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SYNTHESIZING DIVERSITY AND PLURALISM IN INFORMATION SYSTEMS: FORGING A UNIQUE DISCIPLINARY SUBJECT MATTER FOR THE INFORMATION SYSTEMS FIELD

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ABSTRACT

The issues of diversity, pluralism and the subject matter of the information systems (IS) field are critically analyzed using the philosophical works of Michel Foucault and studies in disciplinarity. This essay argues for the IS field to forge its own unique disciplinary subject matter by synthesizing the diverse discourses of its "reference disciplines" and not by merely drawing from them. Using examples of other established disciplines with equally multidisciplinary origins, this paper analyzes the history of the IS field to uncover the field's subject matter. The proposed subject matter maintains the IS field's richness and diversity without losing its unique identity.

Keywords: philosophy of information systems, diversity, monism, pluralism, IS discipline, IS theory, disciplinary subject matter, discourse analysis and Foucault

INTRODUCTION

The diverse nature of the IS field has been a source of great concern [Benbasat and Weber, 1996, Benbasat and Zmud, 2003, Gray, 2003, Hirschheim and Klein, 2003, Markus, 1999]. Many authors view diversity and pluralism in the field as a necessary precursor to progress. Others consider diversity and pluralism as threats to the field's continuing efforts towards maturity. We proceed by arguing, using Michel Foucault's works and other contemporary studies of disciplinarity, that diversity is inherently a disciplinary characteristic. However, this diversity is bounded by a formation—its subject matter—that distinguishes each field from another. Using Foucault's "archeological analysis" on more than 40 years of the field's history, we uncover the IS field's unique disciplinary subject matter. This unique disciplinary subject matter is consolidated, not by merely drawing from the field's "reference disciplines" but by forging a cogent synthesis of their discourses. The successful synthesis of these diverse discourses creates a new domain belonging to the IS discourse. In this way, we propose that the IS field emulate other established disciplines that continue to be rich and diverse, yet distinct, by staying within their unique disciplinary subject matter. Based on this analysis, we infer several implications for consolidating the IS field.

I. OH DIVERSITY! WHAT ART THOU?

Since Benbasat and Weber [1996] highlighted the need to better understand how diversity impacts the IS field, the issue continues to trouble the field. The numerous responses [Gray, 2003] to Benbasat and Zmud's [2003] proposed framework for a single "core" reflect the divide that exists between those calling for a distinctive character for the IS field and those calling for diversity and pluralism. Diversity colors every aspect of the IS field including its philosophical approaches, its research questions, its research methods, and its concepts and theories [Benbasat and Weber, 1996].

IS has been described as the intersection of as many as three to six different fields of knowledge [Culnan, 1986, Davis and Olson, 1985, Galliers, 2003]. In part, because of the diversity of its "reference disciplines," IS authors have historically depended on these different disciplines—with their diverse theoretical foundations, methodologies, and exemplars of good research—to forge a legitimate foundation for the IS field [Benbasat and Weber, 1996]. How far these reference disciplines have helped legitimized the IS field is in dispute. Benbasat and Weber [1996] posit that IS researchers use diversity as a crutch to avoid doing the more difficult task of identifying and building their own theories about IS phenomena that makes the field unique. At the very least, diversity has distracted the members of the IS field from their main activity of articulating the field's core. In their opinion, this is the reason why most of the current disputes in IS research are methodological (e.g., the debate between quantitative versus qualitative, positivistic versus interpretive) rather than theoretical. In a follow-up article, Benbasat and Zmud [2003] propose consolidating the field by defining a central character, or "core" topics of research. Specifically, they propose defining the field around IT and its nomological net. Doing so, in their opinion, will provide answers to questions such as, "What is the nature of the specific expertise held by IS scholars that distinguishes our e-commerce research from that undertaken by scholars from other disciplines?" (p. 190).

On the other side of the divide, diversity is considered a source of strength and even a pre-requisite for progress. Robey [1996] admits that diversity can be a threat, but contends that it protects the field from the tyranny of its elites, and creates a connection between IS and other fields. As a solution, Robey [1996], and Landry and Banville [1992], recommend a disciplined approach that entails subjecting the diverse philosophies, theories and methods available from any reference discipline to the research goals. By doing so, the three research triads of aims, theories and methods are coherently maintained. Galliers [2003] emphasizes the need for a trans-disciplinary approach to IS, one that is not limited to only technological or organizational issues. Alter [2003] argues that the "IT artifact" as a core as suggested by Benbasat and Zmud [2003] is too problematic, and focusing on it will risk excluding critical topics from IS research. Instead of a theoretical core, Lyytinen and King [2004] visualize a core consisting of a "market of ideas" with salient issues, strong results, and a flexible disciplinary structure concerning the application of IT. Other authors conclude that IS should *not* have a core [Myers, 2003, 2004] because the field is not ready to achieve a consensus on a set of core concepts.

Despite this divide, both sides agree on the need for the field to have a strong cumulative tradition, increased recognition, greater legitimacy, and overall cogency. In the spirit of these goals, we argue that when the issues of diversity are scrutinized at the proper levels of analysis, the divide between the need for a "core" and the need for diversity is neither necessary nor useful. We show that it is inherent in the disciplinary nature of any field of study, including IS, to have a "core" but at the same time be open to diversity. This conclusion is drawn from the works of post-modernist philosopher Michel Foucault that describe the critical distinction hinted at by Benbasat and Weber [1996] between (1) the core of the field, and (2) the body of knowledge of the IS field: "The former must give IS its distinctive character…the latter is what we need to become competent IS practitioners" (p. 398).

II. THE DISCOURSE AND THE DISCIPLINARY SUBJECT MATTER OF ACADEMIC FIELDS

Michel Foucault, the philosopher better known for his theories concerning power and the relation between power and knowledge, spent most of his early career analyzing the human sciences. He formulated principles for the methodological analysis of disciplines based on his study of psychiatry (*Madness and Civilization, 1961*), medicine (*The Birth of the Clinic, 1963*), philology, life sciences and economics (*The Order of Things: the Archeology of the Human Sciences, 1965*). These principles are summarized in the *Archeology of Knowledge,* his seminal work that deconstructs the historical development of disciplines and uncovers their ontological and epistemological assumptions. This method of analysis enables a researcher to view any discipline from a higher level, disentangled from its inner complexity. Foucault's [1972] version of discourse analysis, *the archeological method*, is designed to "uncover the principles and consequences of an autochthonous transformation that is taking place in the field of historical knowledge" (p. 15).

Analyzing the Nature and Creation of Knowledge

Because knowledge cannot be expected to explain how it itself came to be discovered, a study of the rules and culture of knowledge becomes necessary. Foucault's version of this philosophy is called the "archeology of knowledge," an historical "dig of sorts" of the nature and creation of knowledge.

Foucault's archeological analysis of knowledge uncovers how disciplines define their "objects" of study based on the conditions and rules that make them possible. An object of study for a discipline can be defined as a perceptible unit of study. Often, these objects are organized in a more abstract unit of study called a "concept." So, lungs and alveoli (air sacs) are *objects* studied in biology. These objects are organized within the *concept* of respiration, which relates such objects in various biological statements. These statements describing objects and concepts are manipulated to form what Foucault uniquely defines as "discourse."

Discourses form the basis for the emergence of a new discipline and work to establish or undermine that discipline. As Foucault [1972] explains, discourses are:

> …that on the basis of which coherent (or incoherent) propositions are built up, more or less exact descriptions developed, verifications carried out, [and] theories deployed. They form the precondition of what is later revealed and which later functions as an item of knowledge or an illusion, an accepted truth or an exposed error (p. 182).

The Formation of Discourses

Everything with the same name may not be the same thing and something considered different may be so from force of habit. In order to uncover the foundations of how knowledge emerges, Foucault first suspended the notion that knowledge is directly related to any author's works (books or writings). The same author may write on different topics, and the same topic may be discussed by different authors in many different works. Foucault came to the conclusion that something else was holding all of these discourses together as they evolved into independent areas of study.

These discourses are formed because the external sociological conditions of that specific time and place create a set of *rules* that governs the formation of "statements" concerning the objects and concepts of study. These rules of formation or "discursive formations" establish various relations and "enunciative functions" that operate within the statements belonging to that discourse (see Figure 1). As a result of the operation of these enunciative functions within a particular domain, the statements formed become part of a specific discourse (e.g., economic, biological, or psychological discourse).

