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THE ROLE OF INTUITION IN INTERDISCIPLINARY INSIGHT

by

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Abstract: Intuition is a hotly debated topic in interdisciplinary scholarship, at the core of the conflict between the need for rigor as opposed to open-mindedness within interdisciplinary studies. To thoroughly investigate this subject, an integration of multiple disciplinary perspectives is required. The mechanisms of intuition are revealed through the studies of cognitive psychology. Intuition has an important role in scientific discovery and in the epistemological traditions of Western philosophy, as well as a central function in Eastern concepts of wisdom. It also is prized for its practical application in a multitude of professions, from business to health care to the military. Intuition can be trained and thus has a place in higher education. For interdisciplinarity, intuition is a crucial faculty for understanding complexity, and therefore must be recognized and included in the development of integrative method and theories of interdisciplinarity.

The subject of intuition is by its very nature nebulous and resistant to definition. Although this lack of definitiveness contributes to its poor reputation, intuition is widely recognized as a core faculty of human consciousness, ubiquitously applied in everyday life and a multitude of disciplinary fields “as a key element in discovery, holistic problem-solving, understanding, and knowledge generation” (Ruth-Sahd, 2003, p. 130). Because the faculty of intuition is employed in integration and complex problem solving, its importance to interdisciplinary studies should be assessed. The role of intuition has been a hotly debated subject in interdisciplinary scholarship, as evidenced in the responses to Newell’s “A Theory of Interdisciplinary Studies” (2001) and the exchange between Szostak (2002) and Mackey (2002) in this journal. Nonetheless, there is a persistent agreement among interdisciplinary

scholars—including Klein (1996), Repko (2005), and Szostak (2004)—that intuition indeed deserves a place in interdisciplinary theory and methods. In order to help integrate the debate and clarify the role of intuition in interdisciplinary studies, a systematic examination of the subject is needed.

Furthermore, intuition is a complex phenomenon involving multiple disciplines and possessing an ill defined, but holistic structure. As such, it constitutes an ideal interdisciplinary subject and can benefit from an integrative approach to understanding. Intuition has been the focus of investigation by a wide range of disciplines, including psychology, philosophy (both West and East), and the sciences. It is recognized for its applications in business, health care, military science, education, and the arts, among others. Although there are other disciplines that may have bearing upon the faculty of intuition, in order to focus its treatment of this expansive subject, this study will confine itself to the areas stated above. By drawing upon the insights generated by scholarship in these disciplines and integrating them through the interdisciplinary process, a holistic understanding of intuition can be achieved. In this way, the complexity of the subject will be retained while illuminating the dynamic interaction among its facets. As opposed to an analytical dissection of intuition, this study endeavors to examine intuition as a system of cognitive phenomena embedded in philosophical, scientific, and cultural traditions, effectively applied in a wide variety of real life and professional situations.

This study will not only demonstrate the advantages of the interdisciplinary method in examining complex subjects, but in turn will clarify the role of intuition within interdisciplinarity itself. In particular, this study draws upon the developing scholarship of interdisciplinarity as a theoretical approach to complexity utilizing the method of integration. The relationship between intuition and the integrative method involves deeper issues surrounding the relative need for (or avoidance of) structure in interdisciplinary inquiry, definitions of the “integrative mindset,” along with the pedagogical intricacies of clarifying integration for interdisciplinary students. Thus, this paper uses the integrative method to examine intuition while examining intuition’s role in the integrative method. That these “dueling theses” should overlap, occasionally conflate, and dance around each other are inevitable (and desirable) consequences of the integrative process, and of the faculty of intuition as well.

Definitions

The term “intuition” is used to describe a cluster of interrelated cognitive

phenomena that produce understanding of a problem or event without the use of reason or analysis. The terminology used to describe the facets of intuition is sometimes vague and can be easily confounded with more popular usage. However, this study will retain the vocabulary employed in the scholarship under examination, while clarifying its discipline-specific definitions. Intuitive understanding is experienced in a number of modes. Often it occurs as a moment of instant assessment, the immediate assimilation of a complex situation “in a flash.” It is experienced socially as gut instinct—visceral, emotional, and empathic—able to pick up on moods, subtle hints in body language or voice tone (Myers, 2002, pp. 33-38). Intuition can arise as the result of mulling over a problem “on the back burner,” where insight into a persistent conundrum that had been dismissed from consciousness comes to light “out of the blue.” Intuition is experienced as common sense, insight into the complexity of ordinary decision-making, which is embedded in collective cultural standards (Gerber, 2001, p. 72). Intuition is connected with creativity, engaged in the processes of inspiration, imagination, artistic expression, and symbolic understanding (Myers, 2002, pp. 59-61).

Intuition is also directly related to the phenomenon of insight. In Gestalt psychology, insight is characterized by an understanding of the underlying structure of a problem (Mayer, 1995, p. 28), an unconscious change in perception that restructures the problem so that its essential features are more easily grasped (Csikszentmihalyi & Sawyer, 1995, p. 329). The universal experience of insight is a method of solving problems by attaining a more holistic synthesis of the relationships among its disparate elements (Dominiowski & Ballob, 1995, p. 38). Instead of delineating these various forms of intuition, and treating them as discrete subjects, this investigation will deal with all these aspects of intuition as a whole. This is in keeping with the nature of the subject as a complex, dynamic holism, and with the spirit of interdisciplinary inquiry as a means of understanding cohesion within complex phenomena through the integration of its facets.

Resistance to Intuition

Intuition has traditionally been contrasted with intellect as a lesser form of human cognition. From Socrates on, intuition was seen as unreliable, wayward and subversive; reason was thereafter held up as the standard for comprehending truth, value, and nobility. Intuition has been associated with superstition, emotional instability, and just plain delusion. It is derided as a more primitive means of understanding the world, a vestigial

remnant of our instinctual animal ancestry (Claxton, 1997, pp. 203-206). Understanding is not instantaneous, but rather the result of the time and effort required to painstakingly analyze our observations of the world and verify our conclusions about it (Gladwell, 2005, p. 13). The main criticism of intuition is that it is fallible, disrupted by emotion and instinct. It is often characterized as a kind of cognitive dart throwing, nothing more than a blind process of trial and error that can easily be distracted or disabled (p. 15), forming and sustaining false beliefs with remarkable ease (Myers, 2002, p. 68).

