Separating Data from Intuition:

Bringing Evidence into the Management Classroom

RUNNING HEAD: Teaching Evidence-Based Management

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ABSTRACT

Evidence based management promises to improve managerial decision making and organizational outcomes. However, the principles cannot take root unless educators focus their attention on teaching evidence-based management in the classroom. To stimulate reflection and dialogue about effective practices, we describe our approaches to incorporating research findings into the classroom. We also share insights from ten scholars who teach from an evidence-based perspective. We conclude by discussing lessons that we have learned from our own students about how to successfully teach evidence based management.

When managers make decisions, they often rely heavily on personal experiences and popular practices (Abrahamson, 1996).While these types of experiences feel closer to real knowledge than data presented in journals, they are also open to many biases, fleeting fads, dogmas, and false beliefs (Pfeffer & Sutton, 2006). In her presidential address to the Academy of Management in 2005, Denise Rousseau called for improving organizational practices through Evidence Based Management (EBM). EBM involves harnessing systematic research and translating it into organizational practices (Rouseau, 2006). The aim is for practitioners to develop expertise and decision making styles that are based on the available scientific evidence (e.g., Barlow, 2004; DeAngelis, 2005; Lemieux- Charles & Champagne, 2004; Rousseau, 2006; Walshe & Rundall, 2001).

In the same address, however, Rousseau also communicated her great disappointment: "that research findings don't appear to have transferred well to the workplace. Instead of a scientific understanding of human behavior and organizations, managers, including those with MBAs, continue to rely largely on personal experience, to the exclusion of more systematic knowledge. Alternatively, managers follow bad advice from business books or consultants based on weak evidence" (2006, p. 257). In the last decade, organizational scholars have undertaken significant efforts to understand why research findings are not transferred to the workplace (see Burke & Rau, 2010; Goodman & O'Brien, 2012; Latham, 2007; Latham & Stuart, 2007; Rousseau & McCarthy, 2007; Rynes Giluk, & Brown, 2007; Rynes, Colbert, & Brown, 2002; Trank & Rynes, 2003). One theme that emerges from these studies is that EBM is not a central focus of many management education programs (Trank & Rynes, 2003).

The lack of EBM education can be partially attributed to the fact that many management educators are not trained as researchers and, as such, are not prepared to effectively deliver

evidence based management practices (e.g., Clinebell & Clinebell, 2008). However, even researchers often do not use the full extent of their scientific knowledge in the classroom. While we cannot speak with confidence to the many possible reasons, we suspect that there are at least three major reasons for this state of affairs. First, researchers may simply not know how to transfer research findings into the classroom. Second, researchers may believe that evidence-based research is too complex and difficult to explain to those who are not trained in research. Third, researchers may believe that research findings are too removed from practical experience and that as a result students may respond negatively to this type of teaching.

Despite these challenges, we believe that evidence based knowledge can be delivered in an engaging, comprehensible manner, and in a way that makes the practical implications of this knowledge transparent. Accordingly, in this paper, we present first-person accounts of how we have implemented EBM in our own classrooms, with the intention of illustrating different ways of bringing evidence into courses. Before presenting these accounts and drawing this roadmap, it is necessary to emphasize that the main goal of this paper is not to present the content of any specific course. Since management courses vary considerably in terms of both content and methods, having this discussion within the context of any particular course would not be as useful as a broader examination of the commonalities between the courses of researchers who are implementing EBM principles. The main focus of an EBM course is on enabling students to recognize that managers can rely on evidence rather than operating solely based on intuitions, common sense, or business fads. As such, these classes can be designed to show students that while managers should not ignore or discount their intuitions, they should examine whether their intuitions are supported by evidence. The EBM approach is likely to provide them with insights

and advantages that extend beyond personal experiences, common sense, and certainly beyond business fads.

Obviously, there is a limited amount of knowledge that teachers can convey in a short semester; it would be impossible to deliver the entire body of research knowledge that has been accumulated in the last century in one course. Accordingly, we believe that the message of any reasonable EBM based course should be that becoming a good manager is a lifetime endeavor of acquiring knowledge. Therefore, a significant portion of effective EBM courses should be devoted to teaching students how to seek knowledge. As a means of communicating this message, in the first section of this paper Adam Grant describes his opening class, in which he lays the foundations for what he teaches in his courses and then explains the rationale underlying this approach. Then, in the second section Amir Erez discusses the content of his EBM classes, as well as the processes and methods of transferring scientific knowledge into practical applications in the classroom. The third section presents insights from a range of organizational scholars who teach EBM at various universities. The paper concludes with lessons learned from current and former students on how to facilitate EBM teaching. We realize that there is no shortage of irony in writing a paper about teaching evidence that provides no quantitative evidence for the effectiveness of the approaches that we describe. However, we believe that this dialogue represents a worthwhile first step toward generating, cumulating, and disseminating knowledge about effective practices for bringing evidence into the classroom.

INTRODUCING EBM IN THE CLASSROOM: ADAM GRANT'S APPROACH

I use an EBM framework when teaching my two management courses: an MBA core class on leadership and teamwork and an undergraduate elective class on organizational behavior. The MBA course uses a computer simulation created by Sigal Barsade and Nancy

Rothbard to facilitate experiential learning and dialogue about decision-making, emotional intelligence, team effectiveness, conflict management, personality, transformational and transactional leadership, and organizational culture. The undergraduate course integrates simulation, role-play exercises, cases, videos, and self-assessments to enrich knowledge about decision-making, motivation, personality, influence, negotiation, teams, leadership, organizational culture, and organizational change. The syllabi for both courses can be downloaded at https://syllabi.wharton.upenn.edu.

