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BEYOND THE GUTENBERG HOLOGRAM: THE GAMBLE OF A LIFETIME

Prefatory Note. When first contacted regarding the possibility of presenting to the 2002 CTSA convention on the topic of new technologies and their impact upon theological reflection in the twenty-first century, I recognized that *Reading the Signs of the Times* meant moving outside the linear boundaries of the traditional plenary paper. Indeed, the presentation process needed to mirror various elements and issues that information technologies raise for academic discourse, and for intellectual reflection in general. As a result, the plenary, while respecting the limits of time and geography imposed by the conference structure, nevertheless attempted to provide an informational/experiential glimpse into the complexities of communication in a cyber age.

As a means of decentering traditional expectations, I commenced the presentation by descending from the "hegemonic platform" and the "empyrean" podium, in order to address the gathering directly. Although this might have been read as a social gesture (which it certainly was!), a more significant intention was the attempt to establish a direct informational/communication link to those receiving my words and ideas, a link less disrupted by the conventional symbols of institutional power and academic "authority."

The session opened with a multimedia activity, including a brief, historical text on the life of St. Ignatius of Loyola; a computer generated slide show that included historical, geographical, and artistic images from his life and era; and a musical selection on CD ROM. This simple demonstration was intended to model the intricate layers of information that can be presented all at once in a digital environment, and readily duplicated around the world with the internet transfer of a few computer files. Our introductory glimpse at the life of Ignatius could have been covered in text form only, in the same length of time, with a few telling phrases and metaphors. However, the selective use of images helped trigger a multitude of additional responses relative to our sense of domestic geography, life crises, spiritual transformation, classical history, hagiography, iconography, architecture, Baroque art, etc. The additional layering of a well-known piece of classical music added to the potential complexity of the knowledge or data we brought to assimilating the experience.

Given the context of an academic conference, the obvious question might be, "Why do this?" We had all seen media presentations before. However, the intention was to provide an experiential frame for understanding the intricacy of information processing that is endemic to the world of computer technology. Our interaction was based on discoveries derived from two modern fields of inquiry—complex systems theory, and cybernetic feedback loops. Systems

science operates on the presupposition that no matter how complex the world we experience, we can always discover intrinsic types of organization within it, and those organizational types are independent of the immediate field or domain we are examining. Moreover, this systems approach emphasizes points of interaction and connection, rather than those of distinction and separation. Of most interest to information theorists are those systems that are adaptive and self-regulating, capable of evolutionary development within their various environments. A human mind, a society, or an environmental ecology are indicative of such developmental systems.

Within these systems are processes of self-regulation and adaptability that are established and maintained by cybernetic loops—complex feedback mechanisms that inform the system of its current state and its future possibilities. There are two basic feedback loops: positive and negative. Contrary to our immediate intuition, these are not systems equivalents of good and bad, or affirmative and critical input. A positive feedback loop consists of information that reinforces the present state of affairs, producing "more of the same" within the system. If allowed to go to extremes, a breakdown can occur—cancer is a case in point. A negative feedback loop offers information that is not simply consistent with what is, and promotes an adaptation in systems behavior. A basic thermostat and heater provide a case in point. Each, in its operations, delivers information to the other, thus promoting balance (i.e., a stable heating level) within the system.

The issue that confronted us in the CTSA plenary "experiment" was the extent to which our theological endeavors are proliferating a pattern based on a positive feedback loop from previous generations of researchers and theorists, and the manner in which contemporary information and media technologies are initiating a negative feedback loop that will require adaptation and evolution in our own self-understanding and methodological development. To some, the language of systems and cybernetics might have seemed like an elaborate screen, simply inviting disciplinary revision or interdisciplinary cooperation. However, the intention was to initiate a new context for conversations, one that would enable us to unpack the more profound potentials that information technology has brought to our field of perceptions.

In an effort to mirror the manner in which cybernetic feedback allows for internal adjustment of an information system, the presentation was divided into a prelude and five "information vignettes." After each, Mary Ann Hinsdale and I engaged in a dialogue of clarification. The purpose was to allow as much course correction or conceptual evolution to occur within the context of a single information transfer that we had conveniently labeled a plenary address. In addition, the reading of the text was supplemented by a PowerPoint presentation, in order to provide a visual map of the verbal/conceptual flow that the printed page represented.