Human fallibility has always been of fundamental concern to most philosophical traditions, regardless of culture or history. Uncertainty is a central bane of human existence, thus the ability to convert the strange into the familiar has been of the essence to our evolution, and eventually, our happiness and prosperity (Claxton, 1997, p. 18). Essential to this exertion of rational control over nature is the notion of definitiveness—the application of reason to uncover stable and predictable laws that govern our behavior and that of the world around us. Formal understanding of these laws gave credence to our reliance upon logic, language, mathematics, and empiricism as the privileged means of validating reality, dominating our problem-solving and decision-making abilities.

This definitive position, however, has its limits. Despite our contention that the world has an essential order, rationality and logic often fail to give us a comprehensive understanding of situations and problems we commonly face and can actually interfere with our perceptions of reality (Gladwell, 2005, p. 111). Reason is prone to a reductionism which concludes that the simplest solution to problems must be correct (e.g., Occam's Razor). Although there is a compelling elegance to this process of problem solving, "real world" (as opposed to abstract) problems are ordinarily slippery in their complexity, embedded in a myriad of dynamic relationships. In order to solve complex problems, "one has to learn to understand not only that which is relatively stable and general but also that which is changeable, deviant, ambiguous, and often contradictory" (Birgerstam, 2002, p. 431). The compulsion toward absolute knowledge inherent in the rational tradition, and the mind-body dualism upon which it rests, are both scientifically and epistemologically suspect, as postmodernists, among others, have pointed out. In the development of integrative methods, interdisciplinarity has become entangled in the epistemological fallout resulting from this suspicion of absolute knowledge, and intuition is at the core of this debate.

Intuition in Interdisciplinary Scholarship

Intuition and insight have been identified in the integrative research models of Klein (1996), Newell (2001), Szostak (2002), and Repko (2005) as crucial to integrating disciplinary perspectives into an interdisciplinary understanding. Nonetheless, the proper place of intuition in the operation of insight and integration is a controversial topic in interdisciplinary scholarship, at the crux of contention between what have come to be affectionately known as the Apollonian and Dionysian schools of interdisciplinarity (Newell et al., 2003). As the names imply, these are idealized caricatures delineating a general philosophical polarity within the scholarship on interdisciplinarity. The Apollonian camp seeks to legitimize interdisciplinary studies in the eyes of academia by emphasizing the need for rigor—a consistent structure for interdisciplinary research that can compare with the methodologies of traditional disciplines. Conversely, Dionysian interdisciplinarians call for a break with the structure of the traditional disciplines, stressing open-mindedness and alternative ways of knowing the complex nature of reality. Dionysians assert that understanding can be distorted and hampered by an over-reliance upon structure; that true comprehension of complexity is often the result of less tangible faculties of insight (Welch, 2003, p. 186).

This debate recently came to a head in an exchange between Szostak and Mackey. In response to an integrative research model proposed by Szostak (2002), Mackey (2002) asks “whether interdisciplinarity is primarily a rule-based process or an intuition-based one” (p. 126). In Mackey’s view, this need to impose a rigorous structure upon interdisciplinary inquiry reduces the debate to the tradition of positivism, the notion that any valid understanding of reality must be based upon logical and empirical methods. Mackey contends that the validity of the scientific method itself has been questioned since the mid-20th century (p. 126). He asserts that interdisciplinarity is a product of post-modernism and must be highly individual, unspecifiable, and institutionally anarchical (p. 128).

Szostak replies that the dichotomy between intuition and structure is essentially false—intuition has a place within the structure of interdisciplinary research, and thus its opposition to structure can be integrated into that structure itself. He sees intuition as necessary for developing new integrative frameworks—assessing previous research, formulating unasked questions, and solving theoretical puzzles (2002, p. 133). Although Szostak advocates wariness toward intuition, reiterating the traditional suspicions of intuition as prone to misguided insights, he conversely cautions that the subjection

of critical analysis to intuition must also be measured so as to prevent the stifling of its potential insights (p. 132). He warns that the uncritical acceptance of intuitive insight that Mackey urges will continue to undermine the validity of the interdisciplinary endeavor in the eyes of the traditional disciplines (p. 135). This debate is crucial to the development of interdisciplinary theory and practice. Within it are the seeds of a new method of synthesizing multiple avenues of understanding within a dynamic epistemological framework. In order to establish an integrative method, both intuition and structure must themselves be integrated (Welch, 2003, pp. 199-200).

Cognitive Dynamics

Intuition has long been recognized as a peculiar faculty of the human mind, and has thus been the subject of extensive psychological scholarship. Investigation in the discipline of cognitive psychology will establish a thorough empirical ground for intuition as a cognitive phenomenon. Intuition is commonly regarded as a form of problem solving and pattern recognition (Myers, 2002, p. 56). It is adaptive, feeding expertise, creativity, and spirituality (p. 248). For cognitive psychology, intuition is embedded in the nature of the unconscious. Contemporary thought on the unconscious has dismissed the previous Freudian notions of an unconscious fraught with chaotic and primitive impulses repressed by the ordering of rational consciousness. Instead, the unconscious mind is now seen as a kind of reality processor that in many ways is superior to the processes of consciousness. The unconscious mind is not merely cataloging discrete packets of experiential information, but accumulating an adaptive multidimensional matrix of associations. Physiologically, this matrix is the result of the ongoing operation of capturing and directing the flow of neurons into a kind of functional topography (Claxton, 1997, pp. 139-140).

