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THE EMERGENCE OF INTERDISCIPLINARITY FROM EPISTEMOLOGICAL THOUGHT

by

James Welch IV
University of Texas Arlington

Abstract: Interdisciplinary studies has positioned itself as an innovative approach to comprehending, navigating, and transforming knowledge. The emphasis in recent scholarship upon complex systems and integration of insights from disciplinary perspectives mark decisive progress toward the development of a cohesive theory of interdisciplinarity. Such a theory would entail establishing an epistemology of complexity through epistemological negotiation. I argue that the interdisciplinary approach to knowledge is a logical evolution of the history of Western thought and an innovative answer to the epistemological project. This project was surveyed in Welch (2009) who described how the Western canonical lineage from Plato to Hegel developed epistemological strategies founded on the principles of duality, determinism, and absolute truth. The present essay carries that historical examination forward by examining the way these strategies were problematized by the more recent approaches to epistemology taken by phenomenology, post-structuralism, pluralism, and pragmatism. These schools of thought are pertinent to understanding the contrasting origins and outlooks of the critical and instrumental modes of interdisciplinarity. This essay concludes that these epistemological schools of thought are not mutually exclusive; they entwine inextricably together into interdisciplinary theory and practice. Indeed, their synthetic relationship is essential for developing interdisciplinary theory as an emergent epistemological innovation. The deep historical context provided here grounds interdisciplinary theory, and gives it a voice in ongoing debates over knowledge itself.

The Emergence of Interdisciplinarity from Epistemological Thought

Interdisciplinarity, conceived as an approach to complexity through the integration of insights from different disciplinary perspectives, endeavors to position itself as an effective strategy for comprehending, navigating, and transforming knowledge. As such, interdisciplinarity strives to be a philosophical *innovation*, a new way of knowing and deciding, which paradoxically attempts to transcend tradition while emerging embryonically from it. This transition, the difficult bridge from adolescence to intellectual maturity, requires a reckoning between the aspiration for a progressive transformation of knowledge while acknowledging its valued roots. Reflecting on the history of ideas helps interdisciplinarity refine its academic position, providing a context for its identity and a strong presence in scholarly discourse. This identity, however, occupies a diffuse and contested space. Pluralism is inherent in the idea of interdisciplinarity, and thus it should come as no shock that interdisciplinary studies should manifest itself in myriad ways. Nonetheless, in order to establish interdisciplinarity as an important philosophical innovation, it is necessary to understand the ways in which the interdisciplinary idea emerges from the history of Western Thought.

In rejecting the absolutist tendencies of the Western philosophical tradition, interdisciplinarity crosses paths with the crucial issues of epistemology that the giants of Western philosophy have debated for over two millennia. Exploring this debate provides a contextual foundation for developing interdisciplinary theory. Interdisciplinary studies, as a way of achieving a synthetic understanding of complexity, is thus intimately involved in truth claims. The integration of insights calls for a kind of epistemological negotiation wherein the interdisciplinarian not only examines the content of conflicting disciplinary perspectives, but also the way in which the disciplines actually “see” and evaluate phenomena. Such an approach to knowledge requires a metacognitive awareness of the way truth itself is formed. This awareness of truth-making is a particular concern for Western philosophy, especially in its more recent developments. Interdisciplinarity is one of those developments. Therefore, this work focuses on the ways in which the interdisciplinary idea arises from and responds to epistemological issues over the course of the Western philosophical tradition.

Welch (2009) traced Western epistemological thought through a lineage of canonical thinkers from Plato to Hegel. These thinkers developed a pervasive epistemological framework resting upon three essential principles—de-

terminism, duality, and absolute truth. Interdisciplinarity, from its inception, emerged as a critique of these strategies as forms of reductionism. Interdisciplinary approaches to knowledge emphasize the irreducible complexity of phenomena, often embedded in systems characterized by multiple nexus points of interaction. The dynamics of complex systems cannot simply be boiled down to a deterministic analysis in which all variables are defined and their interactions formulated to zero-sum. Thus, interdisciplinary notions of complexity acknowledge degrees of unpredictability. Furthermore, the structure of dualism inadequately reduces phenomenal interaction to a simple binary, rather than the polyvalence of interdisciplinary approaches. Lastly, the ideal of absolute truth—some eternal, immutable epistemological standard—runs counter to the very idea of interdisciplinarity, which instead embraces the relativity¹ of epistemological negotiation among the diversity of contending truth claims. The interdisciplinary suspicion of disciplinary epistemic hegemony is embedded in the problematic canonical structures of knowledge upon which they are founded; the interdisciplinarian simultaneously utilizes, disrupts, and transcends epistemological structures in order to progressively form new holistic understandings of complex problems.

Interdisciplinary thought posits that truth is not the *act* of ultimately establishing knowledge, but rather the *activity* of its provisional progress:

The complexity of knowledge is suggested by the current rhetoric of description. Once described as a *foundation* or *linear structure*, knowledge today is depicted as a *network* or a *web* with multiple nodes of connection, and a *dynamic system*. The metaphor of *unity*, with its accompanying values of universality and certainty, has been replaced by metaphors of *plurality* [and] *relationality* in a *complex world*. Images of *boundary crossing* and *cross-fertilization* are superseding images of disciplinary *depth* and *compartmentalization*. Isolated modes of work are being supplanted by *affiliations*, *coalitions*, and *alliances*. And, older values of *control*, *mastery*, and *expertise* are being reformulated as *dialogue*, *interaction*, and *negotiation*. (Klein, 2004, p. 3)

¹ Although the concept of relativity has a notorious reputation in some academic circles, perhaps because it is erroneously confused with nihilism, I contend that it is one of the most powerful developments in epistemology. Furthermore, as this work argues, relativity is essential to interdisciplinary practice and the development of interdisciplinary theory. Therefore, the term and its variations will be used freely throughout this paper.

This description connotes a conceptual transformation of epistemology from its roots in absolutism and reductionism toward relativism and complexity. Interdisciplinarity thus arises from a profound turn in Western thought, described in this study, which examines and responds to the breakdown of traditional epistemological structures.

This article traces two threads of epistemological thought. The first of these is a lineage beginning with Nietzsche, continuing with the development of phenomenology, and culminating in post-structuralism. The second thread describes 19th and 20th century Anglo-American thought as it developed the ideas of pluralism and pragmatism. These particular threads are chosen, for the purposes of this essay, to explore the development of interdisciplinary theory upon a strictly epistemological basis, and further, in order to argue that these thinkers form a philosophical context for the emergence of the interdisciplinary idea.² As such, this work attempts to lay the groundwork for a comprehensive genealogy for interdisciplinarity by demonstrating that the interdisciplinary idea is deeply rooted in Western thought and arose in response to its central epistemological issues. Additionally, this paper asserts that the two modes of interdisciplinarity, which Klein (2005) identifies as the critical and instrumental, effectively correspond to the post-modern and pragmatic schools of thought this survey examines. Critical interdisciplinarity “aims to interrogate existing structures of knowledge and education, raising questions of value and purpose,” while “instrumental interdisciplinarity is a pragmatic approach that focuses on research, methodological borrowing, and practical problem solving in response to the external demands of society” (Repko, 2008, pp. 17-18). In the end, I argue that these epistemological schools of thought are not mutually exclusive; they entwine inextricably together into interdisciplinary theory and practice. Indeed, their synthetic relationship is essential to the establishment of interdisciplinary theory as an emergent epistemological innovation.

The Origins of Critical Interdisciplinarity

Nietzsche’s critique of the Western tradition. The ideas of determinism, duality, and absolute truth found their ultimate manifestation in the En-

² This is not to say that other threads in the History of Ideas have not contributed to the development of interdisciplinarity. Other schools of thought, such as Romanticism, have had an impact upon interdisciplinary identity. Nor do I claim that the survey conducted here is exhaustive. However, the chain of thought here described represents crucial and widely recognized chains of epistemological thought.

lightenment, a revolution of political, economic, cultural and technological systems which reflected the domination of reason over other modalities of thought. Through the 1700s, these ideas became thoroughly institutionalized, characterizing the Western mindset and leading to sweeping innovations at every level of civilization. Reason reified itself firmly as Science, creating a pervasive method of acquiring knowledge through logic and mathematics, and an epistemological standard tested through empiricism. This transformation was validated through the acceleration of knowledge accumulation and technological innovation beginning in the 18th century and continuing to this day. Although a remarkable evolution in human thought, the Enlightenment came at a cost. The dominion of reason brought with it alienation from the organic ebb and flow of Nature. Voices of dissent questioned the utter reliance on reason as a way to know truth. These voices constituted a decisive turn in Western thought, which began to reflect upon itself and question its own epistemological foundations. This school of thought was founded upon a critique of rationalism, which broke decisively with traditional epistemology by recognizing it as an imposed order rather than discovered. The development of the critical mode of interdisciplinarity can be seen as emerging, at least in part, from the critique this lineage developed. By questioning disciplinary structure, critical interdisciplinarity is more essentially questioning epistemological structures. At the turn of the 20th century, such ideas found acute articulation in the poet-philosopher Nietzsche.³

For Nietzsche, the quest for certainty exacted a terrible price. It privileged rationality over epistemological approaches based on spiritual revelation. He identifies this schism in *The Birth of Tragedy*, which explored epistemology as a polar opposition between Apollonian and Dionysian ways of knowing.

