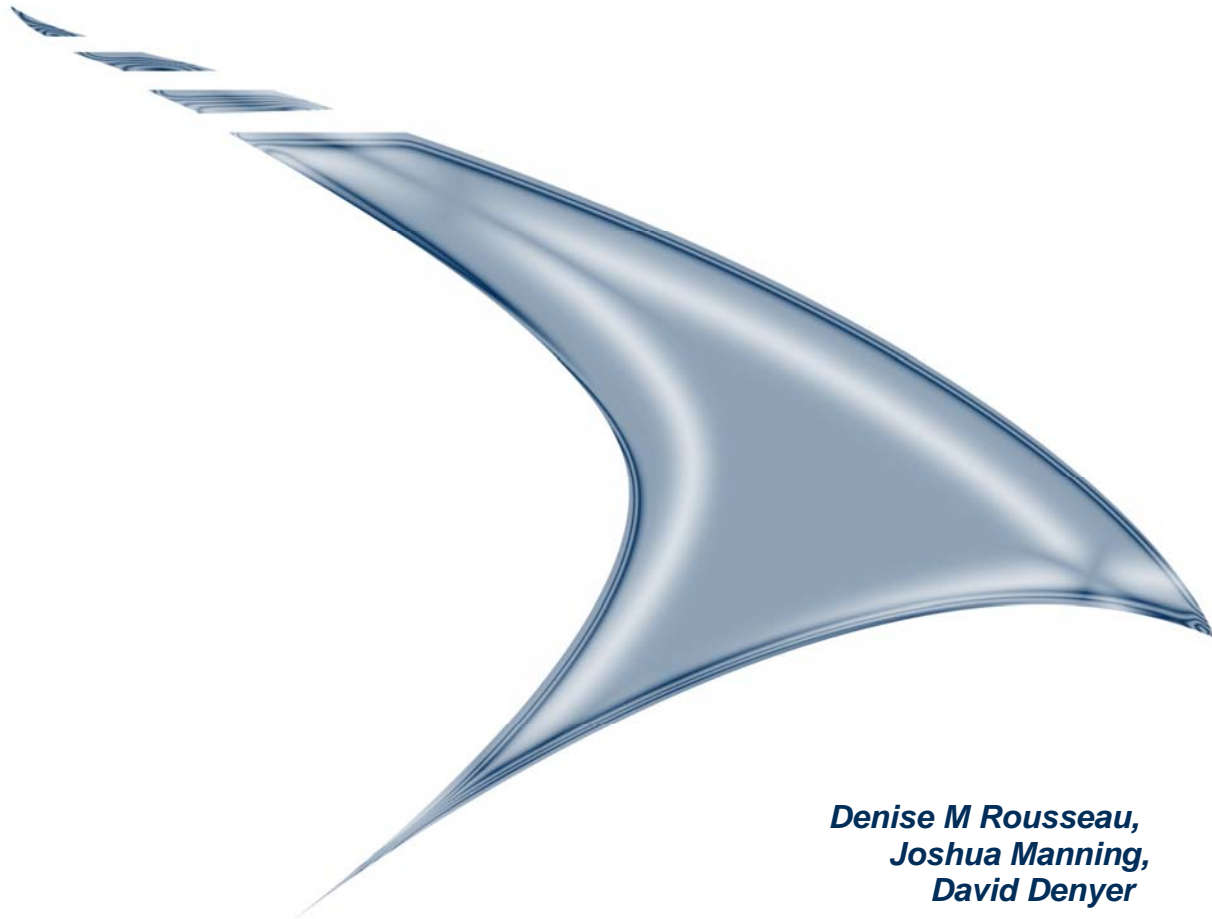


***Evidence in Management and Organizational
Science: Assembling the Field's Full Weight
of Scientific Knowledge Through Syntheses***



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This chapter advocates the good scientific practice of systematic research syntheses in Management and Organizational Science (MOS). A research synthesis is the systematic accumulation, analysis and reflective interpretation of the full body of relevant empirical evidence related to a question. It is the critical first step in effective use of scientific evidence. Synthesis is *not* a conventional literature review. Literature reviews are often position papers, cherry-picking studies to advocate a point of view. Instead, syntheses systematically identify where research findings are clear (and where they aren't), a key first step to establishing the conclusions science supports. Syntheses are also important for identifying contested findings and productive lines for future research. Uses of MOS evidence, that is, the motives for undertaking a research synthesis include scientific discovery and explanation, improved management practice guidelines, and formulating public policy. We identify six criteria for establishing the evidentiary value of a body of primary studies in MOS. We then pinpoint the stumbling blocks currently keeping the field from making effective use of its ever-expanding base of empirical studies. Finally, this chapter outlines a) an approach to research synthesis suitable to the domain of MOS and b) supporting practices to make synthesis a collective MOS project.

Evidence in Management and Organizational Science

It is the nature of the object that determines the form of its possible science (Bhaskar, 1998, p. 3).

Uncertain knowledge is better than ignorance (Mitchell, 2000, p. 9)

This chapter is motivated by the failure of Management and Organizational Science (MOS) to date to make full effective use of its available research evidence. Failure to make *effective use* of scientific evidence is a problem both management scholars and practitioners face. Effective use of evidence, as we employ the term here, means to assemble and interpret a body of primary studies relevant to a question of fact, and then take appropriate action based upon the conclusions drawn. For science, appropriate action might be to direct subsequent research efforts elsewhere if the science is clear, or to recommend a new tact if findings are inconclusive. For practice, appropriate action might begin with a summary of key findings to share with educators, thought leaders, consultants, and the broader practice community. Unfortunately, bodies of evidence in MOS are seldom assembled or interpreted in the systematic fashion needed to permit their confident use. A systematic review of the full body of evidence is the key first step in formulating a science-based conclusion. In consequence at present, neither the MOS scholar nor the practitioner can readily claim to be well-informed.

This lapse has many causes. Two are central to our failure to use MOS evidence well: 1) overvaluing novelty to the detriment of accumulating convergent findings and 2) the general absence of systematic research syntheses. These two causes are intertwined in that as we shall show, use of research syntheses ties closely with how a field gauges the value of its research. This chapter's subject, the systematic research synthesis, is not to be confused with a conventional literature review, its less systematic, non-representative counterpart. Systematic research syntheses assemble, analyze and interpret a comprehensive body of evidence in a highly reflective fashion according to six evidentiary criteria we describe. The why, what, and how of research synthesis in MOS is this chapter's focus.

The explosion of management research since World War II has created knowledge products at a rate far outpacing our current capacity for recall, sense making, and use. In all likelihood, MOS's knowledge base will continue to expand. We estimate over 200 peer-reviewed journals currently publish MOS research. These diverse outlets reflect that fact that MOS is not a discipline; it is an area of inter-related research activities cutting across numerous disciplines and subfields. The area's expansion translates into a body of knowledge that is increasingly fragmented (Rousseau, 1997), transdisciplinary (Whitley, 2000), and interdependent with advancements in other social sciences (Tranfield, Denyer & Smart, 2003). The complicated state of MOS research makes it tough to know what we know, especially as specialization spawns research communities that often don't and sometimes can't talk with each other.

The Danger We Face

The lack of syntheses making it clear what the evidence supports translates into three dangers affecting scholars, educators and practitioners: the misuse of existing research, the overuse of limited or inconclusive findings, and the underuse of research evidence with substantive implications for understanding and working with organizations.

Misuse can arise from basing conclusions on a few studies at the expense of the larger body of research evidence. Organizational researchers who adopt public positions regarding management practices and organizational decisions risk making embarrassing gaffes. The reason is simple: it is difficult to be well-informed on an issue when no systematic summary of the relevant evidence exists.

A case in point is the claim that incentive pay is not an effective motivator of individual job performance (cf. Pfeffer, 1998). This assertion contrasts with a descriptive literature review by Rynes, Gerhart and Parks (2005). They conclude that incentive pay does in fact tend to increase individual performance (cf. Lawler, 1971). Rynes and colleagues further contend that the evidence supports two mechanisms through which pay impacts individual job performance. The first is an immediate incentive effect where increased performance is motivated by a

targeted reward. The second is a more sustained sorting effect where people with higher abilities and motivation self-select into workplaces with performance-based rewards.

In defense of all who make good faith efforts to deploy MOS research on the public's behalf, we note that no one has yet provided the one critical contribution that could resolve the pay-performance dispute--a systematic research synthesis (this chapter's focus). A systematic synthesis musters the full and comprehensive body of available evidence to provide the best-available answer to a question of interest. Such synthesis is uncommon in MOS, placing its scholars and educators in the undesirable position of making purportedly science-based claims to the public, to students, and in textbooks, without the benefit of complete and trustworthy information regarding research findings.