The cognitive mechanisms of the unconscious accumulate and organize experiential information much more rapidly and comprehensively than rational consciousness. Cognitively speaking, intuitive insights result when “a particular combination or pattern that has emerged (randomly, undirected) from the subconscious network is strong enough to surface into consciousness” (Csikszentmihalyi & Sawyer, 1995, p. 343). The unconscious is like a multi-processing calculator of experiential minutiae, enabling us “to find patterns in situations and behavior based on very narrow slices of experience” (Gladwell, 2005, p. 23). These intuitive insights must be “primed,” brought into awareness by the intensity and persistence of neural activi-

ty (Claxton, 1997, p. 157) within “perceptually rich, dynamic situations” (Swaak & de Jong, 2001, p. 287). Intuition is often experienced as an abrupt transition from one problem representation to a “higher” level of insight, seemingly disconnected from prior efforts of solution (Dominowski & Ballob, 1995, p. 52). “It is here that analogies, metaphors, and models are used to solve problems. The person having an insight suddenly realizes that new information is similar to old information in certain ways (and dissimilar to it in other ways), and then uses this information better to understand the newly acquired information” (Davidson, 1995, pp. 128-129). This restructuring of complex problems into a higher order of synthesis is characteristic of the interdisciplinary process. As Sill’s research reveals, “it is boundary crossing that makes possible the redefinition of the boundaries themselves and provides the energy and means for synthesizing new orders of thought” (1996, p. 142).

Despite the apparent suddenness of such insights, the unconscious processes leading up to them are often the result of what Claxton (1997) calls the “Tortoise Brain.” These slow ways of knowing are very effective at uncovering non-obvious relationships and seeing patterns in experiences that are superficially disparate, shadowy, or ill-defined (p. 56). Acquiring insight into situations that are nebulous, patchy, or non-routine depends upon a stance wherein attention is broad and diffuse, requiring a period of incubation or gestation where information is being processed without conscious control. Conventional efforts at rational understanding actually inhibit insight and creativity (p. 131). Kant was famously known for his regular walks; intellectuals from Piaget to Poincaré have all described moments of insight resulting from such constitutionals (Gruber, 1995, p. 426). This kind of intuition prospers best within a mindset that operates on the “borderlands between consciousness and the unconscious, a kind of awareness that is welcoming without being predatory, and perceptive without being blinding” (Claxton, 1997, p. 80). Indeed, this process of cognitive decentering has been identified as crucial to the integrative mindset (Repko, 2005, p. 39).

A danger of both intuitive and rational insight is fixation. Although this term has a myriad of connotations, it is here defined in the more disciplinary-specific sense as the persistence of initial, gut-level impressions, habits of thought or structured ways of knowing. We come to prefer the familiar, making instant judgments and engaging in moral assessment (Myers, 2002, p. 45). Once we have cataloged something or someone, it then takes a preponderance of contrary evidence to shake these notions (p. 118). As our experience accumulates, there is a tendency to lump similar experiences

together into a stable web of associations. Methods of solving problems or understanding situations in the past will habitually be applied to all subsequent encounters with any similar phenomena. These habits of thought have a reductionist tendency of finding elements of a present situation common to a previously experienced one, and jump to a conclusion that worked in the past. These habits obscure the discovery of new directions (Dominowski & Ballob, 1995, p. 48), dismissing novel information that could lead to insight (Davidson, 1995, p. 148). Fixation occurs, as well, through habits of rationally organizing reality. The very act of defining a problem, along with the goals and procedures for solving it, can forestall the possibility of sudden realizations (p. 147), undermining our access to fluid, nonverbal kinds of intuitive understanding (Gladwell, 2005, p. 122).

Fixation, whether from gut level assessment or rational habits, can and must be overcome in order to allow the more open methods of active learning necessary for the mastery of interdisciplinary inquiry. This point is consistent with the emphasis on active and discovery-based learning in interdisciplinary literature (Klein, personal communication, June 14, 2006). All these modes of fixation have the danger of dwelling upon inappropriate solutions to problems (Dominowski & Ballob, 1995, p. 45), negatively affecting problem-solving performance (Davidson, 1995, p. 133), and thus should be of great concern to the development of integrative models and interdisciplinary theory. They impose a kind of intellectual complacency: "A person who is not intrinsically motivated has no incentive to push beyond generally accepted boundaries of knowledge" (Csikszentmihalyi & Sawyer, 1995, p. 359). These fixations may have a powerful pull on our thought processes, but they are not outside of our conscious control (Gladwell, 2005, p. 96). Intuition has a tendency to fill in gaps where direct experience is lacking, rationalizing in hindsight causal relationships where none really exist (Myers, 2002, pp. 77, 91, 113). When seen as a kind of metaphysical or mystical ability to divine the future, intuition is often conflated with "our human tendencies to invent false explanations for what we have done and why; to have difficulty assessing our mind's workings; to be overconfident of our intuitions; to notice, interpret, and recall events that confirm our expectations; to be overly persuaded by unrepresentative experiences and anecdotes; and to misperceive the probabilities of random coincidence" (p. 237). Intuition must be balanced with critical thought, so that its insights may avoid their tendency to fixate on improperly grounded assumptions, without considering opposing ideas and thoroughly testing all preconceptions.

Intuition can be trained and refined through careful balance with other

cognitive faculties. Intuitive insight rarely really comes “out of the blue”; most often it occurs only after a great deal of mental preparation (Seifer et al., 1995, p. 76). Musicians and scientists alike undergo intensive training in their disciplines, which in turn set up the foundation for inspiration. “In reality, most creative ideas, especially of a discovered kind, are the result of multiple cycles of preparation, incubation, insight, and elaboration, with many feedback loops, the end result of which is a solution that may be either final or temporary, in which case the cycle may repeat itself again and again” (Csikszentmihalyi & Sawyer, 1995, p. 344). This kind of non-linear, provisional thinking, again, is quite characteristic of the interdisciplinary process (Repko, 2005, p. 81). Training intuition is a form of metacognition, a conscious awareness of “the planning, monitoring, and evaluation of the solution process” toward the improvement of these functions in a wide variety of problem-solving situations (Dominowski & Ballob, 1995, p. 58). “With experience we become expert at using our behavior and our training to interpret—and decode—what lies behind our snap judgments and first impressions” (Gladwell, 2005, p. 183).

