TRIANGULATING PHILOSOPHIES OF SCIENCE TO UNDERSTAND COMPLEX ORGANIZATIONAL AND MANAGERIAL PROBLEMS

John Bechara and Andrew H. Van de Ven

ABSTRACT

We propose that management scholars can improve their research by triangulating alternative philosophies of science to gain a richer and more holistic understanding of complex managerial problems. We illustrate the proposition by triangulating with three scientific philosophies – positivism, postmodernism, and critical realism – to design a study in response to a debate in the sociology of professions. After summarizing and applying positivism, postmodernism, and critical realism to reveal their differing research approaches, we discuss how to deal with the convergent and divergent information often produced by triangulating philosophies of science. Although common views of triangulation emphasize reliability by focusing on convergent information from different methods, we emphasize validity by discussing how divergent information from different methods reveal important aspects and values of a complex phenomenon that often go unrecognized without triangulation.

INTRODUCTION

The study of management often involves complex social phenomena or problems that are seldom understood adequately from one point of view. Multiple perspectives are needed to appreciate various aspects and dimensions of complex phenomena. To accomplish this, a triangulation strategy is often recommended using multiple methods, models, data sources, and investigators to represent the phenomenon or problem. Although triangulation is a widely endorsed and used strategy in the social sciences (Mathison, 1988), it is seldom applied by using multiple philosophies of science to investigate complex phenomena.

Unfortunately, as evident in the so-called "science wars" among management scholars (e.g., Pfeffer, 1995; Van Maanen, 1995), philosophy of science is sometimes treated as a religion that should be practiced faithfully throughout a scholar's career. Using different philosophies of science to examine a research question is considered "opportunistic" at best and "heretical" at worst by the true believers of a community of researchers practicing a particular philosophy of science. This commitment to a single philosophy of science has the cost of limiting a researcher's capabilities. Many real-world problems are too ambiguous and complex to be represented adequately by one perspective or methodology.

This chapter advances the proposition that management scholars can substantially expand their research repertoire by triangulating alternative philosophies of science to gain a richer and more holistic understanding of a complex organizational and managerial problem being investigated. Although we acknowledge that the incommensurability among philosophies of science might pose a theoretical problem given that each philosophy espouses different ontological, epistemological, and methodological assumptions, in practice each philosophy sheds light on a different aspect of the organizational and managerial problems that can only be elucidated by adopting each philosophy. More importantly, triangulating philosophies of science might also reveal the interdependence among various aspects of the problem and hence highlight inherent instability in privileging one perspective or assuming that each perspective sheds light on a nonoverlapping aspect of the problem. In addition, triangulating philosophies of science is part of a chorus of work, although focused on paradigms,[1] which

highlights and shows the importance of multiparadigm inquiry of complex phenomena in organizational life (Lewis & Grimes, 1999; Schultz & Hatch, 1996; Gioia & Pitre, 1990; Weaver & Gioia, 1994; Hassard, 1991; Tsoukas, 1994). We illustrate the proposition by applying three philosophies of science – positivism, postmodernism, and critical realism[2] – to design a study in response to a debate in the sociology of professions to study the impact of the organizational structure on the professional's work autonomy. We first summarize positivism, postmodernism, and critical realism to reveal their differing research approaches and perspectives; we then apply each philosophy of science to our case. Finally, we discuss the convergent and divergent information often produced by triangulating philosophies of science. Although common views of triangulation emphasize reliability by focusing on convergent information from different methods, we emphasize validity by discussing how divergent information from different methods reveal important aspects and values of a complex phenomenon that do not become salient without triangulation.

PHILOSOPHIES OF SCIENCE

We now provide a brief overview of the main conceptual tenets of positivism, postmodernism, and critical realism. Obviously, we cannot provide a detailed review in the limited space here. Table 1 summarizes the characteristics of these philosophies and provides an outline for the review discussed below.

Positivism

Logical positivism was an extension of the Enlightenment and modernism's faith in objectivity, reason, and the progress of scientific knowledge. It emphasizes sensory observation and induction[3] as the foundation of scientific knowledge (Giere, 1988). Underlying this assumption is a value-free and neutral observer and language. It denies all metaphysical statements as having any correspondence with reality and considers them meaningless due to their failure to pass the verifiability theory of meaning or verificationism (Boyd, 1991; Blumberg & Feigl, 1948). This also leads to conflating epistemology with ontology. It also reduces causal relations or explanations to Humean[4] constant conjunction of events and emphasizes the unity of science or the primacy of the physical sciences as the model for

Table 1. Comparison of the Characteristics of Positivism, Postmodernism, and Critical Realism.