PRELUDE

Interviewed during the *Jesuit Education 21* conference held at St. Joseph's University in late June, 1999, Joseph O'Hare, S.J., offered his reflections on the future of Jesuit education. Commenting on the possibilities for the continuance of a venerable learning tradition, he noted: "I'm full of hope about the future. I don't offer any guarantees, and I can't tell you what the odds are, but I think that it's worth the gamble of a lifetime." As a young graduate student in UC Berkeley's English program some thirty years ago, I had no premonition of the sequence of events that would lead to my personal spiritual transformation; a migration to theological studies at the Jesuit School of Theology and the Graduate Theological Union; and a twenty-year odyssey of vocational discovery as a Jesuit in the California Province of the Society of Jesus. So far, I remain full of hope for the future, and my path has proven well worth the gamble of a lifetime. Throughout these thirty years, theology has been neither a professional avocation nor an academic strategy for me. The "God stuff" of my life and work has always been manifested as an invitation and a question. It mattered little whether the material involved biblical languages and literature, systematics, psychology of religious experience, ritual anthropology, metaphysics and epistemology, music and liturgy, or hermeneutics—the question drew me forward. Theology has always been a model of holistic discovery, a model of wonder before analysis.

The last decade has opened up yet further avenues for exploration. Working in a College of Professional Studies, with adult students whose areas of expertise include organizational dynamics and development, or information systems management, has invited me to ground my academic activities in very concrete environments, and in real-world practicalities. In addition, exposure to the blossoming world of telecommunications technology, multimedia, and computing platforms has redirected a number of intellectual foci in my life. I have come to recognize that message, medium, and method are no longer the discrete entities so energetically pursued in the near past. My attention has moved from the epistemological and systematic to the neurocognitive and metastructural.

Obviously, I do not expect ever to "answer" my "God question," or even to define its content boundaries. This current undertaking is not intended to persuade or to convert anyone to anything. It is not a methodological critique, nor an attempt to provide the Next Great Thing for theological reflection. It is more accurately a series of five informational vignettes, aimed at drawing an imaginative response or inspiring a different mode of inquiry. Indeed, my abiding interest is less in the enterprise of theology (or theologies) than in the *complexus* of influences and inspirations that shapes the person of the theologian. If the theological explorations of the last two centuries have taught us one major lesson, it is that the product is inseparable from the producer. The possible future roles of theology in the twenty-first century must be attentive to the creative

entity that is the *theologian* or the *theological personality*. Postmillennial theological method and methodological application require ever greater attention to the producers of method. Theology resides in the theologian, not the reverse.

Although my opening remarks point to the identity and formation of the theologian, it must be emphasized at the outset that my intention is not to promote subjectivism, personalism, or any form of subject-focused sentimentality. My personal pilgrimages through a variety of fields over the last thirty years have consistently focused on a systemic location for my questioning, and a process for tracking the complexity of my learning. Perhaps the simplest way to describe this odyssey is to say that I was not seeking a methodological dwelling so much as a matrix for an intricate network of information.

Developments in fields as diverse as quantum mechanics, nonlinear systems theory, fractal mathematics, cybernetics, and neurocognition are pointing to the interdependencies of elements within systems at whatever degree of scale. These interdependencies are integral to the *acquisition*, *assimilation*, and *application of information*. The emergence of personal computers, global telecommunications networks, multimedia, and other assorted technological devices for information gathering and dissemination have further nuanced our perceptions of such systems, and their impact on the development of traditional disciplines.

Evolving information paradigms and protocols have given rise to a multitude of new perspectives on theories of knowledge, and contexts for theoretical systems. I shall point to three of them here. The first involves the notion of information networks. Traditional disciplinary efforts have tended to be linear and cumulative, one generation of practitioners building on the foundations laid down by previous experts in the field. I still recall clearly my earliest research ventures into the library stacks, searching for titles I had located through the card catalog. While in that dusty section of shelves, I would peruse the other titles aggregated under a given Library of Congress numbering, occasionally unearthing a real gem. Today, complex database and information systems have created nonlinear and associative networks that rely upon data links rather than discipline-specific conceptual connections. The a priori boundaries that have existed between fields of inquiry are being transformed into hermeneutic distinctions, which are dependent upon the specific intentions of the information management project at hand.

The second relates to the complex media in which contemporary information is imbedded. Historically, academic discourse has taken place within a relatively limited and fixed set of media environments—books, monographs, and articles; or lectures, seminars, and symposia. The obvious emphases on verbal/linguistic skills and processing have placed clear limits on accepted materials and modes of expression and communication. In the multimedia world of the Web, CD ROMs, and DVDs, the possibilities of accessing aural, visual, and verbal/linguis-

tic receptors at the same time are enormously enhanced.[1] The distinction is not a trivial one. By accessing multiple cognitive processing centers all at once, one not only modifies the manner in which information is held and remembered, but also subtly shifts the conceptual frame in which that information is given meaning. One need not go to the extremes of a Proust novel in demonstrating the impacts of extraverbal influences on thinking and communicating to recognize that every human information-input process acts directly upon the information gathered from all the others (whether sensate, conceptual, or imaginative).