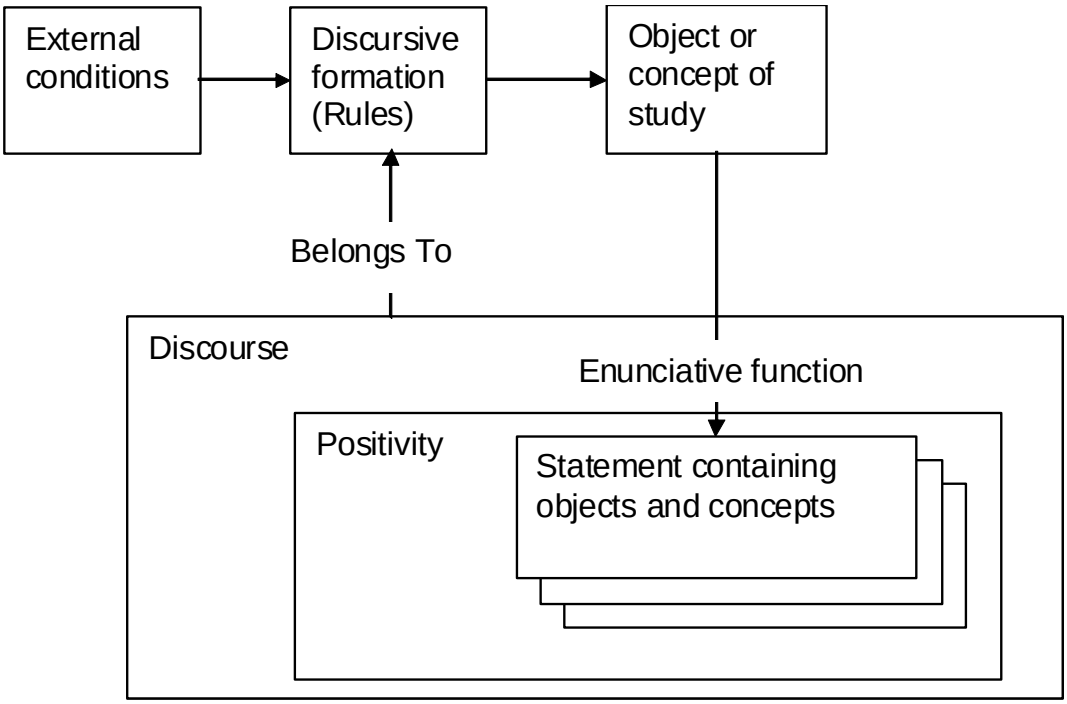


Figure 1: Foucault's Formation of Discourse

The Statement and Its Enunciative Function

In order to define this "discursive formation," Foucault stressed that statements operate beyond their linguistic functions and carry additional "enunciative functions" that relate these statements to a specific domain of knowledge. The statement "The streets of Rome are paved with gold!" carries more implications than what is written.

An example of this transformation of knowledge is seen in the development of Natural History, a "reference discipline" to biology. Before Natural History, the study of living beings based on folklore and legend dominated pre-scientific medieval discourse. Scholars John Ray [1682] and Linnaeus [1737], the father of botany, freed the study of living beings from these medieval rules. These scholars made possible the new rules of *classification* that gave birth to the field of Natural History. John Ray [1682] was the first to divide the vegetable kingdom into monocotyledons and dicotyledons based on these rules of classification. Such a rule distinguishes Natural History from the early medieval discourse of living beings that depended on the rules of genus and species [Foucault, 1970]. This method of characterization later led to Linnaeus's ingenious naming system referred to today as an organism's "scientific name." Using such rules of formation, Linnaeus formulated numerous statements about plants in his classic work *Genera Plantarum.* These rules operate using enunciative functions such as those which classify plants based on the structure, form and arrangements of their flower petals.

As shown in Figure 1, a unique discourse is formed in so far as the groups of statements that constitute it belong to the same discursive formation. In the case of Natural History, this discursive formation is the rule of classification based on visible properties and functions. Any statement that operates according to this discursive formation is said to belong to the discourse of Natural History, and not any other discourse.

Obeying the Rules of Discourse

What was holding together the area of study in its independent space was not the author or the text, but a dynamic and unconscious formation that set up rules defining the objects of study. These rules of formation developed as scholars engaged in discourses about something they together recognized and valued. Discourses obeyed these rules as they evolved into independent areas of study.

The term "discourse" should not be confused with the terms "academic field" or "discipline." A discourse emerges before an academic field is established, and may exist in many different fields and disciplines. For example, psychiatric discourse can be found in medical disciplines as well as in popular literature, legal, philosophical and political disciplines. The division of the penal code based on mental deviance (as when someone is declared not guilty by reason of insanity) demonstrates the use of psychiatric discourse within the legal discipline. Each discourse has a form that enables scholars from one discipline to say that they are talking about "the same thing" or "at the same level" or "applying the same principles" with scholars from other disciplines. Hence, although Natural History as represented by Linnaeus [1737] and biology as represented by Cuvier [1800-1805] are two different discourses that emerged in different centuries, it is possible to link these two discourses using their characteristics, or what Foucault calls their "positivity" (Figure 1).

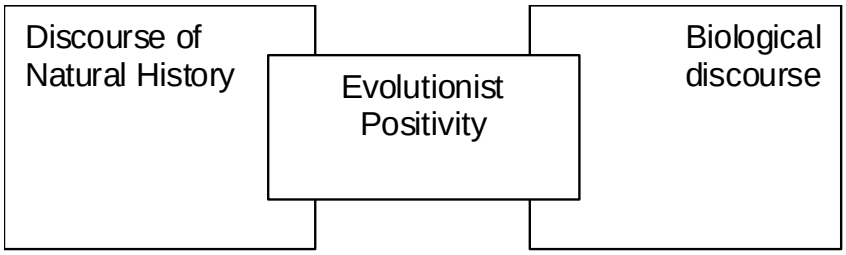


Figure 2: Common Positivity

The positivity defines an associated domain where identities, concepts, and polemical translations take place (Figure 2). Foucault's archeological analysis traces the origins of the evolutionist positivity made famous by Darwin [1859] back to similar positivities proposed by early biologists such as Diderot [1713-1784/1964] and Lamarck [1809/1960].

A Tale of Two Different Positivities

Georges Cuvier was the original paleontologist who developed the concept of "organism" and "extinction" in the early 18th century. Unlike his predecessors who studied living beings based on visible characteristics, Cuvier saw each animal's organs and functions as integrated into a whole organism, regardless of their visible shapes. These concepts became foundations for early "vitalist" positivity in biology. At about the same time, Diderot and Lamarck introduced the concept of evolution. Unlike vitalistic positivity that relied on an internal "force," evolutionistic positivity suggested that animal morphology may be modified by the external environment.

The usefulness of archeological analysis of discipline formation lies in its ability to determine the principle according to which certain enunciations will appear and not others, how certain contradictions within the discourse create derivations of that discourse, or how other contradictions create new discourses, while at the same time manipulating the same objects of study. An example can be seen in biological discourse. Both the creationist and evolutionary theory in biology abide by the same rules of formation that biology is based on—rules of organic structure in life. Both theories analyze the same objects of study, organs, and their related

functions. The difference lies in how each theory manipulates the same objects to create new relations and statements. Each theory operates different enunciative functions resulting in different positivities within the same biological discourse. With this level of analysis, it is possible to uncover the regularities that link different branches of knowledge. For example, Herbert Spencer [1897] drew from biological discourse to theorize the existence of organic structures within the social sciences. In this way, he was able to adapt the evolutionary positivity from biological discourse to formulate his own social evolutionary theory.

Adapting Positivities

Herbert Spencer borrowed the concept of organism from biology and "statics" from physics to explain society. He was responsible for popularizing Darwin's notion (positivity) of evolution into other areas of knowledge. Spencer coined the phrase "survival of the fittest." He applied the numerous functions operating in other disciplines ("enunciative functions") to sociological terms to explain sociological phenomena.

Foucault's framework can be used to explain Benbasat and Weber's [1996] distinction between the *core* of the field (the *discursive formation*) and the *body of knowledge* of IS. For instance, in the field of economics, academic discourse became possible due in part to the early practices of merchants in the 16th century, various governmental economic policies instituted to control the flow of coinage and the practices of mercantilism. These practices took over a period of 100 years and culminated in the writings of political economists in the 18th century [Steuart, 1767] and later in the economic classics of Adam Smith [1776]. These sociological processes gave rise to certain *rules of formation* or the *discursive formation* for economics. Although the discursive formation shapes its content—its objects, concepts and theories—the rules are distinct from its content. Therefore, it is possible to create *different* and *contradictory* objects, concepts, and theories from the same discursive formation.

The different and sometimes contradictory concepts studied in economics—coinage and money, and later, trade, mercantilism, exchange, circulation, value, income, and interest—characterized the dispersion and diversity of early economic thought. This dispersion and diversity of economic knowledge was further widened by new positivities developed by Smith [1776] and Ricardo [1817] who theorized new relationships between labor, production and wealth. At each stage of its history, economics focused on different objects, and gave birth to different concepts and theories, but remained a single cogent discipline with the same *discursive formation,* surrounding the rules governing human needs, wants and how they are satisfied.

