

FROM THE EDITORS

GRAND CHALLENGES AND INDUCTIVE METHODS: RIGOR WITHOUT RIGOR MORTIS

Editor's note: This editorial is part of a series written by editors and co-authored with a senior executive, thought leader, or scholar to explore new content areas and grand challenges with the goal of expanding the scope, interestingness, and relevance of the work presented in the Academy of Management Journal. The principle is to use the editorial notes as "stage setters" to open up fresh, new areas of inquiry for management research. As part of our "Grand Challenge" editorial series, we proposed domains in which management scholars could address socially relevant topics. This editorial opens the discussion of using inductive research methods to address these grand challenges. GG

"Grand challenges" are highly significant yet potentially solvable problems such as urban poverty, insect-borne disease, and global hunger. They affect vast numbers of individuals in often profound ways. Grand challenges are typically complex with unknown solutions and intertwined technical and social elements (Ferraro, Etzion, & Gehman, 2015). They may require working across disciplinary boundaries to solve technical problems, and engaging in political action to resolve social ones. Grand challenges may be discrete with a clear endpoint, like landing a rover on Mars or developing a Zika vaccine, or broad and open-ended, such as curing cancer or eliminating poverty. They may change over time, beginning as primarily technical problems and then shifting to

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social concerns. Regardless of their specifics, grand challenges are complex, uncertain, and without easy solutions (Ferraro et al., 2015).

Grand challenges require novel ideas and unconventional approaches to tackle their complex and evolving mix of technical and social elements. For researchers, addressing grand challenges presents extensive theoretical opportunities to reveal new concepts, relationships, and logics of organizing while also advancing social progress. Several "From the Editor" commentaries have addressed specific types of grand challenges, such as climate change (Howard-Grenville, Buckle, Hoskins, & George, 2014) and digital money (Dodgson, Gann, Wladawsky-Berger, Sultan, & George, 2015). In this commentary, we focus on how one methodological approach—inductive methods such as theory building from cases, interpretivist studies, and ethnography—can powerfully address grand challenges while also developing strong and insightful theory.

Our core argument is that inductive methods are especially helpful for making progress on grand challenges. They excel in situations for which there is limited theory and on problems without clear answers. Pioneering scholars such as Chandler (1960) and Whyte (1981) relied on these methods, as have award-winning *Academy of Management Journal* (*AMJ*) authors, who disproportionately use them. Indeed, papers using inductive methods are among the most highly cited at *AMJ* (e.g., Dutton & Dukerich, 1991; Eisenhardt, 1989a), and have been termed the "most interesting" (Bartunek, Rynes, & Ireland, 2006). Due to their high scholarly impact and ability to address complex topics in interesting ways, inductive methods are likely to be essential for making progress on grand challenges.

INDUCTIVE METHODS

Inductive methods are those approaches through which researchers attempt to generate theory from data. Within *AMJ*, the most prominent among them

are theory building from cases, interpretivist studies, and ethnography. Although these methods are often called “qualitative,” we use the term “inductive” to accentuate their core emphasis on the emergence of theory from data, rather than simply on a type of data. Inductive methods contrast with the dominant approach of deductive and statistically based methods in which researchers begin with hypotheses and test them with data.

Building theories from cases blends case study and grounded theory logics. The approach was initially framed as positivist (Eisenhardt, 1989b), but it is now used by philosophically diverse researchers. Some studies include multiple cases. For these, replication logic in which each case is understood as a stand-alone entity is central. The aim is usually (but not always) explanation of variance in processes or outcomes with an emphasis on the underlying theoretical logic. Its insights are often actionable. *Interpretivist studies* take a naturalist view that knowledge and understanding are socially constructed (Gephart 2004). A core value is the faithful and authentic representation of people’s perceptions of their lived experience (Gioia, Corley, & Hamilton, 2013). The approach is often used to examine concepts such as identity, sensemaking, and sensegiving, and often relies on interview data to give voice to informants. *Ethnography* has its roots in anthropology, and is traditionally focused on understanding a culture. Its use of observation illuminates rituals, non-verbal cues, artifacts, and the use of physical space (Van Maanen, 1988). The focus is on day-to-day practices, including patterns of interaction and ways of working. Observation can reveal what people cannot or will not express (Bechky, 2011).

