ABSTRACT

This paper discusses the phenomenological philosophies of Husserl, Heidegger, and Merleau-Ponty and shows the parallels between these philosophies on the one hand and the implications of complexity theory and cognitive science on the other. Phenomenology, complexity theory, and cognitive science converge on the understanding that the Cartesian objectivist view of the world is erroneous and they offer a contextual and embodied view of the scientific knowledge process. The implications of this convergence for public administration and public policy theories are discussed.

INTRODUCTION

In an Administrative Theory & Praxis symposium in 2001, authors called on theorists to pay attention to the embodied nature of the public administration knowledge. Patterson (2001a) argued that public administration theory would benefit from taking embodied human persons and their visceral emotions into better account. Farmer (2001) concurred and pointed out that public administration should include in its thinking the embodiment of human knowledge, both in terms of bodily desires and culture.

I agree with the common premise of the authors of the symposium—that public administration theorists should include the embodiment of human knowledge in their theories. This phenomenological premise resonates well with the developments in scientific thinking in the last few decades. Particularly important are the developments that occurred as a result of the emergence of complexity theory and cognitive science. It is my aim in this paper to show the parallels between phenomenological thinking on the one hand and complexity theory and cognitive science on the other. I also aim to show why these parallels matter for the study of public administration and policy.
I use the term complexity theory to refer to the theories and areas of study that are known under an array of nomenclatures: "chaos theory," "study of dynamical systems," "nonlinear studies" (Gleick, 1987); "science(s) of complexity" (Kauffman, 1995; Prigogine & Stengers, 1984; Waldrop, 1992); "nonlinear paradigm" (Kiel, 1992); "complexity theory" and "complex adaptive systems theory" (Anderson, 1999). Specific differences among these theories and areas of study are beyond the scope of this paper; my emphasis is on the emerging scientific understanding they represent together. Cognitive scientists describe the way our minds work and how they have become what they are over the course of the human evolution. Cognitive science is not a separate field of scientific study; it brings together the insights of studies in philosophy, psychology, artificial intelligence, neuroscience, anthropology, and linguistics (Gardner, 1985).

The emerging phenomenological orientation in complexity theory and cognitive science has serious epistemological implications. These scientific theories suggest a contextual and embodied notion of scientific knowledge, which challenges the epistemological beliefs of the Newtonian/positivist (classical) science, which has been the established view since the 17th century.³

The Newtonian/positivist science depicts a deterministic universe that exists independently of the knowing subject. Events in this clockwork universe are totally predictable, given sufficient background information and if proper analytical tools are used. The Newtonian/positivist science assumes that scientific knowledge corresponds to its objects of study on a one-to-one basis. It also assumes that scientists can and should separate factual knowledge from their predilections (values and preferences). The Newtonian/positivist worldview defines the goal of science as to discover the universal and timeless laws of the deterministic universe. The Newtonian/positivist philosophers of science believe that the assumptions and methods of science should be the same in both natural and social realms. They think that reductionist/ analytical and quantitative methods are superior and most scientific in all realms of study and consider holistic and qualitative approaches inferior, or even unscientific.

The Newtonian/positivist depiction of the universe as a clockwork was challenged by quantum mechanics, as early as at the turn of the 20th century, but the implications of quantum indeterminism have been largely dismissed as "quantum weirdness," particularly in the absence of any strong evidence of its effects on macro-levels of experience. More recent developments, particularly those in chaos and complexity
theories and cognitive science, are more pertinent to our macro-level experiences, and therefore they pose more serious challenges to the Newtonian/positivist science. Chaos and complexity theories demonstrate that nonlinear relations in nature, which are mostly dismissed as “anomalies” by the Newtonian science, force us to abandon or revise our assumptions of determinism and predictability. Complexity theorists argue that the recognition of the nonlinear and mostly indeterministic nature of reality forces us to adopt an “endophysical” (as opposed to “exophysical”) and contextual (as opposed to timeless and universal) notion of scientific knowledge (Prigogine & Stengers, 1984; Rössler, 1986). Cognitive science demonstrates that the knowing subject cannot be detached, hence the knowledge processes cannot be “objective” in the sense the Newtonian/positivist science assumes it is. In fact, cognitive science shows that our knowledge is very much grounded in our bodily functions and direct experiences of the world.

What is the relevance of the challenges to the Newtonian/positivist worldview for public administration and policy? Many of the still prevalent theories of public administration, organization theory, and public policy analysis and the methods of inquiry used in these areas are based directly or indirectly on the ontological and epistemological assumptions of the Newtonian/positivist science. Take the Weberian model of bureaucracy and the classical and scientific management theories as examples. These theories presume the existence of a deterministic human universe, just like the clockwork universe of the Newtonian science. In this universe, human beings are atoms whose behavioral patterns can be observed and measured objectively. These human atoms can be manipulated (“managed”) and placed in pre-determined positions (e.g., hierarchically organized boxes in organizational charts). It is assumed that a scientific manager can objectively know the context-independent (timeless and universal) laws of this human universe and can apply this knowledge in managing organizations. The methods of inquiry that the scientific manager uses have their roots in the Newtonian/positivist science as well. Experimental (or quasi-experimental) methods, regressions models, and cost-benefit analysis all make deterministic and objectivist assumptions.