To introduce EBM, on the first day of both classes, I open with a statement like this: "Welcome to management 101. We're going to spend the semester looking at effective strategies for making decisions, hiring and motivating people, exercising leadership and influence, making teams effective, and driving organizational change. At the outset, I want to be clear that the principles that we'll cover in this class are based on rigorous evidence. Many people feel that medicine sets the gold standard for evidence, so let's take a look at some widely celebrated discoveries. The best evidence in medicine is based on randomized, controlled experiments, comparing treatments to placebos, which provides the best estimate of how well the treatment truly works. Here are some of my favorite findings from evidence-based medicine. For starters, what do you think is the correlation between taking ibuprofen and reductions in pain, on average? For those of you who are a bit rusty, a correlation can range from -1 to +1, and a correlation squared gives you the variance in the effect that's explained by the cause. Shout out some guesses."

I use it as an opportunity to engage the students and respond with some lighthearted humor. When a student offers a high estimate, above .7, I might respond, "Wow, you are a serious ibuprofen fan." When a student gives two figures after the decimal point, like .36 or .42, I

often comment, "That was oddly specific." After nine or ten guesses, ideally covering the full range from low to high, I share the results, all of which are drawn from Meyer et al. (2001).[1]

The correlation between ibuprofen and reductions in pain is a lot smaller than most people think: it's only .14. Square that, and it turns out that Advil and Motrin only influence 2% of the total pain that people experience. How could the effect be that small? First, it doesn't work equally well for everyone—there are some people who don't benefit from ibuprofen at all—so there's variability in the effect. Second, it doesn't work equally well for all forms of pain—it's more effective for mild than severe pain, and for swelling than a stomachache. This opens up the opportunity to discuss variations in the direction and magnitude of correlations between studies, revealing how an effective treatment for one person in one context can be ineffective or even backfire for other people or situations. Third, we often come to believe that medicine works better than it does. Think about the last time you had a headache, took Advil, and felt better an hour later. Recall that correlation doesn't mean causation. In some cases, the headache would have dissipated anyway, just due to the passing of time—but we don't take that into account.

I continue with several other examples of evidence-based medicine. Randomly assign some insomniacs to take sleeping pills, and others to take placebos that look like sleeping pills, but in fact contain no medicine. What's the overall effect on whether they fall asleep faster, sleep longer and with fewer interruptions, and experience higher-quality sleep? The average correlation is .3. Sleeping pills only explain 9% of the total variation in sleep quantity and quality between insomniacs. How about the effect of sugar on children's behavior? It turns out that it's zero. Experts believe that there are two effects that cancel each other out: although sugar makes some children hyperactive, for others, it may actually provide a boost in willpower and self-

[1] So that the students can investigate for themselves, I provide them with the sources for the evidence that I cover, and often discuss the articles after they read them. As Amir will discuss, there is an important difference between establishing expertise, on the one hand, and always being correct, on the other hand.

control. Across 47 different studies, what's the average correlation between drinking alcohol and engaging in aggressive behavior? The answer: .23. Finally, how about the correlation between smoking and the probability of developing lung cancer over a 25-year period?

I take a few guesses for each of the correlations above, highlighting where we can draw causal inferences from random assignment to controlled treatments and where we need more complicated designs and statistical analyses to address causality. For smoking, the reveal provides a powerful segue to the major insights from the exercise. The average correlation between smoking and lung cancer is only .08. Although this is smaller than the U.S. Surgeon General's warning might imply, my intent is not to deliver a pro-smoking message. A correlation of .08 is still strong enough to make smoking the leading known cause of lung cancer.

I have five major reasons for showing students these results. First, as the smoking data illustrate, small effects can matter. Even if a correlation isn't whopping in absolute size, it can still be very important from a practical perspective. According to the CDC, smoking accounts for nearly 20% of all deaths in the U.S. and roughly 80% of deaths from lung cancer. On average, smoking appears to shorten lives by 13-14 years. Second, when their guesses are off the mark, students see that there are dangers in extrapolating from their own unique experiences. The factors that influence our health don't necessarily apply to other people or to every situation. A little alcohol may not make you aggressive, but you can't assume that a lot of alcohol won't make a friend aggressive. Third, we often learn more from failures than successes (e.g., Madsen & Desai, 2010), when students miss the mark in one area, they become more open to questioning other assumptions and beliefs. Fourth, opening with data about human behavior can be challenging, as many laypeople believe they are experts in human behavior (Lilienfeld, Lynn, Ruscio, & Beyerstein, 2009; Watts, 2011). By contrast, because students do not believe they are

experts in medicine, this discussion is non-threatening, and sets the stage for taking an open-minded approach in the domain of management. Finally, like medicine, principles of leadership, teamwork, and organizational behavior can be studied scientifically. I explain that in my view, the strongest method is a field experiment in which we randomly assign leaders or teams to different conditions, with a treatment, placebo, and control. Failing that, longitudinal studies tracking effects over time can be quite powerful.

I then move to evidence-based management, using the findings from medicine to demonstrate how we stack up. I suggest to students that these are just a few highlights from the types of topics that we'll cover in the course, and some of the studies have surprising results. First, I ask the students what would they guess is the average correlation between CEO narcissism and extreme returns on assets (ROA) and total shareholder returns (TSR). This was a clever study by Chatterjee and Hambrick (2007), who studied more than a hundred companies in the computer industry. They measured CEO narcissism, and tracked changes in ROA and TSR in subsequent years, controlling for previous years' returns. The more narcissistic CEOs were, the greater the extremeness or fluctuation in returns. Narcissistic CEOs were supremely confident, so they swung for the fences, winning big and losing big. The average correlation was .17.

To engage the students, I ask them how they would measure CEO narcissism if they wanted to conduct this study. "If you had never met your boss, what clues could you find that he or she was a narcissist?" I then go on to describe the study. You can't exactly randomly assign CEOs to become narcissists, so strategy researchers Arijit Chatterjee and Don Hambrick did the next best thing. They searched for traces of CEO narcissism that would be publicly visible. During the second and third years of each CEO's tenure, they combed through annual reports, press releases, interviews, and compensation. In annual reports, they measured the size of the

CEOs' photos. Some annual reports had a full-page photo of the CEO alone. Other annual reports featured no photograph of the CEO at all, or featured the CEO with several other executives. A prominent photo of the CEO alone might be one signal of narcissism: "I am the central figure in this company" and "I deserve to be showcased."

