on certain, key causes at first and then build on this foundation to increasingly represent the complexity of the leaders' sociotechnical systems. This approach may also help leaders make sense of their environments, especially unfamiliar environments, while minimizing cognitive fatigue. For example, in an experimental study Marcy and Mumford (2010) examined the effects of causal analysis training on performance in a leadership simulation. After receiving varying levels of training, 160 undergraduates completed the computer-based simulation and were scored on game performance (weighted to reflect realistic leadership outcomes such as organizational performance), sensemaking activities, and adaptation in response to environmental changes. Not only did they find that leadership scores were lower in more complex simulations (medium effect) but they also found that causal analysis training increased scores (medium effect), and did so regardless of complexity, the quality of prior information, and the quality of their mental models of the problem scenario. Interestingly, they also found that causal analysis training eased participants' sensemaking load (small effect). In a similar study, Marcy and Mumford (2007) examined the impact of the same causal analysis training on performance on several leader social innovation tasks. Causal analysis led to more original solutions (small/medium effects) when participants were induced to reflect on relatively unfamiliar, versus familiar, problems. It may be that the causal analysis training provides leaders with a useful starting point—the key causes in the system—for developing creative solutions when solving unfamiliar problems.

Causal Analysis Strategies. It is not enough for leaders to simply possess high-quality (invariant and specific) causal information in their descriptive and prescriptive mental models. They must also employ effective strategies for applying that information in the development of visions and action plans. Johnson and Keil (2014) noted that because “insensitive and specific causal relationships lead to improved abilities for inference and intervention, heuristics that rule out causal relationships lacking these features would potentially be able to narrow the space of candidate causes without much risk to ruling out useful causal generalizations” (p. 2224). As noted previously, people often make many errors both when working with causal information (C. J. Anderson, Glassman, McAfee, & Pinelli, 2001; Hogarth & Makridakis, 1981; Lombrozo, 2007; Mumford et al., 2007; Xiao et al., 1997) and when thinking about people (Macrae & Bodenhausen, 2000). This indicates that leaders’ reasoning about causality in sociotechnical systems is a unique form of cognition, especially because the causality involves social/human causes or outcomes.

Causal analysis strategies are effective, in part, to the extent that they direct one’s attention towards useful causal information (S. G. B. Johnson & Keil, 2014), help avoid biases and cognitive errors (Dörner & Schaub, 1994; Mumford, Schultz, & Van Doorn, 2001), result in more accurate mental models (Hodgkinson et al., 2004; Strange & Mumford, 2013), and increase leader performance (Marcy & Mumford, 2010). Based on a review of relevant literature, Marcy and Mumford (2007) identified seven heuristics leaders might use to identify more useful causal information. The studies by Marcy and Mumford (2007, 2010), reported above, provide evidence for the utility of these strategies. The seven strategies encourage leaders to identify causes that

(1) can be manipulated,

(2) can be controlled (by the leader),

(3) have direct effects,

(4) have large effects,

(5) influence multiple outcomes,

(6) are functionally similar to other causes, and

(7) interact with other causes.

Further support for some of these strategies can be found in two studies examining the impact of causal analysis on creative problem solving (Hester et al., 2012) and ethical decision making (Stenmark et al., 2010). In the Hester et al. (2012) study 232 undergraduates drew link-and-node representations of their mental models for and provided solutions to two marketing leadership problems. Prior to working on the second problem, participants were provided varying types and levels of causal analysis training. Participants' mental models were assessed for several objective and subjective quality indicators (e.g., number of critical causes included, perceived coherence) and a single index score assigned (Mumford et al., 2012). Solutions were scored for creativity. They found that causal analysis strategies that encouraged a focus on identifying causes affecting multiple outcomes and on identifying causes that might have unanticipated negative effects contributed to the development of effective mental models of the problem at hand. Strategies that encouraged a focus on critical causes, causes affecting multiple outcomes, and on contingencies (causes that interact with other causes) led to the development of more original solutions and strategies that focused on causes affecting multiple outcomes also led to higher quality solutions. Stenmark et al. (2010) asked 87 undergraduates to work on ethical decision-making tasks embedded in a leadership context. For each problem, participants were asked to list the causes of the problem, generate possible actions, forecast outcomes of those actions, and select their preferred actions from preidentified list of lower, moderate, and highly ethical decisions. The findings indicated that the extent to which participants identified critical causes (those with large effects) was significantly positively related to the quality of forecasts and the ethicality of participants' ultimate decisions (both medium effects).

