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Abstract

Change, disruption, and growth have their origins both outside and inside the firm. How management interprets and responds to cues in the environment often determines whether the outcome will be positive or negative for the firm. Iatrogenesis refers to inadvertent outcomes, usually worse than the initial problem(s), resulting from treatment, decisions or advice. This paper describes seven categories of management decision error and demonstrates how each may lead to iatrogenic outcomes in organizations. We propose the term "organizational iatrogenesis" to capture the unintentional genesis of significant organizational problems due to unwise intervention strategies. Three error types have already been well documented. Type I or "Alpha" errors, Type II or "Beta" errors form the foundation of interpreting data in statistics. Mitroff and Betz (1972) introduced Type III or "Errors of the Third Kind," a meta error of focusing upon or solving the "wrong" problem(s). Here we add strategy errors (Type IV), two action errors (Type V and Type VI), and the compound cascading Error of the 7th kind (Type VII) as dangerous sources of organizational iatrogenesis. These decision errors often result from a mixture of volatility, uncertainty, complexity and ambiguity in the environment.

Keywords *iatrogenesis; decision making; decision errors; organizational failure; leadership; risk management;*

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Monday, January 16, 2017

Dr. Francesca Gino, Editor
Organizational Behavior and Human Decision Processes
Harvard Business School
Cambridge, Massachusetts, USA

Dear Dr. Gino,

Please find attached our manuscript entitled: "Organizational Iatrogenesis and Decision Errors of the 4th, 5th, 6th and 7th Kind" that we are submitting for exclusive consideration for publication as an article in *Organizational Behavior and Human Decision Processes*.

This paper a) proposes and describes the concept of organizational iatrogenesis; b) introduces the concept of "cascade iatrogenesis" to management decision making, which, due to its catastrophic nature begs to be understood better; c) describes and names primary types of decision errors (four of them new) to provide conceptual tools for understanding organizational iatrogenesis and cascade iatrogenesis; d) demonstrates the need for empirical research into possible strategies for avoiding, averting or arresting organizational iatrogenesis and especially cascade organizational iatrogenesis; and e) provides examples, questions and problems to guide future research.

We believe this paper will be of interest to a broad readership including those interested in decision making, decision errors, organizational failure, leadership, risk management, cognitive biases, sense-making habits and related topics. We believe the paper will stimulate readers to further investigate the organizational iatrogenesis phenomenon.

Thank you for your consideration of our work! Please note that an early version of this paper was published as a chapter in *Handbook of Decision Making*, 2010. The current paper is significantly different and better. This paper has never been published in a peer reviewed journal. Please address all correspondence concerning this manuscript to Mark Meckler, University of Portland.

Sincerely,

Kim Boal & Mark R. Meckler

ACCREDITED BY AACSB

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Abstract

Change, disruption, and growth have their origins both outside and inside the firm. How management interprets and responds to cues in the environment often determines whether the outcome will be positive or negative for the firm. Iatrogenesis refers to inadvertent outcomes, usually worse than the initial problem(s), resulting from treatment, decisions or advice. This paper describes seven categories of management decision error and demonstrates how each may lead to iatrogenic outcomes in organizations. We propose the term “organizational iatrogenesis” to capture the unintentional genesis of significant organizational problems due to unwise intervention strategies. Three error types have already been well documented. Type I or “Alpha” errors, Type II or “Beta” errors form the foundation of interpreting data in statistics. Mitroff and Betz (1972) introduced Type III or “Errors of the Third Kind,” a meta error of focusing upon or solving the “wrong” problem(s). Here we add strategy errors (Type IV), two action errors (Type V and Type VI), and the compound cascading Error of the 7th kind (Type VII) as dangerous sources of organizational iatrogenesis. These decision errors often result from a mixture of volatility, uncertainty, complexity and ambiguity in the environment.

Introduction

Making decisions about what actions might be taken and whether or not to act is a fundamental to managing. When managers, intent on solving problems focus upon event attributes and event structures related to a problem, they have to consider at least four levels of analysis. As Mitroff and Betz (Mitroff & Betz, 1972) demonstrated, they have to be sure they are working on the right problem in the first place. Second, they have to figure out how the forces involved in the problem interact with each other and how

they interact with the problem. Third, they have to choose a feasible and effective course of action. Fourth, they have to decide to act or to not act. At each of these decision levels there is a likelihood for error. The likelihood of overall decision error compounds as sub-levels of the decision interact with each other, implying an organizational world full of error-laden paths.

Interestingly, previous studies do indicate that performance improvement interventions quite regularly lead to *decreased* organizational performance (Bernardez, 2009). While this may not be surprising, it is certainly troubling. Furthermore, not all wrong decisions are equal. Some decision error paths are far worse than others. The really nasty decision paths are those that lead to irreversible *iatrogenic* outcomes.

This paper applies the general concept of iatrogenesis to explain classes of management action decisions that backfire, leading to “organizational iatrogenesis.” In the following pages we propose and describe the concept of “organizational iatrogenesis; we introduce the concept of “cascade iatrogenesis” to the organizational behavior literature, which due to its catastrophic nature begs to be understood better; we provide conceptual tools for understanding organizational iatrogenesis and cascade iatrogenesis by describe seven primary types of decision errors (naming four new types); we demonstrate a clear need for empirical research into possible strategies for avoiding, averting or arresting organizational iatrogenesis and especially cascade organizational iatrogenesis and we provide examples, questions and problems to guide future research.

Our general thesis is that without careful consideration of *visioning errors*, *correlation error*, *strategy error* and *action error*, decision makers blind themselves to the risk of iatrogenic solutions that create more problems in the organization than they solve. Importantly, if the robust findings from human healthcare research are in any way indicative of or transferable to organizational health issues, then it is not un-rare for iatrogenic outcomes of organizational decisions to cascade, leading to irreversible organizational decline.