The Weberian model of bureaucracy and the scientific and classical management theories have been subjected to many criticisms and many alternatives have emerged over the last century. However, their direct or indirect influences have hardly diminished. One needs only look at the creation of the Department of Homeland Security in the United States to see the continuing strength of the bureaucratic impulse (i.e.,
the impulse to solve problems by creating new hierarchies and command and control structures). To observe the continuing influence of the Newtonian/positivist worldview, one may also look at the increasing popularity of quantitative methods in the mainstream publications in political science and public policy (Cushman, 1994) and in the increasingly mathematical curriculum standards for graduate students in these fields (Cohn, 1999; Green & Shapiro, 1994).

The Newtonian/positivist assumptions are inherent in the rational choice paradigm, which is arguably the most popular paradigm in political science, international relations, sociology, and psychology today (Cohn, 1999; Green & Shapiro, 1994). Frederickson and Smith (2003, pp. 187-203) point out that rational choice is not as popular in public administration, but especially the rational choice theories of bureaucracy and service delivery pose the most serious challenges to the orthodox thinking in public administration. In the rational choice paradigm, individuals are considered atoms that are driven only (or primarily) by the desire to maximize their utility functions. Individual rational actors live in a human universe that is deterministic and therefore can be known objectively. Rational choice theorists aspire to develop a universal theory of human behavior (Cohn, 1999; Cushman, 1994; Green & Shapiro, 1994). They assume that, once discovered, the laws of human behavior should be applicable everywhere and at all times. Their methodology is heavily quantitative, because they believe that to be considered scientific a theory must be generalizable and thus mathematical (Cohn, 1999).

My argument is that the continuing dominance of the Newtonian/positivist epistemology and methodology in public administration and policy and related areas is not in sync with the recent developments in the natural sciences, particularly the emergence of complexity theory and cognitive science. As Wheatley (1994) puts it, if social scientists are going to emulate the natural sciences, they should not emulate the 17th century Newtonian science, but the science of our times. Complexity theory and cognitive science represent today’s science and they suggest a phenomenological epistemology.

Phenomenological philosophy evolved over time. This evolution can be traced in the writings of three philosophers: Edmund Husserl, Martin Heidegger, and Maurice Merleau-Ponty. Husserl was the founder of phenomenology. Heidegger articulated Husserl’s insights into a worldview that made being-in-the-world the locus of the knowledge process. Merleau-Ponty further emphasized the corporeality of knowing. In the next section, I discuss these three philosophers. In the fol-
lowing section, I will summarize the implications of complexity theory and cognitive science.

PHENOMENOLOGY

Phenomenological Critique of Objectivism and Dissolution of the Subject–Object Dichotomy

Husserl, Heidegger, and Merleau-Ponty all critique objectivist science, each in his own way. They dissolve the Newtonian/positivist (or Cartesian) subject–object dichotomy by placing human consciousness and/or human existence at the center of the knowledge process. This dissolution is not free of problems. With the dissolution comes the inevitable question: Is objective science possible at all then? Husserl’s early concept of “intentional consciousness” mystifies the knowledge process. His later concept of “life-world” (Lebenswelt) makes it more corporeal. Heidegger’s concept of “being-in-the-world (Dasein), and Merleau-Ponty’s “flesh” build on Husserl’s life-world and refine it.

According to Husserl, the problem with objectivist science is in its separation of knowledge from the direct experience of the knowing subject. The danger in this separation is that human beings objectify “external reality” and hence lose touch with the reality they actually live (Hummel, 1994, p. 209). Husserl counters this objectification by placing human beings and their consciousness and experiences at the center of the knowledge process and hence dissolving the subject–object dichotomy. As Madison (1988) puts it, Husserl deconstructs the dichotomy between the “epistemological subject” and the “objective world” by positing that the relation between consciousness and reality is constituted by consciousness (p. 11).

In Husserl’s early conceptualizations, consciousness is intentional and pro-active. Knowledge is not an unmediated reflection of independently existing realities, but a product of the consciousness of scientists. Is objective science possible at all then? Husserl is not out to abolish science; in fact, he offers his phenomenology as the basis of an alternative science. The aim of this science, what he calls “pure phenomenology,” would be to identify and describe the universal structures of human consciousness by reducing the acts of consciousness to their essentials.

The method of pure phenomenology would be “bracketing” (Ein­klammerung), which “refers to the process of suspending judgment about the existence of the world around us, by placing in abeyance or parentheses our commonsensical presuppositions about the world and
the relationship between the perceiving consciousness and objects in external reality” (Loughlin, 1993, p. 511). In other words, using the method of bracketing, one could focus on the presentation of an object to a subject, not the object itself, and reach the essence of human experience.