Other fields also bear witness to inappropriate use of scientific evidence. Recall the false consensus regarding fat and heart disease in the 1980s:

"In 1988, the surgeon general, C. Everett Koop, proclaimed ice cream to be a public-health menace right up there with cigarettes. Alluding to his office's famous 1964 report on the perils of smoking, Dr. Koop announced that the American diet was a problem of 'comparable' magnitude, chiefly because of the high-fat foods that were causing coronary heart disease and other deadly ailments. He introduced his report with these words: 'The depth of the science base underlying its findings is even more impressive than that for tobacco and health in 1964.' That was a ludicrous statement, as Gary Taubes demonstrates

in his new book meticulously debunking diet myths, ‘Good Calories, Bad Calories’ (Knopf, 2007). The notion that fatty foods shorten your life began as a hypothesis based on dubious assumptions and data; when scientists tried to confirm it they failed repeatedly. The evidence against Häagen-Dazs was nothing like the evidence against Marlboros.” (Tierney, 2007)

If the evidence were weak, why would the American Surgeon General take such a position? Why did hundreds of popular heart health books follow it? Why did it prompt search for fake fats avoiding the purported bad effects of the real thing? It appears that the Surgeon General was expressing the consensus on the part of medical doctors, nutritionists and public health specialists, who themselves were relying on secondary sources such as popular books and trade articles rather than primary studies. No systematic review then existed to confirm or refute the Surgeon General’s claim. When the U.S. National Academy of Science (NAS) ultimately completed such a review, both the government and the public rejected its findings. It’s important that NAS checked out Koops’ claims, an action contributing to the shift toward evidence-based medicine (Sackett, et al., 1996; 2000). However, this case also demonstrates that beliefs based on an ill-informed *use* of research can be tough to counter.

Underuse of research evidence is the other extreme—and tougher to spot. It manifests in the reluctance of scholars and practitioners to take an informed position *despite* the existence of evidence. Silence in the face of a large body of evidence is understandable if no one has assembled and interpreted it. It is

perhaps even more understandable where the position the evidence supports bucks the tide. We wonder would contemporary firms and their stockholders adopt different stances toward such organizational practices as downsizing or exorbitant CEO pay (cf. Cascio, Young & Morris, 1997; Cowherd & Levine, 1992) if systematic reviews existed to demonstrate what their *real* effects are likely to be. We cannot say what any such systematic reviews might conclude. We do know that without such reviews no credible evidence-based challenge can be mustered to counter dysfunctional labor force churn or CEO pay packages that benefit a few but not the firm's stakeholders. MOS as a field has not yet formed the habit of looking carefully at its accumulated evidence. In consequence, uses of its evidence are inevitably limited—and risky. This can change. It should.

Uses of evidence in MOS as well as other applied fields run the gamut from scientific discovery and explanation to management education and practice guidelines, and on to the formulation of public policy. The efficacy of any use of evidence depends on the availability of carefully conducted research syntheses.

Research Syntheses are the Way Forward

This chapter calls for adoption of the good scientific practice of systematic research syntheses. Systematic means comprehensive accumulation, transparent analysis, and reflective interpretation of all empirical studies pertinent to a specific question. Reliance upon any sampling or subset of the literature risks misrepresenting its diversity in findings, outcomes methods, and frames of

reference. The pertinent complement of evidence typically is available via the internet, readily to scholars with electronic library access and ties to the broad scientific community. Systematic research syntheses evaluate a field's knowledge claims while recognizing omissions, limits, and untested assumptions. Syntheses separate replicable findings from noise. If a synthesis were available to identify where stable effects do in fact exist, researchers would be less likely to interpret apparent inconsistency as intractable complexity (Schmidt, 1992). Importantly, syntheses can also yield insights unrecognized by the original researchers or other less systematic literature reviews.

Systematic research syntheses are important too as quality control. Peer-review serves more as a check on a primary study's published report. The original data themselves seldom are subject to scrutiny. Credible evidence exists of researchers acting as cheerleaders for their preferred intervention, skewing their sampling of informants to those who support a particular point of view, and selectively reporting data in line with their thesis (Weiner, 2003). Moreover, a multi-discipline survey of American scientists (Martinson, 2005) reported that 0.3% admitted to falsifying data (in comparison 8.0% report ignoring human subject protocols). The original impetus in medical research for development of systematic research syntheses was concern over the impact that pharmaceutical firms were having on the research. Although advocacy effects and ethical violations may be few, any threat to the integrity of the research process is cause for concern, another reason for cumulating studies and comparing their patterns of results before drawing conclusions.

Most MOS research is never subjected to careful accumulation, analysis or reflection. Traditional literature reviews are skewed by familiarity and availability bias and the implicit preferences of the reviewer (Goodstein & Brazis, 1970; Tranfield et al., 2004). The descriptive literature review typical of MOS can give short shift to alternative points of view, related research from other disciplines or methodologies. It commonly fails to fully represent the research relevant to the question at hand (Salipante, Notz & Bigelow, 1982; Tranfield, et al., 2003). A case in point, approaches such as meta-analysis combining quantitative indicators (Hedges & Okin, 1985) or meta-ethnographies integrating qualitative findings (Estabrook, Field & Morse, 1994; Noblit & Hare, 1988) are limited in that each ignores the other (potentially leading to different conclusions, cf. Guzzo, Jackson & Katzell, 1987).

Without systematic research syntheses, MOS is in real danger of knowledge loss. As time passes, earlier studies become less likely to be appropriately interpreted and integrated into current thinking (Tranfield et al, 2003). Limited and unsystematic use of the available evidence base plays a role in the dilemmas MOS faces regarding its training of doctoral students and their development of successful academic careers (Zammuto & Connolly, 1984; Pfeffer, 1993; Glick, Miller & Cardinal, 2007; Rousseau, 2007). The field's newcomers have difficulties choosing productive research topics and identifying ways to make useful contributions. When it is tough to determine what is known and what isn't, it even tougher to know what's important to know next.

This chapter's goal is to promote the good scientific practice of research synthesis as an aid to knowledge accumulation and, potentially, more rapid advancement of MOS as a field. In doing so, we address key stumbling blocks hampering uptake of research syntheses in MOS and ways to overcome them. We next examine alternative forms of syntheses various fields currently use. Lastly, we formulate a framework for research syntheses to better deploy MOS research in answering scientific and practical questions.

The Meaning of Evidence in MOS

MOS is a practically-oriented broad-ranging social science (Whitley 2000). It encompasses theory and research on organizations and associated human behaviors, as workers, managers, and customers. It yields an array of products from *facts* about workers and organizations (e.g., their characteristic properties and processes) to *tools* based on scientific knowledge (e.g., psychometric tests, management science algorithms).

Evidence is the essence of human knowledge. It deals with the regularities our senses and measuring tools can detect. Scientific evidence is knowledge derived through controlled test and observation. It differs from the firsthand evidence people derive from experience or the testimony others provide. Firsthand evidence and testimony play important roles in management practice; so does analyzing business data in making managerial decisions (Davenport, 2006; Pfeffer & Sutton, 2006). Evidence-based management is the complimentary use of scientific evidence and local business evidence. The former is difficult for

practitioners to access because as yet MOS evidence is seldom organized in a way that lets would-be users know what the scientific evidence supports.

Science seeks general knowledge, explanations that make useful predictions about a common reality in a replicable fashion. It creates theories that explain regularities in our natural and human-made world (Bogen & Woodward, 1988). Regularities like sunrise and sunset are directly observable. Indeed some regularities may be deemed so obvious that no empirical study is needed. (N.B. This is a reason why no randomized controlled trials have been conducted to see if jumping out of an airplane wearing a parachute prevents death, Smith & Pell, 2003). Most aren't quite so obvious. Establishing that a phenomenon is potentially real and meaningful is science's critical first step (Merton, 1987). This often is accomplished via observations that lead to formulating a theory that can be tested. In MOS for example, descriptive research has identified the existence of work/nonwork boundary issues firms and employees face (Hochschild, 1997; Perlow, 1997). Theory can then be formulated and tested to account for certain observed regularities, such as why successful workers who negotiate special arrangements to manage work/family conflict might subsequently experience far poorer career outcomes (Hornung, Rousseau & Gleser, in press). In the process of developing and testing theory, the systematic accumulation of empirical observations constitutes the evidence for judging the theory's merit.

Evaluating evidence involves six basic criteria. The first requirement of evidence is *Construct Validity*. To establish that a phenomenon is potentially real and

meaningful basically means that the regularities scientists use to identify it can be consistently demonstrated. For example, organizational commitment on the part of employees has been conceptualized lots of different ways, but primarily as a psychological attachment to the organization. To establish it as a real and meaningful phenomenon, purported observations of commitment must be consistent with its conceptualization as a psychological attachment (displaying attachment features like goal acceptance and desire to remain). The potential reality of commitment is supported when employee reports of their commitment coincide with their support for and continued employment in the organization. Concomitantly, the meaningfulness of commitment as a phenomenon in its own right requires that its characteristics be distinct from other potentially related phenomena, such as work ethic or values (e.g., Morrow, 1983). Construct validity is an evidentiary requirement for all scientific constructs. Any test of cause-effect relationship must establish the construct validity of both the presumptive cause and effect.

Second, *Internal Validity* is the extent to which a study properly demonstrates a causal relationship between a presumed cause and effect. Many causal factors play a role in a given bit of data (Bogen & Woodward, 1988; p. 317), including the phenomenon itself, the instrumentation used and other factors impossible to fully account for (e.g., respondent mood, order effects of items or measures). Internal validity is actually an amalgam of features required of an informative body of evidence. *Covariation* means that indicators of cause and effect are inter-related. *Temporal Precedence* means that studies are designed such that the "cause"

precedes the "effect" in time. *Non-Spuriousness* means that no plausible alternative explanations exist for their observed covariation.