Iatrogenesis

Iatrogenesis is the unintentional creation of a new (usually negative) situation from interacting decisions, forces and actions stemming from (usually positive) naive intentions. Almost all of the literature on iatrogenesis is focused upon attempted solutions that do more harm than good, generating new (and worse) areas of risk/harm that did not previously exist. In the medical profession and literature, iatrogenesis is inadvertent impacts or outcomes brought forth by a treatment or supposed cure, and is commonly used to describe serious new adverse health effects brought about by unforeseen interactive forces. Ivan Illich (1975) published much of the seminal work on the topic, offering sociological theory on changing human health care requirements and systems.

The study of iatrogenesis has grown up in the health sciences, where it is well documented as a serious medical treatment issue. For example, Brennan et al (1991) published a highly cited Harvard Medical School study that found nearly 4% of all hospitalizations resulted in subsequent negative iatrogenic events, 14% of them fatal (0.5% overall). Hofer and Hayward (Hofer & Hayward, 2002) offer an excellent run-through of the typical medical situation, and explain how error and uncertainties compound to create harm. This is now referred to as “cascade iatrogenesis,” which is discerned and described by Thornlow et al (Thornlow, Anderson, & Oddone, 2009; Thornlow, Oddone, & Anderson, 2013) as a series of or combination of diagnostic, correlation and action/treatment errors that lead to irreversible deterioration.

There is a vast literature on clinical iatrogenesis in all of the various specialty areas of health care. There is a small set of research reports observing that iatrogenesis as a phenomenon is not limited to the doctor/patient/disease level of analysis, nor is it even bound to health care. This small sample of studies offers evidence of iatrogenesis intruding into technology, economics, poverty, copyright law, social work, language use and general risk management (Avitzur, 2013; Dymitrow & Brauer, 2016; Kennedy, 2015; Meessen et al., 2003; Melendez-Torres et al., 2016; Palmieri & Peterson, 2008; Wiener, 1998). While the

scope of the research is broad, the number of studies remains tiny and we find very limited discussion of iatrogenesis in the management literature. The most (and perhaps only) detailed discussion of iatrogenesis in risk management literature is provided by Wiener (1998) who demonstrates that “excessive countervailing risks are systematically generated by institutions that regulate target risks”(Wiener, 1998, p44). Wiener develops a compelling analogy between medical iatrogenesis and regulatory iatrogenesis. The only business centric investigations are in chapter on decision errors (Boal & Meckler, 2010) and a short study (Kennedy, 2015) in the legal and economic context of U.S. copyright law.

This paucity of discussion outside of medicine and health care is unfortunate. Even a minimal commitment to risk management, innovation and solution effectiveness in business dictates that the fallout of decision errors be minimized. Understand and managing iatrogenic risk should be the first thing to which we attend.

Illich (1975) himself stressed the import of looking for iatrogenesis in organizational and social life beyond clinical medical treatments. In fact, applying iatrogenesis beyond medicine to other decision contexts and to general sense making is the very point of the seminal work, and why it was so controversial for so long. Illich described and defended (Illich, 1974; Illich & HOSE, 1975; Illich, 1976; Illich, 1975) three levels of iatrogenesis: clinical, social and cultural iatrogenesis. Clinical iatrogenesis is damage caused by toxic, unsafe or ineffective treatments, and is the type of iatrogenesis that the vast majority of the literature focuses upon. Social iatrogenesis in health care occurs when medical solutions are depended upon, and expected, for more and more ills. Cultural iatrogenesis in health care is a sense-making transformation of life’s critical events into medical events, to be dealt with using medical treatments and medical science as a source of meaning.

One take-away from the previous literature is the rather simple deduction that avoiding iatrogenesis requires increasing attention on the decision of whether to act or to withhold from acting. The general bias of the management literature is that action is preferred, and we focus on courage to act (Clawson, 2009;

Jones, 1991) or how to get from intention to action (Fishbein & Ajzen, 1977). On the other hand, deciding when to not-act is major focus in the health care literature, specifically as a result of industry-wide awareness of iatrogenic events. Perhaps an underlying management bias for action assumes that, of course, we should act. A bias for action was, at least for a while, considered a best practice (J. C. Collins & Porras, 1994). Here, we ask: what happens if we treat this as a serious stage of the decision making framework? What are the kinds of results of action errors as they interact with error from other parts of the process? This leads to contemplation about instances when it is best to *not* to act, even in the presence of a feasible and empirically tested strategy for action.

Visioning Error, Correlation Error, Strategy Error and Action Error

Clawson (2009) described “the leadership point of view:” as seeing what needs to be done; understanding the underlying relationships and forces at play, and having the courage to initiate action.” This simple framework describes major cognitive processes in which leaders must engage. Omitted by Clawson is (at least) pre-action responsibility for eliciting effective courses of action and choosing feasible effective solutions (Rumelt, 1980). Putting these four cognitive leadership stages together, a four-part decision error framework emerges tracking the four major areas of concern: “visioning errors,” “correlation errors,” “strategy errors” and “action errors.” The first three types of errors are well researched and documented in the literature. We will only summarize below.

Concatenation of Visioning Error, Correlation Error, Strategy Error and Action Error

There is certainly no guarantee that only one kind error is committed per problem. After all, there are (at least) four categories of error, and it is possible for management to make all of the kinds of error, none of the errors, or any combination. Poor decision makers (or those with bad luck) might find themselves all too often working on the wrong problem, accepting unfounded cause and effect relationships, choosing questionable strategies and then acting when they shouldn't.