Husserl's early concept of intentional consciousness was somewhat obscure. It was not clear where he located the origins of consciousness. Husserl recognized the malleability of consciousness, and thus implied that human experience may influence consciousness. However, until he developed the concept of life-world (Lebenswelt), the centrality of human experience in knowing the world did not become clear in his works. Life-world is the immediate and unmediated experience, according to Husserl. It is the world human beings actually live in.

Life-world is pre-scientific; it is also where science originates. In Husserl scholar Føllesdal's (1988) words, the life-world is the ultimate court appeal, behind which there is no point for further justification. Every claim to validity and truth rests upon this ‘iceberg’ of largely unthematised prejudgmental acceptances. Every request for justification ultimately has to lead back to this same sort of acceptances. There is nothing more ultimate to turn to, and there is nothing more that can be asked for. (p. 129)

Although objectivist science uses a series of presuppositions that would presumably generate detached and decontextualized knowledge (e.g., empirical research protocols and criteria of validity of knowledge), these presuppositions have not actually suspended or eliminated life-world as the origin and ultimate judge of scientific knowledge.

Heidegger's phenomenology builds on Husserl's notion of life-world. Like Husserl, he sees the roots of all forms of knowledge, including scientific knowledge, in man's primordial, existential understanding. And, like Husserl, he struggles with the question, is objective scientific knowledge possible? Man’s primordial understanding, according to Heidegger, is shaped by being-in-the-world (Dasein). As Mueller-Vollmer (1994) puts it, in Heidegger, “human existence embodies in its ontic constitution, as part of its Being, a preontological understanding of self and of the world in which it finds itself” (p. 33). In other words, in Heidegger being and knowing are one and the same. As such, his phenomenology renders knowledge inseparable from the context, situation, and existence of the knower.

More specifically, according to Heidegger, knowledge requires presuppositions that are shaped by the context of the particular knowl-
edge process. Science is interpretation, and interpretation requires a “fore-having”—something we have in advance, a presupposition:

[I]nterpretation is grounded in something we have in advance—in a fore-having. As the appropriation of understanding, the interpretation operates in Being towards a totality of involvements which is already understood—a Being which understands. . . . [I]nterpretation is grounded in something we see in advance—in a foresight. This foresight “takes the first cut” out of what has been taken into our fore-having, and it does so with a view to a definite way in which this can be interpreted. . . . [T]he interpretation has already decided for a definite way of conceiving it, either with finality or with reservations; it is grounded in something we grasp in advance—in a fore-conception.

An interpretation is never a presuppositionless apprehending of something presented to us. . . . In an interpretive approach there lies such an assumption, as that which has been “taken for granted”. . . . that is to say, as that which has been presented in our fore-having, our foresight, and our fore-conception. (Heidegger, 1994b, p. 223)

Heidegger’s reasoning is circular and poses problems to scientific understanding by his own admission. Understanding pertains to being-in-the-world. Interpretation and meaning are derivatives of understanding. We must understand what is to be interpreted beforehand. Thus, philosophy and scientific knowledge are derivatives of understanding, hence being-in-the-world. But is science not supposed to be objective, independent of the observer? Heidegger admits that there are potential problems in his conceptualization. He emphasizes particularly

that our first, last, and constant task is never to allow our fore-having, foresight, and fore-conception to be presented to us by fancies and popular conceptions, but rather to make scientific theme secure by working out these fore-structures in terms of the things themselves. (Heidegger, 1994b, p. 226)

But then, how does one make sure that “fancies and popular conceptions” are not allowed in scientific thinking? And how does one make “scientific theme secure by working out these fore-structures in terms of the things themselves”? Heidegger does not have clear answers to these questions, but he stresses that understanding, scientific or otherwise, “is rooted in the existential constitution of Dasein” (Heidegger, 1994b, p. 226).
Contextuality of Knowing

Do Husserl and Heidegger suggest a subjectivist view by saying that scientific knowledge is not independent of life-world or being-in-the-world? I think they pose a problem, rather than articulating an anti-objectivist alternative. Husserl and Heidegger reject the decontextual notion of knowledge in objectivist science. Their concepts of life-world and being-in-the-world establish the bases of the notion that knowledge is contextual. Merleau-Ponty affirms the contextuality of knowledge and further asserts its corporeality, its embodied nature. As I discuss in the next section, complexity theorists and cognitive scientists substantiate the phenomenological insight that knowledge is contextual and embodied.

In the works of phenomenologists, one can observe references to three forms of contextuality: biological, social, and temporal. Knowledge is biologically contextual, because it is generated through a series of biological processes (e.g., sense organs and neurons). It is socially contextual, because the knowing subject uses the foundational principles of learning he/she absorbs from the social relations into which he/she was born (language, values, and legal norms). It is temporally contextual, not only because individuals are born at different times into different sets of social relations, but also because they use their previously acquired knowledge as the template in acquiring new knowledge (the knowledge process is dynamic in this sense).

According to Husserl, although consciousness structures what we experience, “how it structures it depends on our previous experiences” (Follesdal, 1988, p. 108). Consciousness is not fixed; it changes with new experience. Husserl is not explicit about how consciousness changes, other than saying that it changes in the face of the failures of its anticipation (p. 115). Implicit in his conception of life-world is that one’s biological make-up constitutes a context in which knowledge is produced. He posits that life-world is where scientific knowledge is rooted, but he also mentions that scientific knowledge and its applications (such as the products of technology) change life-world (p. 128). In other words, life-world is a product of the social context as well, because technology is a social process and product.