The third concerns what I would term "iconic frames" or "iconic maps." Given the epistemological constraints that determine the parameters of discipline-specific content, there are clear markers of what "matters" in discourse, and what is acceptable as evidence. Such constraints establish the "privileged information" within a field of inquiry. Simply put, what is acceptable in assessment of an impressionist painting is not germane to a mathematical proof in calculus. However, in the context of complex information media, the cognitive processes generally associated with logical proof can be linked directly to those associated with aesthetic appreciation. Thus, the "icon," or the complex of significant meaning, becomes more intricate. What the impacts of these media will be in determining the future unfolding of so-called disciplines remains to be seen. However, the recent unfolding of fractal mathematics and nonlinear dynamic systems is an indication that the possibilities could prove profound indeed.[2]

All of the studies, tools, and information networks alluded to above have become part of the matrix in which I engage in "theological reflection." I assume that theology is but one, complex information processing modality among thousands, and therefore part of a process of system interdependency. The following elements are some among many of the filters or foci through which we can begin to investigate theologians, their theological methods, and their possible message for the future.

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[1]A great deal of research and experimentation is currently being done on the impacts of technological media upon learning and information application. *Syllabus* is a monthly publication dedicated to "technology for higher education." In the most recent issue, Chris Dede, a Harvard professor of Learning Technologies, addresses the positive and negative dimensions of complex media in the current educational environment: "Interactive Media in Education," *Syllabus* 15 (June 2002): 12-14.

[2]The contemporary interface between laboratory science and theoretical mathematics has become more intricate due to the evolution (or revolution) in understanding nonlinear systems—systems that do not adhere to the simple, mathematically ordered universe we assumed we lived in since the time of Aristotle. A wonderfully comprehensive yet anecdotal introduction to the issues can be found in James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1988).

APOLOGETICS: THEN AND NOW

On March 5, 2002, Archbishop William Levada of San Francisco made a presentation at the University of San Francisco entitled "A New Apologetics for the New Millennium." Drawing from Avery Dulles's work on the history of apologetics, written in the period after the Second Vatican Council, Levada traced three major currents. The first involved social explanation—attempting to clarify to a mistrusting culture that Christians were not dangerous fanatics or a threat to common order. In the second, apologetics attempted to gain an evangelical foothold in the religious worlds of Judaism, Islam, and, more recently, the world of agnosticism and atheism. In the third, a modern "apologist" aims at the "infidel" within the contemporary believer—a void of connection to the practice of the tradition itself.

Levada's baseline point was that apologetics needs a renaissance in today's Catholic community, to address the disconnection between faith and reason, and culture and religious/spiritual affect. The Archbishop was forthrightly addressing a sensed need for clarity of evangelization—a clarity of medium, message, and practice. His broad thematic brush strokes outlined a canvas that could include scripture, liturgy, ecclesial history, pastoral practice, philosophical inquiry, etc.

Why is such a plea for apologetics pertinent here? If the theological community writ large (most certainly that in the Roman Catholic sector) has experienced *Magna Carta* moments in the last century, they have been precisely through liberation from the role of "apologist," from the strictures of explaining and/or justifying the "deposit of tradition." Having begun my own explorations during the flowering of an American reconstruction of liturgics and catechetics, I quickly became aware of the urgency that was felt to link the theological enterprise to as many pertinent fields of inquiry outside ecclesial circles as possible. Indeed, the historical, anthropological, philosophical, psychological, and sociological investigations that had entered the theological sphere during preceding decades were symptomatic of a felt need to "move" theology into an intellectual mainstream of inquiry that was both conversant and compatible with the physical and social sciences.

By the end of the millennium, this movement was deeply entrenched. Theology, the medieval "Queen of the Sciences," had been almost fully transfigured into a companion among sister disciplines. However, a critical distinction remained. If we trace the development of the roots and methods of the physical and social sciences, each has a specific sphere of investigation, a process for acquiring and analyzing information, and a discipline-specific product that results. Simplistically put, historians have an "apologetic" for history (allowing for scholastic differences, which may be paralleled to "denominations" within a religious tradition), psychologists have an "apologetics" for psychology, and so forth.

I realize that such statements can sound like naïve disciplinary reductionism, but there is a point to be made that is worth the risk. Theology as a discipline (or discipline set) was spawned from the experienced "God stuff" of living individuals and cultures. Its apologetic foundations derived from an experiential urge to explain and explore the lived roots of a faith community and of individuals, from a shared locus of spiritual identity and religious practice. As it has assimilated itself to a variety of empirical disciplines (to very good ends!), its *modus vivendi* has often been supplanted by its *modus operandi*. In an attempt to match the empirical clarity of the physical or social sciences, theological disciplines have often adopted a clinical detachment and methodological precision that can transplant them to an observational plane quite outside the grounding experiences of the communities that gave them birth. This methodological disconnection from origins has its costs in limiting both interpretation and communication.