Measurement quality is particularly important to reducing spuriousness. Poor measurement quality creates alternative explanations for observed covariation where measures are unreliable (i.e. contain substantial error, as when respondents have difficulty answering complicated questions) or invalid (i.e. lacking construct validity, as in the case of a general intelligence test that taps cultural knowledge but not mental abilities per se). Careful design of primary studies promotes these three conditions of internal validity, but seldom eliminates them. Threats to internal validity are overcome when accumulated studies with different designs yield comparable findings.

The third criterion, *Effect Size* is a measure of the strength of the relationship observed between two variables (Hedges & Okin, 1985). In research on causal relationships, the key indicator is an effect judged significant according to the decision rule established in advance (e.g., statistical significance). It is less apparent whether its *size* is important given the host of factors that can constrain it including the observed variance in variables (Fichman, 1999). Moreover, some effects can be so easily induced that their effect size is less important than the fact that they are likely to be relatively pervasive (e.g., in-group/out-group effects; Prentice & Miller, 1992). Other difficult-to-influence dependent variables such as successful organizational change can have cumulative effects over time (e.g., where initial small effects escalate as the change develops; Goodman &

Rousseau, 2004). However, effect sizes are meta-analyses' common currency, summarizing statistical findings across multiple studies (Hedges & Okin, 1985). The *significance* of the effect size is essential information in a meta-analysis. Depending upon the research's purpose, relative effect size may be less critical. Studies combining effect sizes with cost/benefit information can have important evidentiary value. This is particularly the case where great benefit can be attained at low cost or with little effort.

Fourth, *Generalizability* or external validity refers to the extent to which a result holds across populations, settings, procedures, and times. Some results are idiosyncratic to the research context and don't occur outside them (e.g., answers to a particular survey item; Fischhoff, 1991; Sudman, Bradburn & Schwarz, 1998). Most experimental settings never occur naturally, providing instead special "pure" conditions (Festinger, 1953). A study has evidentiary value when it provides information (qualitative or quantitative) regarding the conditions to which a treatment effect or phenomenon is generalizable. Robust causal relationships are those that are stable across situations, such as trust's impact on cooperation (Fichman, 2003) and in-group/out-group effects on liking (Brewer, 1979). Less robust effects may depend on context, such as how leadership styles impact follower behaviors (e.g., Porter & McLaughlin, 2006). Generalizability is a matter of judgment based upon information a set of studies provide about participants, treatments, and settings (Steckler & McLeroy, 2008). Unfortunately, research reports often fail to include in sufficient detail the facts needed to assess

generalizability (e.g., participant background, the study's time frame or circumstances; Rousseau & Fried, 2000)

Generalizability is particularly threatened when only findings from published studies are considered. A purpose of traditional literature reviews is to identify whether findings are stable across researchers, methods, measures and times (Salipante, et al., 1982) to provide a firm foundation for advancing knowledge (Webster & Watson, 2002). However, identifying the stability of findings requires that relevant unpublished as well as published studies be reviewed, to overcome the bias many journals have against publishing non-significant results. Statistical meta-analyses that make special effort to overcome the “file drawer problem” provide more generalizable results than reviews limited to published materials (Schmidt & Hunter, 1990). A review that effectively identifies the generalizability of findings “facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed” (Webster & Watson, 2002, p. xiii).

Fifth, *Intervention Compliance* refers to the occurrence of all conditions required to induce a particular cause or apply a specific treatment. “Treatment” non-compliance by care givers and patients is a source of inconsistency in the findings of medical research. Attention to compliance raises questions regarding whether all practices specified in the protocol were followed. It questions how well-trained, skilled or competent were those responsible for implementation. Compliance is a particular concern in MOS because of variations in

organizational and management practices. Pritchard, Harrell, DiazGranadeos & Guzman (in press) investigate between-study differences in how thoroughly an organizational analysis and assessment system, PROMES, was applied. Several implementation-related factors were identified in primary studies, including the extent users adhered to the PROMES process and the quality of the feedback provided. These features of intervention compliance were found to impact the overall productivity gains associated with PROMES. Generally speaking there is widespread variation in how organizations implement routines (e.g., performance appraisal) or interventions (e.g., quality programs). A study providing information regarding differences in actual implementation, and the sensitivity of outcomes to it, has considerable evidentiary value.

Sixth, *Contextualization* is empirical evidence regarding how context influences the phenomenon under study. It goes beyond generalizability in that contextualization identifies the limits of a phenomenon or cause-effect relationship by providing information regarding *why* it is limited. One important form of evidence to identify contextual supports, that is, co-occurring conditions not part of the phenomenon itself, which influence its occurrence or consequences. Such is the case where the effects of high involvement work systems depend upon organizational supports such as workforce training and appropriate rewards (cf. MacDuffie, 1995). In contrast, absence of contextual support is indicated when an organizational setting is inhospitable to a new management practice or other intervention. Prior events or historical factors, such as a previously failed change, can lead an otherwise constructive

management practice to fail. Investigations into conditions of failure as well as success can contextualize the occurrence and operation of a given practice or intervention.

Context also impacts generalizability by altering the meanings of the phenomena studied. Such factors are commonly noted with respect to location (e.g., industry or country) and time frame (e.g., pre-internet, cf. Rousseau & Fried, 2000). In the case of location, national culture differences for example are known to influence how MOS phenomena are socially constructed. Such in the case where directive leadership produces more positive responses in countries valuing authority than in more egalitarian nations (e.g. House, et al., 2004). With respect to time frame, historical forces influence MOS phenomena as witnessed in the ways firms respond to market forces and the shifting dynamics between capital and labor (Barley & Kunda, 1988; Guillen, 1994). In interpreting studies of employee-employer relationships, time frame must be factored in as in the case where unionism (greater in the 1970s than the 90s) and globalization (the reverse) may influence the perspectives of actors and the roles institutions play (e.g., government, stock market participation).

Insofar as primary studies have some evidentiary value along the above criteria, it is only in synthesizing an accumulated body of studies that the full meaning and quality of evidence can be gauged.

Challenges to Research Syntheses in MOS

Having identified the criteria for establishing what evidence is in a systematic review, we now turn to investigate the dynamics within MOS that make it difficult to actually synthesize research. Three factors must be addressed to move the area toward greater use of research syntheses:

1. Alternative models of science disputing what is knowable and how to determine it;
2. Divergent political and cultural assumptions regarding the appropriate focus and methods in studying workers and managers, organizations and markets, and the institutions in which they are embedded; and
3. Professional rivalry in gaining legitimacy, institutional support, and scarce resources.

Alternative Models of Science

Alternative views of science exist within MOS and underlie disputes regarding the nature of evidence (Table 1). Epistemology, the theory regarding the nature of knowledge, acknowledges several approaches to scientific knowledge (Morgan & Smircich, 1980). The form evidence takes in each approach depends on its assumptions regarding the nature of reality. MOS grew out of the social sciences and its epistemological approaches reflect these roots. Let's start with two poles of an epistemological continuum most relevant to management and organizational science, positivism and relativism. (Note we exclude a fourth epistemology sometimes associated with MOS, pragmatism, because it ignores the essential role theory plays in the value of evidence. Pragmatism's focus is

“can something be made to work” not why it works; James, 1907). Rooted in logic, Positivism argues that evidence is what can be observed. Empirical study and independent verification are the proper basis for developing and evaluating natural explanations of observable phenomena. In positivism, evidence constitutes repeated observation of cause-effect relationships (e.g., rewards increasing the frequency of targeted behavior, aspirin reducing inflammation). Positivism seeks explanations founded on the notion of a unified reality governed by observable laws. In social science, the positivist perspective is found in behaviorism (e.g. Skinnerian psychology).

Table 1 - Alternative Epistemologies in Management and Organizational Research

	Positivism	Critical Realism	Relativism
Reality	Objective	Objective yet human interpretations effect observed reality	Socially constructed
Application of Evidence	Confirmatory. Only what is observable exists	Falsification	Critical
Data	Concrete and quantitative	Observations, judgments, and interpretations; quantitative and qualitative	Text--Spoken or Written
Focus	Observation as reality	Causal mechanisms identified via fallible observations	The sense people make of the social world

Positivism's emphasis on universality leads its advocates to make assumptions that limit the research questions they ask. The question "under what conditions will individuals resent the use of reinforcement systems" is unlikely to come up since "resent" is an emotional state not a behavior and an individual's viewpoint falls outside positivism's chosen domain. Positivism downplays the role of context and history making it less compatible to the study of organizational practices and workplace experiences. It has limited applicability in MOS where research often focuses on subjectivity, including individual and collective interpretations of events (e.g., Martin, 1990), not observation per se.

At the opposite pole is relativism where no universal reality is presumed. Relativism is skeptical about the existence of a reality beyond what is socially constructed (see Bechara & Van de Ven, 2007). In rejecting the notion of reality, relativism manifests in a family of approaches including feminist criticism and postmodernism. Each focuses to a large extent on the many explanations or narratives that account for the human experience using text as a basic datum. Instead, relativist approaches analyze verbal behavior, speech and print, with a goal of broadening understanding of the actors' perspectives. In relativism, evidence constitutes any theme or mode of expression actors repeatedly convey. Relativists interpret these repeated expressions in terms of the conscious and unconscious processes of social actors and the larger social setting. Relativism excludes phenomena in the natural world associated with organizations such as environmental adaptation and other systems functions (e.g., Miller, 1971). Like positivism, it ignores phenomena incompatible with its view of reality.