Let us review some very simple probabilities that may be generated when these different kinds of errors interact when working on an organizational problem. If there are a host of problems facing the organization, there is a possibility that management will work on the wrong problem(s). Assume that a leader is good at recognizing and prioritizing problems and gets this pretty much right 80% of the time. Further assume that this leader is a stickler for an audit trail, tracking assumptions, making sure that all the reasonably available evidence is gathered, correctly measured and tested; so we assign a very high 0.95 probability that no correlation error will be made when analyzing the evidence, with a 0.025 chance of Type I error and 0.025 chance of Type II error. Let us next assume this executive has a talent for choosing and sticking to plans that are both feasible and likely to be effective; a proven strategist who is correct (enough) about these things 95% of the time. Finally, assume that this manager is exceptionally good at knowing when to act, when to withhold action, has the courage to act when it is indicated, and the strength of will to hold off even under severe peer pressure to act. So, we then assign a 0.95 probability this good decision maker does not make a Type V error or a Type VI action error. The overall results for this most excellent executive are disturbing. There is only a 68.59 percent chance ($0.8 \times 0.95 \times .95 \times 0.95$) that this excellent decision maker will get it right, and that's not including the likelihood of execution going well.

One would expect that a more average executive decision-maker would have a lower probability of making the right decision. Nutt (1999) reports that half of the decisions made in organizations fail. While alarming, we do not find this claim surprising. Peterson and Meckler (2001) emphasized how even a few interactions create chaos and unpredictability:

“(1) large differences in outcomes can come from small differences in initial conditions; (2) largely unpredictable, radical changes can be intermixed with and become directly dependent on incremental, predictable changes; (3) short-term predictability can accompany long-term nonpredictability; (4) seemingly random patterns can show an apparent attraction to specific configurations; and (5), mutual

influence among a small number of predictors can appear to be random” (Peterson & Meckler, 2001 p31).

While all this volatility, uncertainty, complexity, and ambiguity (Bennett & Lemoine, 2014a; Bennett & Lemoine, 2014b) may seem bleak, part of the point of understanding chaos is that there are patterns to be found for those that know how to look (Amigó, Kocarev, & Szczepanski, 2006; Chatrath, Adrangi, & Dhanda, 2002; Davis, Eisenhardt, & Bingham, 2009; Priesmeyer & Baik, 1989). We therefore suggest building awareness of each of the major decision points, the errors that occur at each and how these may interact. Perhaps some useful patterns will emerge.

The rest of this paper is organized as follows. Seven types of error are named, described and explained. Then combinations of the kinds of error are considered and thought experiments about the outcomes are offered. We conclude by summarizing and calling for research to lower the chances of seriously disruptive errors of the seventh kind. Perhaps this will spur experts to find strategies that minimize these dangerous risks without handcuffing our ability to pursue rewards.

Error of the first kind and error of second kind: Correlation Error, Type I and Type II

Correlation errors occur when pondering, testing and deciding about relationships between variables such as existing forces, possible actions and potential outcomes related to a problem. These errors are the classic Type I (α) and Type II (β) errors described by Neyman and Pearson (1928/1967; 1933/1967). Type I (or α) errors occur when the null hypothesis is mistakenly rejected -- we mistakenly reject that there is no relationship between the variables. In other words, there is not in fact sufficient evidence to support the hypothesis, but we mistakenly decide that the evidence does support the hypothesis. It is not unusual to find managers believing they have evidence that “A” is the cause of “Problem B,” when there is in fact actually not sufficient evidence of a relationship.

Error of the 1st kind, Correlation Error, Type I

When attention is focused on the right problem, and no action is taken, the problem can escalate if a Type I correlation error has been made. Some argue that President George W. Bush's administration erred early in 2002 in this (type I) way when he concluded that Iraq was an immediate terrorist threat based upon evidence of weapons of mass destruction ("wmd's"), when the evidence was not in fact sufficient to support that hypothesis. Another example occurred two years before the October 2008 global financial system crisis that sent equity values down over 40%, and shut down interbank lending. No later than 2006, both Senators Barak Obama and John McCain had separately spoken about the sub-prime mortgage crisis especially how it was affecting Fannie and Freddie Mac (mortgage investment companies), and yet nothing was done (The Financial Crisis Inquiry Commission et al., 2011). One could argue that the right problem *was* brought to attention, and *was* worked on, but then a Type I error was made. The Senate committee gave too much weight to the evidence pushed forth by Fanny and Freddie Mac lobbyists, who demonstrated a strong inverse relationship between the existing controls and the size of the mortgage asset problem. Leaders were therefore convinced that using the existing control systems more would make the problem less. This was not also an error of non-action. That is, action was (correctly) not taken on a problem that (it rationally seemed) *should not have been acted upon* because adequate existing resolution systems *seemed* in place. However, while resolution systems *were* already in place, they were not in fact adequate. The adequacy was (incorrectly) established at the correlation error point, not at the action decision point. Errors are often rooted in this kind of bounded rationality. What we mean is that sometimes action and non-actions decisions are rational at the time of the decision, given the problem as presented and the evidence at hand, but in fact wrong due to error caused by complexity, information equivocality, tunnel vision and so forth.

Error of the 2nd kind; Correlation error, Type II

Type II errors occur when a hypothesized relationship does in fact exist, but decision makers fails to incorporate this fact. Relying on flawed testing methods, the Union Cycliste Internationale (UCI) erred in just such a way with a series of decisions from 1995 to 2005 that performance enhancing drugs were not significantly influencing the outcomes of races such as the *Tour de France*. The UCI's tests were showing insufficient evidence to claim the presence of illegal performance enhancement supplements when such supplements were in fact present. And past errors do not necessarily help future problems. In 2016 the International Olympic Committee (IOC) and International Association of Athletics Federations (IAAF) had to go backwards to correct major errors that allowed cheating athletes to participate in the 2012 Olympics, despite testing and evidence gathered by World Anti-Doping Agency (WADA). False negatives were reported, and the problem festered to the point that nearly the entire Russian contingency to the 2016 Olympics in Brazil was banned.