Heidegger’s Dasein is temporally and socially situated, and it is self-realizing. Dasein is what it is because of its past and present; it encompasses its past and present. Dasein also projects future possibilities and calls for the realization of these possibilities. Therefore, understanding is not merely reflective, but it is constitutive and oriented toward self-realization. In other words, Dasein is more than what it factually is: “to
its facticity its potentiality-for-Being belongs essentially" (Heidegger, 1994a, p. 218). As Hummel (1994) puts it, in Heidegger man becomes his own project; he becomes himself through his intentional acts. In doing so he does not only reveal himself to the world, but also his Being emerges (p. 273). Heidegger also posits that we experience ourselves in the company of others; therefore, we are “co-beings.” We share our co-being through communication, and through communication we understand our common situatedness (pp. 179-180). Being and knowing are socially contextual.

In Merleau-Ponty the social and biological forms of contextuality of knowing are evident and temporal contextuality is implicit. His philosophy is more corporeal than Husserl’s and Heidegger’s in the sense that he sees human beings as biologically interactive and interdependent with their environments. Merleau-Ponty favors “a notion of human awareness rooted in the corporeal dimension of existence that is always situated in concrete lived experience” and he sees the body as “a dynamic region of sensory awareness that is oriented toward the world” (Chamberlain, 1993, pp. 423-424). According to Merleau-Ponty, there is constant interaction and interdependency between our bodies and our biological and social environments; it is more of a conversation between two sides. Our language and perceptions are interdependent: “On the one hand, the speaking subject is rooted in the natural expressivity of the body situated in its perceptual field. On the other hand, the lived experience of the body as motor subject transcends itself through language and enters a linguistic field beyond its immediate perceptual one” (p. 424).

In his later works, Merleau-Ponty put forth the notion of the “flesh” and defined embodiment more broadly. The flesh is more than the body and perceptions. “The flesh is the formative milieu of both the corporeal and the psychic, of object and subject; it is the undivided Being...existing before the consciousness-object split” (Madison, 1988, p. 64). As such, flesh encompasses the social as well as the biological.

**COMPLEXITY THEORY AND COGNITIVE SCIENCE**

**Critique of Objectivism**

Complexity theorists and cognitive scientists find the objectivist assumptions of the classical science untenable. They do not see the scientist as a detached observer, nor do they see scientific knowledge as objective in the Newtonian/positivist sense. They explain that objectivism is not tenable because natural phenomena are indeterministic, non-
linear, and dynamic. Cognitive scientists reject the Newtonian/positivist objectivism on the basis of their findings about how the mind works.

Complexity theorists Prigogine and Stengers (1984) see Husserl's notion of life-world as a serious alternative to the objectivist view of science and agree with Merleau-Ponty's assertion that truth can only be understood within situations and that knowledge is both objective and participatory. According to Prigogine and Stengers, "Description is dialogue, communication, and this communication is subject to constraints that demonstrate that we are macroscopic beings embedded in the physical world" (p. 300).

Prigogine and Stengers (1984) assert that objectivism is untenable because of the inherent indeterminism of the world. They point out that the fundamental assumption of classical science—that the world is simple because it is governed by time-reversible and thus eternal laws—is not true. They argue that time is irreversible and this is the source of indeterminism in nature: "We find ourselves in a world in which reversibility and determinism apply only to limiting, simple cases, while irreversibility and randomness are the rules" (p. 8).

Prigogine and Stengers's (1984) thesis may be summarized as follows: The problem of the Newtonian science is its predilection to study only closed systems, equilibrium states, and linear relations in nature; these are not the rule in nature, but exceptions. The implicit metaphor of the Newtonian science (clockwork universe) is misleading. Reality is indeterministic and unpredictable. Closed and linear systems can be in equilibrium, and they are deterministic. In such systems, time is reversible: The system can go back and forth between known states. Thus the patterns of their behavior can be known. Open systems tend toward disequilibrium (they are dynamic); in such systems, relations are mostly nonlinear and time is irreversible (earlier states of a system cannot be regenerated). Disequilibrium and irreversible time are at the root of indeterminism and unpredictability. Patterns of a system's future behavior cannot be predicted precisely (quantitatively). Overall generalizations about the system's behavior cannot be made; only local and temporal knowledge is possible. According to Prigogine and Stengers, the inherent indeterminism of nature defies the attempts of the Newtonian science to generate an objective and complete knowledge of the world. One cannot step out of reality to look at it from outside, because its precise boundaries are not known (there is no such thing as "entire reality"). Therefore, the scientist is within the world he/she observes.
Prigogine and Stengers (1984) do not abandon the notion of objectivity, however. They propose a “new conception of objectivity.” This new conception would subject us to “intrinsic constraints that identify us as part of the physical world we are describing. It is a physics that presupposes an observer situated within the observed world” (p. 218). In this world, we should accept the possibility of objectivity in knowledge to an extent, in some areas. However, this objectivity will never be the objectivity of the correspondence theory of truth, which suggests “a direct connection between our description of the world and the world itself” (p. 55).