Why should this matter? In the burgeoning computer age of information networks, it has become increasingly apparent that each system dedicated to acquiring, assimilating, and applying information has its particular set of what might be called "systems component interfaces." For a computer, these component interfaces might be designated simply as the hardware, the software code, and the media connection to the "consumer" (texts, audio, video, images and graphics—whatever is generated for absorption by the user). Clearly, all these elements are essential to the complete experience of working with information in a computer environment. However, the emphasis has progressively been placed more firmly on the quality of the media connection, since this is the interface that most directly impacts the depth and effectiveness of the interaction between computer and user. Those of us privileged or cursed to have been introduced to the world of personal computers more than a decade ago can recall the terrors of the evolving GUI (the Graphical User Interface—what actually met us on the screen). To the extent that our computer was able to mediate information to us from the dark labyrinth of its inner workings, or carry the messages we typed with dubious fingers into the fragile recesses of its hard drive—we were delirious or despondent, often left unsure how secure and durable the transaction had been.

At the risk of creating an overly intricate metaphor, we might compare the repository of information in theological disciplines (scripture, systematics, history, etc.) to hard drive memory, method or methodological procedures to the software code, and various products (books, articles, lectures) to the media connection. I would submit that, although our repository of information is sizeable, its range of use is currently quite restricted by the software code of our methodological practice. Moreover, our media connection is even more constrained by the boundaries of our academic disciplines.

All of this metaphor making is not just an exercise in rhetorical flourishes. It simply provides a more imagistic sort of shorthand for the deeper elements at play within theological practice. The issue at hand is a heuristic one. In fields as

diverse as artificial intelligence and cognitive information chunking, practitioners are grappling with the manner in which we (or future thinking machines) are able to develop associative links across dissimilar fields of information, to formulate conceptual and imaginative connections that provide answers to complex questions, or solutions to unsolved problems.[3] In any information-processing endeavor more intricate than counting and reporting the number of jelly beans in a candy jar, each of the elements outlined above plays a major role. The scope of our basic data sets (our hard drive), the range and flexibility of our methodological procedures (our software code), and the variety and impact of our communication (our media connections) each and all determine what we hold as legitimate knowledge or learning. I suspect that one of the most significant points of development in theological dialogue over the next fifty years will be the determination of our heuristic process—what do we include in our information universe, how do we allow ourselves to process and transmit that information, and how do we apply it?

To continue the computer metaphor—the unfolding of our media connections will ultimately redefine the heuristic paradigms we embrace within the envelope of theological exploration. The historical spectrum of theological communication has moved from a catechetical frame to an ecclesial one; then from a philosophical/scholastic perspective to one modeled on the social sciences. The geometric expansion of our data sets in the coming decades, coupled with ever more intricate methodological procedures, will finally be melded into a new set of media possibilities that will impel a redefinition of method and disciplinary praxis.

It may seem a convoluted journey to have initiated this reflection in the realm of apologetics and to end in the arena of heuristics. However, the theological disciplines are, in effect, the apologists of their methodological inclusions (and exclusions). Perhaps Archbishop Levada was ultimately prescient on a scale he never intended.

THE GUTENBERG HOLOGRAM

There have been few mechanical devices with more direct historical impact on the unfolding of scholarly enterprises than the printing press. Walter Ong and others have documented extensively the movement from cultures of orality to those with scripted traditions—papyri, scrolls, tablets, manuscripts, etc.[4]

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[3]In the ever more complex world of academic disciplines, professors are finding it increasingly difficult to coordinate the amount of material needed for comprehensive coverage within a field. One response has been the practice of "chunking," in which groups of practitioners divide up a project, each providing a slice of the whole. Then, each member of the group can use the aggregate materials as needed. The process is based on an "ethic of sharing" rather than the territoriality of traditional academic production. See David G. Brown, "Searching for Chunks," *Syllabus* 15 (May 2002): 22.

[4]Walter Ong has certainly been one of the pioneering figures in dealing with the

However, it was not until the establishment of the Gutenberg press and its more sophisticated successors that the modern forms of scholarly argumentation and demonstration developed their present range and scope. Our interest here is not in the history of the printed page, but in the social impacts of volume printing, of the "book form," and of the iconic value of "texted artifacts."