Diversity of Content vs. Stability of Discursive Formation

Adam Smith explained economic prosperity using the concept of division of labor. Based on this same notion, Ricardo invented new theories of "diminishing returns" and "comparative advantage." However, Ricardo did not attribute value and economic growth to the distribution of income as Smith suggested. Instead, he explained them using labor productivity. All of these terms refer to the same economic objects but are manipulated in different ways.

This diversity in internal content occurs in all disciplines, the natural and social sciences, and the arts. Regardless of their diversity, the statements containing these groups of (1) objects, (2) concepts and (3) theories belong to certain discourses because they either originated from or were formulated within that discourse. For example, in the natural sciences such as physics, one group of physicists explains the behavior of light using objects called "corpuscles." Another group of physicists uses "waves." Statements in physics explaining the behavior of corpuscles and waves belong to the discourse of physics. On the other hand, statements that explain the behavior of "corpuscles" in biology belong to the discourse of biology. Similarly, statements concerning oceanic "waves" belong to oceanography. The same terms are used by both disciplines but each has its own unique *enunciative function*. In the social science discipline of

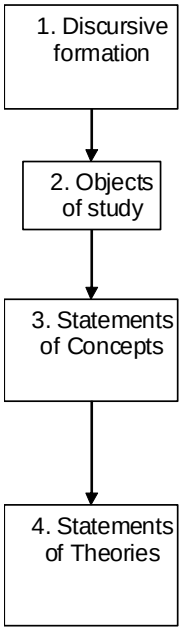
psychology, concepts of perception and consciousness are formulated to describe different objects such as memory, attitudes and behaviors. These different objects and concepts eventually become part of psychological theories when they pass rigorous tests provided by the discipline.

Figure 3 describes how three established discourses—biology, psychology and economics—forge their internal content based on each unique discursive formation.

The Constituents of Historical Knowledge

Sociological processes create the possibility for the creation of knowledge. As the discourse matures, theories are invented. Scholars in all fields work towards establishing theories that explain or predict the phenomena they are studying. Only when their theories are recognized by the scholars in their fields as well as by scholars in other fields, will they truly contribute to the historical development of knowledge.

As shown in Figure 3, the discursive formation of the discourse—the rules that govern its formation—make possible its objects of study. The rules that govern the study of organic structures make possible the study of objects such as cells, chromosomes, organs, and their forms and functions. These objects are in turn manipulated in statements that discuss respiration, photosynthesis and other biological concepts. These statements form part of many biological theories, such as vitalist theories and evolutionary theories.



Example Discourses

Biology	Psychology	Economics
Rules governing life's organic structure	Rules governing the representations of the mind	Rules concerning human needs, wants and how they are satisfied
Cells, chromosomes, organs, form and functions	Human mental processes, behavior and attitudes	Forms of labor, capital and production, money and prices
Respiration, photosynthesis, reproduction, and nutrition	Perception, consciousness, memory, learning and personality	Supply and demand, savings, investment, expenditure, circulation of money, multiplier, and unemployment
Cell theory Vitalist Theory Evolutionary Theory Theory of heredity	Cognitive dissonance theory Cognitive load theory Gestalt theory Operant conditioning Constructivist theory	Theory of diminishing returns and comparative advantage Keynesian theory Monetary theory Marxian theories

Figure 3: Hierarchy of Elements in Discourse

Similarly, the rules that govern the various representations of the human mind in psychological *discourse* make possible the study of non-tangible objects such as human mental processes, human behavior, and attitudes. These objects are deployed to describe psychological concepts such as perception, consciousness, memory, learning, and personality. These psychological concepts are in turn manipulated by statements that form part of many psychological theories such as cognitive dissonance theory, gestalt theory, and operant conditioning theory.

This analysis does not assume that theories are required before a discourse can emerge. Many discourses produce incoherent statements and concepts that fail to culminate into theories. Psychoanalysis is an example of such a discourse [Popper, 1963]. According to Foucault [1972], the existence of cogent theories signals that subgroups of statements within the discourse have reached a certain level of coherence, rigor, and stability. Before coherent theories are established, Foucault calls these less coherent theories "themes" that fields of studies use to manipulate their objects and concepts. Regardless of the level of coherency of the discourse, *it is the core of that discourse, its discursive formation that generates themes or theories, not the reverse*.

If each discourse possesses its own set of objects of study, how then are original objects, concepts, and theories formulated? According to Foucault, discourses can invent new objects, concepts, and theories; but they often use the positivities of other discourses to forge their own. A discourse may use exactly the same terms as that used by an earlier discourse to describe the same object of study. But as long as they are enunciatively different, they can be considered original and will contribute to the stock of knowledge of the "borrowing" field. For instance, the concept of the "organic structure" in social psychology [Spencer, 1897] is borrowed from biology [Cuvier, 1800-1805], but redefined in the context of social psychology and management [Burns and Stalker, 1961].

The Question of Originality

Scholars sometimes use analogies from other areas of study to label phenomena within their fields. In the management discipline, Burns and Stalker used analogies from physics (mechanistic) and biology (organic) to describe organizational practices that lead to innovation.

In economics, classical theories use money, prices, and labor in concepts such as supply and demand, savings, investment, and the circulation of money. These same objects and concepts are reused by Keynesian theorists to contradict classical theorists by redefining their relationships to create *new Keynesian concepts* such as the "multiplier effect."

One intuitive way of viewing the discursive formation of a discipline is to view it as the discipline's *subject matter*. Objects of study, concepts and statements, and even theories are often shared among different disciplines. For example, certain concepts and theories in psychology are widely used in the field of economics and management. What is *not* shared is its discursive formation or its *disciplinary subject matter*. Each unique disciplinary subject matter implies the use of specific rules of formation and their associated enunciative functions operating within the statements representing the discipline. The disciplinary subject matter reflects the sociological processes and conditions of possibility of the field and distinguishes one field from another. The disciplinary subject matter of biology—the rules surrounding life's organic structures—distinguishes it from psychology, even though both fields may study the same objects such as the human brain and associated neuro-motor organs. The same distinction can be made between the fields of computer science and IS. Both study similar objects such as computers, but they do so with different enunciative functions because they are formed from different discursive formations, each with a different disciplinary subject matter.

Disciplinary Subject Matter and Essential Activity

Each discipline performs a unique function in transforming historical knowledge. This function is the "essential activity" which is inextricably tied to the essence of that discipline (its disciplinary subject matter). In this way, members of that discipline will recognize who they are professionally and what role they play in the universe of inquiry; more importantly, they are recognized by others.

Another way of viewing the distinction between the core of the field and its internal content is by inspecting the "essential activity" of each field. The essential activity represents the core of the field, while the internal content is the substance manipulated by that activity. The essential activity of Natural History is to classify plants and animals based on the form and function of their visible characters, because this is the discursive formation of the field. This activity is distinguished from the essential activity of biology, which is to link the different organs of living beings to organic similarities regardless of their visible form. In language studies, researchers may perform different activities depending on whether they "psychologize" or "sociologize" a piece of literature. In other words, it is possible to analyze the same piece of literature in different ways depending on which model, the psychological or sociological model, is superimposed on the text. The distinction between IS and computer science can also be analyzed based on the essential activity of each field. The objectives or missions of the professional organizations of each field reflect the essential activity the field is performing. The Association of Computing Machinery, which represents the computer science field, has the following objectives:

> ...advance the sciences and arts of information processing...the study, design, development, construction, and application of modern machinery, computing techniques and appropriate languages for general information processing, for scientific computation, for the recognition, storage, retrieval, and processing of data of all kinds, and for the automatic control and simulation of processes [Revens, 1972, p. 486]

Computer science is therefore concerned primarily with the processing of symbols on modern computers. The mission of the Association for Information Systems, on the other hand, is:

> To advance knowledge in the use of information technology to improve organizational performance and individual quality of work life [Monod, 2001].

As with the computer science field, the IS field is also concerned with modern computers, but the IS field is focused on the improvement of the human condition, not the technology per se.

If this analysis of the discursive formation of academic fields and their internal contents is correct, diversity is therefore not an issue to the progress of an academic field. Assuming a unique IS discourse exists, IS researchers are free to study any object, formulate any concept, and invent any theory; and at the same time, draw from any other discipline, so long as they do so within the same unique set of rules that define the field. As Foucault [1972] emphasizes, a discursive formation is synthesized if "one can show how any particular object of discourse finds in it, its place and law of emergence; if one can show that it may give birth simultaneously to mutually exclusive objects, without having to modify itself" (p. 44).