While differences among inductive approaches exist, they share many commonalities. First, they all involve *deep immersion* over time in the focal phenomena with openness to many types of rich data—from text, observations, and surveys to, more recently, Twitter feeds, YouTube videos, and Facebook posts (Toubiana & Zietsma, 2016). Inductive researchers may conduct deep dives into archival data, as Arndt and Bigelow (2005) did in their study of change in occupational gender roles; or engage in prolonged ethnographic work, as Kellogg (2012) did in her study of politics in medical reform; or combine interviews and observations, as Battilana and Dorado (2010) did in their study of microfinance organizations. Regardless of approach, the core interest is in collecting data that fully and accurately address the focal research

question, and capture the relevant aspects of the focal phenomenon.

Second, inductive approaches rely on *theoretical sampling*, which involves the selection of cases based on their ability to illuminate and extend relationships among constructs or develop deeper understanding of processes (Eisenhardt & Graebner, 2007). In contrast, random sampling involves selection that enhances empirical generalizability to a population. Theoretical sampling has several advantages for inductive research. For example, researchers can use it to hone in on the focal phenomena by eliminating or accounting for extraneous variation (e.g., Davis & Eisenhardt, 2011), or to create opportunities for comparison such as through matched pair, polar, or racing designs (e.g., Kellogg, 2012). Researchers can use theoretical sampling to enhance theoretical generalizability by sampling across relevant categories (e.g., Seidel & O’Mahony, 2014), or to bolster the robustness of emergent theory (e.g., Heinze & Weber, 2016). Theoretical sampling can also be used to adjust the sample on the fly as new insights or opportunities emerge. Regardless of approach, the core interest is enabling meaningful comparisons that lead to better theory.

Third, inductive methods rely on a *grounded theory-building* process. Although they may not use the exact steps of orthodox grounded theory building (Suddaby, 2006), they all use a similar process (Walsh, Holton, Bailyn, Fernandez, Levina, & Glaser, 2015). This process includes data gathering with some sort of memoing, and adjusting data collection in real time to fit emerging understanding and opportunities. It also frequently involves the same basic analytic steps: build thick descriptions from the data, such as chronologies or vignettes; code raw data into first-order codes or measures; raise them to a more abstract level, such as second-order themes or constructs; use constant comparison between emergent theory and data and other tactics to generate creative insights; and engage with literature to sharpen both the constructs and the theoretical logic of the relationships between constructs. Whether researchers use terms like “axial coding” and “second-order themes” or constructs and measures, the process is fundamentally the same—that is, an iterative process of gathering raw data, producing progressively better-defined and grounded higher-order concepts through constant comparison and mind-expanding techniques, and creating underlying theoretical arguments that connect constructs. Ultimately, the core interest is strong theory—clearer constructs, better understanding of relationships between them, or

richer processes—about important phenomena that is grounded by empirical data.

ADDRESSING GRAND CHALLENGES WITH INDUCTIVE METHODS

Grand challenges are complex problems with significant implications, unknown solutions, and intertwined and evolving technical and social interactions. Inductive methods are particularly able to address these substantial problems. As we describe next, inductive methods can help examine and contribute to solving grand challenges by generating novel ideas, revealing effective processes, coping with complexity such as configurations, emergence, and equifinality, unpacking subtle constructs, and exploiting extreme cases.