I would assert, without fear of contradiction, that there is not a scholar in the current Academy on the lee side of 40 years, who has not been fundamentally shaped in his or her learning process by what I term the *Gutenberg Hologram*. A hologram is essentially a three-dimensional image generated by laser illumination from a two-dimensional data set. In the case of the traditional book, what has "leaped off the page" is more than an idea or a process. Centuries of use and familiarity have generated an entire iconography of texts that is extraordinarily powerful. For many, even the physical shape, texture, and heft of a book carry mythical, if not religious, power. The hologram under consideration here extends to include the socialization of readers into particular modes of thinking and into valorization of particular forms of rationality. In this generation of e-books and online journals, it is altogether possible to obtain and use an enormous variety of text items, without ever passing one's hands along the spine of a book, or running one's finger down the reassuring and tangible face of a printed page. Yet for some, there is a nearly visceral reaction to the loss of the "texted artifact." The convenience of anytime/anywhere access to a virtual universe of information is small consolation in the face of losing contact with a treasured cultural icon.

In the "world of the book" (putting narrative to the side), the vast majority of educational, scholarly, and theoretical writing follows a simple and obvious pattern. Authors commence with a premise (sometimes left implicit), provide a wealth of supporting information, and then offer a conclusion. This prominent method is linear and probative, a laudable means of helping many readers to track a logical pattern of thought. However, the probative and the linear constitute only one dimension of the intricate web that is the neural processing matrix of a human brain. Much has been written in the last thirty years regarding the so-called right- and left-brain hemispheres, or the frontal or corticular functions as these relate to limbic and motivational systems. Although many of the division-of-labor neural models that prevailed until recently have come under serious scrutiny and revision, they offered one very important insight into human mental function. The verbal-cognitive operations that are so central to language, logic, and linear rationality are part of a fascinatingly complex set of processes, that also includes memory, imagination, emotion, etc. Even more important, the

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impact of texts on culture and cognition. See his *Orality and Literacy: The Technologizing of the Word* (London: Routledge, 1982).

allegedly "higher" functions are not discrete or separated from the neural network that is the human personality in total.[5]

In the flowering of information technologies and multimedia, a different learning hologram is coming into prominence. Whereas the physical form of the book promotes a linear and sequential process, the Internet, specifically the Worldwide Web, is establishing a pattern that offers an associative, frequently multiplatform, environment. Through the use of hyperlinks and interactive media, web-based information does not unfold in an A to Z progression. Frequently, an exploration online might involve an A to L to D to Q to C type of nonlinear and nontexted investigation, thereby employing the neural patterns associated with narrative, symbol, visual imagery, aural impressions—a plethora of information transmitters. When information is gathered and processed in this nonlinear manner, the learner's options for uncovering new conceptual connections or symbolic value are enormously enhanced. Those of us who, like Alice through the Looking Glass, have burrowed through multiple layers of hyperlinked website materials can attest to the fact that our original motivations or intentions for an online search often smile at us like the Cheshire Cat, as we realize that the parameters with which we began our investigation are inadequate to the richness of the information we have uncovered.[6]

The Gutenberg Hologram is a culturally defined mode of perception, that shapes the normative values of scholarly and academic enterprises. The intention here is not to denigrate either the historical or contemporary significance, or the worth, of this hologram. Rather, a question is being raised about the implications of placing such exclusive emphasis on the products and processes that the hologram inculcates. This is not a call to book burning or to dismantling the educational structures of centuries. Instead, it is an invitation to reflect on the ways in which the informational and hermeneutic boundaries of this hologram can be expanded and nuanced. We hearken back to the comments made at the outset of this exploration—one need not look to redefining theological disciplines so much as exploring new means and modes of creating the theological personality. The emotive, relational, somatic, aesthetic, spiritual, and psychic dimensions of human knowing are not simply addenda to "higher" order reason. They are intrinsic cocreators of the cognitive framework that constitutes thinking

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[5]Although criticized for some of their choices of neurocognitive models, James Ashbrook and Carol Albright have attempted to make a direct link between neural functioning, and the seemingly hardwired human propensity for God experience and God language. See James B. Ashbrook and Carol Rausch Albright, *The Humanizing Brain: Where Religion and Neuroscience Meet* (Cleveland: Pilgrim Press, 1997) esp. part 2.

[6]Paul Soukup, Frank Buckley, and I have written on the subject of information technologies and their impact on contemporary theologizing. See Paul A. Soukup, S.J., Frank J. Buckley, S.J., and David C. Robinson, S.J., "The Influence of Information Technologies on Theology," *Theological Studies* 62 (2001): 366-77.

or knowing.[7] Theological disciplines offer a unique "geography" in which to link discipline-specific activities to a wide range of experiential endeavors that could carry theology into a fascinating new venue.

To return to our controlling metaphors of hardware, software, and media connections, it seems evident that the new options proposed above would contribute to a significant expansion of each. Although the data set held in our theological memory bank might not shift all that radically, our "software" codes (methodological options) and our media connections (products of inquiry) would expand enormously.