In company press releases, they counted the number of times each CEO's name was mentioned. In interviews, they measured the frequency with which the CEO talked about the company using first-person singular pronouns (*I* and *me*) instead of first-person plural pronouns (*us* and *we*). And in compensation, they looked at the size of the gap in salary, bonus, and stock between the CEO and the next-highest-paid executive in the company. How do we know that a giant photo, frequent mentions in press releases, self-absorbed speech, and pay gaps indicate narcissism?

Chatterjee and Hambrick demonstrated this in two ways. First, they looked at the average correlations between these metrics. If they're all indicators of an underlying tendency toward narcissism, they should correlate positively—and they did. For example, the prominence of the CEOs' photos in the annual reports correlated .49 with the gap in salary and bonus between the CEOs and the next-highest-paid executives. Second, Chatterjee and Hambrick averaged all of these metrics to create an overall narcissism score. They asked five Wall Street analysts who had covered the information technology sector for more than a decade each to rate the CEOs on narcissism. The security analysts reflected on their face-to-face meetings and teleconferences with the CEOs, and gave them a 1-4 score for narcissism, or "feelings of superiority, entitlement, and a constant need for attention and admiration… enjoying being the center of attention, insisting upon being shown a great deal of respect, exhibitionism, and arrogance." The correlation between the Wall Street analysts' ratings and the narcissism score was .82. This

correlation is clearly much more impressive than the correlations I discussed earlier in medicine, yet we tend to be more trusting of evidence-based medicine than evidence-based management. It needn't be this way.

To reinforce the point, I quickly give several other examples as a preview of the issues that will be covered in the rest of the semester. The first example I use is the average correlation between incentive pay and individual productivity. One estimate is .32 (Jenkins, Mitra, Gupta, & Shaw, 1998). I then tell students that as they will see later in the semester, pay-for-performance doesn't work equally well for everyone or every task. For example, incentive pay tends to be ineffective for tasks that are highly complex or creative. I suggest to my students that if they are interested in exploring this further, they should check out the book *Drive* (Pink, 2011).

I then discuss the average correlation between structured selection practices and accurately predicting the job performance of applicants. Structured selection practices involve a cognitive ability test and either a work sample or a structured interview—asking the same questions to every applicant and using a predetermined scoring system for evaluating their answers. The correlation is .63—and most of that is driven by the cognitive ability test alone (Schmidt & Hunter, 1998). I then preview what we'll cover later in the class: if you have a measure of an applicant's cognitive ability and conscientiousness, a completely unstructured interview will only explain 1.5% additional variance in performance. However, a fully structured interview would add 16.9% (Cortina, Goldstein, Payne, Davison, & Gilliland, 2000).

Finally, I tell my students that when researchers go into companies and survey leaders about their commitment to management by objectives—setting goals, making participative decisions, and giving feedback, the average correlation they find with company productivity is .67 (Rodgers & Hunter, 1991). The productivity metrics in these studies include net earnings,

assets, operating income, and quantity produced and sold relative to time. Out of 70 different studies in which management by objectives was implemented, assuming that leaders are committed, 68 studies showed productivity gains, yielding an average gain in productivity of 56%.

I then offer my philosophy of teaching: "As a professor, my responsibility is to introduce you to the evidence on management so that you can make more informed decisions as an employee, manager, or leader. Each class, we'll cover the conclusions from an overall body of research, and zoom in on a particularly interesting or surprising study. When you ask questions, it's my job to answer with 'research shows' and 'the best study I've read on that topic is…' By the end of this course, I want to leave you with an attitude of wisdom (Pfeffer & Sutton, 2006): act on the best information that you have, while doubting what you know."

The Theory behind the Approach

I introduce my classes this way with five key principles in mind. First, I seek to present a compelling case for the rigor of our evidence. As an analogy, at the bargaining table, it is common for negotiators to make proposals about how to allocate benefits and burdens, only to find that their counterparts reject the proposals outright. Instead of starting by making proposals, it behooves negotiators to first discuss standards of fairness (Mannix, Neale, & Northcraft, 1995): is equity, equality, or need the appropriate basis for dividing up the resources or costs? Once parties can agree on a common standard, it is much more likely that they will accept specific proposals that align with these standards.

I believe the same principle applies to encouraging students to accept evidence. Instead of leading with the conclusions from our studies, I like to begin by walking them through the methods: what are the designs and measures that we use? When I describe how the scientific

method can be applied to management research, students recognize the rigor underlying the data that I will be presenting. Following the principle of commitment and consistency (Cialdini, 2001), once they buy into the standards of evidence, they are much more comfortable with the conclusions.

It is a bit like resolving a scientific debate by inviting the antagonists to jointly design an experiment (Latham, Erez, & Locke, 1988): by involving students in proposing and agreeing upon the measures, they have little choice but to take the results seriously. This is especially effective after engaging students in dialogue about how to actually design a rigorous study. When I describe how Chatterjee and Hambrick tracked longitudinal changes in TSR and ROA, controlling for prior values when predicting later values, I often see some of the more skeptical students in the class nodding in begrudging acceptance. When we compare their suggestions with Chatterjee and Hambrick's unobtrusive measures of narcissism, many students smile in genuine admiration. Asking students to generate ideas for constructing a CEO narcissism index is a win-win: if they don't identify all of the metrics, they see just how creative management research can be. If they do succeed, kudos to them! The takeaway here is that although many aspects of management are more context-dependent and difficult to quantify than variables in the hard sciences, we can still measure them and generate valid, reliable insights.

Second, I want to highlight what is most counterintuitive and surprising about our research. As Davis (1971) famously argued, ideas often resonate and stick not because they are true, but rather because they are interesting. What makes an idea interesting is that it challenges (weakly held) assumptions, and I want students to be surprised right out of the gate. The medical data open students' minds to the possibility that many of their intuitions are not accurate, and the management data begin to attach this realization to the topic at hand. For example, the findings

about incentives are surprising to a wide range of students—those who believe in the preeminence of money as a motivator begin to question that assumption, and those who are predisposed to avoid it altogether wonder whether there is a time and a place for financial incentives. As students find out that their intuitions might be inaccurate or at least incomplete, they seem to become curious more about the knowledge that can be gained from the course.