Novel Ideas

Creating novel ideas that can contribute to solving and explaining grand challenges is well suited to inductive methods. A key is the combination of openness and discipline within these methods. In contrast with deductive research, inductive research usually begins with a research question but without predefined constructs and theoretical relationships. This lack of a priori theory may lead to novel ideas for two reasons. First, the research is likely to explore unusual settings and unexpected perspectives—precisely the situations in which novel ideas probably exist—rather than examine familiar situations in which plausible hypotheses can be generated. Dutton and Dukerich's (1991) paper on identity, image, and homelessness, for example, both explored a setting that was entirely novel and used the unexpected lens of employees. Second, inductive research is likely to uncover those novel ideas because it is unconstrained by prior hypotheses and the need for quantitative data.

Inductive research combines openness and discipline in other ways that privilege novel ideas. It relies on the discipline of data collection protocols and sample designs, but these may change as new insights and opportunities emerge. Furthermore, it relies on an analytic process, grounded theory building, that is open to novel ideas yet disciplined by data. Moreover, this discipline is central to the creativity and surprise that is so often associated with inductive methods. Just as the discipline of mathematics creates surprise in formal models, the discipline of data enables inductive researchers to generate ideas that they could not have imagined.

Effective Processes

Inductive methods excel at explicating processes and related “how” research questions (Langley, 1999). They allow researchers to dive deeply into one or a small number of theoretically sampled cases, and study them over time with a mix of data. In contrast, mainstream deductive researchers are constrained because they frequently cannot obtain sufficient quantitative data to run statistical analyses of processes, particularly when their unit of analysis is higher than individuals. Instead, they link more easily measured antecedent and outcome variables, but end up overlooking the intervening processes. Yet process theory not only may account for substantial variation in desired outcomes but also provides insightful explanation about how organizations get work done, groups function, and individuals behave.

Innovation processes are especially relevant to grand challenges because many of them, such as Alzheimer's disease, sustainable energy, and urban infrastructure, include significant technical problems. An example of the importance of innovation processes to grand challenges is Gittelman's (2016) work on the productivity paradox within drug discovery. She pointed to biotechnology as a promising technological revolution in medicine that failed to yield a wave of drug discoveries even as the demand for affordable, personalized medicine persists. Gittelman crafted an historical case comparison between competing innovation processes: newer “science-first” drug discovery as exemplified by biotechnology versus older “clinically driven” drug discovery shaped by doctor–patient interactions in hospitals. Based on her case evidence, she developed a provocative theoretical argument that the “science-first” innovation process favored by funding sources for more than 30 years may be less effective for dealing with the complexity of human disease than the more holistic “clinically driven” innovation process that previously dominated.

Since grand challenges are complex, they often require collaboration across organizations to achieve significant breakthroughs. Here again, inductive methods provide insight. Davis and Eisenhardt (2011) examined R&D collaborations between global technology firms. These giants have the scale to address grand challenges, such as bridging the digital divide in developing nations, but often lack all capabilities. By studying multiple cases of collaborative R&D, the authors exploited the advantages of inductive methods. They used

theoretical sampling to account for well-known antecedent conditions such as prior experience, and so sharpen the spotlight on process. They used a rich mix of longitudinal data, and grounded theory building at multiple levels of analysis. They uncovered three processes—two led to failure and a third to success. Typical of inductive research is a surprise discovery—that is, the “rotating leadership” process for successful collaborative innovation, a useful insight for grand challenges that require multi-organization collaborations.

Ethnography complements other inductive approaches. Seidel and O’Mahony (2014), as an illustration, used ethnographic observation in addition to interview and archival data to explore the processes by which teams create revolutionary products. Their focus was on unconventional products, entirely new to society—namely, the type of product that is most relevant to grand challenges. For example, one product was a revolutionary solution to speed the healing of joint injuries. Using ethnographic observation, they were sharply attuned to linguistic representations, artifacts, rituals, and other subtle and non-verbal representations that other researchers might miss. These authors unpacked the innovation process to reveal how some teams are able to achieve coherent designs through everyday work practices that coordinate a repertoire of linguistic and material representations while others are not.