Critical realism occupies the middle ground between positivism and relativism. More pluralistic in its approach to evidence, critical realism includes any epistemological position that maintains the existence of an objectively knowable reality, while acknowledging that perception and cognition mediate human comprehension of that reality (e.g., Bhaskar, 1997; 1998). In this context “critical” means critique of the mind, especially judgments of fact and value. Assumptions and alternative interpretations are probed, compared, and tested. The evidence critical realism focuses upon are the patterns observed in data and their support or refutation of the mechanisms theory specifies.

We suggest that syntheses in MOS research are best accomplished using a critical realist epistemology. Critical realism acknowledges that all methods have limits. Each conflates what is experienced with what exists. Rather than advocate one method over another (e.g., quantitative/qualitative, objective/subjective indicators, laboratory experiment/field study), critical realism makes such a choice unnecessary. Instead it emphasizes triangulation across methods and forms of data. This triangulation is especially valuable in creating systematic research syntheses that address the array of evidentiary criteria specified above. Adopting critical realism is to accept that scientific knowledge is conditional, even while based upon general and invariant processes. In the case of MOS, critical realism is exemplified in a meso or cross-level approach to theory building and research (e.g., top/down control mechanisms and bottom/up emergent processes; House et al., 1995).

Our approach to evidence synthesis is based upon an understanding that reality exists independent of human cognition (i.e., objective), and that all facts, observations and data are theory-laden (i.e., subjective), there being no value-free inquiry. Theoretical pluralism and triangulation are necessary because reality requires multiple perspectives to understand its regularities (Bhaskar, 1998). All evidentiary criteria apply, from internal validity to contextualization, consistent with the acknowledged value of multiple research methods. Research methods differ in their appropriateness depending upon the entities studied. Thus, surveys suitable for assessing individual predispositions may be less appropriate for characterizing cultural institutions.

Political and Cultural Implications of Evidence

A second challenge to evidence synthesis lies in the political and cultural assumptions conflated with research evidence. Douglas McGregor advised, “Tune your ear to listen for assumptions about human behavior, whether they relate to an individual, a particular group, or people in general” (McGregor, 2006; p. 9). Political and cultural perspectives enter into the dispute regarding what is evidence. First, any single study is likely to be “ethnocentric” to some degree, making implicit and unexamined assumptions regard the interests it represents. These assumptions could be societal in nature where Americans, French, and Chinese researchers might well be expected to view the world, and organizational phenomena, differently. For example, the ways Total Quality Management have been implemented and its local meanings are highly

dependent on cultural processes (D'Irbarne, 2000), which in turn influence the nature of both commitment and compliance to this global management system. Moreover, even within the same society, scholars hold divergent viewpoints (e.g., labor/ management, free market/governmental support), with consequences for their approach to research, questions asked and methods they apply (Ghoshal, 2005).

Implicit assumptions can lead to choices of research methods that reinforce certain beliefs, independent of their validity. The commitment research conducted in the individualistic United States at one time largely focused upon individual-level studies of workers in a single firm (e.g., Mathieu & Zajac, 1990). Consistent with historically negative views of workers (e.g., McGregor's, 2006, Theory X; Green, 2006), it is little wonder that scholars once attributed commitment to the vagaries of worker motivation and their personal predispositions. Subsequent inquiry into commitment expanded to consider employer effects. Multi-unit/multi-firm studies began finding that organizations themselves influence workforce commitment (e.g., Shore & Tetrick, 1991). Narrative reviews and statistical meta-analyses conducted on the early commitment research would have been misleading by failing to question whether the organization itself played a role.

A similar example from public health displays the risks of the traditional medical definition of evidence and its biases. McGuire (2005) observes that epidemiological studies typically focus on the individual correlates of disease,

measuring the incidence of illness across with particular demographics. Such studies tend to ignore upstream factors, such as racism, poverty, and unemployment in the case of hypertension. Because individual-level studies are more likely to involve the randomized control trials (RCT) traditionally employed as medical research's gold standard, they better conform to conventional notions of evidence. The result is the potentially harmful situation where contributing societal factors and variations in implementation quality often associated with these are ignored. Reliance on RCTs as evidence downplays the role that non-individual factors might play in health and disease, as example of implicit assumptions having unintended effects on the way research findings are interpreted and used.

Frames of reference and untested assumptions create invisible biases in research. In a classic demonstration of invisible cultural effects in research, Latham, Erez and Locke (1988) describe their efforts to reconcile divergent results reported by goal setting researchers. The result they investigated was the finding that worker participation was important to promote goal acceptance in Israeli studies, but not in North American ones. By working side by side and comparing their research protocols, the researchers found that this effect was due to the ways in which experimenters in the two countries had given their subjects instructions. In the non-participation condition, the Israeli "tell" strategy, assigning goals by direct order, contrasted with the North American "sell" approach, assigning goals in a fashion that motivated subjects to accept them.

As such, cultural practices and assumptions can seep into research methods in unexpected ways.

The uses to which research is put can skew how it is interpreted. This skew often reflects issues of status and power (Baratz, 1974). A case in point, the assessment center is a method for leader selection that uses experts and trained observers to assess individuals for their leadership potential. This methodology is widely understood to be egalitarian in nature. Its assessments are manifestly unbiased and valid with respect to the assessment of men and women, minorities and majority group members (Huck, 1973; Zal, 1998). However, their original use reflected a political agenda. During World War II, the British military had a dearth of officer candidates given the large loss of life and its traditional recruiting of officers from the upper classes. Buddy ratings, where enlisted men rated the leadership capabilities of peers, were found to be an effective way to identify officer candidates (Hollander, 1954; Weitz, 1958). A military review board during the war found this method “too democratic” (Cutcher-Gershenfeld, 1982), and initiated assessment centers as a substitute for the otherwise valid information enlisted personnel provided. Thus the use or non-use of particular practices may have more to do with their cultural conformity than their validity. A systematic review evaluating assessment centers, now widely used, risks passing along this non-egalitarian bias, unless the historical context of its application is represented in the analysis.

Lastly, history plays a significant role in shaping the underlying cultural and political perspective operating on both phenomena and scientist. Joseph Scanlon, an innovator in workplace motivation, was purportedly fond of saying “face the past and back into the future.” Consider the case of industrial accidents. Viewed as acts of God from the outset of the industrial revolution until the early 20th century, industrial accidents came to be attributed at least in part to the accident proneness of workers, “inherent psycho-physiological predisposition toward accidents” (Viteles, 1932, p. 334. Subsequent changes in technology and work routines led to new practices that reduced accident rates to a point where their occurrence, if rare, came to be seen as a consequence of systemic factors (cf. Perrow, 1984) or worker inexperience in a specific job (e.g., Gauchard et al., 2007). The conceptual categories used to identify and understand events such as accidents are socially and historically determined. A reflective review thus needs to consider the prevailing political, cultural, or historical trends to which its primary studies are exposed.

The Professional and Scientific Infrastructure

A third challenge to conducting evidence syntheses is the fragmentation characteristic of management research (Whitley, 2000). In his treatise on the sciences, Whitley classifies MOS as a field with low task and functional dependence. Its researchers, he asserts, experience less need to systematically incorporate their colleagues’ results and ideas into their research than is the case in other fields. In contrast, in psychology or economics competition for reputation and centrality in these more unified fields leads to more integration (Whitley,

2000; Pfeffer, 1993). Low integration is complicated by widespread disinterest in replication on the part of MOS journals (Kilduff, 2007) and the field's preference for novelty over accumulation (Mone & McKinley, 1993).

Fragmentation and specialization are dysfunctional when they undermine a field's integration and knowledge accumulation. Diversity of approaches is not troublesome in itself. Integrative pluralism is a constructive consequence of critical realism, when different theories can be used to account for the same phenomenon in compatible and non-conflicting ways. We suspect that MOS researchers may feel the need to downplay the array of research relevant to their own research programs out of the mistaken belief that pluralism reflects the immaturity of the area as portrayed by Thomas Kuhn (Mitchell, 2002). Instead, we argue that MOS's pluralism is a result of the complexity of its subject matter. Pluralism in theory and method can arise from different levels of analysis and in the assumptions underlying phenomena at different levels (Mitchell, 2002). Individuals, workgroups and organizations are each distinct and irreducible. Groups and organizations cannot be reduced to people because they can pre-exist their current membership and have causal power in themselves (Bhaskar, 1998). Each has causal mechanisms at its own level (immediate or proximal) while mechanisms at other levels operate more distally (e.g., see Hackman, 2003; House, Rousseau & Thomas-Hunt, 1995).

Not all divergent explanations are competing. Instead what we have in MOS's varied approaches and methods is a scientific division of labor. Nonetheless, on-

going efforts to integrate findings obtained in diverse ways increase the likelihood that convergence will occur (cf. Staw, Sandelands & Dutton, 1980; Chatman & Flynn, 2005). Systematic reviews help identify whether differences across research domains are substantive or semantic, indicative of different starting points, disciplinary divergence, or authentic differences in the phenomena studied.

Conclusion

Management and organizational research is essentially a human science (Foucault, 1965) or a science of the artificial (Simon, 1996). In contrast to the physical sciences, MOS's domain is knowledge about human-made objects and phenomena. That is, it focuses on the human-made world of organizations and the behavior of people in relation to them. Human-made organizations, work groups, markets, and social institutions are by their very nature complicated. These multi-level human constructions necessitate critical realism's multiple methods to generate the requisite systematic knowledge. This conclusion is in line with an observation by a proponent of critical realism, "It is the nature of the object that determines the form of its possible science" (Bhaskar, 1998, p. 3).