In this regard, I believe it works in our favor that many students have enjoyed TED talks by Barry Schwartz, Susan Cain, or Dan Gilbert, or read books by Malcolm Gladwell, Chip and Dan Heath, Bob Sutton, Dan Ariely, or the *Freakonomics* duo. These students already have an appreciation for the ways in which social science can be fascinating. It is our job to bring this level of intrigue into the classroom, weaving stories about compelling studies in ways that dazzle and delight. In this regard, I find it helpful to reference popular books that deal with topics from the course, as I did above with *Drive* by Dan Pink. Where the authors have done an excellent job, I can refer interested students to investigate in more depth. Where I find that the authors have misrepresented the evidence, I see it as an opportunity to set the record straight.

Third, I strive to connect the research evidence to students' own personal experiences. When students brainstorm about how to measure CEO narcissism, they naturally draw examples from the leaders with whom they have worked. Many students have observed first-person singular pronouns and other forms of self-promoting, self-absorbed speech; others comment on celebrity CEOs who have claimed disproportionate shares of their companies' earnings.

When I ask students to generate reasons for the .32 correlation between incentive pay and individual productivity, I am asking them to take this a step further, setting the stage for self-persuasion (Aronson, 1999). Even students who expected the correlation to fall in the range of .80 or higher can identify a situation in which financial incentives backfired—or at least failed to

motivate greater effort or performance. When students struggle to generate these examples, following a technique from motivational interviewing (Pantalon, 2011), it is powerful to ask, "Why didn't you guess 1.0?" Typically, students respond that no practice can ever have a universal positive effect, intuitively recognizing that there is always noise around a signal. The next step is to ask them to think about whether the noise is patterned rather than random: what would cause a seemingly beneficial practice to have a null or negative impact? As students reflect on and advocate counter-attitudinal experiences, they often revise their attitudes to fall in line (see Heslin, Latham, & VandeWalle, 2005).

Fourth, I want to validate students' experiences as a meaningful—albeit incomplete—source of knowledge. My objective is to encourage students to reflect on and integrate their experiences with an understanding of evidence. After all, the available evidence may not be incommensurate with the situations in which students find themselves (Rousseau & McCarthy, 2007). Although experience can come with baggage (Dokko, Wilk, & Rothbard, 2009), as students develop expertise, experience and intuition can be useful guides for decisions (Dane, Rockmann, & Pratt, 2012), particularly in stable environments (Kahneman & Klein, 2009). Along with highlighting the traps of experience, by asking students to reflect on their work experiences when evaluating data, I hope students will gain insights about where their intuitions served them well versus less well. As Sim Sitkin (personal communication) tells his students, "My goal is not to replace or substitute for your experience. Rather, my role is to teach you evidence-based frameworks that will help you better leverage your experience."

Fifth, my ultimate aim is to inspire students to become evidence-based practitioners. It is necessary but not sufficient that the data are rigorous and interesting; the effects need to have consequences with practical significance. This is why I close with the data on management by

objectives and company productivity (Rodgers & Hunter, 1991). Students are pleasantly surprised that simple practices can have such strong effects, especially in comparison with powerful medical treatments, and begin to believe that adopting these practices can improve individual and organizational effectiveness.

Throughout the semester, I work to reinforce these principles. Each class includes a summary of the clearest evidence, as well as a deep dive into a surprising or counterintuitive study that will continue to pique curiosity. In decision-making, for example, I ask students to imagine people waiting in line to make copies (Langer, Blank, & Chanowitz, 1978). What percentage of people will allow someone to cut in front of them in response to a request, "Excuse me, I have five pages to copy…"

(a) "May I use the machine?

(b) "May I use the machine because I am in a rush?"

Although many students underestimate the base rate of compliance, few are surprised that the former request elicits lower compliance than the latter (60% vs. 94%). But then I present the third form of the request, which features "placebic" information following the structured of a reason without any new information: "May I use the machine because I have to make copies?" Students are often stunned by the compliance rate of 93%, and this is a natural segue into a discussion of mindless decision-making in organizations, as well as its causes and remedies. By presenting a study like this in each class, I hope that students will develop a habit of questioning their intuitions and a thirst to continue learning about evidence.

Inspired by the Socratic method, I often present interesting experiments in the form of case studies, asking students what they would do before I introduce the interventions that researchers have tested. For example, when presenting my own work on motivating higher

performance and productivity, I tell students about the low motivation levels among university fundraising callers, and ask them how they would increase motivation. I then present my findings that connecting the callers to a single scholarship recipient who has benefited from their work can yield dramatic increases in effort and revenue, driven by a heightened belief in the impact and value of the work (Grant, 2012; Grant et al., 2007). Since few students propose this intervention, it reminds them that the practices we study—not only the results of our research—are not necessarily obvious. To drive home the principles and stimulate ideas about how they can apply them in practice, I then assign them to read a practitioner-oriented article (Grant, 2011) or book chapter (Grant, 2013) about this research.[2]

Of course, as a field, we need to do more around equipping students to access and apply evidence after graduation. In my opinion, the widest chasm between evidence-based management and medicine is the lack of a management equivalent of M.D. and N.P. degrees.[3] In medicine, doctors and nurse practitioners are often trained to keep up with developments in evidence from scientists and translate these developments to their practitioner colleagues. In management, if we wish to encourage leaders and managers to operate based on evidence, it may be time to embrace the ideal of management as a profession (Khurana & Nohria, 2008).

THE CONTENT AND PROCESSES OF TEACHING EBM: AMIR EREZ'S APPROACH

As in Adam's class, typically, MBA students start my management class believing that managing people effectively, and developing competent interpersonal skills, are not something you can learn in a class. Rather, good people skills are a matter of experience and "street smarts." In other words, students believe that managing people effectively is important, but it is simply a

[2] At first, I was reluctant to present my own research in class, as I typically find the work of other scholars more interesting than my own. Recently, I have begrudgingly accepted the idea that when I spend a whole semester with students, I have a responsibility to share my expertise with them.