Cognitive psychology has proved a useful wellspring of information about the dynamics of intuition as a phenomenon, but a comprehensive understanding of the subject requires the exploration of a multiplicity of disciplines, the viewpoint of each accumulating and synthesizing, implicitly and explicitly along the way. This exercise is not a mere comparison and contrast of understandings of intuition through the disciplines, nor is it simply a means of establishing common ground among them. Rather, this paper contends that the process of integration itself fundamentally requires intuitive faculties. Intuition must be accounted for in the development of interdisciplinary method and theory.

Science and Intuition

In science, the role of intuition is mainly described in two ways. First of all, intuition is seen as a form of common sense, here used in the technical sense defined above, in which empirical observation of the nature of phenomena is situated within a matrix of understanding dependent upon current cultural constructions. These common sense notions of the universe evolve through fits and starts as new discoveries call into question former ideas and eventually replace them with more sophisticated theoretical paradigms (Miller, 1996, p. 21). Paradigms shift from a more familiar, accepted interpretation of reality toward a more subtle, novel representation (Domi-

nowski & Ballob, 1995, p. 59). This evolution of common sense intuition is often achieved through creative thought experiments by scientists, who then establish the new paradigm by formalizing their scientific theories. As Kuhn asserted, revolutionary science involves not simply an incremental, contiguous expansion of knowledge, but rather a discontinuous leap to a new perspective of understanding (Csikszentmihalyi & Sawyer, 1995, p. 343; Kuhn, 1996).

In a second sense, intuition is seen in the flashes of insight touted as one of the primary means in which scientists make these paradigm-altering discoveries. This “eureka moment” is deeply embedded in the history of science, often going back to that most archetypal of scientists, Archimedes, whose inspiration for the nature of density came to him during his bath (Gruber, 1995, p. 399). Scientists and artists alike, from Archimedes, Poincaré, and Darwin to Proust, Picasso, and Miró, describe pivotal moments of inspiration that result in startling new insights, revelations of nature that seemingly arise in an explosion of thought, “without any resemblance to discrete and purposeful rational reasoning” (Miller, 1996, p. 326).

Investigations into the nature of scientific intuition concur with the findings of cognitive psychology in concluding that intuitive insights are inevitably the end product of a highly trained mind that has been purposefully ruminating upon a particular problem for a length of time, through a process of mental gestation (Miller, 1996, p. 419). This again is crucial to methods of interdisciplinarity as an “iterative process that works toward solution through an interweaving of generative and cognitive processes, not a big bang that comes all at once, then not again” (Sill, 1996, p. 144). Neither Poincaré, Darwin, nor Einstein claimed exclusive reliance upon intuition, instead describing their mindsets of discovery as a middle path that is “purposeful and protracted, playful and intuitive, deeply knowing and yet partially unconscious” (Gruber, 1995, p. 419).

The process of reconceptualization in science parallels the history of the arts. Both enterprises are adventures into the unknown, seeking a refiguring of representations of the world beyond appearances (Miller, 1996, p. 326). Like the shifts into relativity and probability in science, aesthetic sensibility has transitioned from naturalism into increasing levels of abstraction. The evolution of science and art has ever been an interdependent process (p. 408). The importance of intuition is so fundamental to the arts that its place is all but unquestioned. Art often takes especial pains to circumvent the structures of rational consciousness, intentionally striving to disrupt the stability of its boundaries in order to open doors of inspiration and shake the

foundations of human perception toward a more dynamic, uncertain, and interactive understanding of the nature of the world. Szostak admits that the subject matter and methods of the humanities have a place in science (2004, p. 175). And, as Mackey has asserted, if science recognizes the place of intuition in its own inquiries, interdisciplinary studies cannot afford to dismiss it.

The Philosophical Debate

Intuition has been a core concept in the history of Western philosophy, playing a key role in the subjectivity/objectivity debate over the various capacities of the human mind to perceive truth. A brief overview of this debate will not only add another disciplinary perspective to this examination of intuition, but will also illuminate the background to the current discussion over the role of intuition in interdisciplinarity. The history of intuition in Western philosophy is a subject worthy of extensive elaboration in and of itself. However, because of the interdisciplinary breadth of this study, it is necessary to synthesize this subject in general, holistic terms.

The essence of the debate over intuition concerns the relationship between consciousness and reality. Consciousness is able not only to perceive reality through sense perception and retain those experiences in memory, but also to abstract order and meaning from the world. Abstract thought is seemingly unmoored from the ground of time and space, able to conceptualize phenomena that have no correspondent manifestation on the material plane. This peculiar nature of consciousness has had an unsettling effect on our perceived relationship with reality, and this has been a central focus of the development of Western epistemology.

Here, intuition is often equated with immediate sensory perception—an instinctual, irrational, and unreflective assessment of the world. However, for the school of thought established by the Peripatetic tradition of Ancient Greece, direct intuitive experience came to be viewed as fallible, limited, and circumscribed. To compensate for this, Plato proposed the idea of absolute form, a metaphysical understanding of the ideal nature of reality perceived through pure reason—the ability to discern stable, underlying patterns in nature, and establish facts about phenomena that are consistent and incontrovertible. Throughout the Middle Ages, as exemplified in the works of Augustine and Aquinas, absolute form was equated with God, upon whose eternal and unchanging being the universe was founded. After the Renaissance, the works of seminal scientists such as Galileo and Newton demonstrated

that the intrinsic order to the universe could be formulated mathematically. As Aristotle had long before asserted, reality was a puzzle to be solved by the powers of rational intellect through the mode of logical syllogism.