We shall have gained much for the science of aesthetics, once we perceive not merely by logical inference, but with the immediate certainty of vision, that the continuous development of art is bound up with the Apollonian and Dionysian duality. (Nietzsche, 1872/1967, §1)

³ Nietzsche was certainly not alone in his protestations. Again, the Romantics rebelled against the dominion of reason, and it was questioned by more faith-based schools of thought as well. However, Nietzsche’s philosophy is founded in these strains of thought to a great degree.

Nietzsche described this ancient dichotomy of rational/irrational, static/dynamic, science/art, etc., as the archetypal, ontological basis of consciousness. His intention was not to dissolve this dichotomy, but rather restore it to balance by inverting its polarity. The dynamic tug of war between Apollo and Dionysius, between *thinking* and *being*, is the essence of human thought. Following Hegel, Nietzsche hoped for an evolutionary synthesis of this polarity, and his work was obsessed with tracing the origins of Apollonian dominion over Western thought, and describing its tragic consequences.⁴ True wisdom, he claimed, is attained by transgressing established epistemological norms. Thus, Nietzsche confronted the paradox of shifting paradigms by acknowledging the immense inertia of the prevailing Apollonian epistemology while uncovering the deep ontological pull of Dionysius (§23). In other words, while reason had come to dominate knowledge formation, there remained intuitive and spiritual traces of a fundamental relationship with Nature and Being. The conflict between these two forces, and the mechanisms of paradigm establishment itself, came to characterize philosophers of phenomenology and postmodernism. To explore the way in which paradigms become fixtures over consciousness, Nietzsche utilized the philosophical method of genealogy to recognize how human thought became circumscribed by a framework of values, which cemented themselves through centuries of cultural reinforcement.

In the *Genealogy of Morals*, Nietzsche contended that the dominion of reason has alienated consciousness from its ontological roots in Nature, renouncing Life under the guise of objectivity (Nietzsche, 1887/1967, Preface §5), imposing rational Apollonian order over the older, Dionysian impulses, where human instincts were free to potentiate themselves. Under this new structure of the rational over the irrational, the dualities of pure and impure, good and bad, true and false were reconfigured according to Nietzsche, inverting the epistemological balance of power (First essay §6). This new tradition subjected the phenomenal world to the intellectual laws of logic instead of direct mythic revelation. Thus, Nature herself came to be undervalued as a corruption and distortion of the abstract, absolute ideal (Second essay §7, 11). The attempt to order reality and withdraw into the intellect arose from fear of natural chaos. Monotheism was one response to this fear, offering relief from the tormented condition of mankind, mired

⁴ Although Nietzsche's thought drew heavily upon the ancient tradition of dualism, his work treated polarity as a dynamic system, in which the poles were in mutual fluctuation, which in itself led to the more nuanced views of duality explored in later thinkers.

in the vicissitudes of phenomena, positing salvation unto a perfectly static metaphysical existence, far removed from the material plane (Second essay §19-21). The other was Reason, a panacea for the instability of the natural world by controlling it through knowledge. "A certain *impoverishment of life* is a presupposition of both of them—the affects grown cool, the tempo of life slowed down, dialectics in place of instinct, seriousness imprinted on faces and gestures (seriousness, the most unmistakable sign of a labored metabolism, of struggling, laborious life)" (Third essay §25).

By revealing what he felt were the dangers and delusions of reason, along with its primary strategies of logical determinism and absolute truth, Nietzsche's critique disrupted the epistemological structure of the Western tradition.⁵ This was an important precursor to the development of alternative approaches to knowledge in 20th century thought. Nietzsche opens the door for the eventual emergence of the interdisciplinary idea by questioning the way that epistemological structures frame, filter, and prioritize knowledge formations. After Nietzsche, all such structures, such as disciplinary organization, lose their veneer of inevitability and are now open to interpretation, critique and reconfiguration. However, the interdisciplinary approach, being essentially pluralistic, involves both Apollonian and Dionysian tendencies, acknowledging that the phenomenal world is essentially fluid and dynamic while also possessing structure, acknowledging the utility of reason while also appreciating more intuitive or even spiritual avenues of inquiry (Carp, 2001; Mackey, 2003; Szostak, 2007; Welch, 2007). In fact, the synthesis of this epistemological dichotomy is a core conundrum for the development of interdisciplinary theory (Welch, 2003, pp. 199-201). Is truth gained by objective distance or subjective participation?

Phenomenology. This paradox between subjectivity and objectivity became a primary concern for philosophers who set about developing possible solutions. One such approach is phenomenology as developed by Husserl and Heidegger, which in turn transformed itself through the French post-structuralists. This lineage describes a transition from the objective, absolute, and reductionist imperatives of the Western tradition toward a more subjective, dynamic, and complex epistemology. Nietzsche's identification of rationality as a value system, rather than a metaphysical standard, opened

⁵ It could be argued that the Enlightenment, with Hume's attack on Cartesian rationalism, had already disrupted the Western tradition. However, the philosophy of Enlightenment elevated reason above all other modes of thought. It was decidedly Apollonian.

the floodgates for a fundamental reexamination of the Western approach to truth itself; for, if values are relative and contextual, then truth is not static, but transformational. The German Idealists, grounded in Kant and Hegel, formulated a more nuanced, ontological approach to epistemology, which began to more fully investigate the fluctuating relationship between consciousness and reality.

Phenomenology constitutes an important transition toward relativity, the idea that truth is not founded upon some abstract, immutable standard, but rather embedded in dynamic systems of complexity and contextuality. Phenomenology is nothing less than a metacognitive investigation of ways of knowing, where consciousness is carefully held in complex suspension, so that the dynamics of truth and being can be apprehended within the native fluctuation of objectivity and subjectivity. Phenomenologists endeavor to examine the essential correlation between mind and world, rather than privileging one over the other (Moran & Mooney, 2002). This metacognitive component to epistemology is of particular importance—being aware of the activity of truth-making deconstructs the Cartesian choice between objectivity and subjectivity, and creates the notion of epistemology as a participatory enterprise. Although interdisciplinarians do not practice phenomenology as a core method, phenomenology provides insight to the ways a dynamic epistemology of complexity might be theoretically developed.

The foundation of phenomenology in Husserl. Husserl's epistemology begins with the synthesis of the subject/object schism as a core assumption, which is affirmed through direct phenomenological observation. In this "phenomenological reduction," it is impossible to observe the mind and reality in isolation—they are always dynamically concurrent. Husserl (1970) rejected the empiricist view that the senses are essentially primary and passive, asserting rather that perception is an *activity* in which the senses *engage* the phenomenal world, within "the dynamic and fluid character of our psychic stream and the manner in which past and present play a role in our continuous perceptions of objects" (p. 62). Husserl distinguishes phenomenology from what he calls the *natural attitude*, which sees knowledge as separated into the polarity of ego and object. Phenomenological descriptions instead take place "after an objectifying act of reflection, in which reflection on the ego is combined with reflection on the experienced act to yield a relational act, in which the ego appears as itself related to its act's object through its act... The original act is no longer simply there, we no longer live in it, but *we attend to it and pass judgment on it*" (Husserl, 1970, Inves-

tigation V §11). By reflecting upon the unity of judgment and perception, the phenomenological method achieves a higher, synthetic level of metacognitive awareness, and this is the basic act of objectivity. Thus, according to Husserl's logic, objectivity becomes the interpretive sense (§20). In other words, understanding does not come from either objectivity or subjectivity, but from the metacognitive awareness of how the subjective and objective senses are inextricably unified. This unity possesses an idea, an "essence" synthesized from their interconnectedness. All the nuanced layers of cognition and metacognition phenomenologically form a stratified holism, which fundamentally cannot be separated into constituent parts and analyzed out of context. The phenomenological method illumines the diverse facets of awareness in their native dynamic complexity (Husserl, 1913/2002).

According to Husserl, all evidence is subjectively lived; knowledge can be approached only through an examination of the dynamics within experience itself (Reeder, 1986). Phenomenology reveals within consciousness the self-evident objects of the world, which in turn constitute consciousness itself (Husserl, 1936/2002). We do not merely sense reality; we make sense of reality. By combining essential understanding with knowledge of actual objects, Husserl formulated a powerful pragmatic tool for knowledge (Reeder, 1986). He sought to unravel the reflexive dynamics of consciousness, to illuminate the myriad layers of embedded contexts inherent in the ways we experience truth. He avoided reducing epistemology to subjective terms while also rejecting the notion that the essences we perceive have a separate metaphysical presence.

This stance is instructive for interdisciplinarity as an example of the ways in which contradictory principles, such as subjectivity and objectivity, can be mutually organized within a more holistic, dynamic system. The strategy of holistic thinking is essential to interdisciplinary approaches to knowledge as an epistemology of complexity, and meaningfully corresponds to the integrative technique of "organization" described by Newell (2007) and Repko (2008).