A study by Vessey, Barrett, and Mumford (2011) highlights the importance of perceived control for effective causal analysis. They asked 170 undergraduates to complete several marketing leadership problems. Solutions were scored for both creative performance (e.g., quality, originality of solutions) and business performance (e.g., feasibility, cost effectiveness of plan, brand reputation maintenance). The researchers manipulated participants' perceived control over the sociotechnical system at hand by listing all variables that participants were or were not allowed to modify. For example, in the low control condition, participants could only modify finances and distribution of the marketing channel. A second manipulation provided participants with information analysis strategies with some participants being encouraged to focus on objective performance information, some on subjective social information, and some on both. It is important to note that both objective and subjective strategies were framed in terms of causal analysis. For example, participants might have been encouraged to identify causes and contingencies (objective) or affective causes and causes embedded in social systems (subjective). For both the creative and business criteria, medium size effects were observed indicating higher performance resulted when objective, or both objective and subjective, strategies were given to participants in the high control condition, or when subjective social strategies were given to participants in the low control condition. This pattern suggests that when leaders have the option to utilize social or technical causal information they prefer to work with objective information, but when they have less control they look for manipulable causes within the social system to achieve better solutions.

While the above studies provide evidence for the utility of the seven strategies identified by Marcy and Mumford (2007), further research is needed to expand our understanding of cognitive processes that might influence the application of causal information. For example, one notable causal pattern not found among the Marcy and Mumford (2007, 2010) strategies is the analysis of indirect causal effects or, similarly, causal sequences. Indirect effects are sequential cause-and-effect relationships where at least one effect is also a cause of a subsequent effect. These are, of course, are widely present in scientific research (Preacher & Hayes, 2008; Zhao, Lynch, & Chen, 2010). Indirect causal effects also satisfy the criteria for useful causal information noted previously in that they are specific and invariant (S. G. B. Johnson & Keil, 2014). Yet very little research has been conducted to understand how leaders analyze both indirect and interacting causes.

With the exception of interacting causes, the analysis indirect causes is more complex than the other causal strategies noted previously (Busemeyer, McDaniel, & Byun, 1996). To begin, thinking of indirect and interacting causes inherently requires simultaneous simulation of more variables than, say, identifying causes with large or direct effects. This suggests that working memory may facilitate online processing of such effects (Just & Carpenter, 1992). Similarly, more complete mental models may ease the cognitive demands of analyzing indirect effects (R. C. Anderson, Spiro, & Anderson, 1978; Mayer & Moreno, 2003). Finally, cognitive flexibility is likely to facilitate leaders' analysis of indirect and interacting causes because doing so will require the mental simulation of multiple alternative causal relationship (Hayes-Roth & Hayes-Roth, 1979; Spellman, 1996a).

Another causal strategy not well understood is how leaders might evaluate competing causes. Some research suggests that individuals tend to prefer both simpler and more salient, or obvious, causal information (Lombrozo, 2007). Spellman (1996b) provided evidence that "in cases of multiple potential causes humans do what scientists do, and that is evaluate the efficacy of a target cause conditional on the constant presence and/or absence of alternative causes" (p.

168). Together, these findings indicate that while leaders may evaluate multiple causes, they may unnecessarily discount more complex or more unfamiliar causal variables. Leaders with exposure to multiple and varied experiences, including negative experiences (Williams, 1996), with specific causal factors may be able to more accurately assess the relative causal contributions of those variables (Spellman, 1996b; Wasserman, Kao, Hamme, Katagiri, & Young, 1996).

Retrospective Causal Attribution

Prospective causal reasoning is focused on predicting and controlling future events through identification and analysis of causal information contained in sociotechnical systems. Prospective causal analysis is affected by the content of leaders' descriptive mental models (Cheng et al., 1996) and occurs primarily when leaders are applying prescriptive mental models to plan and execute goal-directed behavior (Strange & Mumford, 2013). In contrast, retrospective causal attributions affect the formation of descriptive mental models. Research indicates that people naturally seek causal explanations of observed events (Ahn et al., 1995; Perales & Catena, 2006). Assumptions about cause-and-effect within a sociotechnical system are influenced by a leader's life history and the experiences and feedback obtained within that system (Strange & Mumford, 2013). The primary construct in this research is causal attribution—the explanations leaders ascribe to specific events as they make sense of the system in which they operate (Martinko et al., 2007). Over time, leaders generalize to form assumptions about causality for specific types of events.