Because the order of the universe had become apparent through the discoveries of science, the refinement of consciousness became itself a scientific project. Western epistemology entered a stage of hermeneutic introspection. What intuitions were caused by and how they registered in the mind became core conundrums for philosophy, and the relationship between intuitive input and conscious understanding was fundamentally questioned. Descartes attempted to eliminate the unreliability of the senses by proposing that consciousness can solely be trusted as the measure of reality. The empirical school of Bacon, Locke, and Hume responded by inverting this notion, holding consciousness itself accountable to scientific skepticism, finding that it, too, was ephemeral and convoluted, lending no real proof for a connection between human understanding and the true nature of reality. As a result of this, empiricism arose as a means of grounding truth in a method of careful experimentation and observation, testing conclusions for consistency and absence of contradiction. Intuition, as immediate sensory perception, isolated causality from conscious misinterpretation.

Nonetheless, the ancient objective of connecting reason to the absolute nature of reality persisted. In order to firmly plant reason as a foundation for truth, Kant took up the question of epistemology left so heavily dangling by empirical skepticism. For Kant, intuition was the connective tissue between the nature of reality and the nature of consciousness, contending that consciousness is not, as Locke asserted, a *tabula rasa*. Rather, intuitive structures such as space and time are essentially hard-wired into the mind by reality itself (Miller, 1996, p. 190). Intuitions of the direct experience of reality could not be understood by consciousness unless they shared a common structure, a *a priori* of experience. Kant, however, could not find a way to reconcile reason with the transcendent, absolutist ideal of “things in themselves,” demonstrating that reason is capable of rationalizing, simultaneously, both the thesis and antithesis of any given proposition. He thus undermined the ability of reason and rationality to verify the metaphysical foundations upon which Western epistemology had so firmly rested. His critique led to a convolution of the subjectivity/objectivity debate that persists to this day. In a crucial sense interdisciplinarity is a response to this conundrum, and the polarization of its Apollonian and Dionysian schools is essentially a discussion about the way in which reason and intuition can coalesce into a higher order of synthetic epistemology.

In this vein, interdisciplinarity is embedded in the expansive philosophical movement known as postmodernism. Postmodernism is by nature a nebulous and pluralistic idea, yet somewhat susceptible to generalization, despite the protestations of its adherents. Postmodernism here means the general critique of the breakdown of the Western Enlightenment project of establishing absolute truth through reason, along with the dawning realization of the damage that notion has wrought upon psyche, society, and nature. Reason was unable to formulate a convincing understanding of reality because it had trapped itself within a misguided paradigm. As Nietzsche preached, rationality and logic distort our understanding of a universe that is essentially dynamic and unpredictable. Postmodernism contends that the goal of reducing reality to stable, predictable formulae inherently contradicts itself and has had dire consequences for Western civilization. Within this critique, contemporary interdisciplinarity has a voice, focusing upon the problematics of disciplinary specialization wrought by the obsessive compulsions of reason in the establishment of definitive knowledge.

Thus, postmodernism (and post-structuralism in particular) set about deconstructing the epistemological framework of subjectivity/objectivity within which all notions of truth had theretofore been tested and validated. As opposed to an incontrovertible establishment of knowledge, Kuhn depicted science as a more fluid process punctuated by abrupt paradigm shifts. Rorty questioned the Cartesian separation of mind and body so crucial to objectivity. Foucault emphasized the impact of cultural and historical forces in the way human thought orders reality. Derrida asserted that consciousness has no real grounding at all, and that in order for our experience to fully interact with reality, logic must be abandoned, and the dichotomies with which Western thought has structured the world dissolved into an interplay of relativity.

Postmodernism insists that consciousness must be a dynamic, interactive process, never ensconcing itself in any one structural foundation. This cultivates a mindset that is as fluid and transformational as the world within which it participates. In light of this, intuition, as an unconscious means of assimilating the relationship between internal thought and external input, has a great potential to connect human consciousness to flow of reality, and thus avoid the nihilistic abyss intimated by postmodernism. Interdisciplinarity holds the promise to address these nihilistic tendencies through its emphasis upon integration and synthetic understanding of complexity. The role of intuition as a fundamental feedback loop between consciousness and reality is all-important to situating interdisciplinarity in the evolution of human thought.

Contemplative Awareness

Although diametrically opposed to postmodernism, science itself has come to question logic and empiricism, to appreciate the role of non-rational, intuitive, and even spiritual means of understanding the nature of the universe and our relationship to it (Myers, 2002, p. 242). In distinction to Western thought, the Eastern philosophical tradition possesses an epistemology that has never been based solely upon notions of rationality, mathematical logic, or absolutism. This tradition is presented here as an example of how intuition is utilized within an alternative epistemological paradigm. This study does not profess to offer an extensive overview of Eastern philosophical traditions, nor attempt to characterize “the East” as a monolithic philosophical, spiritual, or cultural construction. Rather, in the spirit of interdisciplinary inquiry, specific examples of Eastern thought are presented here as a means of shedding a contrasting light upon the subject of intuition, with an eye toward elucidating its application within integrative methods. Crucial here is the assertion that Eastern philosophy has embraced intuition, and treats the subjectivity/objectivity debate in an entirely different way from the West. This section will emphasize Buddhism, specifically the Vajrayana tradition of Tibetan Buddhism, with which this writer, as a student and lay-practitioner, is most deeply familiar.

For the East, the goal of philosophy is not the determination of stable and predictable patterns in the universe, but rather insight into the dynamics of nature through deep contemplation. This contemplative awareness is itself a form of intuition, incorporating the processes of incubation and insight described by cognitive psychologists. Eastern philosophy does not posit the same kind of absolute dualities upon which Western epistemology rests. Mind is not separate from body, and consciousness is not separate from reality—all such dualities are themselves contained within a dynamic holism. Through contemplative awareness, one is able to perceive the underlying essence of reality by steadying discursive thought into a direct experience of reality as it is, not how we wish it to be.