Prigogine and Stengers (1984) assert that knowledge is always a product of an “active intellectual construction” (p. 55). The experimental method is a case in point; it is a dialogue with nature. It requires an active involvement and construction by the researcher. The researcher manipulates “physical reality, to ‘stage’ it in such a way that it conforms as closely as possible to a theoretical description” (p. 41). Nature is not entirely malleable in experiments, however: “However partially nature is allowed to speak, once it has expressed itself, there is no further dissent: nature never lies” (p. 44).

Cognitive scientist Damasio (1999) echoes Husserl’s contention that objects are created through consciousness. The findings of cognitive science show that objects are not merely physical objects; they are autobiographical memories. They are

the “objects” of the organism’s biography. .. Once autobiographical memories are formed, they can be called up whenever any object is being processed. Each of those autobiographical memories is then treated by the brain as an object, each becoming and inducer of core consciousness, along with the particular nonself object that is being processed. (Damasio, 1999, p. 197)

One of the core assumptions of the Newtonian/positivist science is that in order to generate objective knowledge, the knowing subject should (and can) separate his/her values from facts. It is assumed that rational thinking can be achieved only by keeping values (emotions) outside the logical processing of factual information. As Patterson (2001b) observes, bodily emotions are often considered impediments to reason. Damasio (1999) points out that the research in cognitive science shows that facts cannot be separated from values, because cognition is not a realm separate from emotions:

[E]ven when we “merely” think about an object, we tend to reconstruct memories not just of a shape or color but also of perceptual engagement the object required and of the accompanying emo-
Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
organism interacts with its environment as a whole, and this interaction constitutes the mind's frame of reference in its self-definition. The organism interacts with its environment proactively. During its interactions with the environment, the organism maps its relation with the objects in its environment in its brain. These maps function as templates in the organism's subsequent attempts to know. Like Heidegger, Damasio situates mental functions in time and space:

Whatever happens in your mind happens in time and space relative to the instant in time your body is in and to the region of space occupied by your body. .. Ownership and agency are. . . entirely related to a body at a particular instant and in a particular space. (p. 145)

Lakoff and Johnson (1999), acknowledge Merleau-Ponty's philosophy of embodiment as the precursor of their own thinking (p. 97). They use Merleau-Ponty's term "flesh" to signify the biological, social, and temporal embodiment of the mind:

Our flesh is inseparable from what Merleau-Ponty called the "flesh of the world". .. Our body is intimately tied to what we walk on, sit on, touch, taste, smell, see, breathe, and move within. Our corporeality is part of the corporeality of the world.

The mind is not merely corporeal but also passionate, desiring, and social. It has a culture and cannot exist culture-free. It has a history, it has developed and grown, and it can grow further. It has an unconscious aspect, hidden from our direct view and knowable only indirectly. (p. 565)

Lakoff and Johnson (1999) propose an "embodied realism," to replace Descartes's "disembodied realism," which has dominated the Western thinking for centuries now. They point out that the evidence from cognitive science shows that Descartes's philosophy is wrong, because human reason grows out of bodily capacities. Lakoff and Johnson's argument that the interactions of our bodies with our environments "provide the mostly unconscious basis for our everyday metaphysics, that is, our sense of what is real" (p. 17) echoes Husserl's and Heidegger's assertions that life-world and being-in-the-world respectively are the bases of all knowledge, including scientific knowledge. According to Lakoff and Johnson, the embodiment of knowledge is not an impediment to science; it in fact makes science possible:

What disembodied realism. . misses is that, as embodied, imaginative creatures, we never were separated or divorced from reality in the first place. What has always made science possible is our em-
bodiment, not our transcendence of it, and our imagination, not our avoidance of it. (1999, p. 93)

Lakoff and Johnson (1999, pp. 17-22) illustrate the embodiment of scientific knowledge with the example of scientific categories. These categories, like all categories human beings use, are the products of our biological evolution, not reflections of categories that exist in reality, as the Cartesian science assumes. Lakoff and Johnson stress that our concepts and reasoning capacities are products of our evolutionary experiences. Our biological evolution has equipped us with a capability that enables us deal with our environments. Like all other biological organisms, we simplify complex realities by “extracting” segments of them (i.e., categorizing them). Over the course of our biological evolution, the capacity to categorize has been built into our neural structures. Our neurons are structured not only to categorize, but also to define our bodies in reference to their relations with their environments (e.g., inside–outside, up–down). Such structured definitions of bodily orientations are the sources of metaphorical thinking, which enables us to think theoretically. Metaphors play key roles in translating these bodily orientation categories to abstract reasoning (e.g., markets going “up” or “down”).