Dimensions	Positivism	Postmodernism	Critical Realism
Definition	Philosophical movement inspired by empiricism, instrumentalism, and positivism	Contemporary intellectual movement characterized by its skepticism about the foundations of Western philosophy	Philosophical movement characterized by the existence of a mind-independent reality and the ability of a theory to capture partial aspects of reality
Some key authors	Moritz, Schlick (1882–1936), Reichenbach, Hans (1891–1953), Carnap, Rudolf (1891–1970), Hempel, Carl (1905–)	Jean Baudrillard (1929), Gilles Deleuze (1925–1995), Jacques Derrida (1930–2004), Michel Foucault (1926–1984), Jean-Francois Lyotard (1928)	Archer, Margaret (194x–), Campbell, Donald (1916–1996), Bhaskar, Roy (1944–)
Ontology	Objective: reality is the empirical world	Subjective: reality is sociolinguistically constructed	Objective: reality, whether social or natural, is intransitive (i.e., independent of human cognition). It is construed subjectively using different perspectives and paradigms to create transitive (socially created) knowledge. The products of science are always transitive, but they refer to intransitive objects
Epistemology	Objective: the correspondence between our statements and reality through inductive verification or deductive falsification	Subjective: there is no privileged epistemology due to the incommensurability of discourses	Subjectivist: there is no predefined or predetermined methodology or criterion to judge the veracity of our knowledge
Methodology principles	1. Absolute truth (value free) 2. Causal explanation (constant conjunction) 3. Analytic/synthetic distinction 4. Verificationism (inductive verification/deductive falsification) 5. Rational reconstruction (operationalism) 6. Unity of science 7. Neutral observer and language	1. Truth is sociolinguistically constructed (value laden) 2. Anti-essentialism – no underlying causal mechanisms 3. Rejection of grand narratives 4. Lack of linguistic essentialism–linguistic turn–"difference"–self-referential	1. Truthlikeness/verisimilitude 2. Causal explanation (underlying mechanism and structure, i.e., metaphysical) 3. Intransitive/transitive entities 4. Fallabalism of scientific knowledge 5. Epistemic relativism and judgmental relativism

all sciences. Hence, positivism is only concerned with the material/empirical world that exists independent of human cognition.

Logical positivism construes the aim of research as the identification of general causal explanations and fundamental laws that would describe the regularity of events observed. To achieve this goal, the social sciences adopt natural sciences' methods that are usually preoccupied with internal validity, external validity, reliability and consistency, and operationalization of concepts. Research questions and hypotheses are formulated in propositional form and require the use of empirical tests for their verification through careful control (manipulation) to avoid confounding conditions and outcomes. The researcher is assumed to be independent of the objects observed in the world, and capable of studying the objects without influencing, or being influenced by, them. When influence in either direction (threats to validity) is recognized or suspected, various strategies are followed to reduce or eliminate it. Inquiry takes place "through a one-way mirror" (Guba & Lincoln, 1994, p. 110) in a sort of correspondence between our thoughts/signs and reality. By following rigorous experimental procedures, values, and biases are prevented from influencing outcomes, and empirical truth is established through replicable findings. Hence, the researcher has a "God's eye" frame of reference.

Postmodernism

Postmodernism reacted to positivism's emphasis on certainty, its anti-metaphysical attitude, its reliance on sensory observation, and its modernistic values (Alvesson & Deetz, 1996; Dallmayr, 1987; Sim, 2001). Postmodernism construes truth as socially constructed and theory laden. It adopts an anti-essentialist stance that denies science its objectivity and indisputably rational basis, and an anti-foundationalist stance that denies any privileged way of acquiring knowledge of it. Anti-essentialism refers to a rejection of the essence of phenomena and the causal mechanisms underlying them. The essentialist notion is the cornerstone of classic scientific inquiry. As Sim (2001) suggests, essentialism regards the attainment of truth, meaning, and origin as its goal. Anti-foundationalism refers to the rejection of foundational or self-evident beliefs required in the pursuit and acquisition of knowledge. For example, postmodernism rejects the basis of epistemology that asserts the existence of self-justifying or self-evident first principles that guide and provide the basis for scientific inquiry. Finally, postmodernism provides access to the personal and social worlds. The personal world consists of our own individual thoughts, emotions, and beliefs. We experience the world and participate in

constituting this world. Hence, the world is subjective and only accessible to us by sharing and appreciating each other's conception of the world. Similarly, in the social world we are part of and constitute the social system. Hence, our relationship with the world is intersubjective and a socially constructed. We are both constrained by preexisting material conditions, but we also have the power to change these systems albeit very gradually.

Postmodernism rejects the progressive accumulation of knowledge and overarching theories or grand narratives. Knowledge is seen as outcomes of various discourses that have their own rules, structure, and evaluative criteria. Postmodernism aims to decenter the subject and rejects the individual as the center of meaning (Cahoone, 1996; Calas & Smircich, 1999). It also aims at exposing the power relationships implicit in any discourse that empower some individuals and marginalize others. Unlike critical theory, postmodernism does not have emancipatory goals but seeks to critically expose the nature and function of our social and mental worlds.

Critical Realism

Critical realism (Bhaskar, 1979, 1998a, 1998b, 1998c) was developed as an alternative between logical positivism and the more relativistic positions such as postmodernism. It presupposes a mind-independent and stratified reality that consists of underlying structures and mechanisms that determine how things come to behave (transcendental realism). It also holds that theoretical entities have referential value (i.e., theoretical entities genuinely reflect the way the world is). From postmodernism, critical realism adopts a subjective or anti-foundationalist epistemology whereby there are no self-evident methodologies or criteria that provide privileged access to reality. From positivism, critical realism emphasizes empirical experimentation, although it denies the possibility of generalizing its experimental outcomes due to the nature of reality that is stratified and dynamic consisting of underlying contingent structures.