Decades of research on causal reasoning processes in organizations have provided a substantial body of evidence supporting several theoretical models. For more substantive reviews of these theories and the empirical evidence supporting them the reader is directed to Harvey et al., (2014), Martinko et al., (2007), and Martinko and Thomson (1998). Two findings from causal attribution research are particularly important for understanding leader causal analysis. First, the retrospective causal attributions people make both have identifiable characteristics (Abramson, Seligman, & Teasdale, 1978; Weiner et al., 1971) and are influenced by certain characteristics of the information used to make those attributions (Kelley, 1973; Kelley & Michela, 1980). Second, a number of biases arise during the attribution process which can cause inaccurate information to become stored in leader's mental models (Martinko et al., 2007).

Causal Attributions. The information people use to make causal attributions can be described in terms of consensus, consistency, and distinctiveness (Kelley, 1973; Kelley & Michela, 1980). Consensus refers to the whether the observation at hand is characteristic of other entities within the same context. For example, if a coworker speaks loudly in a meeting in which everyone else is also speaking loudly there is said to be high consensus. If the coworker was the only one speaking loudly there would be low consensus for that individual's behavior in that situation. Consistency considers the temporal consistency of the observation for a given entity within a given context. If the loud coworker is always (rarely) loud in meetings there is said to be high (low) consistency. Finally, distinctiveness compares the observation to observations of the same entity in other contexts. For example, is the loud coworker also loud outside of meetings or outside of work? If so, there would be high consistency. If the coworker is not consistently loud in multiple situations then consistency would be low.

Causal attributions are judgments wherein individuals ascribe a cause to a specific effect. For example, if a car salesperson sets a sales record in April he may determine it was because of his particularly good persuasive skills. If a coworker beats his record in the following month the salesperson may conclude that her success was due to the better weather in May. Causal attributions can be characterized on at least three dimensions (Abramson et al., 1978; Weiner et al., 1971). The locus of causality dimension describes attributions that are internal or external to the entity involved in the cause-and-effect event. The salesperson above made an internal attribution about his sales performance and an external attribution about his coworker's success. The stability dimension refers to whether the individual making the attribution determines that the cause is stable or changes over time. Finally, the globality dimension refers to the attributor's determination of whether the cause can be generalized to other contexts. The salesperson above may make a global attribution and conclude that his persuasion skills also apply at home, when buying cable television, and even at the grocery store. His coworker may make a specific attribution about his performance if she determines he just worked extra hard in April.

Martinko and Thomson (1998) combined the information types and attribution dimensions aspects of causal attributions to explain how different types of causal information will likely lead to certain types of attributions (see Table 1 and Figures 2 and 3 in their article). For example, they would argue that the car salesperson above would be most likely to tie his coworker's success to her sales skills if other salespeople did not perform as well in May (low consensus), she was consistently a high-performing salesperson at work (high consistency), and she was not a very persuasive person in other situations (high distinctiveness). Martinko and Thomson (1998) identified eight potential combinations of attribution dimensions (e.g., external, stable, and specific vs. external, stable, and global) that may arise from different combinations of types of causal information (e.g., high consensus, high consistency, and high distinctiveness vs. high consensus, high consistency, and low distinctiveness).

It is important to note that the attribution research described above has dealt almost exclusively with causal attributions made about *people*, and mostly individual people (Harvey et al., 2014; Martinko & Gardner, 1987; Martinko & Thomson, 1998). In the case of leaders, causal analysis occurs within sociotechnical systems. Causal variables in socio-technical systems can be human or non-human, single entities or subnetworks of interacting concepts (Cooper & Foster, 1971). While none of these attribution models purports to be comprehensive, the lack of coverage of group, organizational, and non-human attributional targets (outcomes) is problematic when considering that leaders must make decisions intended to influence not just individuals but research and development processes, resources, operational and manufacturing procedures, financial accounts, groups of stakeholders, departments, boards, etc. Thus, to be effective, leaders must analyze the causes of both social (human) and technical (nonhuman) targets.