The *I Ching* provides a prototype of the Eastern approach to the same epistemological conundrums with which Western philosophy grapples. As Jung describes it: “While the Western mind carefully sifts, weighs, selects, classifies, isolates, the Chinese picture of the moment encompasses everything down to the minutest nonsensical detail, because all of the ingredients make up the observed moment” (*I Ching*, 1950, pp. xxii-xxiii). Instead of attempting to stabilize truth, the *I Ching* is focused upon examining the

dynamics of change and transformation within a framework that provides cohesion without structural fixity. The *I Ching* is based upon a set of binary oppositions (yin and yang), which describe archetypal patterns in nature that shift and interact with each other. As a form of divination, the *I Ching* does not deal with causality in terms of objective, predicable formulae, but rather, in its very ambiguity, requires one to participate in the discovery of truth, to interpret its pronouncements within a dynamic context in which underlying patterns are applicable to present situations. “It is of course disquieting, and one is not certain whether the compass is pointing true or not; but security, certitude, and peace do not lead to discoveries...” (p. xxxiv). This ancient philosophical technique is in complete accord with the findings of cognitive psychology on the mechanisms, practices, and advantages of intuition.

In Buddhism, the beliefs in absolutism, materialism, and nihilism are all subsumed in the “Middle Way,” which posits “a dialectical relationship between empirical reality and ultimate reality, wherein they cannot be separated” (Kyabgon, 2001, p. 75). Buddhism speaks of the metaphysical basis of the universe as emptiness, referring to the lack of any absolute, unchanging essence. “It is because of emptiness that anything can exist at all in the first place. If things had an enduring essence or substance of some kind, we would have to have the concept of a static world” (p. 76). Instead of claiming supremacy of one pole of the dichotomy between intellect and intuition, or subject and object, over the other, Buddhism advocates a kind of suspension of judgment, wherein reality is perceived in its intrinsic contextual ephemerality.

This detached mental stance is also characteristic of the integrative mindset, wherein multiple points of view are dispassionately brought into awareness and synthesized into comprehensive understanding. Intuition enables a perpetually open consciousness that simply and deeply observes reality transpiring, without attempting to structure it. The middle path of Buddhism is an exemplary model of metacognition, an awareness of awareness. This contemplative awareness provides interdisciplinarity with a clearer notion of a notoriously nebulous component of the integrative mindset—a level of reflection in which understanding is both broad and deep, in which open-mindedness and definitiveness attain careful and fluid equilibrium in synthesis.

Contemplative awareness is a form of cognition wherein one becomes cognizant of the ways in which the mind interferes with the direct experience of reality, and through this metacognition releases these layers of preconception and emotional attachment toward a direct experience of what is

(Kyabgon, 2001, p. 160). This intrinsic connection between the nature of the human mind and the nature of reality offers a way out of the objectivity/subjectivity impasse that has so paralyzed the progress of Western philosophy in the wake of the postmodern critique. In the experiments of cognitive psychology, the realization of the solution to a complex problem is often accompanied by a subjective sensation that the problem-solver has tapped into an intuitive reservoir of understanding beyond or beneath rationality (Davidson, 1995, p. 151). “When we develop wisdom, we realize that both subject and object, the mind and the material world, have the same nature. Then, instead of viewing the world as hostile or alien, we see that the world and ourselves are interdependent” (Kyabgon, 2001, p. 44). Understanding the nature of reality is not a process of objectively detaching ourselves from it through the imposition of rational structure, but rather recognizing that our consciousness is itself reflective of and participating in the undefined flow of reality (p. 104).

Eastern philosophy provides both a theoretical justification for intuition and a method, through the practice of contemplative awareness, of cultivating it. It posits a synthetic mindset wherein intuition and calculation are balanced along with all other faculties of understanding—be they physical, emotional, cultural, or spiritual. This balanced mindset offers a powerful way to describe the epistemological stance interdisciplinarity takes toward complexity, as well as elucidating the mechanics of integrative method. Contemplative awareness, presented here as a well-formulated and ancient employment of intuition’s potency, is not offered as the sole template for the integrative mindset or method. However, the difficulties within interdisciplinary scholarship in defining the integrative method and developing a framework that incorporates competing epistemological approaches—intellect vs. intuition, structure vs. flexibility, etc.—are not without precedent. Interdisciplinarity could do well to draw upon the techniques and epistemologies of the East, in which these confounding problems have already achieved a high level of synthesis.

Professional Applications

Intuition has a well-established place in the practice of many professions. Since interdisciplinary studies programs are often involved in professional education for applied fields, a few examples will not only help demonstrate the widespread acceptance of intuition, but also reinforce the notion that its inclusion in interdisciplinary instruction is crucial to preparing our students

for the practical necessities of complex problem solving in the “real world.” In business, intuition is not only accepted, it is prized. An intuitive view of the world enables workers to distinguish appearance from reality and is generally associated with “self-motivation, confidence in oneself, being a practical person, being streetwise, being able to control one’s emotions, and possessing a broad vision” (Gerber, 2001, p. 79). Individuals so possessed are more likely to exhibit calm behavior and leadership in times of crisis (p. 80). Studies of corporate management reveal that “intuitive information processing strategies are most often found at the highest levels of an organization and in...research and development, where coming up with new approaches is both expected and rewarded” (Simpson, 2003, p. 58). Intuition is broadly recognized as an essential faculty for managing market complexities.

Health care professionals are also known for their utilization of intuition in both diagnostics and treatment of their patients, in addition to rule-driven aspects. Ruth-Sahd (2003) recognizes that intuition often takes place in nursing as a shift from rational, linear medical models to a holistic perspective that “recognizes all ways of knowing” (p. 129). She advocates the removal of all barriers toward intuition in nursing education. “If our goal in adult education is to enhance thinking and learning, then we must identify models that will facilitate the understanding of intuition and its role in discovering and constructing meaning” (p. 134).