Heidegger's ontological developments. As a student of Husserl, Heidegger applied the phenomenological method to crucial ontological questions, a deep examination of the shared essences of human existence (being) and the fabric of the cosmos (Being). In his work, ontology and epistemology quickly lose their distinction. His examination of Being becomes an examination of the truth of being. For interdisciplinarity, his work illustrates a highly nuanced treatment of the complexities of existence and knowledge,

along with a more elaborate phenomenological negotiation of the subject/object schism. Heidegger perceived a phenomenological gap in empiricism, because, as he famously put it, “the nothing nothings.” Nothingness is not really void—it is the activity of phenomena drawing us into recognition of a loss of truth. This alienation of being from Being is Heidegger’s central conundrum. Phenomenology allows us to distinguish layers of interaction between consciousness and reality, and thus Heidegger resolves the subject/object paradox by phenomenologically demonstrating that objects in the environment are given to consciousness as external and real. They persist regardless of whatever additional abstractions we make of them. Heidegger describes his idea of the subject/object paradox:

The controversy over the concept of truth goes back and forth between the thesis, *Truth is a relationship of the state of affairs to the subject matter*, and the thesis, *Truth is a specific correlation of acts...* Both conceptions try to direct the concept of truth to one side and so are incomplete. Neither the one oriented toward the state of affairs nor the one oriented toward the act captures the original sense of truth. (Heidegger, 2002, p. 277)

Through integration, objective and subjective knowledge become relative and interactive, yet grounded in an ontological relationship that transcends them both.

For Heidegger, the central question of Being is this: How is it that we know what we don’t know; in other words, why do we experience the absence of Truth? He contended that the resolution of this question involved a re-cognition of a necessary pre-existing relationship between human beings and Being. For, in order to even ask this question, Being must be available to our consciousness in some intrinsic way. Through phenomenological insight, Heidegger saw paradox as an essential property of Being; that Being comes into existence by creating difference, separation, and distance in time and space. However, through beings, conscious quasi-autonomous entities, Being reflects on Itself—existence is enabled through the continual recycling of essence and form (Heidegger, 1977, §2). Epistemology, for Heidegger, is based upon this communion. In order to ascertain truth, epistemology must reposition itself within this ontological dynamic—to be in Truth, rather than construct it (§3). This requires ontological deliberation, communing with Being in its temporal fluidity, not the establishment of fixed and final metaphysical law (§5).

Following from this avenue of thought, Heidegger turned to a phenomenological inquiry into the dynamics of revelation. Like Nietzsche, he decisively contravened the traditional dismissal of the mythic and poetic as legitimate methods for ascertaining truth. Truth, he asserted, must come from divining the nature of truth within its native soil of Being. The imperative to explain Being pins it down into static definition, whereas Being itself essentially dwells within namelessness. By insisting that there is a separation between what goes on inside of subjective human consciousness and the objective phenomena enveloping it, Western epistemology severed consciousness from reality. This was a natural result of our ability to abstract our selves from the phenomenal world. We beings, by the very nature of existence, stand out from Being; otherwise we would possess no cognizance of ourselves as individuals. Yet, within this standing-out is the call to return to Being (1998, §190). For Heidegger, the metacognitive awareness of our own ignorance itself reveals our ontological connection to the fabric of the cosmos, and epistemology arises from realizing and reflecting poetically on this connection. Truth is a mystery which calls us home.

For interdisciplinary theory, Heidegger provides an example of a complex epistemological response to the collapse of determinism, dualism, and absolute truth. His work reconfigures the structures of truth established by the previous canon, and opens up alternative epistemological avenues. Heidegger’s approach to epistemology elaborated upon Nietzsche’s assertion of a primordial ontological connection with the phenomenal world, while utilizing Husserl’s methods for synthesizing the dualistic constructions of the Western tradition. They affirmed that consciousness and reality are inextricably intertwined, and thus have a fundamentally shared epistemological basis. For the phenomenologists, this relationship was self-evident—to any careful observer of consciousness, its connection to an external phenomenal world is undeniable and essential. The critical mode of interdisciplinarity perhaps owes an unacknowledged debt to phenomenology, not simply as the forerunner to postmodernism, but also because of its emphasis upon a more metacognitive approach to knowledge. Critical interdisciplinarity is based upon reflection, the dislodging of consciousness from epistemological structures by recognizing their control over thought. This unsettling realization is a result of phenomenological awareness. The problematic nature of this awareness was of primary concern to the post-structuralists who elaborated upon these phenomenological discoveries.

Post-structuralism. Phenomenology laid the groundwork for post-structuralism by dislodging the metaphysics of absolute truth, and discovering that the relationship between consciousness and reality is extraordinarily convoluted and complex. The post-structuralism of Derrida and Foucault explores this complexity, providing fundamental insights toward the development of interdisciplinary theory. Their work responded to the structuralist movement that had infiltrated linguistics and anthropology in the mid-1900s. Although the structuralists acknowledged that there was a dynamic nature to the process of meaning, they employed reductionist techniques in order to formulate these relationships into a generalizable structure. The post-structuralists saw this enterprise as a regression to the traditional epistemological strategies discredited by Nietzsche, Husserl, Heidegger, and others. Their thought constitutes the formulation of a broad critique of the Western epistemological condition, and forms an important wellspring for critical interdisciplinarity.

An instructive case study for the rejection of structuralist thought is the apostasy of Roland Barthes, who rejected his own semiotic theories in “The Death of the Author.” Here Barthes admitted that his previous attempts to structure subject and object within the dynamic of linguistic signs were inadequate, and he joined the post-structuralist project of situating this interaction within a more relativistic field (Barthes, 1957). He demonstrated this by exploring the convoluted relationship between author and reader, ensconced in their disparate cultural contexts. “Writing is the destruction of every voice, of every point of origin. Writing is that neutral, composite, oblique space where our subject slips away, the negative where all identity is lost, starting with the very identity of the body writing” (Barthes, 1977, p. 143). This dislodges the written word as direct conveyance from writer to reader into a symbolic interaction. A text is not a passage of words imparting a singular meaning, but a multi-dimensional space in which a variety of meanings blend and clash across time and space (p. 146). Barthes contended that the author, like the reader, is embedded in cultural contexts that permeate their thought processes in profoundly unconscious ways. These ambiguous notions of agents within contexts reveal the epistemological problem of subjectivity and objectivity which interdisciplinary theory seeks to synthesize.

Derrida’s development of deconstruction and *différance*. Derrida draws upon the methods of Husserl and the explorations of Heidegger, unraveling as he entangles the conundrum of human ontology and the question of knowledge through his epistemological strategy of deconstruction. De-

construction explores the dynamics of dichotomies such as speech/writing, presence/absence, and interior/exterior. In deconstruction, the poles of all such dichotomies are shown to inhabit yet contradict each other. Derrida’s work is a description of what results from the exhaustion of the metaphysics of exclusive dichotomies (Derrida, 1974). At the core of the metaphysical tradition is *logos*, the assertion that the order of the universe is entirely objective and independent of consciousness. Derrida asserts that this *logocentrism* is not a description of the shared logic of internal mind and external reality, but rather an imposed order, a reductionist scheme to make reality sensible to consciousness, setting up the subject/object dichotomy and privileging objectivity as truth. In this way metaphysics heralds itself as transcendent, radicalizing subjectivity as interpretation and difference, a distancing of experience from reality.

To compensate for this, Derrida devises the epistemological stance of *différance*. This neologism, a newly created compound word, acknowledges the separation of subject from object, and the Heideggerian notion that beings stand out—they *differ*—from Being, an unreflective state of existence. At the same time *différance* situates the subject in a state of suspension, a *deferral* of judgment—a phenomenological position in which the subject *decides* to interact with objects without superimposing intellectual conceptualizations upon them. *Différance*, therefore, is a kind of middle voice, encompassing simultaneously the polar interaction between activity and passivity—the *play* of differences (Derrida, 1973/2002a, p. 557). The poles of objectivity/subjectivity do not, for Derrida, merely oscillate; they *dance* with each other in a dynamic relationship which possesses more nuanced polyrhythms.

The way in which he navigates this paradox is an instructive example of an epistemology of complexity. According to Derrida, objectivity is subjectivity hiding from itself. Thought formulates itself within an *episteme*, a contextual epistemological fabric, which denies its own context inside the delusion of a metaphysical absolute. This epistemological position defines itself as “the very element of philosophical thought, it is *evidence* itself, conscious thought itself, it governs every possible concept of truth and sense” (1973/2002b, p. 549). However, Derrida contends that consciousness is both inside and outside of itself at once, and this paradox is *itself* the essential dynamic of Being. “It is therefore *the game of the world* that must be first thought; before attempting to understand all the forms of play in the world” (Derrida, 1974, p. 50). Derrida’s *différance* provides breathing space for this interaction, allowing the contradiction between the self and other to not sit still. Within this disruption, an opening occurs, which enables a more

complex approach to epistemology. Questioning the Western imperative to superimpose metaphysical abstractions as Absolute Truth rips grounded security out from under philosophical discourse, and presents a formidable epistemological challenge. Without some stable, universal standard for truth, it seems to follow that the very idea of truth is rendered impossible.

However, Derrida clearly and repeatedly states that the disruption wrought by metacognitively thinking through ontological difference does not mean abandoning the search for truth. Derrida's conclusions, despite accusations of nihilism, point toward an avenue for epistemological affirmation that knows truth through the recognition of its loss. Although his work illustrates the ways in which our search for Truth has been trapped by its own devices, it is not an epistemological abnegation entailing an either/or choice between absolutism and anarchy. Derrida admits that there is indeed a "right" way, or else his own critiques could have no basis or wellspring. Within interpretive contexts that are relatively stable, it should be possible to invoke rules of competence, criteria, good faith, lucidity, rigor, criticism, and pedagogy. Undecidability is not indeterminacy. Questioning the episteme implies "that there *are* and that there *should be* truth, reference, and stable contexts of interpretation" (Derrida, 1972, p. 150). Although Derrida acknowledges that we can never escape the metaphysical tradition entirely, in the tradition of Nietzsche and Heidegger, he claims that Being can be affirmed "with a certain laughter and with a certain dance" (1973/2002a, p. 571).