An attributional target represents the effect in a cause-and-effect relationship. Social attributional targets can be any number of outcomes at the individual, group, organizational, or other collective level. For example, the same leader may need to understand how to increase the creativity of one of her direct reports, how to manage the expectations of an entire research and development department, and how to foster a collaborative team environment in her top management team. Technical attributional targets are tangible and intangible non-human outcomes. They refer to the technical work for which the leader is responsible. For example, a civil engineering project manager may seek ways to improve the structural reliability of local bridges when repairs are being made. A recruiting manager may be interested in advances in psychometric testing that could increase the reliability of company's selection and placement process. A CFO will likely be interested in new investment opportunities that can enhance the firm's position against risk. While some technical targets may often operate vis-à-vis social targets—one selection system metric used may be the performance of recent hires—the cause-and-effect relationships are fundamentally non-human—the reliability of a predictive psychometric measure is largely a statistical matter even though human variables are used.

The original three attributional dimensions—locus of causality, stability, and globality—do not seem to adequately address the complexity of this expanded range of attributional targets and their causes that leaders will encounter in complex sociotechnical systems. When analyzing the social and technical cause-and-effect relationships embedded in a system, leaders should consider more than the type of causal information or the dimensions of attributions. Rather, extant research suggests that leaders should focus their analysis on certain types of causes (Barrett, Vessey, & Mumford, 2011; Hester et al., 2012; J. F. Johnson et al., 2012; Marcy & Mumford, 2010; Shipman et al., 2010; Stenmark et al., 2010; Strange & Mumford, 2005; Vessey et al., 2011). More specifically, leaders should focus their attention on causes that can be manipulated and controlled, have direct and large effects, influence multiple outcomes, are functionally similar to other causes, and interact with other causes (Marcy & Mumford, 2007).

Attributional biases. Individuals, including leaders, are prone to several well-documented biases when they make causal attributions (Brown & Mitchell, 1986; Harvey, Martinko, & Douglas, 2006; Martinko et al., 2007). These biases are likely to create inaccuracies in leaders' descriptive mental models of their sociotechnical systems (Strange & Mumford, 2013). Given the role of descriptive mental models in prospective causal analysis (White, 1995) and the formation of prescriptive mental models, such errors are a likely source for a variety of leader performance failures.

A study of 491 leaders, from first-line supervisors to executives, from a wide range of industries conducted by Halbesleben, Bowler, Bolino, and Turnley (2010) demonstrated how leaders' attributions can substantially influence important decisions. Leaders were asked about the organizational citizenship behavior (OCB) of their subordinates. Results indicated that leaders' attributions of subordinates' behavior were significantly related to their causal explanations of the subordinates' motives which, in turn, were related to the leaders' emotional responses to the subordinates' behavior. The performance ratings leaders gave to subordinates were significantly related to leaders' emotional responses, such as anger (negatively related) and happiness (positively related). These findings support the arguments that leaders' retrospective causal attributions of even typically positive events (OCB's) can substantially influence outcomes (performance ratings) via the leaders' interpretation of what caused the event to occur (subordinates' motives for engaging in OCB's). These findings are reflective of various other studies demonstrating errors in leader attributions (Eberlin & Tatum, 2005; Furst & Cable, 2008; Knowlton & Mitchell, 1980; Notz, Boschman, & Bruning, 2001).

Suggestions for Leader Development

With such potentially harmful effects from such seemingly pervasive errors it would be useful to consider how attribution errors might be addressed. More generally, there are several ways to improve leader performance through causal analysis. One approach is to focus on improving leaders' use of prospective causal analysis strategies. Other interventions may be based on helping leaders to obtain higher quality causal information.

Improve prospective causal analysis. Improving leaders' prospective causal analysis may mitigate the negative effects of retrospective attributional biases in at least three ways. First, adopting the causal analysis strategies described previously should help leaders increase both the depth and breadth of their search for useful causal information. Moreover, because these strategies focus on distinguishing more and less useful causal information using them is unlikely to require substantially more time or effort on the part of the leaders in the long term.

Second, as leaders adopt more effective prospective causal analysis strategies, the quality of information contained in their descriptive mental models and the completeness of those models should increase. As noted previously, descriptive mental models are formed in part through leaders' interactions within their sociotechnical systems as they obtain feedback from the system about actions they take. Explicitly focusing influence attempts on specific types of causes should allow for clearer system feedback. This is in part due to a focus on more specific causal variables. For example, it is better to understand how specific elements of interpersonal communication affect followers' reception of messages rather than simply knowing that a certain piece of information should versus should not be communicated. Similarly, as leaders engage in broader and deeper targeted searching for causal information gaps in their descriptive mental models should diminish.