Intuition is crucial to military science as well, a distinguishing faculty of all great commanders throughout the annals of war (Reinwald, 2000). The military phrase, “*coup d’oeil*,” essentially translates as “power of the glance”—the ability to make an instant assessment of the battlefield (Gladwell, 2005, p. 44). Because events on a battlefield literally transpire in the heat of the moment, the possession of intuition as a “sixth sense,” a hunch or a gut feeling, “affords leaders the capacity to make timely, rational decisions based upon extensive experience, memorized skills and concepts, and subconscious pattern recognition” (Reinwald, 2000, p.79). It is the power of visualization—situational understanding under uncertain, indeed horrific conditions. For Napoleon, intuition enabled clarity within a dynamic, ambiguous environment through an ongoing awareness of all facets of the battle as a whole. Reinwald contends that the importance of intuition in military operations cannot be underestimated; it is the most decisive factor in achieving tactical victory. As in the sciences, this intuitive sense of judgment synthesizes experience and reflection.

Gladwell (2005) notes that the chaotic nature of the battlefield is not uncharacteristic of the shifting environments found in many professions, such

as police, firefighters, or medical personnel. In real life there is often neither the time nor resources to calmly analyze all factors of a given situation and make logical, systematic decisions. It is quite often necessary to size up a situation and act (p. 107). Such gut level decision-making characterizes much of our everyday experience. In such cases, rationality leaves us woefully unprepared, and, insofar as it interferes with intuition, impaired. Interdisciplinary studies, with its emphasis upon practical problem solving, cannot afford to dismiss such a potentially powerful faculty for integrative understanding.

Intuition in Education

If intuition is to hold a practical position within interdisciplinary inquiry, methods of incorporating it into interdisciplinary teaching must be identified. Ruth-Sahd's efforts to include intuition in nursing education can supply some general approaches. She recommends that intuition be formally recognized as a legitimate mode of thought, having a seat at the table along with logic and empiricism. Education of intuition involves an emphasis on creativity and a tolerance for uncertainty (2003, p. 132). Such characteristics have been identified among the traits of interdisciplinarians (Repko, 2005, pp. 23-27). The practice of intuition requires an educational environment where students are allowed to make mistakes and learn from them, to explore without fear of punitive consequences for not coming up with the "right" answer (Ruth-Sahd, 2003, p. 133). Zelman (2002), in her group study of intuition among her fellow faculty members, also identifies the necessity for suspension of judgment. Through mutual acknowledgment of intuition in everyday experience and in the classroom, along with a series of exercises designed to stimulate and reflect on intuition, the group was able to bring their intuition into direct practice (pp. 36-38). According to Sill (1996), "instructors can encourage discovery by presenting material in such a way as to trigger thought in multiple, simultaneous matrices, to provide a supportive environment which encourages and rewards divergent thinking, to allow quiet, reflective time, and to model creative thought" (p. 147).

Birgerstam (2002), in a course training business professionals, describes setting up paradoxical scenarios in which his students were forced to make business decisions under impossible time constraints and insufficient data, forcing them to think intuitively, on the spur of the moment (p. 434). Vidiotaping their responses allowed the students to observe themselves under those stringent conditions and reflect upon the way they used intuition to deal with the pressure, thus improving their intuitive reactions. Such meth-

ods are quite familiar to coaches of athletes or military drill sergeants. This technique is as well characteristic of Zen masters, who traditionally present their monks with conceptual paradoxes, such as the koan, in which a conundrum with no single solution is set up for contemplation. Paradox short-circuits the certainty of logic and forces the pupil to resort to more immediate, intuitive avenues for decision-making. The ancient Eastern philosophers have long recognized a kind of “knowing which is *essentially* indirect, sideways, allusive and symbolic; which hints and evokes, touches and moves, in ways that resist explication” (Claxton, 1997, p. 173). Such ways of knowing seek resolution not merely through rational abstraction, but through innovation and improvisation. For interdisciplinarity, successful integration and complex problem solving entail an equilibrium between multiple forms of insight (Repko, 2005, pp. 79-81). The practical necessities of interdisciplinary education thus cannot afford to ignore the power of intuition in pedagogy and curriculum design.

Integrative Wisdom

As a performer, I can relate firsthand my own experiences achieving this elusive equilibrium. In order to function as a musician, I have practiced scales, arpeggios, and numerous other exercises, until I achieved a fluid dexterity at the piano. I have studied music theory, the laws of harmony, chord/scale relationships, rhythmic and melodic structures, until (and this is the point) they have become second nature. My best performances, be they in music or theater, have come after painstaking preparation that was then abandoned, at least consciously, in order to act unthinkingly, allowing my intuition to incorporate discipline and experience into meaningful, spontaneous expression. However, “the paradox for the creative individual is somehow to direct this undirectable subconscious process so that useful insights result” (Csikszentmihalyi & Sawyer, 1995, p. 339). Thus, as Gruber (1995) declares, “without contradiction, creative work can be purposeful and protracted, playful and intuitive, deeply knowing and yet partially unconscious” (p. 419).

The synthetic cultivation of inspiration, intellect and intuition are facets of a more comprehensive constellation of human faculties, posited here as wisdom. Wisdom is the synthesis of all avenues of insight—rational, experiential, intuitive, physical, cultural, and emotional—it breaks down all boundaries between categories of knowledge and returns them to holistic understanding. Wisdom creates equilibrium among these faculties, minimiz-

ing their individual weaknesses and achieving synergy. Successful decision-making relies upon a balance between intuition and rationality (Gladwell, 2005, p. 141). These two poles are not antagonistic, they merely communicate on different levels (Birgerstam, 2002, p. 432). “By being mindful of the limits on our self-knowledge we can restrain our gullibility and motivate ourselves to think critically, to check our own and others’ intuition against reality, and to replace illusion with understanding” (Myers, 2002, p. 86). As the mathematician and physicist Henri Poincaré wrote in 1904, “it is by logic we prove, it is by intuition we invent” (Miller, 1996, p. 337), and in 1908: “Logic, therefore, remains barren unless fertilized by intuition” (Gruber, 1995, p. 415).