Implementation processes are also particularly relevant to grand challenges because many of them, such as inner-city education and sustainable fisheries, involve significant social issues that require political action. Implementing medical reforms has been an unusually fertile ground for study. For example, Heinze and Weber (2016) examined the implementation of “integrative medicine”—specifically, the blend of Western medicine with holistic and Eastern practices. Integrative medicine is relevant to grand challenges because it often achieves superior patient outcomes at lower cost than Western medicine alone. Relying primarily on interviews in a health-care organization, the authors inducted a process theory of opportunistic political actions by low-status actors to overcome resistance and achieve implementation. Consistent with theoretical sampling, they then introduced a second organization that added support for their theory.

In contrast, Kellogg (2012) used polar theoretical sampling in her matched-case study of reform in two hospitals— one successful and the other not. She combined ethnographic observation and interviews to generate a process model of the everyday actions

and counter-actions of both internal resisters and reformers. Her theory goes beyond simply having the right cultural and political resources. Instead, actors exist in a complex and dynamic system of mobilization and counter-mobilization. Reformers who ally across status and identity lines can counteract resisters and succeed. In contrast, reformers who do not bridge status and identity gaps are vulnerable to division of their coalition by resisters and may fail. Overall, inductive methods are particularly useful for generating novel theory with rich insights about processes.

Configurations, Emergence, and Equifinality

Deductive studies often rely on regression-based econometrics that assumes roughly linear relationships and separable contributions of independent variables to explained outcome variance (Fiss, 2007). But grand challenges are complex with often tangled relationships among variables and multiple evolutionary paths to outcomes. Coherent configurations of intertwined practices may emerge and equifinal ways to address grand challenges may exist. Timing and small differences may lead to radical outcomes. Inductive methods are particularly able to describe and explain this inherent “messiness.”

An example of the messiness of grand challenges and the relevance of configurations is a comparative case study of two Bolivian microfinance ventures by Battilana and Dorado (2010). These ventures attempted to alleviate poverty by helping the poor to engage in commerce through small loans. These loans were then supposed to generate sufficient profit to make these ventures self-sustaining. Using multi-case theory building with observations and interviews, the authors tracked each venture from founding using a comparative racing design, and developed a detailed understanding of their evolution. From these data, the authors identified how each venture evolved into a distinctive configuration of reinforcing practices for hiring, training, incentives, and promotion. Counterintuitively, one configuration (termed “apprenticeship”) was much more successful than the other (termed “integration”), despite the former’s being slower to develop. In this study, inductive methods were essential for identifying these configurations, their evolutionary paths, and their success in alleviating poverty.

The equifinality of solutions to grand challenges is central to the Pache and Santos (2013) multi-case study of French work-integration social enterprises.

These organizations assist the long-term jobless to become employed, and combine welfare and commercial logics. Using a matched case design and multiple data types, the authors examined how organizational members combined practices prescribed by the two logics, such as legal status and ownership. They observed that those organizations that mixed mostly “intact practices” from each logic (an approach termed “selective coupling”), survived and prospered relative to peers. Interestingly, the authors also observed equifinality—that is, selective coupling occurred in each organization, but the specific combination of practices was unique to each organization, driven in part by the organization’s origin. Our point is that inductive methods revealed equifinal approaches to addressing chronic joblessness, an insight that would be difficult to observe without such methods.

Emergence triggered by small sources can lead to substantial change in complex situations such as grand challenges. As an example, Kaplan, Milde, and Cowan (2016) examined the emergence of interdisciplinary research in nanotechnology, a scientific arena with many potential uses in grand challenges. Using an inductive approach with qualitative and quantitative data, the authors unexpectedly found that students interacting together while using state-of-the-art lab instruments triggered the bridging of the cognitive and political divides among faculty in biology, chemistry, and engineering. Similarly, Plowman, Baker, Beck, Kulkarni, Solansky, and Travis (2007) explored an emergent process that began with a decision by church members to feed breakfast to the homeless. Using inductive methods and drawing on complexity theory, the authors described how a small action launched non-linear dynamics that produced unexpectedly radical change. Overall, grand challenges are highly complex with solutions that may involve configurations of variables, uncertain timing, and disparate pathways to outcomes. An advantage of inductive methods is their ability to cope with such complexity as it shifts over time.