III. DOES THE IS FIELD HAVE A DISCIPLINARY SUBJECT MATTER?

The first formal degree program in IS was established in 1968 at the University of Minnesota. That means, objects of IS discourse, assuming such a unique discourse exist, are nearly forty years old. What is the nature of this discourse? Is it really unique to IS, or is the field made up of different discourses, each manipulating its own object of study within a fragmented effort among scholars of different disciplines? The critical question here is, **"Does the IS field have a disciplinary subject matter?"** Foucault's archeological analysis provides a set of criteria for

identifying the emergence of a new discourse. *A discourse emerges, or a disciplinary subject matter is put into operation when the system of its formation has achieved autonomy, becomes distinct, and reaches its "threshold of positivity."* The "positivity" defined here by Foucault is represented by a fragmented constellation of statements that has its own foundation to stand on. This "positivity" describes the type of discourse taking place that has taken a clear, valuable and objective identity.

One test for the existence of a new positivity is when an object of study or a subject matter cannot be handled by contemporary research. If the things and notions appearing are new objects and concepts, and these objects and concepts cannot be grasped by contemporary research, the statements and the concepts contained in them may signal the birth of a new discourse. This sudden emergence took place when Darwin made famous the evolutionary positivity within the discipline of biology. It emerged because contemporary vitalist research was unable to address its new objects and concepts. This level of acceptance for evolution was not achieved when it was first introduced earlier by Diderot [1713-1784/1964] or Lamarck [1809/1960] because it lacked the level of coherency that Darwin demonstrated.

The Signs of a New Discourse

The answers to two questions signal the possible emergence of a unique discourse: (1) Are the things, activities, behaviors, roles and notions appearing in the statements newly created objects and concepts? (2) Can these new objects and concepts be handled by contemporary research?

Documentary evidence from the early development of computers suggests that IS emerged as a unique discourse well before the generally agreed birth period of the IS field in the 1960s. At about the same time that the discipline of computer science was emerging, statements outside the discourse of computer science began to appear. Statements comparing the computer with the human brain and human mental capabilities[1]; discussing the impact of the computer on labor and industry[2]; and suggesting different behaviors in relation to new machine applications[3], were appearing in the popular media. These statements were not governed by the discursive formation of computer science, nor did they reach Foucault's "threshold of positivity" for a new discourse. For example, the following were statements made after the implementation of the first mainframe computer at General Electric (GE) in January 1954.

> Our investigations have shown that a high-speed digital computer can be operated on even less than a single-shift basis and still return substantial net savings to the user . . . we figured on reaching the break-even point when the computer is used only two hours a day. And in computing the break-even point, savings were only evaluated in terms of salaries, space rentals and equipment depreciation applicable to those clerical jobs

[1] "Inside the Biggest Man-Made Brain: Navy's New Calculator Has Steel Bones, Silver Nerves, Paper Impulses, and Can Make Mistakes." *Popular Science Monthly*, Volume 150: No. 5 -May 1947 (pp. 95-100); "Computers Beat Brain: New Electronic Devices Said to be 100,000 Times Faster." *New York Times*, Friday, 31 January 1947 (page C5).

[2] "Two Year's Work in Five Minutes: That's What BINAC Can Do! The Story of this Newest Electronic 'Brain' is a Report on the Progress of Philadelphia's Newest Industry." *Philadelphia Magazine,* (October, 1949); "2150 A.D. Preview of the Robot Age: Machines That Think And Do the Hard Work Will Free Men to Develop their Real Talents", *New York Times Magazine*, Sunday, 19 November 1950 (pp. 19, 68f).

[3] "Why Study When Machine Knows All The Answers? Ivy Oratory Says Mechanical Brain Solves Conant's Income Tax And Makes Salads", *Boston Daily Globe*, Wednesday, 4 June 1947; "UNIVAC Beats Statisticians on Election Night" *Systems Magazine*, December, 1952.

> eliminated in four limited routine applications. No value was given to such intangibles as more prompt reporting, the ability of management to make more informed decisions quicker, and reduced investment in inventory [Osborn, 1954, p. 100].

It is clear that concepts such as net savings, break-even point, job elimination, routine applications, intangibles, and informed decisions are not the domain of computer science. They obviously originate from within the domain of management and accounting. The question is, "Do these statements represent the emergence of a unique discourse? The answers lie with two questions that test the possible emergence of a discourse: (1) Are the things, activities, behaviors, roles, and notions mentioned in the discourse newly created objects? (2) Can these new objects be handled by contemporary fields of scientific research? Enunciative functions distinct from those operating behind management or accounting are operating behind the statements manipulating these objects. In the same way that new biological concepts were created after the invention of the microscope [Foucault, 1972], new IS objects are created after the invention of the computer. For example, accounting ledgers became "master files," and accounting entries became "transaction data" or "source documents." Accounting ledgers became "listings of transaction records sorted by date," and financial statements became "computerized reports." Objects of study like "master files" imply a different set of possibilities as compared to accounting ledgers or file folders. These new IS objects become part of the new IS statements that form the new IS discourse. A new language begins to emerge. Table 1 describes several typical IS statements that characterized this new discourse in 1954 [Osborn, 1954].

Table 1: IS Statements in 1954

Concepts	Statements
Overcoming resistance	"Selling" computer applications involve: (1) Offering initial applications to all management functions, (2) Explaining how computers can affect clerical savings, (3) Orienting all management in computer operation and its possible use as a management tool, (4) Stimulating and encouraging bold thinking in terms of determining what additional information executives would like to have to assist them in operating their business more effectively, (5) Weaving the initial and subsequent pieces into an integrated management control system (p. 101).
Applications planning	One of the most important concepts in our business-computer philosophy is this "limited parameter" approach – getting down to brass tacks by concentrating on the smallest possible areas in which savings can be equated to computer cost, and selecting those areas having substantial amounts of clerical and routine effort (p. 103).
Garnering cooperation	Use the concept of a data processing center (p.107). The data processing center . . . allows management to forget the problems of computer operations and spend more time on decision making and policy forming matters. The limited parameter approach….encourages cooperation. Orientation meetings … educational sessions . . . inspire confidence and cooperation. Establish a liaison committee in each conversion area…to approve all aspects of computer processing in its area (pp. 106-107).

These practitioner statements espouse no theory and appear to have little academic value. Nonetheless, a new discourse has begun, in the same way that the discourse of political economy began in the 17th century. During that period practitioner statements involving money, value, prices, and exchange became popular before texts on political economy were written. In the IS field, these statements are generated by an autonomous discursive formation largely independent of the changes in other related disciplines such as management or computer

science. Archeologically, the documentary evidence suggests that IS discourse emerged in the late 1940s, at about the same time computer science emerged.

The IS objects and concepts created by this new discursive formation were not addressed satisfactorily by management, computer science, or any other contemporary field of scientific research. Novel questions on computer "operations" and "use" were being asked in different scholarly articles, and books were being written to answer questions that fell outside both these disciplines [Canning, 1956, Kozmetzky and Kircher, 1956, Laubach and Thompson, 1955] : (1) What other possible ways can businesses harness the power of computers? (2) How can organizations persuade their employees to use computers? (3) How should an organization plan the scheduling of applications waiting to be implemented? (4) How should organizations select the equipment needed for each application? (5) How do organizations staff the planning, design, programming, and operation of such systems? (6) How can the necessary cooperation be enlisted from within the organization for the planning, design, and operation of such a system? (7) How can the benefits be evaluated and presented in an understandable form to those paying for it or using it? (8) What characterizes the communication between humans and computing machines? (9) How can IS be designed as mental and cognitive support for its users?

These new objects and concepts were created as a result of a split from within the management discourse concerned with the deployment of the computer. This diffraction formed a new discourse distinct from the discourse of computer science. Unique concepts concerning the practice of computing such as "goals and methods of adoption," "company-wide support for the adoption," and "measuring and monitoring the progress of adoption" become new problems to study. As many authors have suggested, the general purpose computer is different from electronic calculators and industrial machines [Bell, 1973, Higgins and Glickauf, 1954]. The computer is not a special-purpose accounting machine. Instead, this machine is a *general purpose electronic device* capable of an unlimited variety of applications and operations, providing infinite possibilities for at least two new discourses, computer science and IS. Consequently, "industrial automation" in the management discipline operates a different enunciative function from "IT automation." "Information processing" in computer science operates a different enunciative function from "information processing" in IS.

Other evidence that suggests IS has crossed the threshold of positivity are events that took place during the first decade following the invention of the general purpose computer. The years 1957-1958 were significant to IS because of two events: (1) the publication of Leavitt and Whisler's [1958] "Management in the 1980's" and (2) the publication of two periodicals serving the demand of management and staff not necessarily trained in computer science, *Machine Accounting and Data Processing* (later renamed *Data Processing*) and *Research and Engineering: The Magazine of DATAmation* (later renamed *Datamation*). According to Foucault [1972], disciplines are structured by questions and problems that are "self-producing," not just the result of the need to answer isolated questions or to fulfill a current need. As soon as solutions are found and accepted, more questions and problems are generated, so that more work can be produced within that discipline [Shumway, 1994].