Here again, we see the importance of playfulness and creativity, which are essential strategies of interdisciplinary integration. The art of epistemological negotiation involves allowing for the inherent unsettlement of truth claims, while still participating in the production of knowledge and judgment in a manner that engages the mutual dynamic of subject and object. In other words, truth is not something that can be achieved absolutely but something we can move toward.

For Derrida, this unsettled epistemological strategy is an ontological necessity. Without the possibility of fallacy, our faculty for judgment would not have come in to being. By consciously embracing the necessity of indecision, a complex metacognitive awareness arises, which finds equilibrium within intellectual vertigo. The new awareness opens up a new more dynamic and fluid epistemological horizon, which steadfastly rejects reductionism, embracing a decidedly more Dionysian approach to knowledge. An epistemology of complexity cannot help but be drawn into the dynamics of undecidability and *différance*. Interdisciplinary theory must be founded upon the assumption that all complex systems and phenomena are in a necessary

state of flux, and therefore cannot be investigated in ways that determinately structure that flux.⁶ This is its basic assertion against disciplinary hegemony, which has far-reaching implications. Interdisciplinarity allows for ambiguity, contradiction, and difference (Repko, 2008, pp. 42-43). It neither seeks an ultimate resolution of complex problems, nor a unified transfiguration of all knowledge (p. 15). Although interdisciplinarity may reject these notions of absolutism, it rejects nihilism as well. In seeking to develop ways of making decisions, judgments, and accumulating knowledge within complexity, interdisciplinary practitioners can appreciate the ways in which Derrida navigated these treacherous epistemological waters.

Foucault and the dynamics of paradigm construction. Foucault's conceptualizations of the relationships of power, culture, and knowledge are at their base a deep re-examination of epistemology. For Foucault, Truth is not absolute, but rather an *episteme* within which our notions of truth are determined and defined by collective cultural norms. "The fundamental codes of a culture—those governing its language, its schemas of perception, its exchanges, its techniques, its values, the hierarchy of its practices—establish for every man, from the very first, the empirical orders with which he will be dealing and within which he will be at home" (Foucault, 1970, p. xx). Like Nietzsche and Derrida, Foucault sought to dismantle this epistemological framework by genealogically tracing its origins. His account follows a particular thread, which directly bears upon the formation of the disciplines and the interdisciplinary response to them. Epistemology arose as a response to the dissynchronism between knower and known, knowledge became a "zigzag" course from subject to object, seeking resolution through the accumulation of knowledge, hoping to eventually see reality as it really is. "And just as this infinite play within nature finds its link, its form, and its limitation in the relation of the microcosm to the macrocosm, so does the infinite task of commentary derive its strength from the promise of an effectively written text which interpretation will one day reveal in its entirety" (p. 42).

Foucault goes on to describe how this interpretive task of absolute knowledge eventually fell upon the faculty of reason, which was so successfully employed in the physical sciences that it was assumed the rational laws of nature governed humans as well. The dominion of reason produced an imperative to structure all phenomena quantitatively. Foucault called this ob-

⁶ At least not permanently. Although interdisciplinary research, especially in scientific domains, does employ various forms of structure to help solve complex problems, it does so on a provisional basis.

session *mathesis*: “It reduces the whole area of the visible to a system of variables all of whose values can be designated, if not by a quantity, at least by a perfectly clear and always finite description. It is therefore possible to establish the system of identities and the order of differences existing between natural entities” (p. 136). The establishment of logical order is as much about control as it is about discovery. In our desire to make sense of reality, we force reality into preconceived frameworks of sensibility; we create truth by putting reality into place.

Foucault’s genealogy described an ongoing philosophical project to fastidiously define and structure reality in order to avoid the intellectual vertigo resulting from the metacognitive apprehension of an unanchored consciousness within the fluctuating world. The history of epistemology is, therefore, the ongoing interpretation of domination (Foucault, 1971/1984, p. 81). However, Foucault insisted that this historical task of erecting and bolstering the Western episteme must be dismantled. “Knowledge,” he asserted, “is not made for understanding; it is made for cutting” (p. 88). Foucault’s intention, like Nietzsche and those that followed him, was to transgress that framework, to fundamentally dislodge Truth as immutable essence. His genealogical critique provides an opening for a more highly nuanced metacognitive inquiry on how human thought comes to be situated in cultural constructions.

This element of self-reflexivity develops the metacognitive emphasis of this lineage. It is of crucial importance to interdisciplinary theory as well. The post-structuralists impose metacognition upon epistemology, entailing reflection on knowledge acquisition itself—an awareness that we are consciously constructing a reality beyond consciousness. Thus, awareness is multidimensional, yet from this maze of reflections sense must be made.

Foucault’s later work concentrated upon the subtle mechanisms of power, the effect of logical order upon human psychology, physiology, and social structures. “Knowledge and power are integrated with one another, and there is no point in dreaming of a time when knowledge will cease to depend on power...” (Foucault, 1977, p. 52) Foucault visualized power as a web, a capillary structure wherein individuals are simultaneously undergoing and exercising power. Although the prevailing episteme may seem ubiquitous, it is susceptible to transformation wrought by the agents enveloped within it (Gordon, 1999; Bevir, 1999). Epistemological structures, howsoever deterministically intentioned, can never really achieve permanence. Rather, as irreducibly complex systems, they are inevitably permeable and unsettled, and thus open to perpetual disruption and reconfiguration.

This notion of complexity is shared by interdisciplinarity. Interdisciplinary theory approaches complex systems as holisms, which are characterized by difference and conflict yet possess cohesion (Klein, 1996). “The critical ontology of ourselves has to be considered not, certainly, as a theory, a doctrine, nor even as a permanent body of knowledge that is accumulating; it has to be conceived as an attitude, an ethos, a philosophical life in which the critique of what we are is at one and the same time the historical analysis of the limits that are imposed on us and an experiment with the possibility of going beyond them” (Foucault, 1984, p. 50). Thus, for Foucault, epistemology becomes the metacognitive realization of the process of truth formation, rather than the establishment of Truth itself. This epistemological strategy embraces uncertainty as a necessary condition for truth—truth is seeking, not finding. Here, critical interdisciplinarity finds a conceptual framework for questioning the dominion of the disciplines as the imposition of epistemes upon the complexity of knowledge, and furthermore for questioning the epistemological project itself.

Postmodernism is routinely derided as a plunge off the epistemological cliff, the abandonment of Truth toward the embracing of Doubt. However, I wish to make a distinction here between relativism and nihilism. In discourse over the implications of postmodernism, the two terms are often conflated; nihilism is sometimes denoted as “radical relativism” (Szostak, 2007). I assert that relativism rather occupies an intermediate space between absolutism and nihilism. Although nihilism rejects order in favor of chaos, relativism dances between the poles. Unmooring ourselves from the reductive structures of logical determinism, dualism, and absolute truth, in fact enables the development of an epistemology of complexity. Interdisciplinarity is a decisive response to the postmodern impasse, the anxiety of second-guessing the very structures we have put forth to make reality reasonable. Abandonment of our traditional epistemological standards would seem to leave us wallowing in the vertigo of our own self-doubt. Yet this metacognitive awareness of fallibility is inevitably a source for further epistemological development.

Interdisciplinarity, as an idea, owes much to the disruptions phenomenology and post-structuralism wrought upon the epistemological tradition. From its inception, the interdisciplinary idea sought to transgress the power structures inherent in the organization of disciplinary categories, acknowledging the limitations of logical order over the dynamics of complexity (Hoskin, 1993, p. 277). The disciplines represent a “tabulation” of phenomena, inherently striving to dissect and minimize their complex interactions by dividing

them into discrete categories (Dietrich, 1995). In doing so, the disciplines retreat into isolated epistemological constructions designed to establish truth over their objects of investigation. The development of interdisciplinarity is embedded in this postmodern realization that the things disciplines study are connected to each other (Repko, 2008, pp. 30-36).

Furthermore, critical interdisciplinarity cultivates many postmodern methods in its approach to the epistemology of complexity. It recognizes that difference and contradiction are inherent to complex phenomena, seeking not to ultimately reconcile these differences into a unified episteme, but rather allowing understanding to arise dynamically within the native complexity of phenomenal interchange (Klein, 1990, p. 221). Interdisciplinarity does not impose truth, but rather interacts with truth through the synthesis of multiple disciplinary perspectives (Klein, 1996, p. 10). In postmodern fashion, interdisciplinarians are fundamentally tolerant of ambiguity (Bromme, 2000, pp. 116-118; Hursh, Haas & Moore, 1983, pp. 44-45). Indeed, they seek out ambiguity, while striving to develop integrative understanding. The integrative mindset embraces uncertainty while avoiding nihilism. Although the interdisciplinarity idea emerges from the disruption of disciplinary categories, it strives to further develop a coherent and proactive path to epistemology out from the postmodern impasse (Klein, 1990, p. 42). Interdisciplinarians are interested in integrating knowledge into a dynamic, yet quasi-cohesive holism (Repko, 2008, p. 9). This requires a level of self-reflexivity that is the hallmark of postmodernism (Alvesson, 2002, p. 144). The art of epistemological negotiation requires a comparative awareness of the ways in which various disciplines establish truth claims. In its critical mode, interdisciplinarity is an attempt to cultivate undecidability as a means of keeping the epistemological frameworks presented by the disciplines in constant flux.