Hard-to-Measure Constructs

Inductive methods are particularly useful for exploring constructs that are difficult to identify or measure on a scale suitable for deductive research (Edmondson & McManus, 2007). Concepts such as identity, image, paradox, and perception present measurement difficulties because they are rarely available in archival sources and difficult to access

using other sources (e.g., Schabram & Maitlis, 2016; Kreiner, Hollensbe, Sheep, Smith, & Kataria, 2015). Instead, precise identification and measurement may require contextual understanding and enough time to establish rapport with informants (Rogers, Toubiana, & DeCelles, 2016).

Hard-to-measure concepts are relevant to grand challenges because they often indicate how people understand their situations, and thereby shape their actions. For instance, Sonenshein, DeCelles, and Dutton (2014) examined the interplay between how employees trying to advance issues around the natural environment interpreted challenges about addressing those issues with evaluations of their abilities and attributes to address them. Using interviews with climate change supporters, they developed a theory of self-work that portrayed supporters as actively interpreting challenges to their advocacy of climate change, and thus shaping their ongoing self-evaluation both positively (self-assets) and negatively (self-doubts). The authors used their deep contextual knowledge learned from their first study to complement an observational study that measured the outcomes of this self-work. Even though they used quantitative analysis in this second study, they continued to adopt an inductive approach, such as by avoiding hypotheses and allowing new, unexpected insights to emerge.

Hard-to-measure concepts such as leader identity are especially likely to shape organizational responses to grand challenges. An illustration is the multi-case study by Powell and Baker (2014) of how business-owner founders in the U.S. textile industry coped with the devastating effects of global trade. The authors engaged in rich, longitudinal data collection allowing them to uncover differences in founder identity. In turn, these differences drove distinctions in how the founders interpreted the adversity of global trade, created narratives, and engaged in strategic responses that significantly affected both jobs and survival. Consistent with their identities, some founders saw adversity as an opportunity and transformed their firms, while others saw it as challenge and redoubled their current efforts. In contrast, still others perceived threat, cut jobs, and exited. Our point is that inductive methods enabled these authors to discern nuances in leader identity that can usefully complement large-scale deductive work on global trade.

Paradox is of particular interest in grand challenges like clean air and sustainable agriculture that involve competing tensions such as local versus global and social welfare versus commercial. Yet it is

neither obvious how to sustain paradox nor simple to measure it. Smith (2014) tackled paradox by examining how business units within a global Fortune 500 firm balance exploration versus exploitation. Relying on almost 100 interviews, observations of strategy sessions, and archival documents, she developed an emergent theory of dynamic decision making, arguing that paradox is best managed when decision making is “consistently inconsistent”—that is, shifting between the synergies of competing tensions versus their independence. The implication for grand challenges is the potential for using deliberate inconsistency to cope with inevitable tensions. In sum, inductive methods enable identification and measurement of difficult-to-measure constructs, particularly those involving perceptions of situations and self that are likely to influence how individuals and organizations act in the context of grand challenges.

Extreme Cases

Extreme cases offer opportunities to examine single signature situations in rich depth. Yet, by their very uniqueness, extreme cases are often inaccessible to traditional deductive approaches. Their sample size is, by definition, both small and unrepresentative. However, as Siggelkow (2007) humorously noted, it is hard to argue that studying a “talking pig”—an extreme case—is not valuable.