Critical realism repudiates positivism for its anthropocentric view of the world that confounds constant conjunction of events with causality and reduces the world to sense experience (material/empirical world). This anthropocentricity is also known as the epistemic fallacy that is the reduction of reality to what can be known about reality. According to Bhaskar (1979, 1998a, 1998b, 1998c), reality consists of three domains: the empirical, the actual, and the real[5] that are also the stages of scientific discovery. Stage 1 or

the domain of the empirical consists of regularities or constant conjunctions of events that constitute the basis for our empirical studies in science. Stage 2 or the domain of the actual consists of causal laws that exist independent of agents and may be unperceived. Finally, stage 3 or the domain of the real consists of the generative underlying mechanisms that determine the behavior of entities. Hence, the process of scientific explanation begins with the observation of partial regularities (the domain of the empirical), the separation of the causal components (the domain of the actual), the inference of the underlying mechanism(s) (the domain of the real) that can account for these regularities and, finally, the validation of the mechanism(s) empirically and the elimination of rival explanations. Thus, the explanation shifts from the intransitive dimension to the transitive with the postulation of underlying mechanisms regulating the phenomena that are the essence of scientific discovery.

TRIANGULATION

Using positivism, postmodernism, and critical realism, we reviewed how each philosophy of science emphasizes and de-emphasizes aspects of a problem and might offer inconsistent or contradictory solutions or outcomes. Each philosophy of science dictates the nature of the problem (ontology), the ways of knowing the problem (epistemology), the methods for understanding or explaining the problem, and criteria for evaluating solutions. However, given these different outcomes, how might a researcher proceed?

One alternative is traditional triangulation that focuses on using common or convergent outcomes from each perspective. Traditional triangulation refers to the use of multiple theories, methods, and data sources. It is based on the concept introduced by Campbell and Fiske (1959) as a procedure for establishing the convergent and discriminant validity of measures. According to Mathison (1988), it assumes that the bias inherent in any particular theory, method, or data source will be eliminated, or at least minimized, by relying on the convergent information from different methods.

But reliability should not be confused with validity. Mathison (1988) raises the question of whether arguments for triangulation have confused validity with reliability. The evidence produced by alternative sources and methods might be different because of bias in data sources (reliability), or it may be that different methods and sources tap different dimensions or domains of knowing the phenomenon (validity). If we restrict ourselves to a reliability view of triangulation, we would report only the convergent

findings on which all data sources and methods agree. "By doing this, one would necessarily be unduly restrictive in making valid claims about social phenomena" (Mathison, 1988, p. 16). Buchanan (2003, p. 18) states a more critical postmodern position – "The singular, coherent account which fails to expose conflicting views of the change process is deeply suspect."

A metaphor from geometry may be helpful to distinguish valid from reliable representations of a phenomenon through a triangulation strategy. In geometry increasing numbers of dimensions are needed to represent (or plot all points) of more complex systems. For example, all points in a line can be represented completely in one dimension, all points in a square (or along two axes) requires two dimensions, all points in a cube or box require three dimensions, etc. The question is how many dimensions are needed to represent (or plot) the key features of a problem being investigated? To be considered valid, the dimensionality of the methods used should match the dimensionality of the phenomena observed. When unidimensional methods are used to study a multidimensional phenomenon, the result will obviously be a myopic and only partially valid representation of the phenomenon. Conversely, use of multidimensional methods to examine unidimensional phenomena will converge in a reliable way to the number of dimensions of the phenomenon observed. Valid measurement first requires establishing the dimensionality or complexity of the phenomena under investigation. Then one can examine the reliability (or convergence) of alternative methods in representing that complexity.

To a postmodernist, the dimensionality or complexity of a problem does not objectively exist "out there" as this geometric metaphor implies. Dimensionality is as much a property of the theories and methods used to represent a problem as it is with the problem itself. A single observer (with a given philosophy of science) tends to represent a problem in fewer dimensions than do multiple observers with different perspectives. Triangulation increases the richness (and complexity) of problem representations, which decreases the likelihood of myopic representations that other stakeholders may perceive as being biased and misdiagnosed. When different philosophies and methods of science converge on the same dimensions of a problem, this reliability provides confidence in having a valid representation of the problem domain. But when the views of different stakeholders do not converge, this indicates that the dimensionality of a problem domain may not have been mapped in a valid and reliable way. All one can conclude is that "there is more to this problem domain than I envisioned."

So given different outcomes of triangulation, how might a researcher make sense of convergent and divergent information from different philosophies and methods of science?

It is often easier to construct meaningful explanations in cases where the evidence is convergent. For example, Azevedo (1997) advocates the use of multiple models for mapping a problem being investigated, and argues that knowledge that is reliable is invariant (or converges) across these models. Convergent explanations rely on similarities, consensus, and central tendencies in explaining a problem or issue under investigation. They tend to treat differences and inconsistencies as bias, errors, outliers, or noise.

More difficult (but often more insightful) explanations emerge when different data sources yield inconsistent or contradictory information. Arbitrage provides a strategy for developing holistic explanations based on different accounts of the same phenomenon. Friedman (2000, p. 24) points out that in academe and elsewhere, "there is a deeply ingrained tendency to think in terms of highly segmented, narrow areas of expertise, which ignores the fact that the real world is not divided up into such neat little bits." He argues that the way to see, understand, and explain complex problems in the world is to systematically connect the different dots, bits, and pieces of information through arbitrage – "assigning different weights to different perspectives at different times in different situations, but always understanding that it is the interaction of all of them together that is really the defining feature of the [system] … and thereby order the chaos" (Friedman, 2000, pp. 23–24). Arbitrage is a process that Wilson (1999) calls "consilience," integrating fragmented perspectives and bits of knowledge into a larger (gestalt) appreciation of the question being addressed. It is a strategy of explaining differences by seeing the interdependencies and webs of entanglements between different and divergent dimensions of a problem, its boundaries, and its context.