In 1985 The Coca-Cola Company decided to abandon their original recipe for Coca-Cola in favor of a new formula. They tested to find out if existing loyal customers would be turned off by the change, and tested if non-customers might be more likely to adopt the new product. Unfortunately, they made a Type II error, and failed to reject the null hypothesis when testing for an inverse relationship between demand by existing customers and the new coke formula. While they were correct that potential new customers were more willing to adopt new coke than classic coke-cola, they erroneously failed to reject the other null hypothesis, concluding that there was no inverse relationship between changes in the formula and demand from their existing customers. Focused on the right problem (i.e. gaining new customers), Coca-Cola tested for the relevant correlates and made an error, then rationally acted, abandoning the original recipe and launched New Coke. Type II error can cause serious damage.

Error of the Third Kind: Visioning, Type III

We suggest that *visioning error* occurs when managers or leaders are deciding what problems or issues to work on and the scope of the issue. These meta-level errors are those describe by Mitroff and Betz (1972) as errors of the third kind. When managers do not notice, discern, or pay attention to main issues and levers, and instead focus attention and effort on sub-ordinate or inconsequential issues, then they have made visioning errors. Seeing what needs to be done means discerning which problems are tightly linked to the prioritized outcomes they hope to bring about. When management focuses upon corollary problems that only indirectly impact desired outcomes, or when attention is limited to effects of root problems rather than the root problems themselves, then management is committing errors of vision. Mitroff and Betz (1972) labeled the mistake of working on the wrong problem or issue an “error of the third kind.”

The most typical statement about “Error of the Third Kind” (1972) is that it is solving the wrong problem very precisely. While this statement does not cover all of visioning (or Type III) error, it does capture the spirit of the phenomenon. The manager, team or leader simply misdiagnoses the situation, and thinks problem is one thing when it is in fact another.

We name this “vision error” because it is the result of incorrectly seeing what needs to be done, leaving the “true” problem outside of the attention of the decision makers. Organizational resources are used to solve something (another problem, a symptom, or a non-problem), but not *the* problem.

Visioning, and visioning error have a lot to do with perspective and level of analysis. It is quite common for a problem and solution to seem quite clear on one level of analysis, but for the problem to be quite something else when considered from a more macro, or more micro perspective.

For example, in 2016, Daimler Trucks of North America (DTNA) predicted the demand for short haul electric sprinter vans and trucks to go up due to advances in 3D printing and electric drive trains. A six-

week study with consultants led to a strategy proposal of outfitting UPS and FedEx with subsidized electric short haul fleets and recharging hubs on the outskirts of major urban areas. Just short of the presentation to the executive summit, a meta-system perspective (CITE) was introduced by a U.S Department of Energy specialist. The DOE explained that existing energy grids in most urban areas could not handle a large-scale conversion to locally charged electric drive train trucks and could lead to broad energy network failures. From this meta-system level of analysis, the nature of the problem looked quite different and a visioning error in this case would likely have led to serious iatrogenic outcomes. Although the team consulting with Daimler was certainly thinking at a macro level of analysis in their innovation thinking, they had not looked macro *enough*.

Adequate visioning seems to require more than just having the capacity for taking a macro-system perspective. We suggest that better visioning entails the capacity for discerning issues from multiple levels of analysis simultaneously, from the macro down to the micro and up to the meta.

Metastasis. When organizations work on the wrong problems, at the very least the original problem lingers. It may do so benignly still requiring a solution, but it may fester requiring greater resources to solve. Organizational decline is often characterized by the process of denial, followed by action involving errors of the third kind, which do not stop the decline. Finally, the real problem is address and further action taken. Unfortunately, when the organization gets around to solving the real problem, the problem has festered requiring greater organizational resources to solve but which the organization no longer has, and decline continues.

When there has been an error of the 3rd kind, the solution is at best only indirectly effective, on average irrelevant and at worst iatrogenic at another level not initially contemplated. In the best case, there are already effective administrative structures in place to deal with the true problem, and the problem gets solved even though it was not addressed by decision makers. In the average case, the true problem remains

unaddressed and lingers, yet perhaps remains more or less in check because action is being taken on a related, but wrong problem. In worse cases, the lingering true problem festers, perhaps becoming more difficult to remove. In even worse cases, no action is even taken on related (yet wrong) problems. (This compound situation we describe below as an error of the 7th kind.) An error of the 3rd kind can be quite serious.

Error of the 4th Kind: Strategy Error, Type IV

Type IV errors occur when the wrong potential solution is chosen. By itself, this can be described as the case in which leadership has focused the organization on the right problem, has properly understood the relationships between the forces at play, but has chosen an inferior solution; perhaps one that will not work at all or one that will be generally ineffective even if implementation goes well. Rumelt (Rumelt, 1980) pointed out that this is a strategy issue; either the choice is not consistent internally, not consonant externally, not effective or not feasible, or some combination of all four. To put it simply, it is the common case of choosing from alternative ideas a course of action that will not actually solve the problem.

Organizations seek to grow. They can do this organically, by internally developing the organizational capacity to compete, or they can do this through acquiring the capacity through a merger or acquisition. We know that endogenous growth is safer but takes longer than a merger or acquisition. In addition, we also know that most mergers and acquisitions fail, i.e., they lose money for the acquiring organizations shareholders, and much, if not most, of the time are eventually divested (Allred, Boal, and Holstein, 2005). Given this, a reasonable question is why the prevalence of mergers and acquisitions.

Another example, in the Spring of 2002, An AACSB accredited School of Business reviewed twenty-four years of data and found that new business school hires were most successful if they had three to five years of previous experience at another university. The analysis was discussed and agreed upon as highly relevant prior to searches from 2002 through 2006. However, this relationship was ignored in the formal

selection strategy, leading to a series of failed career starts, recurring recruiting expenses and organizational stress. New leadership implemented a policy in 2007 that experienced candidates be given formal preference. The strategy error was corrected and the department had a series of successful hires and low turnover. Strategic errors where infeasible or ineffective courses of action are decided upon despite decision participants having the correct knowledge or live hypothesis (James, 1896) about the problem and the relationships between the variables are certainly not uncommon.