Extreme cases are particularly relevant to grand challenges because studying these cases can create broad awareness of the focal challenge. Further, these cases often align with studying the long time frames that are especially relevant for open-ended grand challenges such as curing cancer (Langley, Smallman, Tsoukas, & Van de Ven, 2013). As an example, Schüssler, Ruling, and Wittenben's (2014: 142) study on United Nations' climate change conferences observed that: “The field of climate policy is an extreme case of a transnational field.” This field requires global mobilization and potentially affects all citizens of the planet. It is, they argued, uniquely broad, deep, and important. By studying this extreme case covering more than ten years using temporal phases, the authors developed an emergent theory. This theory clarified the effects of growing field complexity and issue multiplication on these field-configuring events while attracting attention to the increasing ineffectiveness of these conferences.

Extreme cases are also germane to grand challenges because they make it easier to generate insights that would otherwise be obscure or even

absent from a “typical” case. In other words, their “extremeness” makes their insights more transparent (Eisenhardt, 1989b). In addition, extreme cases attract media coverage, which enriches the data from which grounded theory can emerge. The massive oil spill in the Gulf of Mexico afforded Petriglieri (2015) an extreme case through which to examine BP's response to an environmental disaster, and consider the effects of the disaster on employees. By studying an extreme case, she had significant media and outside informant data available, buy-in from BP that enabled extraordinary access to employees, and the advantage of the vivid events of the disaster itself and post-disaster response that focused the attention and actions of informants. These advantages facilitated uncovering theoretical mechanisms around action, attachment, and commitment. By contrast, studying a less dramatic environmental breach would likely have made generating insights more difficult because of less data and a more muddled process obscured by other ongoing issues and competing demands for employees' attention.

Despite being clearly non-representative, extreme cases of unique counterfactuals (i.e., non-occurrences) can also facilitate the novel insights that grand challenges require. Siggelkow (2007) described how studying Phineas Gage, a man with a destroyed frontal lobe, enabled brain scientists to develop breakthrough understanding of brain functioning. Similarly, studying unique counterfactuals can help address grand challenges. An example is Ozcan and Santos's (2014) study of the failure of the mobile payments market to emerge despite strong consumer demand, sufficient technical capability, and substantial promise for alleviating poverty through micro-commerce in developing countries. By looking at this counterfactual case of failed market emergence on a global scale, the authors uncovered fresh perspectives on the dynamics of ecosystems and international cooperation that would be difficult to see otherwise. Further and consistent with inductive methods, the authors developed sub-cases of the national successes in Singapore and Japan to contrast with global failure. Together with these sub-cases, the main case deepened theoretical understanding of how global collaborations that address grand challenges such as global fair trade and the Syrian refugee crisis emerge, and when instead national solutions are likely.

Overall, our argument is that inductive methods, with their deep engagement over time with varied data, theoretical sampling, and grounded theory building, are particularly useful for addressing grand

challenges. They facilitate creating the novel ideas that grand challenges demand, are particularly able to reveal effective processes relevant for grand challenges, cope with the “messiness” of their complexity, unpack hard-to-measure constructs, and gain insights from extreme cases. More deeply, they enable broad research questions that probe unconventional perspectives, unexplored settings, and highly significant phenomena.

AVOIDING RIGOR MORTIS, EMBRACING RIGOR (AND QUALITY)

Addressing grand challenges requires thinking “big” and thinking “new.” Yet, sometimes the publication process forces authors to think small and stay wedded to old ideas—just the opposite of what grand challenges need.

Avoiding Rigor Mortis

Inductive research on grand challenges is more likely to flourish with multiple approaches, something that is difficult when authors must follow specific templates. A good example is requiring authors to follow a particular writing format which Pratt (2009) cautions against. An illustration is mandating a data structure figure. While this device may make sense for some studies, it is a force-fit for others, as its authors note (Gioia et al., 2013). In fact, given that a “data structure” displays names such as for categories or concepts and themes or constructs, but often lacks actual data, its usefulness seems modest.