Arbitrage, similar to previous multiple paradigm techniques (e.g., Lewis & Grimes, 1999, among others), highlights the convergent and divergent findings among philosophical results and attempts to reconcile or preserve the tension among the results. The reconciliation of divergent results could be conducted at the boundaries or transition zones by developing second-order theoretical concepts that provide bridges across results from various philosophies of science (Gioia & Pitre, 1990). Alternatively, the preservation of tensions across the results of different philosophies of science can be achieved by moving back and forth between philosophical perspectives and

cross-fertilizing each perspective's results without having to integrate them into one perspective (Schultz & Hatch, 1996).

Paradoxical thinking provides a way to reconcile and maintain divergent results and also highlights interdependencies and relationships among the divergent dimensions of the problem, its context, and its boundaries. Poole and Van de Ven (1989) discuss four general methods of paradoxical thinking: balancing between opposites, shifting levels of analysis, alternating positions over time, and introducing new conception. Van de Ven (2007) states:

> In particular, we proposed four different ways to approach apparent paradoxes observed in practice and our theories about the phenomenon. First, accept the paradox or inconsistency, and learn to live with it constructively in a pluralistic world with principles of respect for and balance between oppositions or 'moderation in all things.' Second, clarify levels of reference from which different perspectives or interests of a problem arise (e.g., part–whole, micro–macro, or individual–society) and the connections among them. Third, take into account the time needed to explore when contradictory interests or processes each exert a separate influence on the problem. Fourth, introduce new concepts that either correct flaws in logic or provide a more encompassing perspective that dissolves the paradox. (Chapter 8, p. 19)

In sum, unlike traditional triangulation that emphasizes reliability, divergent triangulation emphasizes validity, and provides a means of incorporating, assimilating, and maintaining pluralistic perspectives or outcomes that can be inconsistent or contradictory. Divergent triangulation is consistent with the postmodernist anti-foundational stance (Calas & Smircich, 1999) since it embraces pluralism and denies any ''privileged'' philosophy of science. Implicitly it asserts that each philosophy does not reflect intrinsic properties of a phenomenon or problem but rather relational, perspectival, idealistic, and provisional properties, and hence the main-tenance of inconsistent and contradictory outcomes is unproblematic. It is also a technique for comparative appraisal and evaluation of different philosophies that in turn facilitates communicating across philosophical boundaries and increases reflexivity (Alvesson & Skoldberg, 2000; Harley, Hardy, & Alvesson, 2004; Johnson & Duberely, 2003; Lynch, 2000).

CASE OF PROFESSIONAL GROUPS

We now provide an example of triangulating philosophies of science by examining a debate in the sociology of professions. Professionals are increasingly becoming part of larger business organizations. The impact of

such organizations on the individual professionals is an area of particular interest (e.g., Wallace, 1995; Briscoe, 2006). The main concern has been impact of the organizational structure on the professional's work autonomy (Tolbert & Stern, 1991). Competing theories about the state of professionals' work autonomy continue to be part of an ongoing debate in the sociology of professions. According to the proletarianization thesis (Braverman, 1974; Larson, 1977), work autonomy is threatened by the imposed administrative procedures such as work rhythms, hours, and technology use that are all subject to managerial approval and review. In contrast, according to the mutation thesis (Freidson, 1983, 1984), hybrid forms for organizations have emerged (e.g., hospitals and law firms) that deviate from the bureaucratic administrative model and provide a setting to accommodate professionals (e.g., professional organizations/bureaucracies; Scott, 1965; Smigel, 1969).

With this research opportunity, how might researchers address this debate? Using positivism, postmodernism, and critical realism, we show how each philosophy of science emphasizes and de-emphasizes different aspects of the debate and might offer divergent solutions or outcomes. Each philosophy of science dictates the nature of the problem (ontology), the ways of knowing the problem (epistemology), the methods for understanding or explaining the problem, and the criterion for appraising the solutions or outcomes. Table 2 summarizes the application of these philosophies to the debate.

Table 2. Application of Positivism, Postmodernism, and Critical Realism to the Relationship between Work Standardization and Work Autonomy.

	Work Standardization → Work Autonomy
Positivism	Focuses on the empirical association between observable variables that are used to operationalize and measure work standardization and work autonomy constructs
Postmodernism	Focuses on uncovering the subversive and underlying power relations by introducing an ideological dimension to proletarianization thesis that reveals processes of subordination and exploitation where the organizational power brokers are setting and enforcing the goals of work
Critical realism	Focuses on alternative plausible models and suggests a cognitive model and an affective model that moderates the underlying mechanisms of ideological and technical proletarianization

We then discuss the implications of such outcomes especially for our conception of triangulation and adoption of one "privileged" philosophy of science. The adoption of one "privileged" philosophy of science neglects the multidimensionality of reality. We conclude by discussing different types of problems and stakeholders that might benefit from this type of triangulation.