To give this some theoretical context, recall Daniel Kahneman's famous "illusion of validity" decision error (Kahneman, 2011). This is just the opposite situation in which the strategy decided upon is based on relationships that have repeatedly been demonstrated to be in error. We can also juxtapose this to Type I correlation error: when we hire experienced candidates despite no repeatable observational evidence that experienced candidates perform better on the job, we are making a Type I error. When we fail to give preference to experienced academic candidates despite repeated observational evidence that they do perform better on the job, we are making a Type IV error: choosing a course of action that will not be effective.

Why do leaders and decision makers choose from the pool of possible solution courses of action that do not work, even in the face of evidence that they have not worked in the past, or that they probably will not work in the near future? The voluminous literature on cognitive biases and decision biases certainly helps explain this. However, specific research is needed to more tightly link the decision error literature with strategy development and selection.

Error of the 5th Kind, Action (Type V), and Error of the 6th Kind; Inaction (Type VI)

Action errors occur when deciding whether to act on a proposed solution. Managers, after deciding what needs to be done, face a decision of whether or not to take action. Distinct from other parts of the overall process, there comes a time when the manager or leader must "make the call" (Tichy & Bennis, 2007).

There are two kinds of action errors that occur here: actions that you should have taken but did not and actions that you should not have taken, but did. Action error does not occur in cases when action is taken when action is truly needed, and when action is not taken when it is not appropriate. Action error *does* occur when action is taken, when it should not be taken, and when action is not taken when it should be taken.

Certainly there are multiple possible causes for a manager, having already decided what might be done *about* a problem, to then either act or not act. Sometimes a manager acts on a correct decision about what needs to be done, and the problem gets solved. When managers fail to act, this may be the result of a belief that systems and procedures are already in place to solve the problem at hand. Sometimes managers decide not to act because they believe that the problem will simply go away, or at least fade into inconsequence, if they exercise patience and wait it out. Sometimes, it is simply a case of social loafing (Latane, Williams, & Harkins, 1979). In any event, the decision to act may be the correct decision, or the decision to forebear may be correct. Unfortunately, managers often get the call wrong. We call these action errors ‘Errors of the 5th and 6th kind. These action errors deserve special attention because they are the kinds of error that can lead to iatrogenesis on their own.

Error of the 5th Kind, Action (Type V)

Acting to solve a problem, be it the right problem or the wrong problem, can create other difficulties. Sometimes solutions are “iatrogenic,” meaning that they create more, or bigger problems than they solve. Faced with such a possibility the decision maker should thoroughly examine all the potential system effects, and perhaps refrain from action. In the case that the decision was an attempted solution to the right initial problem, and the problem variables were well understood, one important problem is now replaced by another, perhaps worse problem.

The iatrogenic decision maker. Here the decision maker takes charge, makes a decision based beliefs supported by correlation errors, resolving the existing problem yet creating more and greater problems to be solved. This often occurs when the manager cannot anticipate the interconnections between elements, especially non-linear interactions. This may occur because the manager compartmentalizes the decision not foreseeing how the effects may set up other, more difficult problems, or because the manager's time frame is too limited. In general, we know that managers and decision makers have at least somewhat of an irrational bias for action, especially in the pursuit of fostering specific improvements (Patt & Zeckhauser, 2000). We might call one who takes this path “the narrow scope iatrogenic decision maker.” A classic example is Three Mile Island (Osborn and Jackson, 1988). There was a leak in the coolant system and the valve froze up. They decided to fix the problem by draining the coolant, and this led to the disaster in which the plant went south in a major meltdown. While this is a dramatic example of an iatrogenic outcome, such outcomes are more prevalent than we realize. For example, most medicines give list of contra indications, i.e., don't use this medicine with that medicine. However, drug companies rarely look past two-way interactions, and pharmacies who dispense medication often get it wrong anyway (Malone et al., 2007). One of the authors takes eight different medications, prescribed by three different doctors, per/day for multiple ailments. Yet none of his doctors can tell him if he should be taking the eight medications together or not. People who suffer from multiple ailments are always at risk from unknown drug interactions. Some solutions have unknown consequences, but some solutions can be anticipated to cause other problems. Sometimes, because decision makers do not anticipate the futurity of their decisions, focusing, on too short a time period, problems that could reasonably be anticipated are ignored. Sometimes, the decision maker might realize his solution will cause other problems, but because he thinks the immediate problem is more important, or he believes the anticipated problem is a bridge to be crossed when it happens, or the stakeholder group is too weak to worry about, s/he will go ahead and make a

decision that they know will create more and greater problems for the organization. But, that will be someone else's' headache.

Some have argued that President George W. Bush's administration committed this kind of action error of the 5th kind in March of 2003 by initiating (military) action in Iraq when they should not have. The critic's argument is that is even if there were no α -error and Iraq was in fact gathering WMD's, the decision to *act* upon it was in error because broad and powerful international diplomatic systems and control processes were already in place that would have solved or at least contained the problem. Critics point out that the Bush administration acting when they should not have acted created an iatrogenic outcome; that is, taking action made the problem worse instead of better.

Error of the 6th kind, Inaction (Type VI)

Deciding to take no action, when no action is called for is the correct solution. However, falsely believing that the problem will either solve itself or simply go away is an error of the 6th kind. These ζ errors allow situations to linger, at best, or to fester and worsen requiring greater resources to solve. Someone who habitually takes path might be described as "the wishful non-action taker." This person mistakenly thinks that if they do nothing the problem will either go away or resolve itself through existing processes and network externalities. What they don't realize is that the problem either will not go away or that the original problem will metastasize and require great resources to solve the longer organization waits. Collins (2001) discusses how the Great Atlantic and Pacific Company (A&P) went from dominating the grocery business in the first half of the twentieth century to an also ran behind Kroger's in the second half of the twentieth century. Despite data that consumers wanted superstores, and that they had a model that worked (Gold Key stores), A&P failed to act because it did not fit their identity. As Ralph Burger, then CEO of A&P said, "you can't argue with 100 years of success." Fox-Wolfgramm, Boal, and Hunt (1998) describe how an organization's identity can directly lead to resistance to change. Boal (2007) notes that

the rules and routines that make up an organization's transactive memory inhibit search, and lead to a misdiagnosis of the problem or non-action. Such was the case with Sony when it could not let go of its cathode ray tube (CRT) technology for making televisions, while Sharp, Samsung, and LG Electronics forged ahead producing liquid crystal display (LCD) televisions. Wetzel and Johnson (1989) discuss how organizational failure and decline is almost always preceded by a denial of reality leading to non-action.