Furthermore, some inductive work, such as narrative analysis, follows entirely different standards for analyzing data that do not fit the data structure figure approach (Vaara, Sonenshein, & Boje, 2016). Analyzing narratives often involves a more holistic assessment of the data, focusing on its temporal sequencing and plot. Identifying these elements of a narrative becomes difficult if the researcher is too focused on coding smaller portions of text, and not broader patterns of meaning. For example, Gabriel, Gray, and Goregaokar (2010) examined the narratives of unemployed managers and professionals in their fifties during the Great Recession. Instead of a fine-grained coding of the data, they focused on broader patterns of meanings such as tone, emotions, and turning points. This type of analysis would be difficult to undertake when wedded to the orthodoxy of a data structure figure. Similarly, research on routine dynamics (Feldman, Pentland, D’Adderio, &

Lazaric, 2016) often forgoes using a data structure because such an approach makes it harder for researchers to observe patterns of interdependent actions.

Another illustration of writing format rigor mortis is requiring a “data and themes” table that aggregates examples of the data supporting each theme or construct into one table. This table is helpful for some studies because it helps lend credibility to a researcher’s interpretations. Yet, other studies, especially those that include quantitative or longitudinal data or multiple case design where the replication logic across cases needs to be clear, might instead benefit from “construct tables” that summarize the evidence for a given theme or construct for each case. As an illustration, Battilana and Dorado (2010), who examined two microfinance ventures attempting to alleviate poverty in Bolivia, used construct tables that included quantitative data (e.g., number of employees, average loan size) over time that grounded a key construct, “operational evolution,” for each venture.

A second demonstration of rigor mortis is insisting authors follow a *common analysis recipe*. An illustration is requiring grounded theory building to fit a particular set of rules. This confuses the core tenets of grounded theory that matter with the rituals and artifacts that do not. As Walsh and colleagues (2015) noted, grounded theory has been too narrowly claimed by some proponents. Instead, they argue (as we also do) that the pillars of grounded theory such as the emergence of theory from data, theoretical sampling, and constant comparison are necessary, but otherwise the researcher has wide latitude to use techniques best suited to the focal research question. In other words, grounded theory building is a “big tent” analytic approach to exploration that accommodates many philosophical points of view (Walsh et al., 2015).

A third example of rigor mortis is requiring authors to give a *detailed accounting* of the “twists and turns” of the research process. On the one hand, transparency about the significant features of the research process is essential (Bansal & Corley, 2012). For example, it is critical that theoretical sampling criteria are clear and justified. As an illustration, Petriglieri (2015) compellingly argued why the “extreme case” of BP was appropriate for her research question. She included the relevance of BP to her research question on threat to core identity, and her extraordinary access to an unusually broad range of executives who were likely to have strong and stable identification to BP’s commitment to responsible drilling

prior to the spill. It is also important to explain the data collection process fully, including choice of informants, interview protocols, and major changes in research direction. For example, Sonenshein (2010) succinctly explained how his research evolved from his initial interest in employees' meaning making of change to a broader focus on managers and employees, providing the reader with an important overview of the evolution of the paper. Although his article did not document every twist and turn the analysis took, it provided the reader with enough details to understand how he ended up studying what he studied.

On the other hand, there can be too much transparency, especially when journal space is precious. Analysis details require particular care because most authors have false starts, and travel a messy, episodic, and non-linear path to creative insight that is hard to describe or even remember. Insights can appear suddenly or develop incrementally (Klag & Langley, 2013). Forcing authors to describe five or six detailed steps in what one colleague called "ad nauseam" details and another "Kabuki theater" deceptively projects an artificially linear process that does a disservice to the inductive craft. Further, readers lose track of the critical methods features when there is extraneous detail, and may become distracted from the theory that is the central concern of journals like *AMJ*.