However, critical interdisciplinarity cannot be the sole basis for interdisciplinary theory, because there is another step beyond the metacognitive awareness of epistemic structures. This is integration, wherein the interplay of epistemes achieves a higher level of synthetic organization, allowing for greater understanding of complex problems, and better decisions concerning them. In order to interact with phenomena in their native complexity, interdisciplinarity forgoes the stability of the traditional episteme, yet does not abandon the epistemological project itself. In order to understand and attempt to solve complex problems, instrumental interdisciplinarity affirms that truth abides within the dynamics of complexity, that phenomena in flux are still intelligible. The “postmodern condition” was said to arise because the episteme of modernism had finally exhausted itself, revealing its ulti-

mate failure to define reality and guide us through it. The exploration of phenomenology and post-structuralism here provides groundwork and a historical context toward the development of interdisciplinary theory, but it is only half the picture. The practice of interdisciplinary studies has come to define itself not merely as critique, but also as an integrative method for understanding complex systems and solving complex problems. The critical and instrumental modes of interdisciplinarity together form a holistic approach to generating and applying knowledge.

Instrumental Interdisciplinarity

Pluralism. The interdisciplinary idea is not in complete accord with postmodernism because it has evolved from multiple wellsprings. Although the idea of interdisciplinarity owes much to the postmodern critique of the reductionist strategies of the Western tradition, many of its core sensibilities organically belong to the traditions of pluralism and pragmatism developed in Anglo-American thought. Because interdisciplinarity embraces complexity, engaging multiple perspectives as a fundamental epistemological method, it is naturally pluralistic. Complex phenomena are dynamic, polyvalent, and multifaceted, and interdisciplinarity appropriately examines them in just this kaleidoscopic light. Foundational empiricists such as Bacon, Locke, and Hume enabled the development of epistemological pluralism in the 18th and 19th centuries. This school of thought sought to formulate a basis for judgment out of the diversity of human viewpoints and the epistemological frameworks that structure them. Although Anglo-American thinkers became increasingly critical of the epistemological strategies of determinism, dualism, and absolute truth, they never forsook the prospect that human beings are capable of sorting out the truth within a complex, dynamic context (Welch, 2009). Here, we see the beginnings of instrumental interdisciplinarity, emerging from the context of pluralism as the beginnings of an epistemology of complexity.

The dynamics of liberty. A foundational text for the tradition of pluralism is John Milton’s essay, *Areopagitica*. Milton identifies liberty as the essential mechanism of pluralism. Pluralism situates epistemology in the interplay of discourse, and in the interaction between human systems and the natural forces that envelop them. For Milton, liberty creates an ongoing disruption of cultural norms, and implicitly, the epistemological frameworks from which they are formulated. Milton asserted that the accumulation of

knowledge is an essential human activity, and thus humans must take responsibility for the progress of knowledge, and take into account its context within the diversity of historical and cultural thought. This process of collectively realizing truth should be free (at liberty) to conduct itself without the deterministic intervention of social structures. In this way, the collisions of opinion have the space to organically coalesce into a dynamic consensus, which, though unstable, inevitably approaches incrementally closer to truth. Truth is not established by authorities; it is worked out through the exchange of ideas (Milton, 1644/1952). Following from Milton's thought, the idea of interdisciplinarity has a positive foundation; more than a critique of the traditional foundations of knowledge, he began to open for epistemology a way out of entrapping itself—that in the progression of interplaying ideas, there is still progress.

In the *Theory of Moral Sentiments*, Adam Smith elaborated upon the pluralism of Milton, developing a theory about the way in which diverse opinions regarding right and wrong form consensus. Humans possess a basic intersubjective communion of consciousness—a certain “fellow-feeling” (Smith, 1759/1966, part 1, section 1, chap. 1). Within this shared experience, norms of behavior establish themselves through collective judgments of approval and disapproval (part 1, section 1, chap. 5). Smith acknowledged that these imperatives are, at least in their particulars, culturally relative. “In general, the style of manners which takes place in any nation, may commonly upon the whole be said to be that which is most suitable to its situation” (part 5, chap. 2). Nonetheless, as a seminal Enlightenment thinker, he believed that moral conduct transcends cultural codes; it is an instinct, which, despite the delusions of infallible moral and epistemological regimes imposed by revolutionaries and traditional authorities alike, will inevitably surface through free discourse (part 7, section 3, chap. 2).

Smith's moral system has epistemological implications, bringing cohesion to the chaos of human interactions with the phenomenal world. This cohesion is fundamentally based upon the essential propensity for natural pluralistic systems to establish an economy, where diverse forces organically achieve cohesive balance among themselves. Human intention and reason are themselves intertwined in this organic economy (Packham, 2002, p. 476). Complex systems, in their holistic cohesion, are progressive—they dynamically sort through inherent frictions and conflict toward equilibrium. Equilibrium, in this sense, is a multidimensional state of fluctuating cohesion achieved by complex systems. This dynamic equilibrium well describes the process of interdisciplinary integration, which achieves a high level of

synthetic organization among multiple perspectives, which in turn enables positive approaches to complex problems. The parallel between natural phenomena and integrative consciousness is not merely analogy; it is ontology. Although it has been contended that the integrative process does not come “naturally” to the uninitiated researcher (Repko, 2008, pp. 276-277), this is misleading. In the sense that the integrative mindset requires a laborious refinement of consciousness, an elevation from more ordinary modes of thought, perhaps this feels “unnatural,” but only because this transition is experienced as epistemological separation anxiety. Yet, in a truer sense, the interdisciplinary approach to knowledge can be seen as a return to the natural, the fluctuating state of communion with Being described by the phenomenologists and pluralists alike.

John Stuart Mill developed this epistemology of pluralism in his essay, *On Liberty*, asserting that true liberty arises from the equilibrium between individual independence and social context (Smith, 2003). These two levels, of self-interest and collective interest, inevitably adjust to each other through a metacognitive awareness of their relationship (Millgram, 2000). Liberty curtails absolutism by cultivating a balance of power within diffusion of diversity, and in doing so continues the project of truth. “There is no such thing as absolute certainty, but there is assurance sufficient for the purposes of human life” (Mill, 1869/1989, p. 22). Humans are defined by their capacity for choice, and therefore must be dedicated to the unsettled progression of truth, which rules out any simple or final solution to any concrete problem (Berlin, 1969). Mill saw progress in terms of a pendulum, eventually finding its center (Williams, 1958, p. 49). However, this dichotomous paradigm cannot adequately describe the dynamics of human discourse, and the epistemological negotiations that transform it (p. 53). In other words, Mill would have agreed that dualism was reductionistic. He acknowledged a complex sense of agency, in which the individuals become metacognitively aware of their capacity to affect the social constructions enveloping them (Haskell, 1998, p. 345). It is worth noting the similarities between Mill's pluralism and the post-structuralism of Derrida and Foucault.

This describes the beginnings of an epistemology of complexity, in which multiple perspectives are allowed to dynamically interact, unfettered by the imperatives of absolutism. Here we see the development of core interdisciplinary values, including tolerance for ambiguity, appreciation of diversity, and the utilitarian goal of progress through complex problem solving (Repko, 2008). The dynamic relationship between individuals and the collective more deeply conceptualizes complexity, in which either/or dualism

breaks down in favor of a more fluid and polyvalent interaction. The development of interdisciplinary theory arises from this epistemological strategy. Furthermore, the notion of progress presented by the tradition of pluralism is inherent to instrumental interdisciplinarity as a positive response to complex, contemporary problems. In this way, interdisciplinary theory engages in questions of value and judgment, which are themselves situated in the epistemological negotiations of pluralism. The idea of progress will be more fully examined in the survey of pragmatism that follows.

The cohesion of plurality through evolutionary theory. The work of Charles Darwin, although embedded in biology, influenced the development of epistemological pluralism. Darwin successfully overturned the absolutist theory that all species were fixed and independent. This placed existence itself in a state of contextual relativism, which had a profound impact on paradigms of culture and society.⁷ Competing species fluctuate within ecological equilibrium and symbiosis as they adapt to each other. Organic life does not simply react individually to present conditions; it collectively reorganizes itself over time, adjusting its forms to accommodate prevailing environmental patterns. This evolutionary feedback loop involves the forces of nature in an ongoing cycle of re-creation (Darwin, 1859/1952). Thus the equilibrium embedded in nature indirectly affects transformation of species by creating the sustainable system dynamics enveloping all life, and this in turn intimates an ontological basis for progress. However, Darwin pointedly declared that evolutionary progress was not toward a preordained, ultimate goal. Imperfection is inherent in all life, ensuring that the organic world never achieves stasis. The epistemological strivings of the human race are an enhancement of basic evolutionary mechanisms, which are simultaneously derived from nature while also seeking to refine it (Darwin, 1871/1952). Darwin's theories confirm that complex systems naturally form economies of organic cohesion. An economy, in this sense, denotes a system which achieves ongoing balance and cohesion through the mutual interactions of its components.⁸ This is an essential assertion of pluralism, that balance and cohesion *emerge* from complex systems, rather than being externally imposed upon them. This has direct implications for the development of interdisciplinary theory. Interdisciplinarity is based upon the synthesis of diverse

⁷ Although evolutionary biologists might blanch at this assertion, contextual relativism here refers to the fact that the development of species is embedded in mutual interactions with each other and the environment.