Leavitt and Whisler [1958] was significant because it contained exclusively IS statements, proposed new problems and solutions for the nascent field, and demonstrated how a discursive practice could affect non-discursive practices. It provides the first documentary evidence of IS passing the threshold of positivity. It was the first to define the new "intellectual technology" as "information technology." It differentiated "information technology" from "machine technology" of the first industrial revolution, and "social technology" of participative management. It was the first to suggest major sociological, political, and cultural changes to management and organizations. All of this evidence points to the existence of a unique system of formation for a new discourse. The publication of magazines such as *Data Processing* and *Datamation* was significant because the magazines documented many IS *statements,* proposed many new problems for the nascent IS discourse, and established a relationship between the discursive (academic) and non-discursive (non-academic) functions of the discourse.

All of this documentary evidence suggests that IS has indeed crossed the threshold of positivity to become a unique discourse. The problem, however, lies in the nature of this discursive formation. **What, at the disciplinary subject matter level, is the field about?** Both Keen [1987] and Benbasat and Zmud [2003] agree that the nature of the IS field remains amorphous. Drucker once commented to Markus [1999, p. 200-201], "The problem with your field, is that you haven't figured out that it's about *information,* not about technology." Drucker has since conceded that information is not necessarily the only focus of the field and that technology, such as the Internet as a distribution system, plays a major role [Markus, 2005]. Within the IS field, each author has his or her opinion of what the field should be about. Dearden [1964] sees IS as a field concerned with organizational control. Dickson [1968] views IS as a decision-making mechanism. Emery [1973] sees the IS field as the study of adaptable man-machine systems. Ives, et al., [1980] view IS as a study of the information support given to management. Mingers [1995, 1996] agrees with Drucker on the primacy of information and that it should be more closely analyzed and theorized. Keen [1987], and Benbasat and Zmud [2003] propose that the IS field should be about the information technologies as they are created and implemented in social environments. All of these opinions are correct because they highlight objects that should be studied in the field. *But these objects are not the discursive formation that governs their creation*.

What set of rules govern the formation of this new IS discourse? It is not about rules surrounding the representations of the human mind (as in psychology) nor is it about doing work through other people (as in management and competitive strategy). However, in its early years, both psychological discourse and management discourse played major roles in the IS field's development. The answer to this question is *not* any specific theory, because the field's discursive formation—its disciplinary subject matter—is distinct from the many different theories, concepts and objects that it is expected to produce [Foucault, 1972]. According to archeological analysis, rules make up the discursive formation, not objects of study. To uncover these rules, Foucault proposes two methods: (1) examine the theories to reveal the concepts and objects that constitute them, and then identify the discursive formation, or (2) examine the discourse to derive the regularity that governs them. The former is easier because the different levels constituted within the discourse depend on one another. However, in the case of IS, the paucity of theories belonging to the field [King and Lyytinen, 2004, Lyytinen and King, 2004] makes this technique impractical. The latter technique may be more practicable and is applied to the discourse surrounding IS.

A simplified version of the second method is performed using a brief content analysis of the statements that refer to the disciplinary subject matter of IS. A list of these statements is shown in Table 2.

Table 2: Historical and chronological contexts of the subject matter of IS

[Leavitt and Whisler, 1958]	We shall call it *information technology*…One includes techniques for processing large amounts of information rapidly, and it is epitomized by the high-speed computer. A second part centers around the application of statistical and mathematical methods to decision making problems…The third part…consists of the simulation of higher-order thinking through computer programs (p. 41).
[Dearden, 1964]	…the information available to management in these advanced computer control systems would be almost exclusively operational control information (p. 133) … Not only does this excessive concern with automating management information systems direct attention away from more appropriate action for improving management information, but it also directs attention away from more useful computer applications (p. 134).
[Dickson, 1968]	… combines only the information that is pertinent for making decisions…Information from such systems obviously warns when managerial action is necessary and assist in deciding what action to take (p. 19).

[Zani, 1970]	…the major determinants of MIS design and their relationships to one another… These are the factors that should structure the characteristics of information provided to management… (p. 96).
[Kennevan, 1970]	…an organized method of providing past, present, and projection information relating to internal operations and external intelligence. It supports the planning, control, and operational functions of an organization by furnishing uniform information in the proper time-frame to assist the decision-making process (p. 21).
[Emery, 1973]	Part of the organization's on-going activity…based on computer technology… a man-machine system… collection of subsystems…data-base oriented…adaptive to changing needs (pp. 1-2).
[Ives et al., 1980]	A computer-based organizational information system which provides information support for management activities and functions (p. 910).
[Dickson, 1981]	…all informational and decision-making activity associated with operating an organization (p. 4).
[Davis and Olson, 1985]	An integrated, user-machine system for providing information to support operations, management, analysis and decision-making functions in an organization. The system utilizes computer hardware and software; manual procedures; models for analysis, planning, control and decision making; and a database (p. 6).
[Keen, 1987]	…to study the effective design, delivery, use and impact of information technologies in organizations and society. The term 'effective' seems key. Surely the IS community is explicitly concerned with improving the craft of design and the practice of management in the widest sense of both those terms. Similarly, it looks at information technologies in their context of real people in real organizations in a real society (p. 3).
[Keen, 1991]	…ISR can be and should be at the forefront of intellectual debate and investigation about the application of information technology across every aspect of business, government and society and that it has many valuable, original and practical recommendations to offer concerning the effective design, development, implementation, use and impact of IT [information technology] (p. 27).
[Mingers and Stowell, 1997]	…the nature and development of linguistic and social information interchange in so far as it is technologically mediated (p. 7).
[Checkland and Holwell, 1998]	…the orderly provision of data and information within an organization using IT [information technology], that information being relevant to the ever-changing activity of the organization and/or its members (p. 39). …the organizational context in which people create meanings and intentions; this leads to purposeful action… and a form of support (p. 109).
[Alter, 1999]	…a work system whose internal functions are limited to processing information by performing six types of operations: capturing, transmitting, storing, retrieving, manipulating, and displaying information (p. 9).
[Benbasat and Zmud, 2003]	…the IT artifact and its immediate nomological net. We conceptualize the IT artifact … as the application of IT to enable or support some task(s) embedded within a structure(s) that itself is embedded within a context(s) … includes… capabilities… practices… human behaviors… impacts … intimately related to the IT artifact (p. 186).
[Lyytinen and King, 2004]	The real center in the IS field has been and will be constituted through a market of ideas in which scholars (and practitioners) exchange their views regarding the design and management of information and associated technologies in organized human enterprise (p. 236).

Although this list is not exhaustive of all possible conceptualizations of the IS field, it provides a representative feel of what the IS field is about since the 1950s. The results of a simple content

analysis of object-nouns discussed in these conceptions are shown in Table 3. The results show that the term "information" and its derivatives occur 25 times in the nearly 50 years of the history of IS, followed at a distance by "organization" and "system." A more comprehensive set of conceptualizations will most likely produce a similar breakdown of frequencies. The results are consistent with Drucker's comment [Markus, 1999] that information is a "core concern" of IS. However, information is but one of the many "core concerns" or objects that the IS field studies. What needs to be uncovered is the set of rules and regularities that relate all of these objects coherently in a discourse.

Table 3: Most Cited Objects in IS Context

Terms and their derivatives	Frequency
Information	25
Organization	10
System	8
Management	8
Computer	7
Decision/decision making	7
Technology	6
Operations	6
Design	5
Support	5
Function	4
Control	4

Foucault's [1970] archeological analysis provides such a framework. This framework is modeled on three complimentary postulate-pairs of *functions-norms*, *conflicts-rules, and signification-system.* According to this framework, all human sciences are built and linked together within the domain circumscribed by these complimentary postulate-pairs. For example, *functions* are capabilities that humans adapt and evolve to establish average *norms* of performance. At the same time, humans are also in the continuous state of having needs and desires that bring them into *conflict* with other humans. This *conflict* is minimized by establishing a body of *rules*. All of the social actions involving *functions-norms* and *conflicts-rules* are taken via a *system* of meaning or *signification* that humans leave behind. Hence, the science of sociology is "fundamentally a study of man in terms of rules and conflict" (p. 358) and can be interpreted on the basis of functions and systems of significations. Weber's [1947] sociological concepts of *social action* in the light of "verstehen" (subjective understanding), social relationships, legitimacy, order, conflict, power, authority, coordination, and control can all be categorized as either rules or conflict or a combination thereof.