While not taking action may be the correct decision, in many managers' eyes a worse outcome is a reputation of lack of courage or initiative to take action. This would be an especially powerful fear if a boss incorrectly believes that you were aware of the problem but chose not to act thereby risking the creation of a bigger problem. This reinforces the schema that managers are problem solvers/decision makers and action takers creating a general bias for action. For the manager decision-maker, there exists a risk management dilemma: which is worse, making an action decision that turns out bad or not making a non-action decision that allows a problem to evolve into a disaster. In organizational cultures with a bias for action, we would likely find more errors of the 5th kind than errors of the 6th kind. In organizational cultures or structures with a bias for inaction, we would likely find more errors of the 6th kind than errors of the 5th kind.

Sometimes an action error takes the form of *waiting too long* for action. Often it is hoped that not taking action will allow the problem to solve itself or become a non-problem. If the decision maker may believe that merely delaying action will not be fatal or cause further damage, and that the problem will stay of the same shape and form requiring the same resources to solve it. In other words, the decision makers sometimes act as if the problem does not have a time dimension or minimize subsequent interactions with future events. Often by delaying the action decision, greater resources may be needed to solve the problem, but the needed resources are manageable.

No Error

The ideal situation is when no decision errors are made. There are two main no error outcomes. The first describes the leader making no errors. In this path, the decision may be assumed to be sufficiently solved with no enduring outcome problems connected to the solution.¹ Leadership has done at least four things correctly. Firstly, leadership has the organization working on the right problem. They have had clear enough macro-vision to see what needs to be done and not get distracted into working on subordinate, associated or inconsequential problems. Secondly, leadership has ensured that the organization gathered enough of the proper evidence/information to discern fact from belief, desire and fiction, and to uncover true correlations among the forces involved from apparent but non-existent correlations, and to locate true causes from among the many effects and correlates. Third, the leader has wisely chosen among possible solution, promoting a feasible and effective plan. Fourth, the leader has initiated action, implementing the plan based upon this evidence because there is not another effective curative process already underway.

The second possibility is similar to the first in all respects except that management has the good judgment to refrain from taking action, even though the causes of the problem are now understood. This might be described as the “Good vision, good research, good contingency plan, no action, problem solved” path. Refraining from action may be the proper decision for a variety of reasons. Perhaps ironically speaking, there is a rather large class of problems for which taking no or minimal action adequately solves the problem.

¹ When saying sufficient we make no claims to the decision being optimal in outcome or optimal in process. It is our perspective that many fine decisions are suboptimal, as managers satisfice in order to move forward. Sufficient resolution also does not mean that the decision maker went through all of the steps normative decision making models would describe i.e. problem identification, diagnosis, idea generation, criteria sieve, alternative selection, and implementation. Competent decision making also does not necessarily mean following an optimal search pattern. For example, Simon's satisficing model follows a different search pattern than does Einhorn's Elimination by Aspects model and both wind up with a decision, often different and often sub optimal, but not necessarily. A successful decision and successful action simply means that the decision and the action work in terms of the problem.

Firstly, the problem may be the type that just goes away if one waits it out. Dealing with the common cold and or an employee's occasional bad mood seems to fall into this category of problem. Burgelman and Grove (1996) describe how various instances of dissonance require no action, (unless it is "strategic dissonance"). Leaders, they say, should know their organizations well enough to discern between ordinary dissonance that is best ignored and will go away, and strategic dissonance that requires action. Boal and Hooijberg (2000) suggest that discernment lies at the heart of managerial wisdom. It involves the ability to perceive variation in both the interpersonal and non-interpersonal environment. In addition, it involves the capacity to take the right action at the appropriate moment. Second, there may be structures and processes in place that will solve the problem if you do nothing. The real question is whether or not the manager can yield to the logic of this path given the "bias for action" that many managers have. At least in terms of financial portfolio management, it has been demonstrated that men are more prone to this error than women (Barber & Odean, 2001). A further complication is that leaders may need to defend their reputation as a take charge decision maker, and thus act when they would be better off not acting. Some wisdom about this on the part of the decision maker is certainly called for and leaving things (more or less) alone is sometimes a quite viable long term solution.

Error of the 7th kind: Cascade Iatrogenic Errors (Type VII)

Errors of the 7th kind are compound errors that may occur in three circumstances. Two of them are indicated when an Error of the 3rd Kind has already been made, and then an action error is made. For example, there is the situation when Type III error has already been made, then the initial problem is still outside of the attention, and so possible negative interactions with it may not have been considered when a manager acts. Not only does the real problem lay untreated and festering, but mistaken action on the wrong problem may introduce new correlates that may create forces that did not previously exist. This compound decision error situation is a type VII Error ("error of the 7th kind"). Research in healthcare has

identified these compounding errors as cascades (Thornlow et al., 2013), which are generally irreversible (Hofer & Hayward, 2002; Thornlow et al., 2013), unfolding not dissimilar to the network cascades detailed by Duncan Watts (2009; 2002) . Cases of cascade iatrogenesis are those in which erroneous action (type V or type VI) allows forces to interact that were erroneously analyzed (type I and Type II), creating more problems than it solves, creating an environment in which original issue(s) morph(s) into larger, and qualitatively different, often irreversible problems.