A third way prospective causal analysis may minimize the effects of retrospective attributional errors is by directly undermining the bias processes. The available evidence indicates that individuals can reason about multiple competing causes (Spellman, 1996a, 1996b) but that in order to do so they must be aware of those alternative causes. Spellman, Price, and Logan (2001) demonstrated this by asking participants in an experiment to judge the strength of two potential causes of plants' blooming—either being treated with a fertilizer or being planted in a pot marked with a star-shaped emblem. Notably, participants had no prior knowledge of how a star on the pot might help the plants grow. Some participants were told, in varying degrees, that the star emblem was part of a mechanism inside the pot that would inject a growth agent while other participants were given no information about the emblems. All participants were shown a series of plants and told whether the plant received the fertilizer and whether it was planted in a star pot. Participants were asked to indicate whether the plant would bloom before receiving feedback about whether it did bloom. After some trials participants were asked to assess the strength of the fertilizer and the star-shaped pots as causes of plant growth. They found that participants adjusted their causal judgments of each cause only when they possessed information about the causal mechanism for the star-marked pots, and that adjustments were made in accordance with how much causal information they were given about the pots.

Obtain high quality causal information. Leaders may face a particularly challenging development environment. Mental models develop as one receives feedback bearing on the actions taken (Albrecht & O'Brien, 1993; Strange & Mumford, 2005). For leaders, perhaps the most useful form of feedback might be the reactions—mental, emotional, and behavioral—that their actions cause to occur within sociotechnical systems. However, useful causal information may be at times be unavailable or even intentionally hidden from leaders.

Subordinates are motivated to manage their leaders' perceptions of them (Bolino, 1999), and studies have shown that subordinates sometimes withhold information from or distort information given to leaders (Glauser, 1984; Roberts & O'Reilly, 1974). Other organizational forces also act to obscure useful causal information from leaders in teams (Mesmer-Magnus & DeChurch, 2009), new product development (Jespersen, 2012), and creative work (Alge, Ballinger, Tangirala, & Oakley, 2006; Gong, Kim, Lee, & Zhu, 2013), to name a few. This makes it particularly difficult for leaders to obtain the useful causal information (S. G. B. Johnson & Keil, 2014) information that would help them determine whether or not their influence tactics are effective.

Complicating things further is the likelihood that seemingly similar outward follower behaviors might actually reflect very different motives. And it is in these deeper motives where leaders have a more lasting impact—where leadership really happens. A follower who engages in extra-role citizenship behaviors, for example, may do so for the good of others. Another may do so because he or she believes it will create a good impression that will help advance his or her career (Bolino, 1999). Both of these followers, moreover, may be increase these behaviors in response to a particularly inspiring leader (Wang, Oh, Courtright, & Colbert, 2011). On the surface, there may not be much to distinguish the outward behaviors of these followers, especially early on when little other information is available to the leader. In some cases—highly structured manufacturing for example—there may never be much difference in what each of these followers produce. However, in other scenarios—such as work requiring that followers engage in creative problem solving—the different reactions caused by the leader's influence efforts may only become apparent after those differences have in turn led to eventual performance discrepancies. In other words, feedback indicating the ineffectiveness of a leader's attempts to influence others may at times only appear after it is too late to adjust those tactics.

This presents a bit of a guessing game on the part of leaders. Effective experienced leaders likely will have responded to many episodes of repeated too-late feedback. Inexperienced leaders, on the other hand, may have to simply accept that they will fail many times but that these failures will be important learning experiences.

But what if inexperienced leaders could develop their skills faster? What if they could do so without the varied casualties of fired subordinates, ethical missteps, or public relations fires? There is no need to dispute whether anyone developing a skill as complicated as leadership skills are will inevitably experience failure as they learn. Nor am I arguing that we seek to eliminate failures. I am, however, proposing that the nature of those failures need not be catastrophic. In the same way that new product developers attempt to identify product failures early on so that the repercussions reverberate more in the development lab than in the market, it should be possible for leaders to identify failures to influence others before those failures lead to unalterable products. One way to do this would obviously be to train leaders to be more effective in obtaining relevant feedback from those they lead. Communication skills, data literacy, diplomacy, and emotional intelligence may be useful skills in this regard.

Another, perhaps more fundamental approach here is for leaders to develop a deeper understanding of human (and nonhuman) systems. Such efforts should involve leaders learning more about the science of human cognition and behavior. As noted previously, scientific information tends to be more useful for causal analysis (S. G. B. Johnson & Keil, 2014; Rousseau et al., 2008). This means that leaders and organizations should set high standards for their sources of leadership or managerial information. One way to do this would be to rely less on popular press sources and on so-called experts and instead become more informed consumers of scientific evidence (Abrahamson, 1996; Lewis, Schmisseur, Stephens, & Weir, 2006; Rousseau & McCarthy, 2007).