[3] Exceptions to these are several DBA and practitioner-based doctoral programs in the US that do attempt to provide mangers with education and training in understanding and using research evidence.

matter of keen intuition, experience, and common sense (e.g., Lilienfeld et al., 2009; Watts, 2011). Unfortunately, common sense, experience, and intuition often fail to provide accurate knowledge (Kahneman, 2011). And when our convictions about behavior are inaccurate, it is often difficult to know how badly they've served us. Even if we discover our errors, we often become uncritical consumers of faddish remedies. They mostly comfort our intuitions and increase organizational costs, but rarely have positive effects on individual or organizational performance. Thus, similar to Adam, my main teaching objective is to convince students that understanding how to manage people is more a matter of learning and knowledge than common sense and intuition.

Management students are often oriented towards practical solutions to problems. Therefore, my class is structured around a problem that has to be solved. In my first two classes my students experience firsthand how their intuitions and common sense fail them in making critical decisions. I then devote an entire class to explaining the reasons for these failures, and the rest of the course focuses on discussing the solutions to these problems using EBM. The majority of the course, then, is devoted to showing students how the scientific method, EBM, and relying on data to check intuitions can solve managerial problems.

I start my first class by giving my students a preliminary exam about their knowledge of management topics, and ask them to use their common sense to answer the exam questions.[4] The exam consists of fifteen true-false questions with robust scientific evidence to support certain conclusions. For example, job design research shows that complex jobs are motivating and satisfying (Fried & Ferris, 1987; Humphrey, Nahrgang, & Morgeson, 2007) but typically 50% of the students in my class answer the statement "People do not like jobs that are quite complex" as

[4] This exam is similar to the exam developed by Rynes et al. (2002) devised for HR practitioners. The exam, and the course syllabus, can be obtained upon request from the first author (see also Charlier, Brown, & Rynes, 2011).

true. Similarly, about half of the students in my class agree with the statement "Specific goals make people nervous; people work better when they are asked to do their best," despite overwhelming evidence that specific and difficult goals enhance performance (Locke & Latham,2002). When I write the summary of the class results on the board, it becomes apparent to the students that for the majority of the questions they scored no better than chance. I then inform my students that research, which often combines results from hundreds of studies, provides clear evidence to support the answers to these questions. This short exercise demonstrates to my students that the intuition and common sense they used to answer these questions did not help them in coming up with the answers supported by research evidence.

To accentuate the problems inherent in trying to solve managerial problems by relying on intuitions and common sense, I divide the class into teams and give my students 45 minutes to make a decision about the Carter Racing case. The Carter Racing case, created by Brittain and Sitkin (1986), was designed to highlight the problems managers face when drawing conclusions from incomplete and unrepresentative information. The case is based on data about engine failures that occur in cold temperatures. The critical information needed to solve the case is not included in the original case materials given to the students. Although, students are encouraged to ask for additional information, in my experience, usually only one team in a class of 13-14 teams asks for the information that provides them with the correct decision.[5] The other 90% of the students in the class just use the information contained in the case and make the common mistake of sampling on the dependent variable.

Students are usually shocked to discover that their decision to race was equivalent to the decision to launch the space shuttle Challenger which led to the death of seven astronauts and

[5] Adam also uses this case, giving students only 20 minutes to make a decision, and only about one team out of 50 asks for the additional information.

cost NASA a billion dollars. I spend the rest of the first class discussing what happened in the Challenger accident. In the second class students take a test that contains multiple decision making problems which demonstrate the representativeness and availability heuristics, anchoring bias, and escalation of commitment. I then systematically show students how they made the wrong decisions in answering these questions, discuss the biases underlying their answers, and link these biases back to the Carter Racing case, addressing the folly of relying on incomplete and unrepresentative information when making managerial decisions (Heath, Larrick, & Klayman, 1998; Kahneman, 2011). In these classes a special emphasis is on demonstrating how a "blind belief" in an expert and trusting equivocal evidence can lead to major failures in managerial decision making.

This, of course, raises an interesting question: can students trust me as an expert to provide them with accurate information? I use this opportunity to categorically declare that they should not—especially when I use testimonials, not hard evidence, to provide information. In other words, I suggest that throughout the class they should question me in the same way they should question other experts and ask for evidence. My classroom could therefore be a good opportunity to practice questioning experts. Clearly, not all students take this statement seriously, but some do, and this usually leads to lively class discussions. Throughout the course I also present students with examples of when researchers "got it wrong" (i.e., Maslow's need hierarchy, Hertzberg's two-factors model) and use these examples to show students how theories that are not supported by good evidence should be discounted or refined.

After teaching the core management class for several years, I realized that presenting management students with problems and solutions is not sufficient. Students also have to understand why our intuitions fail us. Thus, my third class is now devoted to explaining how our

ways for processing information can lead us astray and why our perceptions that form the base of our judgments are fallible. In this class I utilize concepts from cognitive psychology and neuroscience research (see Ashcraft & Radvansky, 2010; Kandel, Schwartz, & Jessell, 2000) to teach students how we attend to information, organize information, and interpret information and how all these processes lead to problems with judgment. For example, because we are bombarded by a tremendous number of environmental stimuli we naturally attend to a limited amount of information. While this process is completely functional, and in fact we could not survive without it (see Ashcraft & Radvansky, 2010), it also leads us to ignore information that is unexpected, infrequent, and low in intensity. In order to understand our environment we fill in gaps with recalled information that may be false. We organize information using prototypes, schemas, and scripts that at time can be misleading (i.e., stereotypes) and often lead us to incorporate information that was not there (Sulin & Dooling, 1974). Thus, in the perception class students learn that our intuitions may help us in making decisions in contexts where quick responses are essential for our survival, but in other situations, where conscious processing is essential (Kahneman, 2011), fast intuitive processing may create major decision making problems.