RECAPPING THE PARALLELS

The emerging scientific worldview that complexity theory and cognitive science represent is phenomenological. This is the core argument of this paper. In the preceding two sections, I showed the parallels between phenomenology on the one hand and complexity theory and cognitive science on the other. Some complexity theorists and cognitive scientists cite phenomenologists in support of their views. Others make assertions that are in sync with the core belief of phenomenology (e.g., that scientists should recognize the biological, temporal, and social contextuality, or embodiment, of knowledge).

In the preceding sections, I also showed that complexity theorists and cognitive scientists do more than reaffirming phenomenological core insights. They substantiate these insights using the evidence provided by the advances in science. The decontextual objectivism of the classical science is erroneous, according to Prigogine and Stengers (1984), because the inherent indeterminism of the universe does not allow the scientist to step outside reality and have a “God’s eye view” of the universe. The scientific observer has to be situated within the reality he/she is observing. Knowledge has to be “endophysical”
(Rössler, 1986). Life-world, being-in-the-world, or flesh is the source and ultimate judge of scientific knowledge, because the mind and the body together constitute a dissociable organism (they are not separate, as Descartes believed), which is in constant interaction with its physical, biological, and social environment. Cognitive science shows that through our biological evolution we developed a set of cognitive tools that both enable and constrict us to obtain and process knowledge. The combined implications of complexity theory and cognitive science suggest an embodied epistemology—an epistemology that recognizes the biological, temporal, and social embodiment of knowledge.

The assertion that knowledge is contextual (or embodied) disturbs the Newtonian/positivist belief in the universality and objectivity of scientific knowledge. The recognition of the contextuality of knowledge creates a tension. This is the tension between the premise that knowledge is contextual (therefore, it is too complex to be comprehended fully and its nature is bound by the perspective, "subjectivity" of the knower) and the goal of establishing some sort of objective scientific knowledge. If knowledge is contextual, is there room for objective knowledge? If not, then is science possible at all? This tension is evident in Husserl and Heidegger, as I mentioned earlier.

Complexity theorists Prigogine and Stengers (1984, p. 218) propose a "new conception of objectivity" that recognizes the boundedness and temporality of knowledge. Cognitive scientists, Lakoff and Johnson (1999, p. 93) offer "embodied realism" as an alternative to the Cartesian objectivism. They stress that what makes science possible is the embodiment of knowledge; there is no source of knowledge outside and beyond the cognitive capabilities that we acquired during our biological evolution.

Still, neither phenomenologists, nor cognitive scientists or complexity theorists bring a resolution to the tension. Perhaps there is no ultimate resolution to it. The best one can do is to recognize the tension as the core of a new epistemology. As Radder (1996) puts it, we should see our knowledge as knowledge both in and about the world.

Beyond the general acceptance of this duality of knowledge, we need to address specific questions like the one Heelan (1988) puts to phenomenologists, particularly Husserl: If all scientific theory is grounded in the life-world, how come we know the existence of scientific objects, such as electrons, that have no "sensible pretheoretical presence in the life-world before modern science" (p. 167). Husserl does not have a clear answer to this question.
Cognitive science may offer some answers. Lakoff and Johnson (1999, pp. 102-103) propose a model of the cognitive system, which they call the "three levels of embodiment." These are neural, phenomenological, and cognitive levels. At the neural level color, spatial relations, etc. are processed. The phenomenological level is conscious. This is the level where we feel and experience the way things appear to us (e.g., toothache, the taste of chocolate, and the sound of violin). Cognitive level is unconscious; this is the "massive portion of the iceberg," as Lakoff and Johnson put it. It includes perceptual and motor aspects of our bodies, and all unconscious thought and linguistic processing take place at this level. This is where our scientific theories and philosophical concepts are generated.

Lakoff and Johnson's (1999) three-level model may or may not be sustainable under the light of the new developments in cognitive science; it may be modified or abandoned for better conceptualizations. However, their model is noteworthy, because it highlights the inadequacy as well as the insightfulness of phenomenological thinking. Phenomenologists correctly argue that scientific knowledge is grounded in our primordial understanding of the world, and our bodies are the reference frames of our understandings of our relations with our environments, but they are silent about the complex processes of associations and transformations that involve the different levels of our minds and complex bodily functions. Most of knowledge processing takes place at the level of the unconscious, as Lakoff and Johnson remind us. This processing is not phenomenological in a strict sense of the term; it is not part of the conscious awareness of the world. Cognitive scientific findings show that through our evolution we developed a complex cognitive system; we are far from comprehending the full complexity of this system.

**RELEVANCE TO PUBLIC ADMINISTRATION AND POLICY**

As I mentioned in the introduction, many social scientists have emulated the worldview and methods of objectivist science, consciously or unconsciously. The Weberian model of bureaucracy and the scientific and classical management theories of the early 20th century are based on mechanistic images of organization. These images are composed of elements and their measurable and controllable relations—very much like Newton's clockwork universe. The geometry of organizational charts and the mathematization of work relations in ergonomic studies are very much Cartesian. Adam Smith's classical theory of economics and its derivates, like neoclassical economics and rational choice, pre-
sume that self-interested individuals function in deterministic sets of relations in closed systems, which tend toward equilibrium conditions. As complexity theorist and economist Brian Arthur points out, neoclassical economics reduces the rich complexity of human life to a set of abstract principles and elevates quantification to the status of the sole arbiter of truth. In the minds of neoclassical economists human beings are elementary particles that exist solely to maximize their utility functions. Neoclassical economists use mathematical equations to predict the behaviors of human elements, just like Newtonian physicist would try to predict the trajectories of moving objects (cited in Waldrop, 1992, p. 22).