Conclusion

In this chapter I have attempted to integrate research on how leaders work with causal information. People in general naturally seek causal information to better understand and control their environments (Perales & Catena, 2006). To be useful, this information should be both specific (refer to specific causes and effects) and invariant to modest situational changes (S. G. B. Johnson & Keil, 2014). The beliefs leaders possess about cause-and-effect relationships heavily influence the actions leaders take to achieve their goals. Indeed, leader causal analysis may prove to be a central influence on leader performance.

Through retrospective causal attributions leaders form descriptive mental models to explain cause and effect mechanisms in their environments. These beliefs in turn serve as filters for the subsequent search and interpretation of causal information (Pearl, 1996; Strange & Mumford, 2013). However, the encoding of causal information into descriptive mental models is subject to numerous biases and errors (Lombrozo, 2007; Martinko et al., 2007; Martinko & Thomson, 1998; Notz et al., 2001), some of which appear to be particularly difficult to avoid (Stanovich & West, 2008).

When leaders plan goal-directed behaviors they engage in prospective causal analysis. They search for causal information that can be leveraged to achieve their goals. This search results in the formation of prescriptive mental models containing leaders' beliefs about which causes to manipulate and the likely outcomes of their actions. Prescriptive mental models have been shown to exert a direct influence on leader creative problem solving, planning, vision formation, and performance (Marcy & Mumford, 2007, 2010; Mumford et al., 2012; Shipman et al., 2010; Strange & Mumford, 2005). Both the content of leaders' causal analysis and the strategies they use to apply causal information influence the effectiveness of leaders' prospective causal analysis (Hester et al., 2012; Marcy & Mumford, 2007, 2010; Stenmark et al., 2010).

Directions for Future Research

There are several promising avenues for additional research on leader causal analysis. For example, future research should examine indirect effects of attributional biases on leader performance via the formation of prescriptive mental models, action plans, and vision statements. In addition to linking attribution research with a broader range of outcomes (Harvey et al., 2014), such research could highlight additional leadership developmental activities, focused on, for example, source monitoring of assumptions contained in sensegiving efforts (e.g., prescriptive mental models, action plans, vision statements) (M. K. Johnson, Hashtroudi, & Lindsay, 1993; Mitchell & Johnson, 2000).

Another avenue for future research would be to examine the priming effects leaders' descriptive mental models on prospective causal analysis. For example, researchers could assess leaders' attributions, attributional styles, or specific causal assumptions about a given system. It is unclear exactly how these characteristics related to descriptive mental models may influence the extent to which leaders engage in prospective causal analysis, the content of the causal information they consider, and the strategies they adopt.

Similarly, additional research is needed both to provide stronger support for the distinct roles of retrospective and prospective causal reasoning in the formation of descriptive and prescriptive mental models. While the evidence reviewed in this chapter lends support to this conceptualization, a number of questions remain unanswered. For example, how, if at all, do retrospective causal attributions interfere with prospective causal analysis? Which, if any, prospective causal analysis strategies may influence subsequent causal attributions, especially erroneous attributions? Do individuals evidence prospective causal analysis styles similar to the way individuals possess different retrospective attributional styles (Harvey et al., 2014)?

Finally, more research is needed to better understand boundary conditions of leader causal analysis. Organizations as systems are comprised of subsystems existing at multiple levels (Scott, 2016). Leaders' causal analysis may vary depending on the level of the causal components being considered. For example, only a limited set of system components will ever be under a leader's control. The study conducted by Vessey et al. (2011) showed that leaders favored different causal content depending on the level of control they believed they had over the system. Future research could investigate how leaders' causal analysis changes depending on whether the leader is attempting to influence upward, laterally, or downward effects (Dutton, Ashford, O’Neill, Hayes, & Wierba, 1997; Schriesheim, Castro, & Yammarino, 2000), or individuals or groups of individuals (Higgins & Bargh, 1987).

Whether employee engagement is the most pressing human capital challenge today is probably less important than whether leaders believe satisfied employees are more productive or productive employees are more satisfied. Additional empirical evidence bearing on how leaders obtain and use causal information will allow for more effective interventions to help leaders identify high quality causal information. This research will also help to determine whether leader causal analysis is, in fact, a critical leader competency underlying leader performance.

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