It is only when attention is focused (Ocasio, 1997), we can easily notice cases of type VII error. For example, the circumstance of taking the decision path of working on the right problem, determining a cause that does not really exist, and then acting when one shouldn't. By introducing new forces into a group of previously uncorrelated forces, new correlations and unexpected outcomes occur. Combining the Iraq War decision errors possibilities already noted above, we can argue that the combination followed the Type VII path cascading error path. In terms of our framework, a Type I error (of believing in the existence of WMD's) combined with the Type V error (acting when he should have allowed existing processes to solve the problem) was a Type VII error resulting in cascading iatrogenesis. This “error of the 7th kind” may have introduced new forces that combined with existing variables in complex and unforeseen and irreversible ways. The result was a morphing of an initial hidden terrorism cell(s) problem into a major occupation style war, irreversible bad will, foreign government-building initiatives, massive debt increases, economic hardship and a global loss of power and influence for the U.S.A.

In such cases when one of the two action errors (non-action, when action should have been taken, or action when action should not have been taken) are made on the “wrong” problem, and/or in conjunction with correlation errors, the true problem may very well likely morph into something unrecognizable in terms of the original problem. Unlike errors of the 5th kind (that cause escalation of the problem), and errors of the 6th kind (that give problems time to fester), errors of the 7th kind allow problems to grow qualitatively

as well. We contend that these errors of the 7th kind in organizations often result in the same kind of situations documented in hospitals and health care (Brennan et al., 1991; Hofer & Hayward, 2002), where the problem resolution does not just require more resources, but entirely different resources altogether.

In general, when the right problem is not discerned, and a type I correlation error has also been made and no action is taken, the problem can morph into a new shape and form if. For example, when senators Barak Obama and John McCain brought to the U.S Senate the issue of how sub-prime loans might negatively affect Fannie and Freddie Mac and nothing was done, one might argue that not only was the senate wrong that the VaR (value at risk) model was inadequate (Rickards, 2008) and other control systems would solve the problem (as lobbyists reportedly convinced them), but that they were also working on the wrong problem altogether. The senate (leadership) worried about Fannie and Freddie Mac, and did not focus on the roots or properly prioritize (an error of the 3rd kind). Priority attention should have been given to consumers and businesses engaging in loans that they could not afford if even a small downturn were to occur, mortgage brokers under-disclosing loan default risk, and huge default insurance bets being made that insurers could never cover. The Type I error was believing in a strong inverse relationship between the strength of the existing control systems and the problem: the senate believed using the existing control systems more would make the problem less. The U.S Senate also erroneously concluded that the existing control systems were a feasible and effective solution for this (wrong) problem. They then made the rationally correct decision not to act.

The above kind of situation shows how complicated an error of the 7th kind can be, and how easy it is for leaders to make them. The error was a) vision, did not consider the broader macro-systems effects combined with b) did not have enough clear and relevant information about forces and relationships involved, c) a strategy error of deciding upon a feasible, consistent and consonant but not effective course of action (Rumelt, 1980).

Another finance/economics example related to the 2008 financial crises was when the Securities and Exchange Commission (SEC) leadership failed to notice that Lehman Brothers was shorting firms, and covering the short sales with treasury stock it had just taken as collateral for lines of credit to those very firms it was shorting. This Type VII error is visioning error (of the 3rd kind) combined with a non-action error (of 6th Kind). Leadership a) did not have vision to see that unethical short selling was not the important problem, it was firms desperate for cash and about the default on payments; b) lacked information that Lehman Brothers was short selling their own clients backed with treasury stock that was collateral they had no right to float leading to c) non-action with the result of new and worse problems. As a result, Lehman Brother's was eventually left to fail, and many experts in the weeks that followed, including the French minister of Finance, claimed that this was the event that led most directly to the global financial meltdown of October, 2008. When a Type VII error is made, the resulting problem may no longer be recognizable in its original form. The problems are not easily diagnosable, the resources and choices available become less sufficient or desirable, the solution is not readily apparent, and the solution not so attainable.

Error of the 7th kind creates "wicked" as opposed to "tame" problems. Tame problems may be very complex, but they are solvable such as sending a man to the moon. It was a very complex problem, but the individuals could agree upon the definition of the problem and a solution could be found. Wicked problems are ones for which either the problem cannot be defined or *no* agreement on the solution can be found. Think about the "problem" of unwed teenage pregnancy. What is the underlying problem? Hormones? Morality? Both? Neither? What's is the solution? Birth Control? Abstinence? Where individuals cannot agree on the problem, much less the solution, non-action is the likely outcome.

Decision errors leading to positive outcomes

We find two decision error combinations that can lead to positive outcomes. These are an error of the 4th kind in the presence of an error of the 2nd kind (β), and an error of the 6th kind in the presence of an error of the 1st kind (α). For example, there is the common situation in which leadership is working on the right problem and mistakenly believes they have identified some causal relationship that if acted upon will solve the problem. If action were taken, the decision maker would be committing an error of the 4th kind. Here however, management mistakenly does not act even when they believe they are supposed to act. Perhaps management is lacking the courage to act, the incentive to act, or just has too much else going on to work on another implementation. Unknown to the decision maker, the evidence was wrong, and by mistakenly not acting, an error of the 4th kind is avoided. Holcombe (2006) details a poignant example of such a situation. He brings to attention decisions regarding global climate change problems circa 1950-1980. Holcombe points out that if we had acted 30 years ago to stem global climate change based upon the best scientific evidence and overwhelming consensus among our best scholars, we would have tried to *warm* the planet, not cool it. By not acting, even when all evidence said should have, we probably averted making a huge mistake and making the current warming trend worse.