For integration to occur, MOS research from different theoretical and methodological perspectives needs to be accessed, organized, and interpreted into a synthesis of the evidence. Political and cultural assumptions operating on both researchers and the phenomena studied must be reflected upon in the review process. Adopting a critical realist perspective enables a balanced

assessment of the full array of research relevant to MOS's scientific and practical questions.

Approaches to Systematic Research Syntheses

KEITH

It is easier to be killed by a

terrorist after the age of 40

than it is to get married --

ANNIE

That is not true. That

statistic is not true.

BECKY

It's not true, but it feels true.

Screenplay *Sleepless in Seattle*

This snippet of movie conversation conveys what systematic syntheses are intended to establish, a way to tell what is true, as best we can tell. Syntheses constitute a family of methods for accumulating, organizing, and interpreting research (Dixon-Woods, Agarwall, Young, Jones & Sutton, 2004). As a step toward identifying the critical features of systematic synthesis in MOS, we first examine the ways systematic syntheses have been conducted across various fields (Table 2). By comparing and contrasting their features with our six

evidentiary criteria, we can identify ways in which MOS research itself might be synthesized (Table 3).

Table 2 - Forms of Research Syntheses

	Aggregation	Integration	Interpretation	Explanation
Goal	<ul style="list-style-type: none"> Combine effects to increase sample size and reduce bias in answering specific questions. Predict intervention results via more exact estimate than any single study achieves. 	<ul style="list-style-type: none"> Synthesis across different methods to answer specific questions. To explore when interventions are more likely to be appropriate. 	<ul style="list-style-type: none"> Synthesize and interpret research to build higher-order theoretical constructs. Create tentative theories of phenomena including patterns of social construction. 	<ul style="list-style-type: none"> Synthesis to create explanations. Generate theory.
Method	<ul style="list-style-type: none"> Quantitative combination of results of primary studies 	<ul style="list-style-type: none"> Triangulation across multiple studies and methods. 	<ul style="list-style-type: none"> Compilation of descriptive data and exemplars. Cross-study concepts are identified and translated into new categories. 	<ul style="list-style-type: none"> Discern patterns behind explanatory claims.
Data	<ul style="list-style-type: none"> Evidence hierarchy. Favors randomized controlled trials. Published and unpublished studies; data sets 	<ul style="list-style-type: none"> Evidence hierarchy, somewhat contested. Typically published studies. 	<ul style="list-style-type: none"> No evidence hierarchy. Published studies with qualitative data on comparable subject matter. Incorporates primary researcher interpretations. 	<ul style="list-style-type: none"> Multiple forms of evidence accepted. Typically published studies. Qualitative and quantitative data, including theory/ interpretations of primary studies.
Strengths	<ul style="list-style-type: none"> Minimal method bias. Answers precise question. Systematic, replicable. 	<ul style="list-style-type: none"> Combines statistical and qualitative synthesis. Highlights promising interventions. 	<ul style="list-style-type: none"> Synthesizes multiple qualitative studies. Takes context into account 	<ul style="list-style-type: none"> Identifies boundary conditions/contextual factors. Focuses on why and where interventions lead to outcomes. Data from methodologically diverse fields. Highly pragmatic; focused on informing decisions
Weakness	<ul style="list-style-type: none"> Useful only for studies with homogeneous statistical methods. 	<ul style="list-style-type: none"> No standardized methodology . Replication difficult. 	<ul style="list-style-type: none"> Replication difficult (many possible explanations). Information from quantitative data can be lost. Coding relies on reviewer skills 	<ul style="list-style-type: none"> Transparency / reproducibility difficult. Requires detail about the context and interventions not always available in primary studies. Highly dependent on reviewer skills

Table 3

Synthesis Method

	SYNTHESIS METHOD			
EVIDENCE	Aggregation	Integration	Interpretation	Explanation
Construct Validity	?	✓	✓	✓
Internal Validity				
Covariation	✓	✓	✓	✓
Temporal Precedence	✓	?	?	✓
Non Spuriousness	✓	?	○	✓
Effect Size	✓	○	○	?
Cost/Benefit	?	○	○	?
Generalizability	✓	✓	✓	✓
Intervention Compliance	?	?	?	?
Contextualization	○	✓	✓	✓

✓ = Yes ? = Unclear or inconsistent, depending on particular question ○ = No

As a quintessential human creation, science requires not only methods to represent phenomena that cannot be observed directly but also on-going *critiques* of methods and interpretation to achieve authenticity and value.

Systematic synthesis is such a critique: it evaluates both data and the interpretations made of them. Existing methods fall into four categories: aggregation, integration, interpretation and explanation.

Synthesis by aggregation

The defining methodology of aggregative synthesis is statistical meta-analysis. Aggregative syntheses extract and combine findings from separate studies to increase the effective sample size (Schmidt & Hunter, 1990). They undertake to provide evidence of “what is true” or ‘what works’ by summarizing an overall net effect (e.g. Kluger & DeNisi, 1996). This effect may be a correlation or a treatment effect, including measures of the performance or effectiveness for a given class of interventions. The synthesis’s starting point is a narrow, focused question, such as ‘does X lead to outcome Y’, with ‘X’ and ‘Y’ and the ‘outcome’ being defined as tightly as possible. Since the validity of a meta-analysis is depends on the quality and homogeneity of the primary studies on which it is based, its synthesis process is structured with the aim of reducing bias. Prior to actual synthesis, the researcher is encouraged to set a priori criteria specifying the types of studies will be included. Little has been written regarding the construct validity of the indicators used to operationalize the meta-analysis question. Variables with similar labels may well be categorized similarly by the reviewer, regardless of their actual operationalization. Extensive searches of published and unpublished studies are conducted and their methodological quality assessed to distinguish between reliable and unreliable research. In several fields regularly employing aggregated syntheses, the process has been

formalized with the goal of producing rigorous and replicable reviews (Greenhalgh, 1997). See for example, the Cochrane Collaboration (www.Cochranecollaboration.org) in medicine and the Campbell Collaboration (www.campbellcolloboration.org) in education and criminal justice.

Promoters of aggregative synthesis stress the importance of controlling for bias, which includes use of a hierarchy of evidence to rank research designs according to their internal and external validity. Within this synthesis tradition, randomized controlled trials are often regarded as the 'gold standard' for judging 'what works' (Evans, 2003). Acknowledging the problems of observational (non-manipulated) studies, critics stress the limited scope of RCT methods for studying important social and organizational issues (Pawson, 2002a,b), noting the progress made in statistics and social science in working with observational data (e.g., Nagin, 2005; Rubin, 2007).

A key problem in aggregative synthesis is that primary studies are rarely homogeneous. Pooled studies can reflect widely ranging effects from unmeasured factors (e.g., variability in the quality of implementation or influential contextual factors). Contextual differences are downplayed and are not typically a source of information to be interpreted. Unless primary studies carefully report implementation processes and context, aggregated results can mask the mechanisms underlying effects (Pawson, 2002a). Meta-analysis advocates (e.g. Schmidt & Hunter, 1990; Shadish & Sweeney, 1991) suggest that such differences can be accounted for by identifying mediators and moderators.

However, the aggregated synthesis's design must anticipate the presence of mediators and moderators, and the relevant information must be available from the primary studies (cf. Gough et al. 2003). Pooling effect sizes, the additive model of evidence aggregated syntheses rely upon, can fail to provide insights into the mechanisms and contextual factors relevant to organizations and related human behavior. A meta-analysis on the other hand can inform both theory and practice when undertaken in a manner that allows tests of causality (e.g., Orlitzky, Schmidt & Rynes, 2003) or makes use of supplemental information regarding context or nature of the intervention (e.g., Kluger & DeNisi, 1996, described below). Some meta-analyses do include information on consistency of treatment compliance (e.g. Pritchard et al., in press), but compliance is neither always relevant nor typically included. Nonetheless, a basic meta-analysis approach may be adapted by incorporating more diverse sorts of information, including the inclusion of supplementary information from qualitative work and expert practice (Gregson, Rodger, Neal & Avis, 2002).

Synthesis by Integration

Integrative synthesis involves the collection and comparison of evidence involving two or more data collection methods. Like statistical meta-analysis, it too investigates patterns across primary research studies, compensating for single-study weaknesses in research design, to improve the finding's internal and external validity. Data from one study design can be triangulated to corroborate findings from others or to investigate different aspects of a problem. One important use of integrative syntheses is contextualization, capturing procedural

knowledge regarding how interventions or treatments might best be carried out in a particular context. Recognition is growing that incorporating qualitative data in syntheses can provide 'situation-specific wisdom' (Campbell, 1984). This is useful in situations where treatments or practices involve some improvisation (e.g., care givers, teachers or managers adapting a practice to local conditions). Qualitative data can capture local ways of doing things as well as subjective human experiences that more arms' length studies exclude (Dingwall et al, 1998).