The Weberian model of bureaucracy, the scientific and classical management theories, and neoclassical economics and its derivatives emulate the 17th century Newtonian science; as such, they are out of sync with the recent developments in science. As Prigogine and Stengers (1984, pp. 207-208) remind us, the closed system and equilibrium assumptions, which the social sciences and biology adopted from the Newtonian physics of the 17th century, are excessively restricting; they can help explain only a small segment of reality. The universe, for the most part, is indeterministic; most systems in the universe are open systems and they tend toward disequilibrium. The indeterminism of the universe does not allow us to know realities from outside, as if we were non-physical beings, according to Prigogine and Stengers. Phenomenologists and cognitive scientists concur and stress that we can know reality only through the restricting and enabling physicality and biology of our bodies. Knowledge is corporeal; it is embodied. It is not a passive reception of signals, but it is a participatory activity.

Phenomenological philosophers and social theorists also stress that the knowledge process that the 17th century (classical, objectivist) science depicts leads to methodologies that are not only restricting, but also alienating. I referred to Husserl's critique of the subject–object separation earlier. A mathematician himself, Husserl was concerned about the danger of objectifying reality through an excessive mathematicalization of the knowledge process. This objectification would lead to losing touch with the reality individuals actually live, according to Husserl (Hummel, 1994, p. 209). Heidegger was so concerned about and so critical of the alienating effects of the objectivist science that he is critiqued even by complexity theorists Prigogine and Stengers (1984, p. 32) for being anti-science.

Hummel (1994) and Harmon (1981, 1990) critique prevalent organizational practices from their phenomenological perspectives. Hummel
(1994) presents a thorough critique of the bureaucratic form of organization and shows that it removes basic humanness of its participants by creating artificial patterns of behavior and a language that is disconnected from their daily lives. Harmon critiques the reification of organizations and offers a phenomenological alternative that recognizes the active and intersubjective nature of organizational activities and encourages participatory practices.

Complexity theorists are also concerned about the alienating influences of the Newtonian/positivist science. As I mentioned earlier, Kauffman (1995), critiques the classical science and argues that the new sciences of complexity will make people feel "at home in the universe." Complexity theory suggests a contextual, and thus participatory, notion of knowledge. Rössler (1986) calls for and Prigogine and Stengers (1984) make the case for the endophysicality of scientific knowledge, which would close the artificial gap between the knowing subject and the objects of his/her study and move sciences, particularly the natural sciences, to a phenomenological foundation.

The new phenomenological foundation of the natural sciences would bring them closer to the position of phenomenological philosophers and social theorists. This move would also make the natural sciences accessible to the social scientists. This is an important opportunity, I think. The advances in biology, evolutionary theory, and cognitive science are too important to be ignored by social scientists in general and public policy and administration theorists in particular. There is a nascent literature that is calling our attention to the implications of biology for public policy and administration (e.g., Meyer-Emerick, 2004; Miller, 2002).¹³

The danger of not engaging the advances in other sciences, particularly biology, is not only that we will miss out the opportunity to adopt their useful insights in our areas, which is important, but also that natural scientists will not understand the significance of the insights the social scientists accumulated over time. The fascinating ignorance of biologist Edward Wilson and evolutionary psychologist Steven Pinker is a case in point. As I illustrated elsewhere (Morçöl, 1998), Wilson’s otherwise insightful discussion in his seminal book Consilience (1998) is full of misunderstandings of the advances in the social sciences. However, he and Pinker (2002) have a point when they criticize their fictitious "Standard Social Science Model." They make the point that most social scientists have simply ignored the developments in the natural sciences, partly due to lack of knowledge, but also partly, and more importantly, because this ignorance has been legitimized by the separation between
the two that was justified by Dilthey. Surely, the misguided applications, like Social Darwinism, contributed to the leeriness among the social scientists to look into biology.

The result is, as Patterson (2001a) observes, "even the most adventurous in PA have been a bit squeamish about taking plain account of the full range of bodily functions and senses" (p. 177), although other implications of phenomenology—situatedness and contextuality of knowledge—are fully embraced. Needless to say, there are dangers in taking a full account of embodiment, particularly the danger of biological reductionism. As Farmer (2001) warns us, when we consider embodiment we should not privilege the biological. Indeed! But, as he also stresses, "there are only analytical distinctions between the biological, the psychological, the social, and the spiritual (or poetic) aspects of a human being. In ontological terms such divisions melt away" (p. 194). The advances in complexity theory and cognitive science give us the opportunity to understand humans in their full being and do away with artificial divisions.