Positivism

In response to the debate about the state of professionals' work autonomy, researchers adopting a positivist philosophy would be preoccupied with the identification of the empirically measurable variables that can be inputs for assessing causal relationships using various statistical techniques. For example, one effect of the employment of professionals in large bureaucratic organizations is the standardization of professional tasks. Wilensky (1964) argues that the degree of codifiability of professional knowledge is inversely proportional to professional autonomy within the organization. In order to assess this effect, the theoretical terms – work standardization and work autonomy – are operationalized using observable terms such as the number of administrative procedures enforced by the organization and the number of tasks performed that deviate from the procedures, respectively. Based on the proletarianization thesis (Braverman, 1974; Larson, 1977), work standardization is inversely proportional to work autonomy. The validity of this conjecture is dependent on the statistical results that should reveal a negative correlation between number of administrative procedures enforced and number of tasks performed that deviate from the procedures. In contrast, the mutation thesis (Freidson, 1983, 1984) suggests that hybrid forms for organizations have emerged where professionals tend to manage and supervise other professionals and hence the predictions of the proletarianization thesis inadequately describe the state of professional employees. The mutation thesis predicts that work standardization is proportional to work autonomy, and the validity of the relationship is dependent on the results that should reveal a positive correlation between observable terms. However, the existence of statistical correlation or event regularities does not provide an adequate explanation of the relationship and the potentially relevant implications of work standardization on work autonomy. An explanation would require elucidating the mechanisms underlying the statistical correlation and an assessment of the role of context.

   As we will see later, postmodernists and critical realists raise some of the implicit assumptions regarding the work standardization construct, as well as the relationship between work standardization and work autonomy, respectively. The postmodernist and critical realist accounts provide alternative explanations of the observed relationship or regularity and their relationship with the unobservables.

Postmodernism

In response to the debate about the state of professionals' work autonomy, postmodern researchers would be preoccupied with challenging the taken-for-granted assumptions of existing positivistic studies to uncover subversive histories or power relations. For example, the positivistic notion of work standardization overlooks more profound processes of subjugation. For postmodernists, instead, concepts such as "work standardization" are placed in inverted commas to indicate their discursively constructed nature. Thus, a possible genealogical analysis of the notion of "work standardization" would entail revealing its development as an outcome of processes of conformity and subordination and would uncover its multidimensional impact on work autonomy. Using Derber's (1983) distinction between technical proletarianization and ideological proletarianization, postmodernists might highlight the relation between work standardization and work autonomy and illustrate the multilayered process of conformity and subordination that includes the work process as well as the work goals. Technical proletarianization occurs when the professional losses control over the labor process that is now managed by the organization's administration that purchased the labor, whereas ideological proletarianization occurs when the professional losses control over the uses of the product that is now owned by the organization. More specifically, this distinction highlights the loss of control over the process of conducting work and the loss of control over the goals and social purposes to which work is directed in the relationship between work standardization and work autonomy.
   Overall, work standardization is related to the specific job attributes and functioning of the entire production-cum-consumption system that dictates the goals and social purposes of work. Forms of work standardization do not reveal some timeless human nature, nor certain characteristics inherent in jobs, but rather ways of thinking, feeling, and behaving that are effected through particular discourses of work standardization that have arisen in late capitalism.

Critical Realism

Similar to positivism, critical realist researchers would respond to the debate about the state of professionals' work autonomy by focusing on empirically measurable variables and identifying regularities or covariation between variables using various statistical techniques. After these relationships are established, researchers identify the unobservable generative mechanisms underlying the observable regularity of events and relationships. Using Derber's (1983) distinction between technical proletarianization and ideological proletarianization, critical realists might highlight the multiple mechanisms underlying the relation between work standardization and work autonomy, namely the constraints on the work process as well as the work goals. However, they might also highlight different plausible alternative models by considering the cognitive and affective aspects of the work and their role in mitigating or accentuating the relationship between work standardization and work autonomy. A cognitive model emphasizes the inherent uncertainty and difficulty in codifying professional tasks that might result in the standardization of work goals that are more amenable to administrative procedures rather than work processes that are much more technical and require a higher level of expertise. Hence, as the technical uncertainty of work increases, organizations are less likely to rely on technical proletarianization. An affective model emphasizes the socialization and training of professionals, their community, and other-regarding orientation and their values. Therefore, professionals with more extended professional training and experience are more likely to resist ideological proletarianization.

Overall, work standardization can be viewed from a cognitive and an affective model whereby each specifies the extent to which the mechanisms underlying the work standardization and work autonomy are more or less likely to occur.

Triangulating Philosophies of Science

Using these outcomes, different dimensions of reality can be explored and explained. In our case, applying positivism, we explored the relationship between work standardization and work autonomy. However, this relationship neglects the technical and ideological dimension of work standardization. The ideological dimension is exposed using postmodernism that reveals processes of subordination and exploitation where the organizational power

brokers are defining the goals of work. Finally, critical realism distinguishes between a cognitive model and an affective model in an attempt to show how each moderates the underlying mechanisms of ideological and technical proletarianization of work.

We now apply arbitrage and paradoxical thinking to gain a coherent and holistic conception of the relationships between work standardization and work autonomy. More specifically, we link outcomes of each philosophy of science by shifting levels of analysis, alternating positions over time, and introducing new concepts.

From postmodernism, we distinguish between technical and ideological proletarianization. Shifting levels of analysis provides an understanding of the underlying complexity of the relationship between work standardization and work autonomy. Whereas technical proletarianization is more likely to vary at the individual level, ideological proletarianization is more likely to vary at the organizational level. More specifically, technical proletarianization begins with the individual's loss of control over work hours and place of work followed by the routinization of work according to the organization's plans. Ideological proletarianization, however, refers to the loss of control over the overarching goals and orientations of work that are imposed across organizational members.