Integrative synthesis typically employs predetermined questions and selection criteria. Critical selection criteria include the relevance and construct validity of indicators obtained by different methods, all tapping what is presumed to be the same phenomenon. This method often pursues multiple questions allowing the review to address issues no single study can. First, typical questions framing an integrative synthesis relate to effectiveness and cause-effect relationships (e.g., Does the intervention work? What cause-effect relationships are supported across studies? What are the benefits and harm? Who will benefit from application of these findings?). Second, the review queries the appropriateness of the intervention or causal relationship from the perspectives of affected parties (e.g., What do consumers, managers, or workers experience? What issues are important to them?). Third, questions address the feasibility of applying the findings and existence of any procedural knowledge that might aid its implementation (e.g., What resources are required for the effects to occur or the intervention to succeed? Will the intervention be accepted and used?).

Judgment and interpretation are crucial to this synthesis and cannot be eliminated by proceduralization, making it "...a sense-making exercise and not a *mechanical one*" (Pawson, 2002a).

An exemplar of an integrative synthesis is the systematic review of information systems outsourcing conducted by Dibbern, Goles, Hirschheim and Jayatilaka (2004). Putting the phenomenon in the context of industry (e.g., financial, e-Business) and history, Dibbern and colleagues assemble the literature's diverse definitions of outsourcing, and then offer a synthesis of them. They organize and review the literature from positivist, descriptive and interpretive epistemologies. Their final product is a synthesis of constructs and relationships with respect to an array of research questions (e.g., Why outsource?).

An integrative synthesis in MOS can identify both facts (declarative knowledge) and ways to use them (procedural knowledge). Such would be the case in a review of goal setting research's identification of the effect of specific versus do-your-best goals and the procedures used to implement it (cf., Locke & Latham, 1984; Locke & Latham, 2002). However, the extent integrative synthesis overcomes the threats to validity or connects procedural and declarative knowledge depends on the studies reviewed.

Synthesis by interpretation

Interpretive approaches to synthesis are associated with relativist epistemologies (e.g., phenomenology or social construction). They are largely limited to published findings rather than primary data, because qualitative data are not as readily shared except in published form. The central focus of qualitative studies tends to differ from quantitative ones. Qualitative studies often focus on the experiences of participants rather than the latter's statistical assessment of effects. In consequence, motives for interpretive syntheses are driven more by interests in human experience and social phenomena than in interventions or mechanisms. These syntheses often translate key interpretations from one study to another. As such they downplay or ignore issues of internal validity aside from covariation and do not consider effect sizes. Contextualization and generalizability are central considerations in all forms of interpretive synthesis.

One approach in this synthesis family is meta-ethnography (Noblit & Hare, 1988: 5-6). It involves a flexible or open coding system developed by coders reviewing the data to identify categories that emerge. Coders compare the imagery and themes that surface across studies (Beck, 2001). Advocates argue that this approach is a unique form of synthesis because it preserves the interpretive qualities of the original data by, "carefully peeling away the surface layers of studies to find their hearts and souls in a way that does least damage to them" (Sandelowski, et al., 1997: p. 370). In meta-ethnography (see for example, Campbell, et al., 2003), reviewers also identify higher-order concepts not evident in the primary studies. It results in the construction of larger narratives and more generalizable theory (Estabrook, Field & Morse, 1994; Sandelowski et al., 1997).

Interpretive synthesis compiles descriptive data and exemplars from individual studies, building them into a mosaic or map (Hammersley, 2001). The process is one of conceptual innovation and reinterpretation (Campbell et al. (2003), while attempting to preserve the original study's integrity or wholeness (Pawson, 2006).

Another approach is described by Popay, Roberts, Sowden, Petticrew, Arai, Rodgers, and Britten (2005). It focuses on understanding treatments or practices and involves four steps: 1) developing a theoretical model of how the interventions work, why and for whom; 2) deriving a preliminary synthesis; 3) exploring relationships in the data; and 4) assessing the robustness of the synthesized output. Primarily, this narrative approach relies on words and text to capture and explain synthesis findings. Its goal is to "tell the story" of studies included in the review (Popay, et al. 2005: 5). In healthcare, qualitative reviews are used to provide more complete understanding of how patients initiate strategic changes in their own regimens, such as diabetics who vary the timing of insulin administration in response to job demands, not as a form of deviance, but a form of more effective coping (Campbell et al, 2003).

Interpretive syntheses are useful where there is a relatively comparable body of qualitative data. In MOS, such might be the case for example if Hochschild's (1997) study of work/family time pressures were interpreted in relation to Perlow's (1997) study of flexibility in work hours. There is no reason why quantitative data cannot be incorporated in an interpretative synthesis as a

means of identifying a common explanation across bodies of data, although few examples of this exist (Dixon-Woods, et al. 2004). Unlike aggregative synthesis which seeks to mitigate bias by pre-specified decision rules, the reviewer is central to the process of interpretative synthesis. As such the synthesis yields a feasible explanation of the studies' findings rather than a definitive one (Noblit & Hare, 1988). Because qualitative research tends to emphasize the richness and depth of contextual analysis (Fielding & Fielding, 2000), critics of this approach (e.g., Estabrooks et al., 1994) argue that interpretive synthesis is 'context-stripping,' not an interpretive act. Another controversy within the community of qualitative researchers is use of structured methods such as purposive sampling, grounded theory, multiple coders, and respondent validation and triangulation as a means for demonstrating rigor (e.g., Wolcott, 1990; Lincoln & Guba, 2005; Dellinger & Leech, 2007). Such practices do not appear as yet to be widely accepted.

Synthesis by explanation

The explanatory approach to synthesis focuses on identifying causal mechanisms and how they operate. It seeks to discover if they have been activated in a body of research and under what conditions (Sayer, 1992: 14).

This synthesis involves a critical realist approach:

“Social systems are the product of literally endless components and forces. When social science tries to focus on what seems a uniform pattern of behavior it soon discovers that it is shaped by historical forces, with the result that it may

occur in one culture but not the next. Secondly institutional forces play an inevitable part. They render behavioral patterns susceptible to change under different organizational arrangements and political structures. Thirdly, behavioral regularities are, of course, also influenced by the volition and choices of people who act them out” (Pawson, 2006: 18)

Explanatory synthesis starts by articulating likely (alternative) underlying mechanisms and then interrogates available evidence to find out whether and where these mechanisms are applicable. It examines the construct validity of indicators derived from primary studies include in the review and addresses the strengths and weaknesses with respect to the internal validity of primary studies. Primary studies are then used “to test, revise and refine the preliminary theory” (Pawson & Tilley, 1997: 74). Each relevant published article is described and discussed in terms of its contribution to the emerging theory,

“... the reviewer’s basic task is to sift through the mixed fortunes of a programme attempting to discover those contexts (C+) that have produced solid and successful outcomes (O) from those contexts (C) that induce failure (O-). The review process is then repeated across a number of additional studies featuring the same underlying mechanism, with the aim of gathering together the various permutations of success and failure... the aim is to differentiate and accumulate evidence of positive and negative CMO configurations” (Pawson 2002b: 345).

In one synthesis Pawson (2006) addresses the question “does Megan’s law work?” (a state law publicizing sex offenders living in the community). Available

data did not permit determining whether naming (the Intervention) led to re-offending (Outcome). Instead, Pawson capitalized on the broad array of related data and focused on the broader use of public shaming. Shaming in this synthesis constituted the mechanism explaining what system characteristics make naming effective in reducing re-offending. Pawson then built a theory of naming and shaming by developing an understanding based on the accumulating reports from a wide range of programs (e.g., bad checking writers, deadbeat parents, etc.). Note some of these programs had positive results, others not. Through synthesis, Pawson built theory from the body of evidence regarding why naming and shaming worked in which situations and with which types of people. Explanatory synthesis recognizes no hierarchy of evidence. The worth of the study can only be determined in synthesis, by each study's contribution to pattern-building (Pawson, 2006). However, unlike the traditional narrative review an explanatory approach is comprehensive in its accumulation of relevant evidence. Representing the array of approaches to tackling a specific research question is critical to this form of synthesis. It treats the vital evidence from primary studies incorporating the original researchers' interpretations and explanations, not just results. The scope of the review includes a wide range of research types and data forms to promote a full understanding of the phenomenon of interest. Its product is a revised model intended to explain for whom, in what circumstances, in what respect and why, certain causes or interventions produce preferred outcomes (Pawson, 2002b). With respect to these boundary conditions, explanatory synthesis gives considerable attention to

the scope of generalizability for its findings as well as to the contextual factors pertinent to their application.

The explanatory approach is useful for synthesis in fragmented and methodologically diverse fields, where little consensus exists regarding what constitutes quality research. MOS is such a field. The role of theory is crucial to the explanatory approach and theory is made explicit. Advocates of interpretive synthesis view the explanatory approach as merely a form of interpretive synthesis and the quality of the review is heavily reliant on the skills of the analyst (Boaz, et al. 2006). In psychology, Zajonc and Markus's (1975) review of birth order effects on intelligence is an example of this approach. Statistical findings, qualitative information and primary researcher interpretations were synthesized to identify underlying mechanisms accounting for observed patterns.

Implications

No single consensus exists regarding what is 'best evidence.' Nonetheless, the four approaches have certain similarities. They all have a goal of optimizing use of primary studies. Reviewing individual studies can demonstrate insights not otherwise evident. All are question-driven. Each approach yields what can be considered complete studies in themselves by virtue of their formal methods. Lastly, though they display no consensus regarding what constitutes *quality* evidence, all use "tough but necessary tests for evidence" (Solesbury 2004): How relevant is this to what we are seeking to understand or decide? How representative is this of the population that concerns us? How reliable, how well-

founded theoretically, empirically is it? Features from these four approaches are informative in developing appropriate approaches to syntheses in MOS.