EPISTEMOLOGICAL AND COGNITIVE PARADIGMS

Exploration of the human mind and its workings has been a source of fascination in Western tradition at least since the time of the pre-Socratics. "Thinking about thinking" has not only become a foundational practice in philosophical and psychological endeavors, but has also established the paradigms for defining virtually all measures of intelligence and learning. The reigning *Ratio* for traditions of liberal education, and even the learning systems for many fields in professional studies, rests on epistemological foundations. As one who spent the better part of two decades in various modes of epistemological investigation, I well understand the attraction of the endeavor. Much as the artist or musician muses on aesthetic creation, or the athlete on physical performance, those who are taken up with the nature and operation of thought are prone to reflect on the qualities of thinking functions.

Nonetheless, the observations offered in our consideration of apologetics and the Gutenberg Hologram once again give us pause, for a very simple reason. Sequential and linear systems operations produce the epistemological premises and structures that shape valued learning—the process is circular or tautological, equivalent to saying that rational learning is rational. The majority of our definitions of intelligence (Howard Gardner's Multiple Intelligences Theory to the contrary!)[8] derives from the application of a limited set of functions within

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[7]Despite their propensity for complicated and occasionally abstruse analyses, the biogenetic structuralists, during the last two decades, have attempted to explicate the links between the *operational environment* (the external world of the percipient) and the *cognized environment* of the individual. They view human consciousness as a symbolic process, uniting external events, perception, cognition and action. Symbolic meaning provides a wider category for understanding the "mind" than verbal and rational capacity. See Charles Laughlin, John McManus, and Eugene d'Aquili, *Brain, Symbol, and Experience: Toward a Neurophenomenology of Human Consciousness* (Boston: New Science Library, 1990). The foundational text for the biogenetics group is Charles Laughlin and Eugene d'Aquili, *Biogenetic Structuralism* (New York: Columbia University Press, 1974).

[8]Howard Gardner's work with Project Zero at Harvard has marked a breakthrough in

the cerebral cortex, that are largely sequential, linguistic, and quantitative, placing the associative, imagistic, and qualitative in a secondary frame of reference. Anyone who has pursued the Western educational ideal to its apex can attest to the primacy of verbal, argumentative, quantifiable processes in any measures of success. Once again, this statement is not a criticism, but merely an observation of the traditional set of values that is inculcated and promulgated in the formation of the intellectual or academic personality. We certainly could not have amassed the wealth of empirical, theoretical, and informational data extant in our culture without such skill sets. Yet, it must be asserted forthrightly that these skills do not constitute the entirety, or even the most important part, of human learning.

Given an expanded notion of intelligence in general, and of theological capacity in particular, it behooves us to move the discussion from the realm of the epistemological to that of the cognitive. It appears that many in the philosophical community have been accustomed to using the two terms almost interchangeably. Therefore, I take this opportunity to make a critical distinction in our contemporary context. Epistemology is the study of the nature and means of knowing. Cognition is the operational means by which knowing is realized. Epistemology observes our perceived modes of thinking and learning, while cognitive exploration observes how brains actually work while thinking and learning. Admittedly, the latter can never be completely divorced from the former, since the observer's methodology (an epistemological premise) clearly impacts the observer's perceptions. Nonetheless, cognitive studies attempt to provide a more global perspective on the totality of the human mental process (or processes).

Why is this distinction significant in a reflection on the possibilities for future theological development? As long as the models for method are validated by a particular set of epistemological premises, these models will be perpetuated indefinitely. In cybernetic terms, the models exist in a positive feedback loop, an information set that reinforces the status quo, and therefore puts off any sort of change indefinitely. An obvious parallel in the empirical sciences can be found in the arena of quantum and relativity physics. For centuries, the presuppositions about the nature of space, time, and matter continued largely unchanged, because the foundations of empirical epistemology demanded adherence to certain data sets and observation patterns. Once the mathematical intuitions of Einstein and others (often garnered by imaginative means completely outside the empirical paradigm!) showed the incompleteness of that reigning paradigm, the associated physical disciplines made an incredible leap forward in assimilating a broader range of information, that had previously been neglected or discarded.[9]

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transcending the traditional epistemological quotients for assessing intelligence. See Howard Gardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books, 1993).

[9]The discovery of the "nonlinear logic" of the quantum universe marked a threshold experience for the empirical sciences equal to any in their history. For a brief discussion

Theological disciplines may not be in line for changes on the same order of magnitude, but the principle remains the same. The more comprehensive our awareness and appreciation of the complexities of human cognition, and the more expansive our willingness to explore the implications of the hidden and neglected talents within the brain, the more available we are for the next quantum level of discovery. As much of the linear rigor of theoretical empirical science has been mitigated through the unique discoveries of system-shattering cognitive breakthroughs, so the theological enterprise stands to benefit enormously from a similar openness to a heretofore unimagined set of integrative principles or hermeneutic insights. Throughout history, the human brain has always managed to outstrip our notions of the boundaries of intelligence in our definitions of mind.