From the fourth session on, my classes are devoted to solutions to managerial decision making problems and are designed to demonstrate how the scientific method of investigation can help us overcome some follies of our intuitive processes. In these remaining classes I seek to teach students both content and process skills. With respect to content I describe in my classes what the research literature has to teach us about effectively managing people's attitudes, motivation, and team behaviors, and building negotiation and leadership skills. In terms of

process skills, I teach students how to analyze human problems they will encounter in the future without sole reliance on intuition and business fads.

One important class that teaches students processes skills is a class on research methods. The main focus of the method class is to show students how the scientific approach can protect decision makers from confirmation bias. People tend to seek information which agrees with previously held beliefs, lend more weight to information that support their beliefs, and discard information that contradicts their beliefs (Nickerson, 1998). In contrast, scientific theories are controlled and sharpened by falsification, by refutation, and by decisive experiments that are designed to disconfirm hypotheses (Popper, 1963). Thus, in the method class I discuss the advantages of the scientific approach guided by the falsification principle and how it can relieve the confirmation bias. Of course, researchers themselves are not immune to the confirmation bias and in this class I mention several examples of how theories survived for extended periods of time (e.g., utility theory; see Kahneman, 2011) despite overwhelming evidence that contradict their validity. In the method class I also teach students the topics of reliability, validity, experimental design, and field design, and how all these methods protect decision makers from relying on available and misleading information.

My students not only learn about the scientific method, but also experience it. Forty-five percent of the students' grade is based on The Pluto Case,[6] a managerial case created by Tim Judge that was designed to teach students how to reach managerial conclusions by analyzing data. The students are expected to find out if the Pluto company has a job satisfaction problem relative to other companies, identify the department that causes the problem and find the reason for the problem, investigate whether the attitude problem costs the company money, and identify potential solutions to the problem. In order to answer these managerial questions students are

[6] The Pluto case can be obtained upon request from the first author.

required to analyze the data using a verity of statistical methods such as t-tests, ANOVAs, correlations, regressions, and cost-benefit analysis. A significant part of the course is devoted to "walking students through" the Pluto case and teaching them how to analyze data in order to reach managerial conclusion. At first, MBA students are quite surprised to discover the extent of methods used in my class and most of them are not thrilled to learn that they will have to use statistical methods. However, after they successfully manage to solve managerial problem using statistical methods, most of them become convinced in the importance of using of EBM in making managerial decisions.

The content of the "solution classes" corresponds to typical topics such as job satisfaction, motivation, personality, teams, power and politics, and leadership. However, because many of the theories in OB do not feel real, students in my class experience firsthand the applications of the OB theories. For example, one potentially useful aspect of a management class is that it can help students understand themselves, how events at work influence them, and how their attitudes form. Very often, we aren't who we think we are and we do not necessarily know how our thoughts and attitudes about our work environment are formed (Wilson, 2004). Yet a realistic appraisal of our dispositions and attitudes is essential for us to reach accurate judgments. Thus, students in my class learn that they can use evidence based approach even when it comes to understanding themselves.

Indeed, they participate in multiple research-based surveys on which they receive feedback[7] and I use the survey results to demonstrate my teaching points. For example, for the attitudes class I collect data on their job satisfaction and job characteristics.[8] I then test in class the correlation between the Motivating Potential Score (Hackman & Oldham, 1980) and job

[7] Students may choose to participate in all of the surveys, none of them, or some of them, and for each survey they choose to complete they get extra credit points towards their final exam.
[8] If students are not currently working I ask them about previous jobs.

satisfaction, and show students how based on the data they provided, the job characteristic model strongly predicts job satisfaction. In the personality class, students receive feedback about various personality traits discussed in class (i.e., Big Five, risk aversion, core self-evaluations), and can compare their personality scores to the class and the population's statistics. In the team class students receive feedback on how their team members perceive their performance, voice behavior, and social loafing. In the power and politics class students receive feedback on their network centrality and the number of connection they made in the class. In sum, students in my class see how OB topics are directly related to them.

INSIGHTS FROM ORGANIZATIONAL SCHOLARS ON TEACHING EBM

There are plenty of challenges that arise when we teach EBM, and we do not have evidence-based answers to many of the questions posed by the EBM approach. Thus, in this section we capitalize on the expertise of other management scholars who use EBM in the classroom. We identified ten scholars who use the scientific approach in their classes and asked them five questions about how they handle issues with which we often struggle, and which we believe are critical in applying the EBM approach.[9] The scholars who answered our five questions were from different subfields of management and different parts of the world, Rob Briner (University of Bath), Michael Frese (The National University of Singapore), Cristina Gibson (University of Western Australia), Don Hambrick (Pennsylvania State University), Tim Judge (University of Notre Dame), Jeff Pfeffer (Stanford University), Ashleigh Rosette (Duke University), Denise Rousseau (Carnegie Mellon University), Sim Sitkin (Duke University), and Andy Van De Ven (University of Minnesota). Below is the summary of their responses to our questions.

[9] Other approaches for using research evidence to inform teaching can be found in Andre and Frost (1997).

1. **How do you introduce evidence so that it provokes curiosity, rather than putting students on the defensive?**

Our respondents use a variety of methods to provoke curiosity and decrease defensiveness. These methods can be divided into three major themes: creating the element of surprise, posing topics as puzzles to be solved, and highlighting practical applications. To generate a surprise in his classes, Sim Sitkin creates "draw plays." Using the American football metaphor of tricking the other team into thinking one play will be run so they are "drawn" into a poor position for the different play that is actually being run, Sitkin gives students a task in which the students publically demonstrate their incorrect prior beliefs or behavioral patterns. Subsequently, students learn the correct answer based on research findings. Thus, students in his class personally experience how their intuitions fail them in identifying effective practices and how the scientific method can correct for these pitfalls. Similar to Adam, Michael Frese surprises students by using examples from the medical field to show them how doctors make the wrong decisions by relying on a sample size of one individual and how managers make similar faulty decisions by relying on a sample of two (benchmark and their own experience).