Decision makers in taking the $1, 0_\beta, 1_s, 0_a$ path discern the problem well and take action when they should not, on some hypothesized cause of a problem even when there is no apparent evidence that this cause or correlation exists. Flying in the face of the apparent evidence, they act anyway. Perhaps we can describe this kind of decision maker as the “intuitive contrarian” because the evidence was in fact wrong, the causal relationship did exist but was missed (Type II error) and action was actually needed. Through luck, intuition and perhaps even recklessness an error of the 6th kind is avoided.

Playing off of Holcombe’s global climate change in the 1970’s decision example, we may at the time of this writing (2016) be in this situation. That is given the complexity of the earth’s environment and

interacting forces, it is very difficult to gain certainty about what action should be taken to fix the global warming problem, or if action is appropriate at all. However, most climate scientist now agree that despite not yet being certain that atmospheric CO₂ reductions will solve climate change problems we should nonetheless act aggressively. Despite the live hypothesis that Earth has natural cycles and systems that allow it to take care of itself, most agree that it would be irresponsible and in error not to act. Sometimes, despite the lack of complete information, evidence and understanding, we decide to act anyway “before it is too late” before the problem morphs into new and worse problems. Going with intuition about causes, and taking action without full understanding, we sometimes end up with a positive outcome.

Conclusion

We outlined seven different kinds of generic decision error spanning four levels of decision. Type I and Type II error take place at a middle level of decision making when figuring out the forces and relationships involved in a problem. We called these kind of errors “correlation errors.” Type III error occurs at a meta level, when deciding upon what the problems are, what the goals are, and what problem(s) to work on. We call this level of error “vision error.” Type IV is strategy error, occurring when we develop and select solutions that are unlikely to be effective (ether not feasible or not effective for other reasons). Type V and Type VI errors are action decision errors, occurring when deciding whether to act on a possible corrective solution, or to not act in the face of negative evidence. Type V error is acting when action was uncalled for, and Type VI error is not acting when action was called for. Finally, Type VII (Error of the Seventh Kind) is Cascading Error, a compounding of vision, correlation, strategy, and action error with the highest likelihood of yielding major iatrogenic outcomes.

Decision makers go through (at least) four levels of decision: 1) the vision decision, 2) deciding upon the forces at play and relationships between them, 3) developing possible courses of action and deciding what will work, what will not, what is feasible, and which to choose; and 4) deciding whether or not to make

“the call” to act (Tichy & Bennis, 2007). The first level is where either the right problem and goal is identified and worked on or a Type III error occurs. At the next decision level there are three possibilities. Either the data relating to the issue is correctly gathered and analyzed, or a Type I error is made, or a Type II error is made. At the next decision level, feasible effective strategy must be chosen. Developing ineffective or non-feasible courses of action is Type IV error. Finally, when a decision about action must be made, there are four possibilities. Two of the possibilities are correct and two are in error. Correct action may take the form of acting when action is called for, or not acting when waiting or doing nothing is called for. Type V and Type VI errors are when we get those actions decisions wrong.

All the kinds of error may have serious consequences, many of them iatrogenic. Cascading Error of the 7th Kind is the most dangerous of all. Interactions among variables in complicated contexts, such as financial systems, business operations, political arenas, global climates and so forth often exist in precarious balance and sometimes chaotic order. Cascading error is irreversible. The introduction of a single new force, or the withholding of an expected force, can lead to massive disorder, unforeseen outcomes and a transformation of one problem into brand new, qualitatively different, and irreversible problems.

While it is traditionally assumed that learning is intentionally adaptive, under conditions of volatility, uncertainty, complexity and ambiguity, experiences and interpretations are problematic. Prior learning, especially those lessons encoded in rules and routines often prevent new learning, or learning the wrong lessons making improvement problematic. Beliefs, trust, and perceptions, and not detached data and analysis determines what happens under conditions of volatility, uncertainty, complexity, and ambiguity. We have outlined decision errors that can, and do occur, under these conditions. Furthermore, we have argued that many of the decisions errors that occur under these conditions are iatrogenic, in that they cause more harm than the problem they seek to solve. However, we do not know how frequently management

commits the various errors. If Nutt (1999) is correct that half of the decisions that are made, are incorrect. What about the decisions, that should have been made, and that are not? Which are more important to avoid? We believe that management needs to focus on these iatrogenic problems much in the same way that medicine has sought to identify and solve them.

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Organizational Iatrogenesis and Decision Errors of the 4th, 5th, 6th and 7th Kind

HIGHLIGHTS

- This paper applies the general concept of iatrogenesis to explain classes of management action decisions that backfire, an outcome that we name “organizational iatrogenesis.” We introduce “cascade iatrogenesis” to the organizational behavior literature and provide conceptual tools for understanding organizational iatrogenesis and cascade iatrogenesis.
- Four levels of the management decision process are analyzed: 1) the vision decision, 2) deciding upon significant forces at play, 3) developing and choosing from possible courses of action and 4) deciding whether to make the call to act or the call to withhold from acting.
- We expand upon the existing theory by providing a framework of seven kinds management decision errors. Correlation errors (type I and type II) take place when figuring out the forces and relationships involved in a problem. Vision errors (type III) occur at a meta level, when deciding upon what the issues are and what problem(s) to work on. Strategy errors (type IV) occur when we develop and select solutions that are unlikely to be effective (either not feasible or not effective for other reasons). Action errors (type V and type VI) are decision errors occurring when deciding whether to act on a possible corrective solution, or to not act in the face of negative evidence. Cascading errors (Errors of the 7th kind) are irreversible compounding of vision, correlation, strategy, and/or action errors with the highest likelihood of yielding major iatrogenic outcomes.
- If findings from human healthcare research are in any way indicative of or transferable to organizational health issues, then it is not un-rare for iatrogenic outcomes of organizational decisions to cascade, leading to irreversible organizational decline. Even a minimal commitment to risk management, innovation and solution effectiveness in business dictates that the fallout of decision errors be minimized. Understand and managing iatrogenic risk should be the first thing to which we attend.

Organizational Iatrogenesis and Decision Errors of the 4th, 5th, 6th and 7th Kind

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