The key is balancing essential information with parsimonious use of journal space and reader time. A useful heuristic is whether the detail would change the interpretation of the data or suggest (or eliminate) alternative explanations. Graebner (2009), for example, described that her study was not initially focused on trust, and informants were not explicitly asked whether they trusted their partners. These details were significant because of the fact that informants spontaneously spoke about trust, suggesting that trustworthiness was an important factor in their decisions, rather than simply a response to an interviewer's prompt. Yet she left out other details, such as preliminary findings that could not be replicated across all cases, constructs that turned out to be unimportant, or theoretical framings that were ultimately abandoned.

Evaluating Rigor (and Quality)

Although effective writing and transparency are necessary, the rigor and quality of inductive papers rest on three fundamental criteria, as follows.

First, and as with all *strong theory*, is the emergent theory internally coherent and parsimonious? This means that there must be more than vivid stories and diagrams. Rather, regardless of the paper's organization (which is critically influenced by research design), strong theory requires well-defined concepts, relationships between constructs, and underlying logical arguments that support these relationships. A terrific example is the study of "integrative medicine" by Heinze and Weber (2016) in which integrative medicine addressed grand challenges in health by offering the possibility of better patient outcomes at lower cost. In describing their process theory of political action, the authors carefully defined their emergent constructs (e.g., leveraging status), and indicated how they were assessed (e.g., multiple examples). Further, they provided the logical arguments underlying the relationships between constructs (e.g., several arguments as to why leveraging status leads to political success for low-status actors). Although not essential, they also included testable propositions and counterfactual evidence.

Addressing alternative explanations and boundary conditions is also essential for strong theory. As an illustration, Pache and Santos (2013) addressed alternative explanations to their emergent theory regarding "selective coupling" within social enterprises addressing chronic unemployment. The authors considered alternative explanations such as founding period and organizational size. They also discussed the situations (boundary conditions) to which their emergent theory was likely to be theoretically generalizable, such as other settings facing institutional competition.

Furthermore, the emergent theory should be as parsimonious (simple) as possible yet still remain true to the core insights. An advantage of inductive methods is the ability to incorporate fine-grained data. Yet, researchers must also separate essential ideas from less important ones and conceptualize at a useful abstraction level. Complicated "spaghetti and meatball" figures that include many "boxes and arrows" may fail this test.

Second, are the constructs or themes convincingly *grounded in compelling data*? This means that authors should reveal their data in formats that help the reader understand the chain of evidence (e.g., are informants' interpretations faithfully reported?) and tie them to the grounding of the emergent theory. "Construct tables" summarizing the evidence supporting the focal construct by each case and over time can be helpful for some studies, while "data and

themes” tables may work for others. In still other situations, different data display approaches might be helpful. For example, deeply processual work may require distinctive formats such as temporal bracketing, timelines, and phase models (Langley, 1999), whereas ethnography may rely on vignettes with perhaps no tables at all (Pine & Mazmanian, 2016). It is also appropriate to specify characteristics of cases and data sources (something commonly undertaken in many recent papers published in *AMJ*; see, e.g., Ben-Menahem, von Krogh, Erden, & Schneider, 2015; Massa, Helms, Voronov, & Wang, 2016).

Third, does the research provide rich and unexpected *insights*? Inductive research has a particularly high bar in this regard. One common challenge is to avoid providing a beautifully written illustration of an existing theory. Rather, it is essential to make a contribution to a specific research conversation or open a new one by providing fresh insights not easily discernible from existing theoretical and empirical work.

CONCLUSION

Grand challenges present significant opportunities for *AMJ* contributors. Our immediate aim is to describe how inductive methods—for example, theory building from cases, interpretivist studies, and ethnography—are particularly relevant to address those challenges. These approaches share common features such as deep engagement with rich mixed data over time, theoretical sampling, and grounded theory building. Moreover, these common features are at the heart of why inductive methods are so relevant to the grand challenges (and management, organization theory and strategy more generally). Our broader aim is to further the agenda of grand challenges by clarifying inductive methods—that is, how to avoid false rigor or what we term “rigor mortis” and instead how to embrace “rigor” (and quality) in inductive research by generating strong theory that is well grounded in rich data and achieves insight.

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