LINEAR AND NONLINEAR SYSTEMS

There have been few greater breakthroughs in the evolution of modern science than the discovery of the reality and operation of nonlinear systems. After centuries of enculturation to the dogma of the Aristotelian and Newtonian universes—with their concise and predictable mathematical connectedness—scientific theory has uncovered the fundamental principle that linear predictability is an illusory, local phenomenon that is not transferable to reality as a whole. It is no longer acceptable to ground empirical theory on the assumption that there exists a mathematically coordinated whole, which can be effectively dissected into disciplined segments or fragments, each with quantitative, linear measures that can be indefinitely enhanced and refined. The universe is a complex of probabilities and contingencies, that is incapable of reduction to deterministic chains of causes and effects.

One of the most significant byproducts of this new empirical sensibility has been the exploration of nonlinear systems and nonlinear dynamics. Areas as diverse as weather prediction, and calculating water flow in an irrigation canal, have benefited from a growing awareness that these oddly unpredictable systems are more than simply the sum of their parts. Two plus two will not regularly yield four. Mapped as grids of data or information, nonlinear processes will display odd clusters of "attractors"—certain patterns of behavior that are not congruent with an arithmetic sum of the elements. In scientific cultures that had frequently drifted toward various types of determinisms, the discovery of nonlinearity marked yet another paradigm shift from the certitudes of a Newtonian world.

With the application of nonlinear systems thinking to the investigation of group and social behaviors and interactions, various open-system models have

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of this transition, see Heinz Pagels, *The Cosmic Code: Quantum Physics as the Language of Nature* (New York: Bantam Books, 1990): 133-35, 155. For a lucid exposition of the unfolding of Einstein's theory of relativity, see Stephen W. Hawking, *A Brief History of Time* (New York: Bantam Books, 1988).

begun to emerge. Human persons and organizations are viewed through the lens of connections rather than that of distinctions. Open-systems strategies are based on the premise that living organisms and their interactions are ultimately linked at all levels, and not finally subject to the dualisms and divisions that we so often layer upon our perceptions of reality.[10] Most disciplines define boundaries by exclusion rather than inclusion, setting up polarities between one information set and another. Open systems promote an intellectual holism that invites points of congruence in place of separation.

For many of us, a nonfamiliarity with such open systems may lead to images of positive thinking and group affirmation, as if this were simply a matter of respect or concern for the other. This is not the case. An open systems process builds on the foundation that all information networks are ultimately interconnected. Centuries of linear investigations, especially in the physical sciences, have acclimated us to strategies of discovering particularities in their uniqueness, rather than to processes of interconnectedness. However, it must be emphasized that this is not a naïve holism either.

Perhaps the evolving history of the medical model of health can provide us with a practical exemplar. In preempirical cultures, the health of the human person is frequently viewed through a lens that emphasizes the well-being of the entire organism, spiritually, psychologically, and somatically. However, the lack of clinical exactness in diagnosis prevents addressing a discrete condition, such as a liver disorder, or an aortic blockage. With the growth of a highly technical medical process, it is quite natural (and certainly the experience of Western medicine in the first seventy-five years of the twentieth century) to focus on a restricted area of diagnostic analysis, to the neglect of the patient as a whole human being. In the last quarter century, the realization that all aspects of the individual (psychic, somatic, social, and ecological) are integrally linked in the optimization of health (or of healing), has begun moving the health professions steadily toward a more open systems approach to diagnosis, prognosis, and treatment protocols. This is one indicator of the ways in which highly linear disciplines can be adapted to a more nonlinear, interconnected mode of operating.

In the theological arena, nonlinear and open systems offer us a context for realizing synergistic links between our data, our methods, and our modes of communicating, as well as for forging the points of connection to other fields of inquiry. Closed system strategies have long impacted traditional academic enterprises, with various dualisms, hierarchies of authority, the cult of expertise, etc. A closed system relies upon reifications to establish artificial boundaries and distinctions, employing strategies of control, classification, and subordination to maintain a temporary sense of equilibrium in a location of imbalance. Within an

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[10]For a concise and enlightening exploration of the complex systems structure of human thought, genetic coding, and feedback networks, see John Briggs and F. David Peat, *Turbulent Mirror* (New York: Harper & Row, 1989): 153-80.

open systems model, the ideal is to realize a maximum interconnection of all information, and to minimize the exclusion of any parties. From such a vantage, discovery is enhanced, and systemic politics is diminished.

Those shaped in the Academy during the last 50 years can readily attest to the community pressures directing one to an ever-tighter disciplinary focus as part of initiation into the "guild." Work across disciplines was viewed with suspicion in many circles as a sort of dabbling that diluted concentration on the primary work of the field. The move toward new, interdisciplinary endeavors during the last decade or so indicates a growing dissatisfaction among certain scholars with the exclusive linearity of an earlier model. However, there is still much work remaining if we are seeking to migrate to open systems strategies in our academic enterprises. The connections implicit within complex data systems and networks may provide us with fruitful analogies in our future efforts.