These four methods of synthesis also highlight features particularly valuable to MOS syntheses. The array of backgrounds and training of MOS researchers leads us to value a formalized process for synthesis to create transparency. Like aggregative and explanatory syntheses, a public and replicable approach, specifying judgments made, allows putting issues of values on the table and subject to scrutiny. By providing an ‘audit trail’ between the claims made and evidence used in formulating an interpretation we accomplish a key requirement of MOS synthesis, strengthening the truth claims synthesis might yield. The integration of qualitative and quantitative data, as in integrative and explanatory syntheses, provides access to a more complete array of the MOS knowledge base, allowing better contextualization and generalizability on the one hand, and incorporation of declarative and procedural knowledge. With these key elements in mind, we now turn to the design of a systematic research synthesis process for use in MOS.

Features of MOS Research Syntheses

“God gave all the easy problems to the physicists”

Unknown, but famous, behavioral scientist.

In marshalling its evidence regarding human behavior in and around organizations, MOS as a late adopter can learn from the approaches to synthesis other fields use. *We seek an approach to evidence synthesis that is systematic*

and replicable, giving confidence to the users it informs regarding the status of present knowledge on a given question. One commonplace complaint among MOS doctoral students is how difficult it can be to identify and make sense of a body of research. We frequently poll groups of students asking, “How many of you have been trained in how to conduct a literature review?” Our consistent finding has been that students get little training in how to review or assess existing research. Developing a structured and broadly applicable approach to synthesis especially adapted to MOS can serve several purposes from better doctoral student education to accelerated scientific progress and more effective practice (Rousseau, 2007). *We seek an approach that can be readily used and adapted to further the supply of convergent knowledge,* consistent with the essential role that systematic reviews play in other disciplines adopting evidence-based approaches to practice (Tranfield et al., 2003). We note that critics of evidence-based initiatives framed the use of synthesis as a competitive matter (e.g. Learmonth & Harding, 2006), giving rise to “‘paradigm wars’ and corresponding mudslinging on behalf of ‘quantitative’ versus ‘qualitative’, ‘positivism’ versus ‘phenomenology’, outcomes versus ‘process’ and so on” (Pawson, 2001: 3). We concur with Baruch Fischhoff’s (1991, p. 844) observation, “Each discipline has an intact critique of its competitors.” In the case of evidence synthesis, the paradigm debate is moot. *We seek an approach that is inclusive of lines of inquiry, research methods, and data sources.* MOS’s inherent pluralism suggests the need to find an alternative to the self-defeating paradigm contests. Acknowledging the merit of Fischhoff’s observation, we propose a framework for systematic but flexibly structured research syntheses

congruent with MOS's pluralism in methods, phenomena and potential end users (scholars, textbook writers, practitioners, and policy makers). We recommend a four-stage synthesis process as a starting point for learning and further development.

Step 1: Question Formulation: Reflection, Debate, and Reformulation

To be useful, a review must have a clear purpose and a specified audience (e.g., scholars, practitioners, policy makers). Beginning with the end in mind, the review question(s) must reflect the review's intended use. Let's say the intended use is scholarly explanation. Targeting explanation might lead to a question such as "what mechanisms operate in the influence of pay on motivation?" In contrast, if the intended use is a practical application, the review process might begin with a question such as "how can the effect of pay on motivation be optimized?" (The same issues apply if there are multiple questions.)

Synthesizing MOS research is complicated by the pluralism of values held by their stakeholders and the complexity of organizations, which cascades effects across levels. The process of question formulation requires attention to both. Attending to stakeholders at the question stage can introduce a variety of meanings for key constructs. Returning to matter of pay and individual motivation, adopting an employer's perspective might concentrate attention on motivation in the form of willingness to engage in in-role performance. In contrast, an employee's point of view might lead to considering whether

motivation reflects commitment (internalized motivation with broad behavioral effect) or compliance (externalized controls narrowing the range of likely behavior). In that case both in-role and extra-role performance may be used as proxies for motivation. Any construct a review question contains must be defined in the context of that question to provide an organizing framework for the review. Hence relevant perspectives and underlying value judgments are important to surface early on. Scientists too make value judgments. These value judgments reflect prevailing scientific beliefs as well as the scientist's professional education, personal motives, and response to institutional pressures (cf. Baratz, 1974; Campbell, Daft & Hulin, 1982).

The complexity of the phenomena associated with the review question(s) derives from MOS's multi-level nature. Studies from several levels of analysis may be pertinent to a review question. Take for instance the question of whether incentive pay impacts individual performance. As described above, Rynes and colleagues (2005) identify several ways in which incentives can impact worker performance. An individual-level motivation effect can occur along with position- or firm-wide sorting effects where highly motivated workers are attracted and retained and the rest screened out. The studies required to address the impact of incentive pay on individual performance involve phenomena and data from several levels. The wording of the question itself is insufficient to determine what levels of measurement the reviewed studies should reflect. Reviewers need to develop knowledge with respect to the theories addressing the issues at hand before specifying the range of studies to examine.

Given the many purposes of evidence, from explanation to forecasting, any question framing needs to factor in the time frame in which evidence has been gathered (i.e. contextualization, as described above). Moreover if the purpose of the review is to advise management practice, it needs to account for the context of future use. As noted above, the historical nature of evidence risks drawing conclusions biased by past practices and erstwhile conditions (Clegg, 2005). So how then can we overcome the limits of the historical past in the face of an unknowable future?

External changes over time can alter the nature and meanings of causal relationships and the effectiveness of interventions. As the nature of work, the competencies of workers, and the sophistication of management and information systems evolve, the factors driving outcomes can change too. In those syntheses where effects are the focus, a basic question needs to be asked: Compared to what? In a review focused on effective management practice, inquiry might compare targeted sectors and subgroups of particular relevance. Let's say that a relevant fact to management practice is that in the course of a decade, workers in China and India are transitioning from low-wage jobs to global knowledge work. The reviewer knows that better educated workers are likely to be managed differently than their less educated counterparts. It is also the case that sophisticated global firms have different incentive systems and supports than many domestic ones. The questions asked might seek a more fine-grained look at aspects of the research most relevant to the anticipated

nature of future work and firms. Nonetheless, as the mix of workers and firms change, fluctuating ranges in variables (broadening or narrowing) can alter observed effects and their stability. It is important to remember that science describes our world as it has been and is, not a logically necessary one (Mitchell, 2000, p. 251), nor the world that will be.

The framing of the question also may acknowledge other constraints. Past research has focused largely on European and North American samples, with research from Asia or other parts of the world appearing only recently. Because the contexts of past observations may be limited, the initial review set up might acknowledge its limitations in order to make a concerted effort to offset them (e.g., seeking relevant non-English language primary studies), to provide a basis in subsequent steps for comparing North American findings with those obtained elsewhere, or to establish boundary conditions.

Although we are never free of the effects of personal values, history and culture, we can consciously critique our own question framing to surface as possible assumptions and implicit biases in order to consider these factors in the review. In formulating review questions, seeking out the opinions and feedback from others with diverse points of view yields more informative questions. We note that having questions reviewed by teams of scholars and practitioners is a common practice in fields with longer histories of conducting systematic reviews (e.g. Cochrane and Campbell Collaborations). At this early stage in the synthesis process, having an array of scholars and practitioners assess and interpret the

question from various vantage points can enhance the ultimate value of the completed review. Doing so can increase the mindfulness of reviewers regarding the disputes and alternative frames of reference associated with their subject. In all, in formulating a review question (or questions) we have two goals: a well-specified and informative question, asked in a manner that avoids obscuring contested issues.

Stage Two: Comprehensive Identification of Relevant Research

The next step is comprehensive identification of research relevant to the central review questions. Salipante and colleagues (1982) have pointed out that the reviewer is inevitably limited by the studies available. In assembling the material to be reviewed, in most cases, the broadest possible array of relevant research should be gathered to compensate for researcher value judgments and uncontrolled validity threats. For most uses, multiple forms of data from descriptive to archival, quantitative to qualitative, are potentially relevant. Assembling a diverse body of evidence also makes possible the investigation of contextual factors influencing findings. Potential sources include published and unpublished material, data bases, and direct contact with the authors of the research. As MOS scholars work in a myriad of countries, it can be necessary to access work in several languages (e.g., German in job design research, Frese & Zapf, 1994; Swedish in studies of employee participation, Holmberg, 2000). Review teams whose members have relevant language fluency have an advantage.

The more heterogeneous the distribution of uncontrolled validity threats in a set of similar findings, the greater the validity of the findings from the set (Salipante et al. 1982). In the pursuit of appropriate inclusion of relevant research, precise inclusion/exclusion criteria should be specified, applied, recorded, and monitored (Tranfield, et al. 2003).

Construct validity is a critical and potentially complicate issue at this stage. A review seeks to capture all relevant studies regarding the review question's key constructs. Reviewers beware. Labels can be misleading. MOS researchers can employ a non-standardized array of terminology to refer to the same under constructs. For example, one study of employment relationships might construe training to be part of a transactional psychological contract while another operationalizes it as part of a relational contract (Rousseau & Tijoriwala, 1999). Careful attention is needed to determine whether and how to include such research in a larger review (cf. Li, Rousseau & Silla, 2006).