The interdependence among technical and ideological proletarianization mechanisms can be understood using the cognitive and affective models suggested by critical realism. Whereas the cognitive perspective suggests that organizations resort to ideological proletarianization when the codifiability of professional tasks is high, the affective perspective suggests that organizations might be prohibited from using ideological proletarianization when dealing with professionals that have extended training and experience due to their resistance to change in their work goals and orientations.

Understanding the dynamics of technical and ideological proletarianization requires adding a temporal element. By alternating positions over time, Derber (1983) states that the process of proletarianization follows several stages where ideological proletarianization precedes technical proletarianization given that work goals are more amenable to administrative procedures and policies. In addition, technical proletarianization follows two stages beginning with the loss of control over work hours and place of work followed by the routinization of work according to management's plans. However, the cognitive aspect of professional tasks, namely their uncertainty, has prevented complete technical proletarianization and specifically has prevented the routinization of tasks. Hence, professionals have succumbed to ideological proletarianization that influences the control

over the goals to which work is put and reduces the domain of professional autonomy to problems technique.

Finally, introducing the concepts of ideological desensitization and ideological co-optation (Derber, 1983) that emerged as responses to ideological proletarianization, we can explain the maintenance of such processes of proletarianization. First, ideological desensitization refers to a process where professionals separate themselves from their work, the context in which they conduct their work, and the uses of their work. More specifically, ideological desensitization refers to the refusal to accept the ideological or moral dimensions of work and that work serves certain interests and not others. This process of separation and desensitization prevents discontent on the part of the professionals who are not expecting any ideological or moral dimension to their work. Second, ideological co-optation refers to a process where professionals redefine their goals to be consistent with the organizational goals. In other words, professionals conform to the organizational procedures with their underlying values and expectations to justify their work within their employing organizations.

Overall, we apply arbitrage and paradoxical thinking to gain a coherent and holistic conception of the relationship between work standardization and work autonomy. In response to the debate in sociology of professions, we show that the proletarianization thesis provides a partial account of the relationship that is restricted to the ideological domain of work. The mutation thesis, however, complements the proletarianization thesis but is restricted to the technical domain of work. In addition, we show that neither thesis reveals the interdependence among the ideological and technical domains, the underlying temporal dynamics of the relationship, or the factors maintaining proletarianization.

TYPES OF PROBLEMS THAT REQUIRE TRIANGULATION

Many phenomena contain inconsistent and contradictory elements. Rendering such problems as incommensurable denies their reality. As Suppe (1977) insightfully questioned about Kuhn's claims of incommensurability, if pluralistic perspectives are truly incommensurable, how is it possible that scholars (and practitioners) can compare different paradigms and communicate constructively across paradigms? One implication of the divergent triangulation is that researchers need to expand their traditional explanations that emphasize convergent central tendencies to include

explanations based on inconsistent findings through arbitrage and contradictory findings with methods of paradoxical reasoning (Weaver & Gioia, 1994). Two problems that require this type of triangulation are those requiring the views of multiple stakeholders and distributed cognition.

Understanding the views of multiple stakeholders requires compiling and coordinating between and among perspectives, world views and accounts, and appraising their interrelationships. In so far as convergence is possible, then a unified and integrated position can be developed and addressed. However, more often than not, the perspectives, world views, and accounts do not share a complete part–whole relationship, and hence unification, integration, or even elimination cannot be accomplished, at least not to the detriment of developing a solution. To address such problems, nonconvergent triangulation provides tools such as arbitrage and paradoxical reasoning to recognize and compare pluralistic accounts and views of different stakeholders.

Similarly, distributed problems require more than one human being to accomplish the cognitive requirements (Hutchins, 1991). As Giere (2002) argues, understanding such problems requires coordinating knowledge rather than simply pooling knowledge statistically by different people or units. Divergent triangulation, through arbitrage, facilitates the coordination of individual bits of knowledge and organizes them into an organized system operating in real time. Hence, the problems are appraised and resolved without the mediating reductionism, parsimony, and unification of traditional triangulation.

CONCLUSION

Management scholars in each philosophy of science use a repertoire of well-established methods and techniques to identify event regularities in the empirical world. Positivism, postmodernism, and critical realism treat the regularities as expressions of historical, contextual, and developmental processes of discourses or mechanisms, respectively. However, the assumptions and presuppositions of each philosophy impede any unification, integration, or elimination. Some of these assumptions are ontological, which have implications for the nature of the world, and epistemological, which have implications for the ways of knowing the world such as the causal relations employed and the structure of the domain under investigation. For positivism, the causal relations are restricted to the domain of the empirically observable. For postmodernism and critical realism, the causal relations include not only the empirical but also the social and personal/mental that

interact and mutually affect each other. Despite there being one phenomenon or problem under investigation such as in our case example, each philosophy of science provides a partial and provisional perspective. Each philosophy highlights different areas, parts, and domains as causally active or inactive. Hence, using divergent triangulation, management scholars can appreciate the perspectival and transient nature of the pluralistic outcomes of each philosophy. This equips scholars with a technique to address the questions and use the methods specific to each philosophy to understand complex phenomenon. It is only when a "privileged" philosophy is propounded that seeks to displace or eliminate others that conflict arises. More often than not, this conflict is due to the researcher's philosophical orientation rather than the phenomenon or problem under investigation.