Using the same method, each object listed in Table 3 can be categorized by its fundamental relationship with the postulate-pairs of *functions-norms*, *conflicts-rules, and signification-system* as shown in Table 4. For example, "information" and "decisions" are essentially signs organized in a system (complimentary signification-systems) used, consumed, and ultimately left behind by humans as they set up rules to manage conflict, perform their day-to-day functions, and establish their norms of performance. Information and decisions provide meaning for the performance of such activity. What makes the IS field unique is that the organization of signs take the form of computer-based systems. So, any activity involving a computer-based system that manages conflict, makes decisions, supports the operations, design and control of human action using meaningful signs falls within the domain of IS. Activities that do not involve humans extracting

meaning from the computer-based system or vice-versa as part of human goal of establishing norms of performance are outside the domain of IS.

Table 4: Objects of Study of the IS Field in Relation to the Human Sciences

Signification-System	Information Decisions Technology Computer
Conflicts-Rules	Organization Management
Functions-Norms	Function Decision making Operations Design Support Control

For instance, the activity of budgeting by itself is part of accounting discourse. It can be categorized as a human design and decision-making function geared to resolve conflicts among competing resources. But when that activity is performed by extracting meaning from computer-based signs such as those available within an electronic spreadsheet system, the IS discourse offers additional expertise beyond what the accounting discourse is capable of providing. The critical difference between basic budgeting performed by an accountant and budgeting involving an electronic spreadsheet lies in the additional discourse that would not have been generated if not for the organization or management of the functions in the electronic spreadsheet.

Similarly, Porter [1980] has made a significant contribution to management discourse on strategy and competitive analysis. When McFarlan [1984] and Porter and Millar [1985] introduced the strategic implications of IT, they created a new positivity within management discourse that is shared with the IS field. At about the same time, IS discourse was approaching the same "issue" from the perspective of executives using the personal computer [Rockart and Treacy, 1982]. Both efforts shared the same positivity, and focused on similar statements, objects, and concepts. But it was Rockart [1988] who developed the discourse into an actual product design (the executive support system). Both human activity and computer technology were modified as a result of the meaningful links between the functions of the executives and the computer technology. The discourse on executive support systems extends Porter's discourse on strategic management and would not have been possible without the involvement of the computer-based signifying system.

The difference between such activities and activities in other fields that also involve computer technology lies in the semiotic link between the computer technology and the human element. Tasks performed by computers that do not generate a semiotic link are essentially outside the domain of IS. For example, the discourse surrounding computer technology controlling a jetliner, controlling climate in a "smart" building, and maintaining balance of a moving automobile are not part of the IS domain because they do not involve any links providing meaning to the human

cognitive functions. Instead, they involve "information processing" as enunciated in computer science or other engineering-related disciplines.

The previous discussion provides a preliminary set of rules that can be defined for the IS field. The set of rules that govern IS discourse therefore appear to be those surrounding **the semiotic interrelationships between computer-based signifying systems and the organization and management of human decision making, operations, design, support, and control.** In other words, the rules that govern the IS field surround the relations that carry meaning between humans and computer technology. Computer technologies are viewed as signifying systems or signs that convey meaning because of the unique nature of information, and only when they do so will they fall within the domain of the IS field. It is the representational forms of these interrelationships that are often referred as "information systems." Hence, if biology is the science of life, the IS field is the science of "meaningful interrelationships" with computers.

Three further tests are applied to explore the validity of this disciplinary subject matter: (1) if it can be demonstrated that the disciplinary subject matter remains unchanged in light of the changing objects being studied, (2) if this disciplinary subject matter is unique and not shared by any other field, and (3) if it is capable of addressing Benbasat and Weber's [2003] question about the contribution of the IS field in the multi-disciplinary area of e-commerce (p. 190).

FIRST TEST: DIVERSITY WITHIN A STABLE DISCIPLINARY SUBJECT MATTER

Sometime in the early to mid-1980s, the focus of the research in IS shifted from psychological objects (e.g., psychological types, cognitive style and Simon's psychology of decision-making) to economic and organizational objects (e.g., strategic planning, aligning IS goals with organizational goals, competitive advantage from IT). Even though these two sets of objects differ significantly from one another, they both concern the semiotic interrelationship between the signifying system and the executive for the purpose of decision making, firm operations, and control. In the 1970s, the field was focused on the fit between the signifying system and the psychological make-up of the decision-maker [Mason and Mitroff, 1973]. Later, this research focus was found to be at best tenuous [Huber, 1983] and could not produce any stable theory. In the 1980s, several authors highlighted the strategic significance of the signifying system (information technology) in enabling the *human* function of managing conflict within the industry [McFarlan, 1984, Porter and Millar, 1985]. At the same time, a parallel research focus was taking shape in the form of the decision support system (DSS) movement at MIT/Wharton [Keen, 1991]. The DSS discourse was concerned with the improvement of managerial decision making specifically in the areas of user/system interfaces, model management, and knowledge-based systems irrespective of the users' cognitive style. These two research foci **studied different objects, but remained within the same disciplinary subject matter**—the semiotic interrelationship between the executive and the signifying system designed to improve the executive's decision making function. The former theme of cognitive style did not find stability, but the latter theme of decision support did, and it became a fecund area of research for the IS field.

SECOND TEST: HOW UNIQUE IS THIS DISCIPLINARY SUBJECT MATTER?

As the earlier historical analysis of the IS discourse demonstrates, no other field comes close to addressing the semiotic interrelationships between the signifying system and human functions such as decision making, operations, and control. The enunciative functions that operate behind the statements surrounding these interrelationships are unique to IS. In early IS discourse on harnessing the power of computers in business, certain rules surrounding the processing capability of mainframes dictated the frequency of clerical activity. Consequently, businesses organized their information processing over periods of human inactivity to take advantage of excess capacity (i.e., batch processing). These issues are unique to IS and go beyond the expertise belonging to the field of computer science.

On the other hand, isn't information already part of the foundations of many other fields other than IS? At least one other discipline—Information Science—can claim to link computer technology to human activity. The field of Information Science does involve signifying systems and human activity, but there are two major differences: (1) the discursive formation of Information Science was in operation before the invention of the general purpose computer, whereas, the discursive formation of the information systems field did not emerge until computer technology was invented, and (2) Information Science is about the characteristics and nature of the signifying system (information) for the purpose of collecting, collating, and evaluating the signifying system itself [Bottle, 1997]. It is not concerned with the semiotic interrelationships between the signifying system and human activity. In other words, information systems and information science are conjunctive (share same objects), but are also disjunctive (do not share the same disciplinary concerns) [Ellis et al., 1999].

This difference can also be seen between information systems and computer science. Besides the IS and computer science fields, many other fields such as psychology, physiology, optics, physics, linguistics, biology, sociology, statistics, and journalism [Klein, 1990b] have all adopted the same information theory from Hartley [1928] and Shannon and Weaver [1948, 1949] as one of their theoretical foundations. But each discipline applies its own enunciative functions to support its own concepts and theories. In computer science, Shannon's mathematical information theory provides a way of measuring the efficient communication or reproduction of symbols. They do not, however, measure information content [Kramer-Friedrich, 1986]. As Shannon himself admits, the "semantic aspects of communication are irrelevant to the engineering problem" [Shannon, 1948, p. 379]. Information as studied by IS has meaning and therefore causes activity in a receiving system simply by virtue of its form [Strombach, 1986]. Therefore, in computer science, the signifying system itself is different from that of IS, and the focus of the computer science field is not on the link between that signifying system and human functions. Instead, computer science focuses on the link between one signifying system and another.

THIRD TEST: WHAT IS THE NATURE OF THE SPECIFIC EXPERTISE HELD BY IS SCHOLARS THAT DISTINGUISHES OUR E-COMMERCE RESEARCH FROM THAT UNDERTAKEN BY SCHOLARS FROM OTHER DISCIPLINES?

E-commerce research can be found in the fields of economics, computer science and information systems. Many other fields such as marketing, decision and management sciences have also contributed to e-commerce research, but for the sake of brevity, only the contributions from the first three fields will be analyzed. The challenge to the IS field is to identify its unique contribution to e-commerce research [Benbasat, 2001, Benbasat and Zmud, 2003]. Using the discursive formations uncovered for economics, computer science and information systems, it is possible to identify each of their unique contributions to e-commerce research. The field of economics, based on the rules surrounding human needs, wants, and how they are satisfied, will contribute expertise on the issues of supply and demand, prices, information economics, transaction costs, and the creation of value. Computer science, using the rules governing the processing of symbols on computer technology, will create objects of study concerning the effective design, development, construction, and application of symbols (computer languages, algorithms, techniques) on computer technologies within the e-commerce domain. The field of information systems, using the meaningful links between human actors and these e-commerce technologies, will contribute expertise on how to organize both human action and technologies to minimize conflict, make better decisions, improve the control of day-to-day human activities, and ultimately improve the human condition.