In the case of systematic reviews involving organizational practices, our current understanding of how managers and employees actually engage in these practices (deciding when to offer or seek out a reward, promotion, etc.) isn't well developed. Moreover, both organizational practice and policy execution entail some degree of improvisation (cf. Feldman & Pentland, 2003). Systematic syntheses addressing practice-related questions require primary studies addressing implementation effects as well as descriptions of how manager or worker "responds in a unique way to the unique case" (Dingwall, Murphy,

Watson, Greatbatch & Parker, 1998, p. 168, referencing the clinician). In this manner the evidentiary conditions of compliance, contextualization and generalizability also receive attention.

Step 3: Organizing and Interpreting

After gathering the appropriate array of relevant studies, the planning for data extraction begins. The first key issue is what information to derive and code from primary sources. The purposes reflected in the framing of the review questions guide the information extracted and interpreted. Is explanation provided via a single theory, competing theories, or complimentary ones? Studies might be coded to identify *mechanisms* associated with a phenomenon if competing theories are investigated. Or, to identify *phases* of a phenomenon if complimentary theories are examined.

Use of multiple extractors, as readers and coders, is important at this step in order to reduce mistakes in data recording as well as to avoid omission of relevant material. We anticipate that this recommendation will be criticized as “rigor displayed for its own sake.” Note, however, in adopting a critical realist perspective we acknowledged the fallibility of all observations. This limitation applies to the information compiled in systematic reviews. A rigorous, transparent review process is therefore wholly in keeping with MOS’s epistemological basis.

The fallible nature of judgment and rating processes is compounded in systematic reviews by the non-standard reporting styles even published sources display. In consequence, data need to be available for checking. Agreement between extractors should be assessed in terms of rates of agreement and/or inter-rater reliability as appropriate. Divergent judgments should be reconciled. Disagreement between extractors should be recorded in order to capture substantive issues relevant to their interpretations.

Next, the review entails the systematic organization of the data into formats that allow summary and display in the synthesis report. This body of evidence is then probed, sifted, coded, aggregated, and cross-tabulated in numerous ways. All the while, reviewers should engage in a mindful questioning of a priori beliefs regarding the scope and implications of relevant research.

It is important to examine whether the type of method or perspectives researchers have adopted play a role in their findings. Scientific theories explain facts about phenomena rather than facts about data. If an alleged phenomenon is only detectable via highly specialized body of data, this raises suspicion that the phenomenon is spurious (Bogen & Woodward, 1988, p. 318). Spuriousness turned out to be the case in empirical studies of Herzberg's two factor theory. The hygiene/satisfier distinction showed up in interviews formatted so that interviewees credit themselves for things they like (using their skills at work) and blame the company for what they don't (pay)—but not in surveys or interviews structured differently (House & Wigdor, 1967; King, 1970). Facts and

phenomena are not found in the data themselves, but in their interpretation. Interpretation is informed by more than data per se. It is informed by the sensemaking and reflection scholars engage in.

Research background, discipline, or social ties can predispose scientists to analyze and interpret data in a way that confirms firmly held or taken-for-granted beliefs. Such appears to have been the case with Least Preferred Coworker research, popular in the 1960s and 70s (Fiedler, 1967; 1983) where only the findings of the theory's creator and associates, consistently supported the theory. This pattern can be attributed to the intensity of analytic methods used, including the addition of control variables until observed results were fell in line with theory (Graen, Alvares, Orris & Martella, 1970). To identify such patterns, it is necessary to look for clusters and outliers in the results.

The product at this stage is a summary (descriptive and/or statistical), identifying regularities, inconsistencies, and co-occurring conditions that potential influence findings. Information summaries provide include effect size (r or d), patterns of co-occurring features or conditions, and the phenomenon's antecedents and consequences. A case in point is Kluger and DeNisi's (1996) statistical meta-analysis (607 effect sizes representing 23,663 observations) looking back at several decades of research on performance feedback's effect on task or job performance. The effect proved to be conditioned upon the nature of the feedback given. If the form of feedback given called more attention to the self than to task, performance declined. If feedback were more task-focused,

subsequent performance improved. Comparison of effect sizes was used to identify the underlying phenomena.

Descriptive information included in summaries may capture the functions or meanings of a given practice (e.g., promotions that typically are seniority based in one set of studies or merit-based relative to one's cohort in another). They serve to locate the phenomenon studied in its social, industry or cultural context (as in the case where a meta-analysis of assessment center outcomes for men and women is interpreted with respect to research on the way actual promotion decisions are made). As always, however, the reviewer, and consumers of reviews, must recognize that another level of threats exist to entire sets of studies—the conditions limiting the actual settings included and the types of studies conducted (Salipante, et al., 1982, p. 345).

Step Four: Synthesis

The resulting synthesis is an informed explication of what the scientific evidence says with respect to the question and related issues surfaced in the process. Triangulation identifies convergent findings (consistent patterns of effect sizes, comparable meanings and/or goals attached to particular practices or interventions). It also involves making sense of inconsistent results rather than ignoring them. Differences can be attributable to error, to method, or in some cases to meaningful factors such as boundary conditions and situational constraints on the distributions of observed variables (e.g., effects of education on occupational performance may be difficult to detect from studies within a

given type of work since education is often a pre-condition of occupational entry). Integrative explanations focus on explaining interdependencies between aspects of a problem, its boundaries and context (van de Ven, 2007). Exploiting multiple perspectives makes salient the robust features of reality by calling attention to any patterns across them. Some argue that judgment itself can be systematized using decision making technologies or Bayesian methods to integrate weighted judgments (e.g., Sutton, 2001). Informed conversation across stakeholders and interest groups regarding the meaning of syntheses' findings and future implications seems critical for MOS evidence to be well-interpreted and understood. Opening the synthesis to public discussion not only provides a check on quality but can deepen its value and authenticity. Offering the review to public discussion can call attention to one thing no review ever takes into account very effectively: the studies that were never conducted. Public discussion can call attention to unrecognized parameters or under-valued features that no study as yet includes.

Interpretation need not stop when synthesis is achieved. Some syntheses will conclude that the evidence is inconsistent or weak, prompting critical research to resolve contested issues. Other syntheses can lead to a simulation of its results to replicate their conditions. Syntheses can be a catalyst for redesign of organizational practices and routines (Van Aken, 2004; Romme & Endenburg, 2006). It can lead to the development of policy implications, informed by how stakeholder interests can be differentially affected by its findings. Most importantly, reviews can form the basis for consensus discussions and

conferences among scholars, practitioners, and policy makers to engage in well-informed conversations about the evidence now in hand.

Implications

“Beware of the person of one book.”

St. Thomas Aquinas

All studies have limits. Only in their combination does evidence emerge. The goal of science is to produce useful models of reality. Unfortunately, research has not always had a net benefit. In MOS for example, some scholars have critiqued its research for espousing dysfunctional views of labor and capital (Ghoshal, 2005). We believe that the opportunity to both uncover and develop constructive solutions to the problems workers and firms face can be realized through a careful, reflective attention to MOS evidence. But assuredly little impact will occur until we embrace the process of research synthesis. Indeed to do otherwise means that MOS research will remain underutilized at best and often misused, rather than informative and constructive.

Syntheses are needed to provide access to the evidence that would inform MOS’s scholarly development as well as the teaching and practice of evidence-based management. Without syntheses researchers confronting seemingly inconsistent results will choose one of two paths. They may throw up their hands and abandon promising lines of research due to an inability to distinguish complexity from randomness. Or, they may (unconsciously) escalate their efforts to produce the results they prefer. Collectively either way we lose. In this regard

the *Annals* series and the Academy of Management generally have an important role to play in promoting systematic syntheses and their public discussion.

Note we have no expectation that the availability of evidence directly translates into action. Evidence is not answers. Instead synthesized evidence is an accessible knowledge supply from which well-informed answers can be derived. Moreover, even rational models of decision making focus on what knowledge decision makers already possess. Few people search for relevant evidence before making decisions. Unfortunately failure to seek relevant evidence affects the decisions of scholars too. Herb Simon used to say “When an academic starts a sentence, ‘As a (fill in the blank),’ I always know I am not going to learn anything.” Fill in the blank with the words “economist,” “psychologist,” “sociologist,” or any “ist” of your own choosing. Long ago, Dearborn and Simon (1958) demonstrated that a subject presented with a complex stimulus sees what he or she is ready to see. As human as laboratory subjects and executives, scientists themselves tend to see what their frames of reference prepare them to see (Walsh, 1988; Waller, Huber & Glick, 1995). So, if the information provided by an evidence synthesis is not enough to promote its use, then what?

Interpreting evidence is essentially a community project. Evidence synthesis is a critical *first step* in priming the pump so that accumulated knowledge is made available for interpretation and use. It is not enough to publish a primary study, no matter how well executed or substantive it is. Until it is interpreted in the context of a larger body of evidence a primary study is merely one brick and not

a building block. A single study can form part of several syntheses and numerous updated reviews over time. Intensive communication and networks are needed to impact the understanding, uptake and application of evidence. Evidence syntheses and their products belong in the day-to-day conversations of MOS's constituencies, its scholars, practitioners, and policy makers. We echo Bhaskar's (1998) aspiration for research syntheses to become an emancipatory social practice. How much more effectively might we use the resources at our disposal to foster change if we interpret the world adequately?

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