Tim Judge, Jeff Pfeffer, Denise Rousseau, and Andy Van de Ven all pose management topics as puzzles.[10] For example, Rousseau asks her students to generate their own questions that management research might be able to answer and show them in class how these puzzles could be solved by doing a literature search. Similarly, Van de Ven asks students to collect evidence to inform questions such as "is a happy worker productive?" Students in Judge's class analyze an actual dataset in order to answer several important managerial questions. The major advantage of this approach is that in learning to solve managerial puzzles by themselves, the students transform from passive listeners into active researchers.

[10] Here Pfeffer recommends the book by Heath and Heath (2007).

Our other respondents reported that they provoke curiosity by presenting multiple practical examples of how evidence can be used to solve problems. For example, Rob Briner asks students how they make a decision about what movie to watch. In discussing the validity of internet movie databases such as "Rotten Tomatoes," Briner shows his students that they already use a form of evidence in everyday decisions. Since they already make everyday decisions in an active and critical way by making judgments about the reliability, validity, and relevance of aggregated information, why not use the same methods when making managerial decisions? To convince students that EBM can have major impact, Cristina Gibson uses many examples from her own research on team performance in multi-billion dollar projects. The use of successful examples ranging from the personal decisions of how to choose a movie to the collective engagement in a high-impact project helps to convey how evidence can be used to enhance judgments.

2. **Many of the principles of management are context dependent. How do you prevent students from reaching the conclusion that there are no generalizable principles of management, and that we will always have different answers because different practices work in different contexts?**

Our respondents varied in their emphasis on contingencies and moderators in their classes. However, there was consensus among them that there are generalizable principles of management. At the one extreme, Tim Judge, Jeff Pfeffer, and Michael Frese argued that principles of management are less context-dependent than one might think. For example, Judge wrote: "I don't wholly agree with the premise of the question. Not everything is context-dependent. Interactions are everywhere but so are main effects. For example, there are many variables that affect whether lifetime cigarette smoking translates into lung cancer. But that

hardly means there is no main effect. This is true with most management practices and interventions." Similarly, Pfeffer stated: "most of the 'action' is in the main effect, so that the interaction term is seldom that important. Moreover, most 'contingency' theories turn out not to be actually correct," and Frese simply responded that "we do not have different answers in different contexts, even if some things are context specific."

At the other extreme, Ashleigh Rosette argued that "There are no 'cookbook' solutions," and therefore, in her classes she attempts to communicate to students that effective management is complex and context-dependent. All of our other respondents were somewhere in between these extremes. For example, Rob Briner believes that some principles of management are relatively generalizable and others are far less so. As such, the key is to discuss in class when differences in context matter, and if so, how and in what ways. Cristina Gibson, Denise Rousseau, and Andy Van de Ven concur that it is important to identify and discuss the specific aspects of context and situations that matter, but at the same time emphasize that not all situations are different—and that some principles hold across settings. Despite the differences in the approach to context, our respondents broadly support presenting the general principles of management, the main effects that support these principles, and to a lesser extent the contextual factors that moderate them. Don Hambrick summarized this general consensus by elaborating: "I only burden my students with the most robust, well-studied contingencies. I stay away from formally discussing additional contingencies so as to avoid dissolution into a purely situational perspective. I would rather provide students a few high-leverage hooks, while acknowledging them to be less than complete, than to throw in every element of context."

3. **Given that human behavior is very complex and not particularly predictable, how do you convince students that you can still add value to organizations by teaching evidence?**

Our respondents shared the view that although human behavior is quite complex, by teaching evidence, we can increase the predictability of human behavior. For example, Jeff Pfeffer explained: "Yes, human behavior is not like physics—where the speed of light is a constant. But knowledge is all about increasing the odds of being right, not being right every time." Ashleigh Rosette suggested that "Even though human behavior can be complicated, uncertain, and even at times disturbing, I communicate to my students that these characteristics provide little justification for a deliberate choice to be less informed as opposed to more knowledgeable. Possessing a more divergent body of knowledge helps managers make more informed decisions." Michael Frese commented that management is as predictable as medicine, and Andy Van de Ven argued that human behavior is complex, but this does not mean that there are not many recurrent predictable patterns. Rob Briner questioned whether all human behavior is really that complex. He also suggested that "precisely because behavior is sometimes complex and not that predictable, we need to learn about it. After all, why bother studying simple predictable things?" Don Hambrick agreed and pointed out that the difficulties in predicting human behavior make managerial skills important: "I remind MBAs that if a problem lends itself to solution by formula, clear-cut rule, or checklist, it will be amenable to automation or outsourcing. The golden ideal is to work in a domain that involves combinations of tools, theories supported by evidence, and some recurrent patterns along with insight, judgment, creativity. The material we cover in my course is exactly of this type." Here, Denise Rousseau summarizes the general philosophy of all these scholars by suggesting: "If we learn from science the basic underpinning of behavior in organizations, we can make better choices about how to respond to common situations and know better how to evaluate what works and why."

4. Scientific evidence comes in a technical language (e.g., F-test, SEM, meta-analysis), a language not spoken by most managers and management students. How do you translate this technical language to those who are not fluent in statistics and research design?

In general, most of our respondents agreed that we should minimize the technical language used in the classroom. Denise Rousseau advised against discussing individual studies that may require more technical language. Instead, she recommended emphasizing areas where the research is clear, as captured by meta-analyses and systematic reviews. Don Hambrick also reported that he avoids the use of highly technical language in his classes, but sometimes refers to basic concepts such as correlation coefficients. He also aligned with Rousseau in proposing that we should discuss main patterns instead of assuring that students understand the "niceties of the methods."

Cristina Gibson, Michael Frese, and Sim Stikin all discuss some technical concepts such as meta-analysis in their classes and provide a bit of "primer" on a technique or method before presenting evidence. However, they strive to edit out technical language, relying instead on more intuitive language in their classes. The only exception to this approach came from Tim Judge, who gives the students in his classes an introduction to methods such as t-test, correlation, regression, and meta-analysis. Judge reports that he sometimes receives a "push back" from students who do not understand why they need to learn it. For example, an EMBA student once commented: "This is for junior people. I delegate this stuff." However, many other students—and management consultants—are excited to learn as much as possible about how to address questions by analyzing data. It is important to indicate that despite their reluctance to use technical language in their classes, our respondents strongly agree that the results of research should be presented in the classroom. This sentiment is well represented in Sim Sitkin's response

that: "One term that I think is important to use is 'research.' I was advised when I first started teaching to assiduously avoid the 'R word' or I would lose my students. I assiduously ignored the advice, as I believe part of our distinctive role is to help students learn to value science."