⁸ An ecology would be this sense of economy applied to a natural bioregion.

perspectives, which results in a more holistic understanding and cognitive advancements. This implies that diversity of perspectives is not epistemological anarchy, but rather that complex systems naturally tend to negotiate themselves into higher order systemic organizations. This provides an ontological basis for an epistemology of complexity, asserting that complex systems do not require intellectual imposition. Dynamic equilibrium is, in fact, a natural process inherent in the phenomenal world. Furthermore, human consciousness evolved from this natural process and therefore can never be truly alienated from it.⁹

Anglo-American thought embraces plurality as a necessary and natural function of the phenomenal world and the relationship of consciousness to it. This epistemological strategy was able to sidestep the paradoxes of Western epistemology by assuming a close connection between humans and nature, determining that systems of diversity produce cohesive economies, and affirming that human discourse entails a natural proclivity toward progress. In doing so, these thinkers set epistemology upon a decidedly non-absolutist, non-dualistic ground, in which the dynamic of life was nonetheless affirmed. Truth was not something to be established in comparison to an immutable idea, but rather was fully embroiled in the shifting interplay of natural forces and human participatory reflection upon them. Interdisciplinary theory fundamentally assumes epistemological plurality, and fully embraces the ideal of liberty of discourse, specifically across disciplinary boundaries. Interdisciplinarity approaches knowledge as the tangled web it is, understanding that truth comes from participating in this web, not anchoring it to some static, absolutist framework. In its instrumental mode, pluralism lays the groundwork for the interdisciplinary propensity to engage productively in discourse about truth and value, with the progressive goals of creating better knowledge and the greater good.

Pragmatism. Interdisciplinarity in its instrumental mode is focused upon practical problem solving, providing a methodology for examining and resolving the myriad complex problems confronting the 21st century. As such, it possesses a strong pragmatic impetus, an instrumental orientation that seeks to enhance social and academic progress, along with the critical function of reorganizing the value systems within which this progress is founded. In postmodern fashion, interdisciplinarity strives to take into account the

⁹ However, this is not to say that practical interdisciplinary projects do not involve intellectual contention and the interplay of power and control. Rather, this interplay itself is part of the economy of complex systems.

inherent “slipperiness” of complexity, enveloped within cultural matrices and permeated by subtle power plays. This paradox of attempting to make sense of complexity and apply that understanding to achieving progress, while simultaneously acknowledging the quasi-determinate nature of complexity, is the crucial conundrum facing the development of interdisciplinary theory and its epistemology of complexity. The school of pragmatism offers valuable insights to this problem, and supplies another puzzle piece in the groundwork for the genealogy of the interdisciplinary idea. Pragmatism arose from the traditions of empiricism; however,

rather than depending on sense data and inductive logic for knowledge, the pragmatists argued that any idea could be considered knowledge if the consequences of that idea were advantageous.... To pragmatists, knowledge is a tool to be evaluated as a tool; it is never certain. At any time and place, knowledge is that which helps the most people achieve satisfaction of their needs, including the need for more knowledge. (Cunningham & Fitzgerald, 1996, p. 43)

Pragmatism sought to minimize the reductionism which had paralyzed previous epistemological strategies by forming a strong link between knowledge and action. “Pragmatism offers a conception of reason that is practical rather than intellectual, expressed in intelligent doings rather than abstract sayings. Flexibility and adaptability are its hallmarks rather than mastery of unchanging universal principles” (Brandom, 2002, p. 8). However, rather than simply modeling the theoretical on the practical, the pragmatists synthesize both these notions as adaptive, dynamic interactions between organism and environment (p. 18). Pragmatism courts a kind of epistemological balance, critical of the reductionism of the Western philosophical tradition, while simultaneously avoiding the nihilism intimated by postmodernism, and therefore is quite in line with the interdisciplinary approach to knowledge.¹⁰

Peirce’s foundation of pragmatism in scientific inquiry. The origins of American pragmatism can be traced to the works of Charles Sanders Peirce. Peirce saw that epistemological systems resting upon reason or authority became static—their sense of certainty closing debate. To his mind, it was up

¹⁰ For a thorough overview of pragmatism and all of its major figures, see James T. Kloppenberg (1996), “Pragmatism: An Old Name for Some New Ways of Thinking?” *Journal of American History*, (83)1, 100-138.

to science to expose defective reasoning so that we might further refine our comprehension of the logic of the phenomenal world. We are logical animals, but imperfectly so, because we tend to conflate our hopes and aspirations with knowledge (Peirce, 1877/1972, p. 123). Human nature possesses a predilection for making sense of the world, and this impulse leads us to fall into habits of mind, “guiding principles” which stabilize understanding. Outside these parameters, the intellect experiences vertigo. Peirce asserted that common sense had become corrupted with the bad logic of metaphysics, an epistemological course that sought to eliminate doubt. Although these metaphysical systems rested on no observable facts, we became intellectual slaves to them because their fundamental propositions seemed “agreeable to reason.” Thus metaphysics settled in to its own epistemological framework, erasing doubt by establishing certainty in something beyond human experience. Peirce argued that inquiry is rather the struggle toward settlement of opinion. The only way to truly fix our beliefs is to isolate ourselves from the diversity of discourse. “Unless we make ourselves hermits, we shall necessarily influence each other’s opinions; so that the problem becomes how to fix belief, not in the individual merely, but in the community” (pp. 129-130). However, doubt stimulates inquiry, like a raw nerve, and truth, for Peirce, is the public, shared project of ever confronting doubt.

Peirce was therefore concerned with how this pluralistic discourse clarified itself. “A clear idea is defined as one which is so apprehended that it will be recognized wherever it is met with, and so that no other will be mistaken for it. If it fails of this clearness, it is said to be obscure” (Peirce, 1878/1972, p. 137). He contended that ideas cannot be tested merely through self-consciousness, as Descartes suggested, nor through Socratic dialectic or Aristotelian syllogism (Welch, 2009). Scientists, on the other hand, hope that investigation, if pursued far enough, will give one certain solution to each question. “The opinion which is fated to be ultimately agreed to by all who investigate, is what we mean by the truth, and the object represented in this opinion is the real. That is the way I would explain reality” (p. 155). Pragmatism, as Peirce envisioned it, participates in the scientific tradition of cooperative knowledge, where all available insights confront and reflect upon each other toward the attainment of indisputability.

However, knowledge always sets out from a contextual epistemological position, from which it is impossible to fully divest oneself. The accumulation of knowledge is a collective experiment—cycling induction and deduction, continually iterated by doubt—testing truths through application and rational agreement on terms (Peirce, 1905/1972, p. 277). Peirce asserted that

this discourse is systematic and progressive—truths will, on the average, have a greater tendency to attain belief; were it otherwise, the sorting out of false hypotheses would, instead of being the result of ontologically founded selection, be nothing short of a miraculous stroke of luck. Thus, reflective thought is essentially grounded in the phenomenal world. This conclusion involves pragmatism in an almost phenomenological investigation of the relationship between consciousness and reality. Human consciousness is neither ontologically nor epistemologically pure; it exists in the fluctuating intermediacy of affirmation and denial, determination and indetermination, generality and vagueness (pp. 290-291). Pragmatism contends that consciousness accesses deeper organizational levels of the phenomenal world—a logic interpenetrating reality—through its innate, and evolutionarily derived, capacity for abstract thought. Therefore, progress is built into nature through the very instinct of doubt. Peirce’s communal approach to epistemology set the stage for interdisciplinarity by valuing exchange of ideas among diverse specialists (Haskell, 1998). Knowledge is here approached as an ongoing process of collaboration and debate toward a more holistic understanding of complex problems and the sorting out of solutions to them. This dynamic, synthetic, and progressive epistemological strategy is well in line with the aspirations of interdisciplinary theory, utilizing meta-cognitive reflection as a means of offsetting epistemological fixation though the productive employment of doubt. The productivity of doubt must lead somewhere, to some greater good or better understanding.

James’s theories of epistemology. William James refined the pragmatic approach, positioning it within the context of Western thought as a development of empiricism rather than rationalism: “Rationalism is always monistic. It starts from wholes and universals, and makes much of the unity of things. Empiricism starts from the parts, and makes of the whole a collection—is not averse therefore to calling itself pluralistic” (James, 1955, p. 21). James criticized absolutist philosophers for dwelling in a realm of transcendent abstraction.

When the first mathematical, logical, and natural uniformities, the first *laws*, were discovered, men were so carried away by the clearness, beauty and simplification that resulted, that they believed themselves to have deciphered authentically the eternal thoughts of the Almighty. His mind also thundered and reverberated in syllogisms (p. 48).

For these philosophers, rational truth must be absolute, objective, pure, remote, and exalted—what our consciousness ought to think. Like Peirce, James saw the pragmatic method as a turn towards concreteness, adequacy, fact, action, and power (p. 47).

James asserted that the phenomenal world and our experience of it form a cohesive, continuous integration. “‘Things’ do exist, even when we do not see them. Their ‘kinds’ also exist. Their ‘qualities’ are what they act by, and are what we act on; and these also exist” (p. 120). Common-sense categories allow us to organize overwhelming sensory input—all theories are instrumental modes of adaptation to reality. Although there is ambiguity in our search for truth, James contended that we can verify true ideas through processes of assimilation, validation, and corroboration. The mind may “cook” sensations, organizing them into thought, but our abstractions work only insofar as they agree with reality. “The directly apprehended universe needs...no extraneous trans-empirical connective support, but possesses in its own right a concatenated or continuous structure” (p. 199).