A multidisciplinary activity involving these three fields will generate valuable knowledge in the area of e-commerce. For instance, in the case of online auctions, economists study theories to reduce transaction costs or engender trust among auction customers. This study can be done without IT and becomes the economic field's contribution to e-commerce. Computer scientists study the construction of technologies that summarize bidding transaction data and maintain high

performance under heavy transaction loads. The processing of this data can be performed without human involvement and becomes the computer science field's contribution to e-commerce research. The IS field, tying the contributions of both economics and computer science, explores the possibility of reducing economic transaction costs and engendering trust using computerized bidding data. The measurement of both transaction costs and trust in this context is not possible without involving both IT and the human element. This demonstrates how the IS field contributes to e-commerce research by providing expertise that neither economics nor computer science can provide by themselves.

IV. IMPLICATIONS FOR CONSOLIDATING THE IS FIELD

Foucault's analysis of the transformation in historical knowledge carries significant implications for an emerging interdisciplinary field such as IS. We describe implications pertaining to the divide between monism and pluralism in IS research, the significance of disciplinary boundaries, the dangers of operating outside these boundaries, the difference between fragmentation and specialization, and the measure of progress for the IS field.

THE DIVIDE BETWEEN MONISM AND PLURALISM IS NEITHER NECESSARY NOR USEFUL

The distinction between the rules of formation of a discourse and its content implies that the diversity in content (research methods, objects of study, concepts, or theories) is inherently a disciplinary characteristic. Established disciplines such as physics and biology in the natural sciences and economics and psychology in the social sciences continue to use different research methods, and will continue to invent diverse objects and concepts that suit their needs. For example, early vitalist theories in biology were replaced by the theory of evolution [Darwin, 1859]. Even Darwin's evolutionist theory has undergone tremendous change. However, the disciplinary subject matter, the "core" of biology, remains the same.

IS researchers are free to apply any philosophical approach to explain IS phenomena, as long as the philosophical approach augurs with the object or concept being studied. Objects shared with sociology may require a subjective, interpretive approach, whereas objects shared with engineering may require a more objective, positivistic approach. As long as the IS field has decided on "what" they are to study, research philosophy offers various epistemologies suited for each type of inquiry. The IS field is also not limited to any single theory, because theories are as much an invention as are objects and concepts. What matters is that the research is performed within the boundaries of the rule of formation of the IS discourse, its disciplinary subject matter.

THE ROLE OF BOUNDARIES IN DISTINGUISHING THE IS FIELD

The act of distinguishing the field is concerned with identifying the essential activity of each field. IS researchers must be aware of the objects and concepts they are studying. Are we studying IS objects or psychological objects? Are we strengthening or creating new concepts belonging to IS, or are we using management or organizational concepts to solve some management or organizational problem? The key to realizing the benefits of the diverse discourses of the field's "referent disciplines" is to work within the disciplinary subject matter, *the discursive formation of an academic field that will remain stable as it produces knowledge in its diverse forms*. Such a discursive formation is synthesized if mutually exclusive objects are created without the field having to modify that formation.

One of Foucault's major theses in his archeology of knowledge is the notion of the "analytic of finitude." This theory asserts that limitations placed on human activity are the cause of its progress. All established disciplines define their boundaries and within these boundaries demand that their scholars produce their novel propositions. In biology, Cuvier [1800-1805] and his contemporaries had required of the organic structure of life that it should define the conditions of possibility of the discourse on living beings. In economics, Ricardo [1817] had required that labor provide the conditions of possibility of exchange, profit, and production. Herein lies the paradox

of disciplinary productivity. It is the limits imposed on human academic endeavors that produce the genius from which the expanse of knowledge becomes possible. Thus within the confines of its disciplinary boundaries will the IS field find its inexhaustible source of discourse. Only when boundaries are drawn around the field can it be said to be progressing. Without boundaries, how can progress be measured?

The Analytic of Finitude

Foucault's concept of "analytic of finitude" goes back to Kant who stated that the very factors limiting us as humans are also the reasons for our creativity. In other words, our limitations force us to innovate. "Necessity is the mother of invention."

Disciplinary boundaries are not impermeable boundaries that exclude or prevent interdisciplinary activity [Klein, 1993]. It is through such boundaries that interdisciplinary activity takes place. Based on the unique subject matter of linking the signifying system with human activity, any area of human activity that requires a close link with a signifying system becomes a potential area of study for the IS field. For example, because of the nature of DNA as a complex signifying system, the task of modeling and conceptualizing the meaningful linkages, and millions of possibilities in protein and genomic patterns in bioinformatics offers an unprecedented opportunity for the IS field. Unfortunately, little concerted effort within the field was expended to take advantage of the needs of the stakeholders in genomic research. Similarly, in the related area of medical practice, doctors have ceased to become the only focus of the discipline. Instead, other signifying systems outside of the doctor; the masses of documentation, instruments of correlation, and technology-mediated techniques of analysis have modified the doctor's position as an observing subject in relation to the patient [Foucault, 1972]. This transformation in clinical medicine, essentially the process of linking diagnostic and treatment activities with a signifying system, is emerging because of IT and provides a golden opportunity for IS researchers. Fortunately, the IS field is addressing this opportunity through the emerging field of medical informatics [Shortliffe and Blois, 2001, Wilson and Lankton, 2004].

THE IS FIELD NEEDS TO DEFINE ITS OWN OBJECTS AND CONCEPTS

Each established academic field finds a way of uniquely defining its object of study. For example, in economics, money is one of its major objects of study. The discipline of economics offers several definitions and sub-disciplines pertaining to the study of money. Nobel prizes have been awarded to scholars specializing in monetary theories. In this new millennium, if there was a single area of specialization that society needs, it is the study of "information." Not since the first printing of the Gutenberg Bible has information experienced such a transformation. The field of IS is perfectly positioned for this task of theorizing an inter-subjective account of information [Mingers, 1995, Mingers, 1996]. Similarly, "organization" in IS should also have its own unique enunciative function. This is true regarding the study of other objects, such as "system" and "management." The IS field is free to adapt positivities from the field of Organization Science or General Systems Theory to forge its own conception of "organization" or "system." Only when the field does so can it claim ownership of its own concepts, and eventually, its own theories.

If the foregoing analysis is correct, the continuing debate between those espousing a single "core" and those supporting pluralism may be symptomatic of an internal power struggle between different discourses that constitute the foundation of the IS field. Most authors agree that the multidisciplinary nature of the IS field requires multidisciplinary approaches. However, the IS field still needs to create objects, concepts, and theories that it can claim as its own; otherwise, **the IS field risks remaining a cross-disciplinary effort instead of emerging as a unique *interdiscipline***. The result of remaining merely a cross-disciplinary effort is a *terminus a quo* within IS disciplinary activity that might strengthen its referent disciplines, but does little to consolidate the IS discourse itself.

THE DANGERS OF MULTIDISCIPLINARITY AND THE BENEFITS OF INTERDISCIPLINARITY

Cross-disciplinary efforts take place when one field works with another to achieve a common goal. Depending on the type of activity and level of integration between the different disciplines involved, a specific type of cross-disciplinary effort takes place. At the lowest level of cross-disciplinary research is the concept of multidisciplinary research or "pluri-disciplinary" research. Multidisciplinary research brings together researchers or content from different disciplines to bear on a problem without integrating the content. This type of research is exemplified when archaeologists and historians share an interest in analyzing an historical artifact [Klein, 1990b]. The next level of cross-disciplinary research, *interdisciplinary* research [Apostel, 1972], is the activity of operating across the knowledge and skills of more than one discipline [Grigg et al., 2003] to achieve a *synthesis* greater than any single discipline. Interdisciplinary research take place when a geographer incorporates economic concepts of development into regional analysis or a chemist becomes dependent upon the resources from physics.

Hackhausen [1972] describes four different kinds of interdisciplinary interactions: (1) borrowing (pseudo interdisciplinarity), (2) solving problems (composite interdisciplinarity), (3) increasing the consistency of subjects or methods (supplementary interdisciplinarity), and (4) the emergence of an interdiscipline (unifying interdisciplinarity). Pseudo interdisciplinarity occurs when one discipline uses the methods and techniques of other disciplines (e.g., econometrics is the result of the discipline of economics borrowing mechanical models from mathematics). The Apollo space project is an example of both pseudo interdisciplinarity and composite disciplinarity because the goal of the space project was to solve the problem of putting man on the moon. Although many disciplines were put to bear on the project, and extensive amounts of knowledge were created, no new discipline emerged at the end of the process. It is possible for a cross-disciplinary research effort to achieve any one or more of these kinds of interaction in its projects. In the case of molecular biology, a new *interdiscipline* (*unifying interdisciplinarity*) emerges as a result of biology borrowing techniques from physics to solve its own specific problems.