THE METHODS OF CYBER-THEOLOGY

Having investigated the implications of various cognitive and nonlinear models for theological thought and methods, we can briefly focus our attention on a global medium for change—the cosmos of computer and information technologies. Although the computer as a machine operates on a limited, sequential, and quantifiable pattern of information bytes, its ability to aid in synthesizing and disseminating information positions it powerfully in a time of systemic transition, not only in the enhancement of knowledge, but the transformation of learning. As a communication tool, the computer permits us to aggregate text, image, sound, and video within a single context, vastly expanding the cognitive impact of whatever materials are presented. This potential offers a wealth of opportunity to every academic enterprise, including theology, to integrate multiple layers of information.

We have only begun to explore the potentials of visual and sonic media within the world of cyber-communication and learning. Since the advent of information broadcasting (radio, television, film), we have tended to see discrete media as accessories to verbal/linguistic processes in learning or in academic projects. That an aggregate of media connections (both aural and visual) could be employed all at once is a new prospect, and certainly more than a purely environmental one. This is not a "spoonful of sugar" initiative, intended to lure a generation of TV-hypnotized minds into the intricacies of linear logic. This is a new paradigm for *acquiring* and *assimilating* information. The world of virtual reality simulations, for example, is not a comic-book version of the "real thing"—be it physics or political science—but an integrated information matrix that allows individuals to receive and locate material in a more integral cognitive framework.

Recent developments in computer processing have begun to push the envelope of machine "intelligence." Once machines could only mimic the linear, logical aspects of human thought (the first area where a computer could compete

on a global scale with an expert in a noncomputational exercise was in chess). It is a telling feature of our cognitive makeup that the elements of symbolic association, imagination, intuitive insight—the qualities we most readily neglect in our empirical ambitions as thinkers—are the ones most distinctly human, and the ones most difficult to emulate mechanically. As those within the theological disciplines explore future possibilities for method, a deep inspection of such elements might be in order. Computer capacity will urge us in that direction, as the erstwhile tool begins to approximate the complex reality that is a human colleague. How odd it is that we often cherish those abilities in our intellectual companions, that are most akin to generic mechanical functions—data manipulation, linear logic, etc., while neglecting those inherent aptitudes that truly humanize us.

Computer simulations first pointed contemporary mathematicians and physicists in the direction of nonlinear dynamics, chaos theory, fractal imagery, and other post-Newtonian discoveries about the unpredictable ways of the natural order. Theology in the twenty-first century may well glean helpful metaphors, and even unique approaches to method, by giving more attention to such discoveries. It may be more than a bit ironic that theological reflection, which gleaned its historical foundations from the experience of divine interaction with the mundane, may have to look to other intellectual resources to rekindle the wonder of divine initiative at work beneath the surface of our experience as thinkers.

CONCLUSION

The five preceding information vignettes provide us with glimpses of the new horizons awaiting theology as an academic discipline in the coming decades. As we progressively refine and develop the means by which we acquire, assimilate, and apply information, we shall be called upon to reimage some of the foundational ways in which we design our disciplinary criteria and projects, uncovering a new apologetic for theological study and reflection. With the gradual eclipsing of texted artifacts as the predominant tools of analysis and communication, we shall uncover more of the potentials of complex media for articulating our theological insights and intentions in more elaborate and comprehensive iconic frames. With ever greater attention being paid to the effective and accurate transmission of information, it will be incumbent upon us to maximize the efficacy of our "media." Simply put, our methodological strategies will require enhanced attention to the cognitive impacts of what we say, and how we say it. Clarity of epistemological design will no longer suffice. With a geometric increase in the quantity of data resources, we can rely less and less on an intellectual process of distinctions or exclusions, and must create a new, open systems dynamic for linking information, a dynamic that relies upon connectivity and feedback to promote insight and discovery. All these emerging horizons of

human thinking and knowing will self-direct and self-correct in consort with the evolving universe of information and media technologies.

In sum, the new cosmos of technologies (computers, multimedia, telecommunications networks, etc) will become infused into our learning process, and will call us forward into a compellingly new world of resources and perceptions. This next step in the evolution of consciousness and intelligence will afford us opportunities to move beyond the linear strategies of our traditions, and to redefine the iconic boundaries of our expression, boundaries so long defined by the impact of the Gutenberg Hologram. The decision to view the systemic and cognitive changes of the new millennium as Creation or as Armageddon resides with us. We cannot know what the odds are for our ultimate success, and there certainly are no guarantees, but the potential should prove well worth the gamble of a lifetime.

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