Pragmatism asserts that the ideas we have about reality can be fruitfully tested through our interactions with it (p. 208). James described this process as essentially digestive, fed by experience contextualized within beliefs that we are always assimilating, rejecting, or rearranging. The search for truth serves a purpose, “that we may the better foresee the course of our experiences, communicate with one another, and steer our lives by rule. Also that we may have a cleaner, clearer, more inclusive mental view” (p. 235). Although our conceptualization of truth may be subjectively muddled and slippery, pragmatism provides an epistemological vantage grounded in the coherent nature of the phenomenal world.

The true is the opposite of whatever is instable, of whatever is practically disappointing, of whatever is useless, of whatever is lying and unreliable, of whatever is inconsistent and contradictory, of whatever is artificial and eccentric, of whatever is unreal in the sense of being of no practical account. Here are pragmatic reasons with a vengeance why we should turn to truth—truth saves us from a world of that complexion. (p. 242)

The diversity of perceptions forms a system that puts reality into shape within the perpetual interchange of difference and similarity. Truth grows inside the web of experience, yet simultaneously arises from its correspon-

dence to reality. “*To know an object is here to lead to it through a context which the world supplies*” (p. 227).

This epistemological strategy effectively develops a potential path between the extremes of traditional absolutism and postmodern nihilism. Pluralism necessarily involves competition and conflict as responses to epistemological instability, and thus more essentially reflects the dynamic complexity of life itself. Yet, insofar as we are able to develop cohesive conceptions of reality, the confusion of the phenomenal world is diminished, creating a holistic space for common purpose and collective action (Flathman, 2005, pp. 176-178). These holisms “enable, in part by engendering controversy and conflict, potent economic, political, religious, and other forms of endeavor” (p. 179). Unlike postmodernism, this approach is essentially cooperative and goal oriented. Pragmatism avoids nihilism by situating consciousness in an ontological relationship with reality, which can be tested by metacognitively reflecting upon the ways in which our ideas cohere with reality. Instrumental interdisciplinarity participates in this ongoing project of refining and clarifying knowledge, and applying this understanding to complex problems that confront us.

Dewey and the idea of progress. The work of John Dewey demonstrated how pragmatism was a significant departure from absolutist epistemological strategies, a shift that originated in Darwinism.

The conceptions that had reigned in the philosophy of nature and knowledge for two thousand years, the conceptions that had become the familiar furniture of the mind, rested on the assumption of the superiority of the fixed and final; they rested upon treating change and origin as signs of defect and unreality. In laying hands upon the sacred ark of absolute permanency, in treating the forms that had been regarded as types of fixity and perfection as originating and passing away, the *Origin of Species* introduced a mode of thinking that in the end was bound to transform the logic of knowledge, and hence the treatment of morals, politics and religion. (Dewey, 1909/1998, p. 39)

Darwin discovered that variation was contending within a system of mutual adjustment of parts and wholes. Although this implies a confluence of both design and chance, Dewey is quick to point out the Darwinism posits no supreme metaphysical scheme underlying reality, no first cause or final goal. Dewey, like the rest of the pragmatists, criticized the traditional philosophi-

cal habit of looking to eternal truths while dismissing the present and avoiding confrontation with contemporary problems (p. 43).

Dewey therefore advocated the restoration of philosophy as a powerful voice for cultural transformation (p. 55). The human condition is in a fluctuating dynamic between the deterministic forces of nature and our capacity for agency.

Our undergoings are experiments in varying the course of events; our active tryings are trials and tests of ourselves.... Experience exhibits things in their unterminated aspect moving toward determinate conclusions. The finished and done with is of import as affecting the future, not on its own account: in short, because it is not, really, done with. (Dewey, 1917/1998, p. 49)

Although we may enter into a relationship with the world somewhat blindly, we have the capability of intelligently testing our interactions with it. This middle ground characterizes the interdisciplinary approach to epistemology. Letting go of metaphysical absolutes does not mean that humans are incapable of pursuing knowledge or solutions to social problems. Truth may be contextual, but it is not completely subjective, because subjectivity itself cannot be isolated from the phenomenal world. The Western tradition radically separated the two, and then attempted to bring them back together in a more inorganic way (pp. 59-62). Instead Dewey proposed that epistemology should embrace the complexity of this relationship. “The pragmatic theory of intelligence means that the function of mind is to project new and more complex ends—to free experience from routine and from caprice” (p. 67). The development of interdisciplinary theory is an answer to this powerful challenge.

This brings interdisciplinary thought more fully into examinations of value and progress. Although postmodernism in general thoroughly rejects such notions as socially constructed assertions of power, the interdisciplinary stance is much less skeptical. Instrumental interdisciplinarity asserts that, through epistemological negotiation, progress toward clarity can be attained and fruitfully applied to solving complex problems. In this sense, progress is not a deterministic structuring of complex problems toward an ultimate solution, but rather a continually unsettled sorting out of knowledge, whose achievements must always undergo questioning and subsequent adjustment. Although much work needs to be done in developing this ongoing epistemology of complexity, classical pragmatism, as formulated by Peirce, James, and Dewey, offers considerable groundwork for this project.

Rorty's pragmatic postmodernism. Within the philosophy of Richard Rorty, pragmatism and postmodernism synthesize, and this in turn illustrates a way to integrate the critical and instrumental modes of interdisciplinarity. The way in which he negotiated these two schools of thought has instructive implications for interdisciplinary theory. In typical pragmatist style, he attacked the tradition of dualism, which separates essence from perception and thereby reduces their relationship to stasis. In contrast, Rorty contended that our privileged access to our own mental states is merely a biological fact of the complexity of the human brain, demanding no metaphysical implication or need for skeptical deconstruction (Rorty, 1979). In agreement with interdisciplinary theory, Rorty responded to this delusional schism by advocating a more holistic approach to knowledge.

In developing the nuances of relativistic pragmatism, Rorty examined the implications of epistemology and human action once the imperative for certainty has been abandoned, and we “are content to treat the demands of self-creation and of human solidarity as equally valid, yet forever incommensurable” (Rorty, 1989, p. xv). In postmodern fashion, he asserted that truth is not a matter of epistemological conquest:

Any attempt to drive one's opponent up against a wall in this way fails when the wall against which he is driven comes to be seen as one more vocabulary, one more way of describing things. The wall then turns out to be a painted backdrop, one more work of man, one more bit of cultural stage-setting. A poeticized culture would be one which would not insist we find the real wall behind the painted ones, the real touchstones of truth as opposed to touchstones which are merely cultural artifacts. (p. 53)

Thus, in order to participate in epistemological activity, one must metacognitively transcend prevailing cultural paradigms. This is an essential principle of pragmatism and is analogous to the interdisciplinary practice of transcending disciplinary structures of knowledge.

Rorty embraced the pluralistic emphasis on liberty as the means through which society negotiates truth claims. “A liberal society is one which is content to call ‘true’ (or ‘right’ or ‘just’) whatever the outcome of undistorted communication happens to be, whatever view wins in a free and open encounter. This substitution amounts to dropping the image of a preestablished harmony between the human subject and the object of knowledge, and thus to dropping the traditional epistemological-metaphysical problematic” (p. 67).

Parting from the classic pragmatists, Rorty synthesizes a new philosophical class, The Ironist, who develops skills at recognizing the epistemological frameworks within which individuals or communities center their social constructions and their lives (p. 97). This is a more sophisticated pragmatic formulation of epistemology which metacognitively monitors and adjusts human ideas and beliefs toward progress. Awareness of our own uncertainty helps us attune our solutions to the problems themselves, and thus attain higher levels of epistemic solidarity—cohesion within the dynamics of diversity. This pragmatist objective is an essential foundation for the interdisciplinary project of an epistemology of complexity (p. 121). Interdisciplinarity strives to apply the art of ongoing epistemological negotiation to the refinement of knowledge and the resolution of complex problems.

Many of the core principles of contemporary interdisciplinarity, especially in its instrumental mode, derive from the schools of pluralism and pragmatism. Interdisciplinarity embraces pluralism as a fundamental assumption—truth claims can emerge only from a dynamic system of diverse voices contending and cooperating with each other. This dynamic discourse is not, however, a broiling concatenation of random ideas. Pluralism and pragmatism are grounded in the fundamental assumption that ideas, like all organic systems, naturally form coherent economies, which sort themselves of their own accord toward discernable progress. For interdisciplinarity, progress is most often a practical concern, involved in value judgments, best practices, and identification of desirable outcomes. Pragmatism asserts that all notions of truth and value are testable and accessible to consciousness. Thus, within human experience, beset with contradiction and blessed with comprehension, we have the nascent ability to make sense of it all, and pursue this sensibility toward the realization of mutually desired ends. All the members of this lineage, from Milton to Rorty, share the notion that truth dwells not in some rarified metaphysical space, but is inextricably immersed in our connection to the phenomenal world as vital and viable agents. Interdisciplinarity is not only at home here, but seeks to further develop the epistemological implications of this school of thought.