NOTES

1. We maintain that the major difference between a philosophy of science and a paradigm is in terms of their substantive orientations. While a philosophy of science specifies a set of ontological, epistemological, and methodological assumptions, it is not oriented toward a specific scientific field of inquiry but is assumed to apply broadly to all fields. Paradigms, however, tend to be oriented toward a specific scientific field of inquiry and provide a more concrete set of philosophical assumptions that are ontological, epistemological, and methodological. For example, positivism is philosophy of science that maintains a general set of philosophical assumptions that can apply to any scientific field of inquiry; however, functionalism is a paradigm that is typically associated with sociological inquiry.

2. These three philosophical schools are featured in this chapter because they reflect many current practices and debates among social scientists. Positivism and postmodernism set the outer limits of philosophical thought with their contrasting ontology and epistemology, and hence bracket the discussion of critical realism which lies in between the previous schools.

3. Popper claimed that scientific activity often emerged out of metaphysical speculation and creative intuition that might become testable and therefore scientific. He replaced logical positivism's inductive and verificationist principles with deduction and falsification. He reversed verificationism, which proves a theory, into falsificationism that only disproves a theory. With his falsificationism, he attempted to avoid Hume's skepticism by providing a systemic way of conducting science. Thus, any statement that cannot be falsified or refuted was metaphysical and therefore not scientific. This process of falsificationism leads to epistemological Darwinism where the fittest of theories will survive empirical refutation. This evolutionary process leads to better approximations of the truth or increases truthlikeness/verisimilitude. Yet, Popper still preserves some of the positivist assumptions such as the possibility of a theory-neutral observational language, a

modified correspondence theory of truth, the methodological unity of the sciences, and the use of science to control the natural and social environment.

4. Hume defined causality as a product of habitual experience. The four conditions to insure causality are: constant conjunction (two events are constantly associated with each other), antecedence (events occur sequentially in time), contiguity (both events are spatially in the same location), and necessity (no alternative observation). The last condition, necessity, was problematic since it was impossible to observe all instances of the phenomenon under investigation, and thus any universal law from a finite number of observations can never be certain.

5. Since critical realism espouses a stratified ontology, that is, the mind-independent world consists of three strata – the real, the actual, and the empirical – it construes each stratum as interdependent and nonreducible to its constituent strata.

ACKNOWLEDGMENT

REFERENCES

Alvesson, M., & Deetz, S. (1996). Critical theory and postmodernism approaches to organizational studies. In: S. Clegg, C. Hardy & W. Nord (Eds), *Handbook of organizational studies* (pp. 191–217). Thousand Oaks, CA: Sage.

Alvesson, M., & Skoldberg, K. (2000). *Reflexive methodology: New vistas for qualitative research*. London: Sage.

Azevedo, J. (1997). *Mapping reality: An evolutionary realist methodology for the natural and social sciences*. Albany, NY: SUNY Press.

Bhaskar, R. (1979). *The possibility of naturalism: A philosophical critique of the contemporary human sciences* (1st ed.). Brighton: Harvester Press.

Bhaskar, R. (1998a). General introduction. In: M. Archer, R. Bhaskar, A. Collier, T. Lawson & A. Norrie (Eds), *Critical realism: Essential readings* (pp. ix–xxiv). New York: Routledge, Taylor and Francis Group.

Bhaskar, R. (1998b). Philosophy and scientific realism. In: M. Archer, R. Bhaskar, A. Collier, T. Lawson & A. Norrie (Eds), *Critical realism: Essential readings* (pp. 16–47). New York: Routledge, Taylor and Francis Group.

Bhaskar, R. (1998c). The logic of scientific discovery. In: M. Archer, R. Bhaskar, A. Collier, T. Lawson & A. Norrie (Eds), *Critical realism: Essential readings* (pp. 48–104). New York: Routledge, Taylor and Francis Group.

Blumberg, A. E., & Feigl, H. (1948). Logical positivism. *The Journal of Philosophy*, *28*, 281–296.

Boyd, R. (1991). Confirmation, semantics and the interpretation of scientific theories. In: R. Boyd, P. Gasper & J. D. Trout (Eds), *The philosophy of science* (pp. 12–34). Cambridge, MA: MIT Press.

Braverman, H. (1974). *Labor and monopoly capital: The degradation of work in the twentieth century*. New York: Monthly Review.

Briscoe, F. (2006). Temporal flexibility and careers: The role of large-scale organizations for physicians. *Industrial and labor Relations Review*, *60*(1), 67–83.

Buchanan, D. A. (2003). Getting the story straight: Illusions and delusions in the organizational change process. *Journal of Critical Postmodern Organization Science*, *2*(4), 7–21.

Cahoone, L. (1996). *From modernism to postmodernism an anthology* (1st ed.). Cambridge, MA: Blackwell Publishers Inc.

Calas, M. B., & Smircich, L. (1999). Past postmodernism? Reflections and tentative directions. *Academy of Management Review*, *24*, 649–671.

Campbell, D. T., & Fiske, D. W. (1959). Convergence and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, *56*, 81–105.

Dallmayr, F. (1987). The discourse of modernity: Hegel and Habermas. *The Journal of Philosophy*, *84*, 682–692.

Derber, C. (1983). Managing professionals: Ideological proletarianization and post-industrial labor. *Theory and Society*, *12*(3), 309–341.

Freidson, E. (1983). The reorganization of the professions by regulation. *Law and Human Behavior*, *7*(2/3), 279–290.