The reflexive capacity of wisdom is also quite useful in practical problem solving. Synthesizing a broad range of faculties, and deploying them appropriately to a given situation is the art of wisdom (Claxton, 1997, p. 192). It comes about through the assimilation of a variety of learning styles, the exploration of multiple sources of knowledge, and application of this assimilation to everyday life (p. 221). As fluid and situational as wisdom may seem, Csikszentmihalyi and Sawyer (1995) assert that the achievement of creative insight is dependent upon the synthesis of ideas from different domains, requiring immersion in the ideas and practices of fields within each domain, and concentration upon a problematic area of the domain. The trick here is the ability to allow interactions between relevant information across domains at a subconscious level where parallel processing can occur. Wisdom does not ignore subconscious processes, but rather is able to observe the subconscious without interference and recognize the emergence of a new configuration of the problematic situation, utilizing evaluation and elaboration to help focus the insight in ways that can be understandable and valuable to others (p. 358). Within this natural process all faculties of understanding blend together, support each other, in a kind of dance both rational and intuitive, ordered and fluid, structured and improvisational.

These descriptions of the process of wisdom echo the fundamentals of interdisciplinary theory and the integrative method. Key to interdisciplinary theory is the notion that all but the most isolated and abstract problems are complex, and that, if problems are to be investigated in their complexity, they cannot be broken down into components for specialized analysis—they must be examined holistically. Holistic understanding of complexity is not accomplished merely through an immersion into the details of complexity, attempting to draw maps and create hierarchies amongst the intricate webs of relationships inherent in any complex system. Often, “all that extra in-

formation isn't actually an advantage at all; in fact, you need to know very little to find the underlying signature of a complex phenomenon" (Gladwell, 2005, p. 136). In other words, part of the process of integration is knowing how to back off from the nitty-gritty particulars of complexity and let the big picture resolve itself on its own terms. This big picture is possible because the human mind and the reality it perceives share the same complex nature.

Problem solving often requires timely assessment of complex situations, where sufficient data for a rational decision is unavailable. Under these constraints, typical of most practical complex problems, intuition shines. The "process of acquiring knowledge then becomes an activity where we need to learn to distinguish and shape what is ambiguous, evasive and less obvious into something with more fixed contours, so that we can later study how essentials may possibly relate to each other and form recurring patterns" (Birgerstam, 2002, p. 433). Intuition weeds out salience from among the multifaceted and often contradictory complexity of phenomena (p. 435), and thus enables the understanding of it as a dynamically structured whole (p. 440).

Allowing intuition such a prominent role requires an unequivocal abandonment of rational intellect as the sole or even dominant faculty of human understanding. For many, unmooring oneself from the comforting structures of rationality creates a disturbing kind of intellectual vertigo. Relinquishing control to the more nebulous and indeterminate ways of intuition can feel unsettling, if not downright alarming. Furthermore, interdisciplinarians who embrace intuition as part of the integrative process run the risk of condescension by scholars in other disciplines that define intuition at best as unexamined knowledge or "sloppy thinking." In response to the necessity of establishing interdisciplinary studies in the university, many notable interdisciplinary scholars, including Newell, Szostak, and Repko, have taken on the task of structuring interdisciplinary methodology on a more linear, rational basis. Although these scholars take pains to incorporate intuitive understanding in their paradigms, and include caveats concerning the necessity for non-linear thinking, creativity, tolerance for ambiguity, and metaphorical abstraction, none have thoroughly examined how to cultivate these intuitive abilities and employ them in complex, holistic problem solving. This is because, for the trained academician in any discipline, intuition seems like a leap off a conceptual cliff. However, in order for interdisciplinarity to fully develop, the schism between Apollo and Dionysus in interdisciplinarity must itself be synthesized. Without rigor, intuition is prone to amorphousness and indecision, and without intuition, rigor is empty form, incapable of true insight (Welch, 2003, pp. 199-200).

As this study has endeavored to substantiate, intuition is neither mysterious nor unnatural. In intuition we possess an instinctual rudder that has the potential to guide us through situations in which there is no solid, logical frame of reference. Far from being a nebulous aurora of neural activity, the unconscious mind is agile, perceptive, and capable of divining patterns within complexity (Myers, 2002, p. 52). It does this better than rational consciousness because it is constituted to accept chaos as necessary to order. The intuitive mind reflects this nature of complex reality “as an open system, never completely in equilibrium with its surroundings, seeking ever-deeper understanding” (Miller, 1996, pp. 443-444). Interdisciplinarity is not simply a problem-solving tool, it is a philosophical stance toward understanding and being in the world. This unsettled equilibrium is at the core of the integrative mindset, and is essential to wisdom itself. In order to bring intuition to bear as a vital element of insight it, like rationality, must be practiced and refined.

If interdisciplinarians truly want to claim the full breadth of human understanding as our potential field of inquiry, it is incumbent upon us to embrace all faculties of understanding. How can we, who steadfastly emphasize inclusive over exclusive thinking, fail to thoroughly involve intuition not only in our formulation of methodology, but in the way we instill skills and ways of knowing in our students, potential interdisciplinarians to come? Active learning entails challenging students to think for themselves, outside the box and on their feet. Instruction on intuition, as theory and practice, is vital to interdisciplinarity. Csikszentmihalyi and Sawyer’s investigations into intuition report experiences of insight as the result of protracted narratives involving multiple stages, discussions among peers, consideration of reigning paradigms and disciplinary definitions of salience (1995, p. 334). This description of intuition profoundly parallels the integrative process laid out by current interdisciplinary scholarship.

The integrative mindset is not merely a synthesis of the rational/intuitive dichotomy, but a complete deconstruction of it, so that the boundaries disappear into a comprehensive holism. The human mind already knows how to do this; it has never really been divided, neither amongst itself nor with the reality that surrounds it. The complex nature of mind synchronizes with the complex nature of reality because that is what it evolved to do—coalesce ever-changing patterns, making sense of a reality whose order refuses to hold still. Wisdom is the core of the integrative mindset—a controlled surrender, which allows complexity to reveal itself. Wisdom knows how to navigate complexity.

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