Conclusion

Interdisciplinarity is primarily conceptualized as a response to disciplinary structures of knowledge. This response necessarily involves epistemology, for disciplines do not merely organize knowledge, but establish norms of validation and the languages within which inquiry itself is conducted

(Schulman, 2002, pp. vi-vii; Fish, 1991, p. 15-22). Nonetheless, interdisciplinarity does not seek to transcend the disciplines entirely into a unification of knowledge. The problems with such grand narratives have been thoroughly described by postmodern thinkers. Rather, the interdisciplinary approach offers corrective measures to dominant knowledge formations of any sort, by broadening their contexts and establishing synthetic relationships among them. Thus, the interdisciplinary idea has evolved from a mere critique of the disciplines to the more sophisticated mission of negotiating within and beyond the epistemological frameworks they project. Furthermore, interdisciplinary theory has implications well beyond disciplinary structures, for it is embedded in the epistemological conundrums that have obsessed and perplexed Western thought for two and a half millennia. Interdisciplinarity, in both its critical and instrumental modes, seeks to continue the epistemological project, while incorporating its critique. The development of this epistemology of complexity is no small feat. Now that the traditional strategies of duality, determinism, and absolute truth have been discredited, epistemological standards themselves have become fragmented, decentralized, and contentious. A way is needed to make sense of this fractious, dynamically changing world, and to apply that sense to problem solving, decision making, and progress.

Complexity has become a cornerstone of interdisciplinary theory for good reason.¹¹ Complexity offers a more adequate paradigm for 21st century existence, an organic and logical response to the collapse of absolutism. Instead of reducing knowledge to simple structures or idealized models, complex epistemology approaches knowledge as open-ended and ill-defined, acknowledging its dependence on context, and focusing upon relationships between systemic elements. Knowledge emerges from the cross-fertilization of diverse perspectives, and inquiry is conducted concurrently in multiple dimensions (Klein, 2004, p. 6). However, the Western canon, in its reductive imperative, did not do away with complexity; it merely subjected the Dionysian impulses of organic chaos to the Apollonian order. This order, full of formulae and taxonomies, is itself an incredibly complex reflection of the phenomenal world. This order may not possess the nuanced cohesive multivalence of interdisciplinary conceptions of complexity, but the power of order cannot be ignored (Szostak, 2007, p. 56). Navigating through such

¹¹ This emphasis on complexity was first formally proposed by Newell in the 2001 issue of *Issues in Integrative Studies*. Most of the issue is dedicated to a debate over the subject by several prominent interdisciplinary scholars, especially in the sense of nonlinear relationships.

contradictions is an essential art of the interdisciplinarian. Klein (2004) describes the process where epistemological domains which once defined isolated fragments of humanity have become permeable, and in this boundary crossing, new hybrids organically and dynamically form (p. 8). This organic interaction of knowledge domains provides an ontological basis for interdisciplinary inquiry, as theory of complexity emerging from epistemological discourse.

The interdisciplinary approach to knowledge entails disrupting epistemological constructions and rejecting notions of deterministic finality. Interdisciplinary integration arises out of conflict and difference, embracing the ambiguity necessarily involved in epistemological pluralism (Newell, 2007, p. 252; Wolfe & Haynes, 2003, p. 153). As Derrida would put it, *différance* enables complexity itself, and allows for the possibility of epistemological progress without ignoring the way in which it problematizes itself. A complex diversity of perspectives brings with it irresolvable tensions; yet this indicates that interdisciplinarity has not trapped itself into static paradigms, but is working through knowledge systems toward a more integrative creation of new knowledge. By embracing the dynamic nature of complexity, interdisciplinary thought situates itself in the midst of turbulence and uncertainty, now recognized as core characteristics of the phenomenal world, which have come to dominate 21st century life (Klein, 2004, p. 4). The unsettlement of difference creates a metacognitive impasse, a moment of phenomenological reflection, which sees epistemological structures for what they are, both useful and delusional.

Epistemological negotiation in interdisciplinary studies requires a reflection upon the process of synthesis and a metacognitive appreciation of disciplinary perspectives as organizational tools, useful structures for understanding complex problems, while simultaneously offsetting their epistemological determinism (Alvesson & Sköldböck, 2000, p. 144). Thus, the interdisciplinary approach to knowledge produces a unique mindset, which navigates among *epistemes*, carefully synthesizing the ways in which they illuminate important facets of complex problems. Yet the metaphors of navigation and illumination describe an implicit ontology at the core of interdisciplinarity. In order to navigate, one must have one's bearings, and to synthesize, one must be able to see the light. Humans become deluded, or at least distracted, by enveloping their minds in established epistemological structures. It is tempting, in postmodern custom, to posit that there is no escape from the epistemic projections of human consciousness, that knowledge is offered only within cultural bounds (McMurtry, 2009, pp. 7-8). This

contingency of knowledge is an unavoidable postulate of interdisciplinary theory, for it must answer the postmodern critique of absolutism, while also fostering the progression of knowledge. This requires an acute awareness of subjectivity in the mind of the interdisciplinarian, and this phenomenological stance opens doors for synthetic understanding and meeting the challenges of our world (McCormack, 2009, pp. 20-21). The interdisciplinary mindset takes a metacognitive step beyond subjective envelopment, and in doing so attains a better vantage point for making judgments and creating knowledge—for assessing truth.

Interdisciplinarity engages in epistemological pluralism, the holistic amalgamation of insights from diverse perspectives. This attitude approaches phenomena in their native complexity, wherein organizational systems organically arise and contend with each other. This organizational tendency is inherent in all systems, be they natural, social, or psychological. Thus interdisciplinary inquiry participates in the art of interpretation, which portends a fundamental relationship with knowledge, encouraging intellectual flexibility and playfulness. Yet, interdisciplinarity asserts that there is equilibrium between dissonance and harmony, enveloped in the pluralistic dance of diverse perspectives, while valuing unity, coherence, and balance among them (Newell, 2007, pp. 260-261). Interdisciplinary theory attempts to bring insights from different perspectives into a cohesive understanding of complex phenomena applied toward progress, and in this way fundamentally synthesizes postmodern and pragmatic schools of thought, along with the critical and instrumental modes derived from them.

In accordance with the goals of pragmatism, interdisciplinary thought is a response to the demands of society, seeking to solve “real world problems” and critique the epistemological assumptions that confound our understanding of those problems (Repko, 2008, p. 276). Interdisciplinarity is inextricably involved in the pragmatic sorting out of consensus, applying its theoretical discoveries toward the sustainability of any system under investigation (Klein, 2004, p. 5). Crucial here is establishing productive communication among constituent voices within the system in order to achieve progress and better understanding (Szostak, 2007, p. 41). In the wake of the postmodern critique of absolutism, there is still the imperative to produce, disseminate and synthesize knowledge toward the “greater good” (Friedman, 2001, p. 504). Here interdisciplinarity provides a practical means for negotiating epistemological complexity, taking into account diverse avenues for fruitful synthesis of knowledge that will enable the navigation of conflict through to common ground.

Interdisciplinarity synthesizes epistemological strategies endemic to modernism, postmodernism, and pragmatism, incorporating their incongruity (Repko, 2008, p. 208). As an epistemology of complexity, interdisciplinary theory establishes equilibrium between absolutism and nihilism, asserting that knowledge is progressive, while also problematic. The heritage of Western thought has supplied numerous paradigms to contain the vertigo of epistemological dynamisms unfolding within and around us—to formulate them and hold them still. The metacognitive realization of this problematizes the history of thought, makes us aware that through our need to make sense of things, we force things to make sense (McCormack, 2009, p. 24). These paradigms offer crucial insights, but inevitably reduce the phenomenal world to static principles that over-simplify it. Out of this metacognitive realization, interdisciplinarity emerges as a holistic alternative to the postmodern impasse by reasserting the basis for a pragmatic approach to knowledge, the means to discern progress from delusion. “Ironically, then, the salvation of objectivity (as a goal to be strived for but never perfectly achieved) lies though reflecting on subjective biases... this can only be done within an ongoing conversation, for each of us is likely better at spotting the biases of others” (Szostak, 2007, p. 44). Interdisciplinarity is not afraid of truth, but instead of claiming any monopoly on truth rather insists upon a synthetic navigation through to truth.

As this historical survey demonstrates, the interdisciplinary idea has genealogical roots in the continuum of Western thought, and offers potential solutions for the paradoxes to which it arrived. Nietzsche opened the doors of perception by questioning the traditional foundations for truth, allowing alternative means for organizing and transforming knowledge. The phenomenologists used this opening to develop a metacognitive awareness of the relationship between subject and object, and thus demonstrate the inextricable connection of consciousness to reality. They also determined that this relationship was dynamic, fluctuating, and contextual. Post-structuralism sharpened the disruption of absolutist epistemology by embracing relativity itself, and exploring the unsettled interaction of truth claims. The postmodern critique of knowledge which developed out of post-structuralism implicated disciplinary structures, and thus engendered the interdisciplinary idea. Yet, at the same time, interdisciplinarity is also grounded in Anglo-American thought. From pluralism comes the notion that systems comprised of diverse elements naturally form economies of synthetic complexity. In seeking to integrate multiple perspectives, interdisciplinarity is participating in an essential function of complex systems. Pragmatism further grounds

the individual as an active agent in the system, and asserts that progress is possible through reflective and coordinated effort. In this way, the essence of interdisciplinary theory can be founded in a new conceptualization of wisdom, proactive judgment derived from metacognitive awareness. Interdisciplinary wisdom, by adapting to this new conception of epistemological negotiation, renews the Western epistemological project and presents a gateway for its furtherance.

Biographical Note: James Welch IV holds a PhD in Humanities—History of Ideas. He is Assistant Professor, and currently serves as Interim Director of the Interdisciplinary Studies Program at the University of Texas at Arlington. His research and publications focus upon the development of interdisciplinary theory and the application of interdisciplinary approach to problems of sustainability, social development, and political discourse.

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