Freidson, E. (1984). The changing nature of professional control. *Annual Review of Sociology*, *10*, 1–20.

Friedman, T. L. (2000). *The lexus and the olive tree*. New York: Anchor Books.

Giere, R. N. (1988). *Explaining science: A cognitive approach*. Chicago: University of Chicago Press.

Giere, R. N. (2002). Scientific cognition as distributed cognition. In: P. Curruthers, S. Stick & M. Siegal (Eds), *The cognitive basis of science* (pp. 285–299). New York: Cambridge University Press.

Gioia, D., & Pitre, E. (1990). Multiparadigm perspective on theory building. *Academy of Management Review*, *15*, 584–602.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In: N. K. Denzin & Y. S. Lincoln (Eds), *Handbook of qualitative research* (pp. 105–137). Thousand Oaks, CA: Sage.

Harley, B., Hardy, C., & Alvesson, M. (2004). Reflecting on reflexivity. In: *Academy of Management best paper 2004 CMS* (pp. B1–B6).

Hassard, J. (1991). Multiple paradigms and organizational analysis: A case study. *Organization Studies*, *12*(2), 275–299.

Hutchins, E. (1991). Social organization of distributed cognition. In: L. Resnick, J. Levine & S. Teasley (Eds), *Perspectives on socially shared cognition* (pp. 283–387). The American Psychological Association: Washingtion, DC.

Johnson, P., & Duberley, J. (2003). Reflexivity in management research. *Journal of Management Studies*, *40*, 1279–1303.

Larson, M. S. (1977). *The rise professionalism: A sociological analysis*. Berkeley, CA: University of California Press.

Lewis, M. W., & Grimes, A. J. (1999). Metatriangulation: Building theory from multiple paradigms. *Academy of Management Review*, *24*, 672–690.

Lynch, M. (2000). Against reflexivity as an academic virtue and source of privileged knowledge. *Theory, Culture and Society*, *17*(3), 26–54.

Mathison, S. (1988). Why triangulate? *Educational Researcher*, *17*(2), 13–17.

Pfeffer, J. (1995). Mortality, reproducibility, and the persistence of styles of theory. *Organization Science*, *6*(6), 681–686.

Poole, M. S., & Van de Ven, A. H. (1989). Using paradox to build management and organization theories. *Academy of Management Review*, *15*, 562–578.

Schultz, M., & Hatch, M. J. (1996). Living with multiple paradigms: The case of paradigm interplay in organizational cultural studies. *Academy of Management Review*, *21*, 529–557.

Scott, W. A. (1965). Reactions to supervision in a heteronomous professional organization. *Administrative Science Quarterly*, *10*(1), 65–81.

Sim, S. (2001). Postmodernism and philosophy. In: S. Sim (Ed.), *The Routledge companion to postmodernism* (2nd ed., pp. 3–14). New York: Routledge, Taylor and Francis Group.

Smigel, E. O. (1969). *The Wall Street lawyer, professional organization man?* London: Free Press of Glencoe.

Suppe, F. (1977). *The structure of scientific theories* (2nd ed.). Urbana, IL: University of Illinois Press.

Tolbert, P. S., & Stern, R. N. (1991). Organizations of professionals: Governance structures in large law firms. In: P. S. Tolbert & S. R. Barley (Eds), *Research in the sociology of organizations* (Vol. 8, pp. 97–117). Greenwich, CT: JAI Press.

Tsoukas, H. (1994). Refining common sense: Types of knowledge in management studies. *Journal of Management Studies*, *31*(6), 761–780.

Van de Ven, A. H. (2007). *Engaged scholarship: A guide for organizational and social research*. New York: Oxford University Press.

Van Maanen, J. (1995). Fear and loathing. *Organization Science*, *6*(6), 687–692.

Wallace, J. E. (1995). Organizational and professional commitment in professional and nonprofessional organizations. *Administrative Science Quarterly*, *40*(2), 228–255.

Weaver, G. R., & Gioia, D. A. (1994). Paradigms lost: Incommensurability vs structurationist inquiry. *Organization Studies*, *15*, 565–589.

Wilensky, H. L. (1964). The professionalization of everyone? *American Journal of Sociology*, *70*, 137–159.

Wilson, E. O. (1999). *Consilience*. New York: Prentice Hall.

John Bechara is a doctoral candidate in strategic management and organizations at the Carlson School of Management of the University of Minnesota. He received his MBA from the University of Minnesota and his BS in computer science from the American University of Beirut. His current research focuses on professions and occupations, organizational change, social networks, and the philosophy of science. His work has been published in the *Journal of Organizational Behavior*.

Andrew H. Van de Ven is Vernon H. Heath Professor of Organizational Innovation and Change in the Carlson School of Management of the University of Minnesota. He received his PhD from the University of Wisconsin at Madison in 1972, and taught at Kent State University and the Wharton School of the University of Pennsylvania before his present appointment. Prof. Van de Ven directed the Minnesota Innovation Research Program that tracked a wide variety of innovations from concept to implementation during the 1980s. Since 1994 he has been conducting a

longitudinal real-time study of changes in health care organizations. He is coauthor of *The Innovation Journey* (1999), *Organizational Change and Innovation Processes: Theory and Methods for Research* (2000), *Handbook of Organizational Change and Innovation* (2004), and *Engaged Scholarship: A Guide for Organization and Social Research* (forthcoming), all by Oxford University Press. Van de Ven was 2000–2001 President of the Academy of Management.