5. **The traditional case method sometimes focuses on idiosyncratic examples rather than systematic patterns from important research findings, but it is also fun for students. How do you use cases in your classes without losing scientific rigor?**

All of our respondents reported that they enjoy using the case method in their classes, but differed in how they utilize cases. Jeff Pfeffer, Sim Sitkin, and Andy Van de Ven use cases to illustrate general, scientifically proven principles. For example, Pfeffer suggested that cases on networking (e.g., Ross Walker or Heidi Roizen) nicely illustrate the well-established principles of the importance of weak ties, filling structural holes, and being central in networks of information exchange. Michael Frese and Cristina Gibson use case studies as experimental material in which students engage with some problems (e.g., poor communication in the team) and then during a debrief are provided with research evidence related to the solutions to these problems (e.g., a climate of psychological safety). Don Hambrick and Sim Sitkin use cases as precursors to discussing general principles and theory, such that cases serve as "teasers" or reference points to illustrate main empirical findings, as well as, some of the contingencies of general principles.

For example, Hambrick sometimes uses a case that describes a CEO who is overwhelmed, and the students invariably propose that the CEO needs to have a COO. This provides him with a good opportunity to describe a study: "What if I told you that CEOs who have COOs perform appreciably worse than those who don't have COOs? That's what we found in a large-scale study that included appropriate statistical controls for prior performance, industry

factors, etc. (Hambrick & Cannella, 2004). Why do you suppose that, on average, having a COO could be a bad thing? Under what circumstance do you think the odds might be defied, with the benefits outweighing the costs?" Hambrick uses this case study and the provocative empirical findings that follow it as a springboard for deeper discussions. Denise Rousseau uses cases in three different ways: as a way to diagnose situations, as a shared context for exploring well-supported evidence-based principles, and as exemplars or models for what evidence-based practice looks like. Both Rousseau and Tim Judge, however, caution that many published cases involve very little systematic use of scientific evidence. Thus, both either considered (Judge) or have taken to (Rousseau) writing their own cases to demonstrate how evidence based practice can be applied in organizations. All of the respondents agree that cases can provide explicit and concrete instantiations of general findings from empirical research, but also emphasize that cases cannot stand alone and need to be accompanied by "hard empirical evidence."

Conclusions

There are several important insights that these perspectives offer. In turn, these focal points could help researchers overcome several of the obstacles facing the successful use of the EBM approach in the classroom. First, there are diverse methods of making evidence-based teaching stimulating by introducing surprises, puzzles, and practical examples that are actually inherent in the nature of many scientific studies. Second, although human behavior is complex and context-dependent there are also many generalizable principles that can be used to predict human behaviors and outcomes. These principles can be taught and can certainly be used to manage people more effectively. Third, while it is perhaps not advisable to use technical language in the classroom, all of the scholars agreed that in teaching management, educators

should not only rely on the "soft stuff" (i.e., case studies) but try to make the "soft stuff" harder by complementing it with empirical evidence.

DISCUSSION

One of the main concerns of those considering teaching EBM is that students will react negatively to the scientific approach. For example, Goodman and O'Brien (2012: 309) report that in conversations with their colleagues about EBM, they often heard comments such as "Hey, it'll take the fun out of class and ruin my evaluations." This has not been the case in our experience, nor does it appear to be accurate to the scholars who gave input into the writing of this paper. In fact, students in effective EBM based classes often make comments such as: "The professor is a dedicated researcher and was able to bring that experience to the classroom and really give us an insight into the subject," "talking about studies makes material that can be bland very interesting," "I'm glad you didn't shy away from what the evidence indicates," and "He did a great job at the very beginning of the class in recognizing that there might be some skeptics that didn't believe that leadership could be learned. Then, he used data to diffuse that notion... He was able to respond to every question, no matter how far-fetched, with information from some research study that he had read. The class was fun, interactive, informative, and made me think a lot more about my leadership style, and team dynamics."

Although students' testimonials should be taken with a grain of salt, several insights can be gained from their experiences. First, in order to teach EBM effectively, it is important to express passion for research and be unapologetic about it. Second, students often view scientific evidence as interesting stories, and one of the best ways to learn and change is by telling stories (Heath & Heath, 2007; Kotter, 2012). Thus, in stark contrast to the quote above from Goodman and O'Brien (2012), when presented in a compelling manner, scientific evidence can make learning more fun.

Third, focusing management education on EBM has the potential to enhance managerial decision making (Rousseau & McCarthy, 2007) and smart management students often recognize this potential. Of course, not all students respond positively to the scientific approach and some students have difficulty understanding scientific evidence, especially if it comes in technical terms such as correlations and regressions. However, for the most part, we find that students in effective EBM based classes usually appreciate being exposed to EBM and tend to embrace it.

The social and behavioral sciences can enhance the effective management of people and enable the development of new skills that can be used on a daily basis to improve personal and organizational performance. However, this literature is not easily mastered, and managers often rely on their intuitions and common sense to manage people and make decisions. Students in effective EBM based classes learn that although managers can get by with "seat of the pants" management in the short run, this management style makes sustainable success precarious. But students also learn that because so few managers have the knowledge and discipline to apply social and behavioral science methods and findings to their organizations, those who do can achieve a competitive advantage. Indeed, the use of evidence may be one reason why "companies with former business school professors as executives generated significantly greater revenues per employee than counterparts with non-former professors as executives" (Jiang & Murphy, 2007: 29).

The aim of this paper is to share experiences in teaching management classes using the EBM approach. We hope this paper convinces readers that it is not impossible to effectively use the EBM approach in the classroom in accurate, fun, and practical ways. It's not easy. It takes time. It takes discipline and commitment. But it can be done.

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