ENDNOTES

1. I will not make any claim as to whether, or to what extent, the developments in complexity theory and cognitive science have been influenced by phenomenological philosophies. Some complexity theorists and some cognitive scientists make direct references to phenomenological sources. I will cite these references. It would be the task of another paper to track the phenomenological influences in complexity theory and cognitive science, however.

2. I do not make a distinction between public administration and public policy in this paper. Although one can find differences between the two in detail, such differences are not directly pertinent to my points in this paper.

3. I defined the term Newtonian/positivist science in an earlier work (Morçöl, 2002). The target of most phenomenological philosophical critiques is Descartes, not Newton. However, as I explained in my earlier work, it was Newton who articulated Descartes's and Bacon's contributions to a comprehensive philosophy and methodology and the logical positivists codified the fundamentals of the Newtonian science for a workable methodology. Hence, the Newtonian/positivist science is more comprehensive and relevant to today's epistemological discussions. In this paper I will use the term Newtonian/positivist science in general, except when I cite the specific usage of a particular philosopher.

4. Morgan (1997) categorizes Weber's model of bureaucracy, scientific management theory, and classical management theories under the machine metaphor. He aptly observes that the core metaphors of this model and these theories are mechanistic (i.e., Newtonian). As two of the reviewers of this arti-
cle emphasized, Weber's general sociological theory is more sophisticated than the machine metaphor suggests. His premise that sociology should study "action," rather than "behavior" places him closer to phenomenology, for example. However, my focus in this paper is not on his general theory of sociology, but his model of bureaucracy. Unlike Taylor, Gulick, or Fayol, who argued that the scientific principles of organization they formulated should be applied universally, Weber did not particularly favor the bureaucratic form of organization. His was a description (model) of the salient characteristics (ideal type) of large-scale organizations of his time (Frederickson & Smith, 2003, p. 102). In this paper I use the term Weberian model of bureaucracy in this descriptive sense. In Weber's ideal typical description, bureaucracy is goal-oriented (rational), formal (impersonal), specialized, and hierarchical. This description, regardless of Weber's general theoretical orientation and intentions of providing it, is very much like Newton's description of the universe: It is atomistic and deterministically organized.

5. See detailed discussions of the Newtonian/positivist nature of these methods in (Morçöl, 2002, chap. 1).

6. See Morgan (1997) for the large spectrum of theories that emerged in reaction to the mechanistic theories. Phenomenological thinking has been influential on some of these theories.

7. Frederickson and Smith (2003) observe that the (Weberian) bureaucratic model was synonymous with public administration for virtually all the twentieth century (p. 207). They also point out that although this model is less relevant now, as the network governance theorists argue, it still remains a sharp intellectual tool (p. 209). I think the example of the Department of Homeland Security illustrates that the bureaucratic model is a highly operational intellectual tool; it guides action almost instinctively.

8. Heidegger's student Hans-Georg Gadamer could also be discussed here, but his contributions, although significant, are more on interpretations of texts (hermeneutics). Hermeneutics is related to phenomenology, but including Gadamer in the discussion would not make a significant contribution to the limited purpose of this paper.

9. Husserl uses the terms suspending judgment, eidetic reduction, epoché, disconnexion (Ausschaltung), and bracketing (Einklammerung) interchangeably (Loughlin, 1993).

10. Consciousness anticipates, but it can be wrong (expectations may not be fulfilled), and so the knower may have to revise his/her views and expectations (Føllesdal, 1988, p. 115).

11. A growing number of cognitive scientists recognize that metaphors are not merely linguistic tools, but our cognitive systems are metaphorically structured (for example, see Gibbs, 1993; Rumelhart, 1993).

12. For a discussion on the religious, particularly Christian, underpinnings of the Newtonian notion of decontextual, objective science, see Morçöl (2002, chap. 2).
13. Miller's (2002) application of memetics, whose roots are in evolutionary biology, to an understanding of postmodern public policy is particularly creative and intriguing for its implications.

14. The separation between the natural sciences (Naturwissenschaften) and the human (or cultural) studies (Geisteswissenschaften) is usually attributed to Wilhelm Dilthey's work. Mueller-Vollmer (1994) points out that this distinction has its roots in Johann Gustav Droysen's designation of the term “understanding” (Verstehen) as the method of the human sciences, as opposed to “explanation” (Erklärung) as the method of the natural sciences. This 19th century separation and its implications for the developments in the late 20th century, particularly the phenomenological view of science complexity theory and cognitive science represent, is a topic that is directly relevant to my discussions in this paper. However, this crucial topic deserves a separate and in-depth discussion, which is beyond the scope of my paper.

REFERENCES


**Author Note:** I gratefully acknowledge the critiques by the three anonymous reviewers of the earlier version of this manuscript and comments by Ulf Zimmermann of Kennesaw State University. They all helped me clarify and refine my points in the paper.

**Gökütğ Morçöl** is an associate professor of public administration and policy at Penn State-Harrisburg. His research interests are applications of complexity and network theories in public administration and policy and metropolitan governance. He is the author of *A New Mind for Policy Analysis* (Praeger, 2002) and a co-editor for *New Sciences for Public Administration and Policy* (Chate-laine Press, 2000).