When cross-disciplinary efforts do not reach higher interdisciplinary levels of interaction, a cogent interdiscipline does not emerge; instead, the combined efforts become *multimodal*, a state where disparate disciplines struggle to dominate the cross-disciplinary effort [Klein, 1990b]. This description of cross-disciplinarity is consistent with Foucault's archeological analysis. In Foucauldian terms, although cross-disciplinary research draws from different positivities, it will not result in the synthesis of a new discourse. Instead, different positivities are put to bear on the problem being addressed without formulating a new set of rules that will govern the combined positivities. At best, new discoveries within the *existing* collaborating disciplines may be found, but no new discourses emerge. On the other hand, if the efforts result in the emergence of a new discourse, that discourse will be the nucleus of what possibly could become a new interdiscipline. Examples of interdisciplines that have emerged from successful interdisciplinary efforts include molecular biology, solid-state physics, biochemistry, biomedical engineering, radio astronomy, and paleontology in the natural sciences; as well as, anthropology, accounting, management, industrial-organizational psychology, social psychology and criminology in the social sciences [Klein, 1990b]. In the social sciences, management emerged from studies in psychology, sociology, and decision sciences, and expanded its foundations to include other fields such as anthropology, economics, mathematics, political science, and systems theory [Koontz, 1961, Koontz, 1980].

Sjölander [1985] suggests that this process of synthesis undergoes 10 stages, starting with the first stage when the contributing scholars from different disciplines present their discipline's work and solutions; to the final stage when the in-depth knowledge of contributing disciplines are appreciated and the group embarks on a "real beginning" that produces results at an accelerated rate. The final stage occurs when *intellectual critical mass* is reached and an interdisciplinary

effort actually takes shape. Sjölander's [1985] description of the process of synthesis is similar to Keen's [1980] notion of cumulative tradition[4].

Being multimodal has its advantages [Klein, 1990a]. Many established fields began as multimodal fields. The vastness and complexity of the problem domain creates a "subtle seduction" that attracts scholars from other fields to participate in the multimodal activity. Multimodality protects the field from myopic approaches and cultivates a potentially productive interaction between the different modes. The multimodal field has the opportunity to synthesize the most interesting findings from the various disciplines. However, if the synthesis does not take place, the field will remain a multimodal field instead of becoming a unique interdiscipline. This brings a multitude of possibly insurmountable problems [Klein, 1990b]. The lack of loyalty among the researchers in the field (as researchers move in and out across its boundaries) makes it difficult for the discipline to reach organizational and *intellectual critical mass*. The complexity of the many different influences increases the *burden of comprehension* for the members in that emerging discipline. Not only do the scholars of the field need to be familiar with the theories from contributing disciplines, the context, history, and status of other fields also become the burden of multimodal field; and this burden increases further as the topical agenda expands. The questions that emerge within these multimodal disciplines are liable to be more complex and more changeable than those that dominate a single cogent discipline.

BETWEEN MULTIMODALITY AND SPECIALIZATION

Multimodality needs to be distinguished from specialization. Disciplinary specialization can be defined in Foucauldian terms as a *derivation* [Foucault, 1972, p. 153] from a single discursive formation. A biologist may specialize in plants (becoming a botanist) and will create objects, concepts and theories that explain plants, but the specialization demonstrates the operation of the same enunciative functions. A multimodal field, on the other hand, is based on several discursive formations, each trying to dominate one another [Klein, 1990b]. As a result, any "disciplinable" areas will consist of multivalent dimensions that are the domain of more than one group of specialists. Not surprisingly, multimodal disciplines are attacked as being eclectic and lacking rigor. This mutable and perhaps inconsistent quality of the field means that the criteria for recognizing and judging conceptual novelties and new knowledge areas tend to be arbitrary, ambiguous, and less likely to be based on a consensually determined set of ideals. Of course, "consensual" here does not mean that everyone must agree on the same point of view. Scholars in the field need to agree only on the set of ideals representing the field such that it is possible to recognize serious research from trivialities.

Although the IS field may have reached organizational critical mass as judged by the increasing number of attendance at IS conferences, *intellectual critical mass* [Klein, 1990b, Sjölander, 1985] deserves careful consideration. For example, Keen [1991] notes that there is "nothing that is unique to ISR [information systems research], in terms of either topics, theory or methodology, and there are many researchers who study the same topics as the ISR community" (p. 287). In certain research circles, Keen sees more dabbling taking place rather than in-depth accumulation of tradition. To improve the quality of IS research, he recommends a serious study of the relevant "core concerns" of the IS field. Regarding the issue of the *burden of comprehension*, he notes that "No one in the ISR (information systems research) community can be thoroughly familiar, for instance, with the theory of cognitive psychology, philosophy of language, organizational theory, developments in telecommunications…international business, international technology and regulation, linguistics, ethnography, and the theory of labor markets" (p. 39).

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[4] One way in which this intellectual critical mass can be measured is by using bibliometric methods [Garfield, 1955, Small, 1978]. Bibliometric methods are quantitative methods that identify the strength of agreement on certain concepts. Co-citation analysis is an example of a bibliometric method.

V. CONCLUDING REMARKS

The IS field is capable of emulating other established fields that have forged, in the process of their constitution, a unique disciplinary subject matter for themselves. The key to this process lies in synthesizing its own objects of study, using truly novel and original concepts, or by adapting the positivities of its diverse referent disciplines. Since the time of Aristotle, the goal of inquiry and research is to increase man's knowledge and to help mankind understand the phenomena happening around them. Aristotle said:

> Hence, if the facts about a given area are grasped, our next task will be to set out the demonstrations readily. For if our inquiry leaves out none of the facts that truly hold things, we will be able to find and produce a demonstration of whatever admits of demonstration, and if something does not admit of demonstration, to make this evident also (*Prior Analytics*, 46a17-27).

Cogent theories are the successful conclusion of these efforts—the result of combining the objects and concepts in relationships that describe, critique or predict phenomena within the area of study. The more coherent the theory, the more rigor it demonstrates. The more rigor it demonstrates, the more stable it becomes. T**he progress of the IS field should be measured not so much by the volume of work performed, the number of conferences held, or even the number of scholars researching the field, but by the coherency, rigor, and stability of its theories.**

A reflection of the field's coherency, rigor and stability can be seen in its relevance, the relationship between the field's discursive practices (academic pursuits) and non-discursive practices (praxis). This is the natural relationship between rigor and relevance. Rigorous and stable theories become relevant because they exhibit coherency with non-discursive practices. Most scholars in the IS field would agree that a close relationship between discursive and non-discursive practices would be mutually beneficial. Historically, established disciplines have always demonstrated a close relationship between its discursive and non-discursive practices. For example, the early study of political economy in Europe, such as Gresham's Law, was very closely related to, and had a very powerful influence on, the mercantilist measures of the 16th to 18th centuries [Grammont, 1620, Le Branchu, 1934, Smith, 1776]. Merely "following the phenomena" as it occurs in referent disciplines is counter-productive because this notion risks turning the field into an impoverished account of reality, merely reporting on the latest technology or new organizational theory, instead of becoming a force that shapes reality. The idea that tension should naturally exist between a "praxis-oriented field" and an "intellectual periphery" goes against the historical experience of established disciplines. Concepts and theories invented by intellectual pursuits, that have been shown to be coherent, rigorous and stable, have always been sought after by non-discursive practices and are rewarded in terms of legitimacy, money, and influence.

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REFERENCES

Alter, S. (1999) "A General, Yet Useful Theory of Information Systems," Communications of the AIS (1) 13.

Alter, S. (2003) "Sidestepping the IT Artifact, Scrapping the IS Silo, and Laying Claim to 'Systems in Organizations'," *Communications of the AIS* (12) 30.

Apostel, L. (ed.) (1972) *Interdisciplinarity: Problems of Teaching and Research in Universities*, Paris: Centre for Educational Research and Innovation (CERI/OECD).

Bell, D. (1973) *The Coming of the Post-Industrial Society: A Venture in Social Forecasting*. New York: Basic Books.

Benbasat, I. (2001) "Editorial Notes," *Information Systems Research* (12) 1, pp. i-ii.

Benbasat, I. and R. Weber (1996) "Rethinking Diversity in Information Systems Research," *Information Systems Research* (7) 4, pp. 389-399.

Benbasat, I. and R. Zmud (2003) "The Identity Crisis within the IS Discipline: Defining and Communicating the Discipline's Core Properties," *MIS Quarterly* (27) 2, pp. 183-194.

Bottle, R. T. (1997) “Information Science,” in J. Feather and P. Sturges (Eds.) *International Encyclopedia of Information and Library Science*, London, New York: Routledge, pp. 212–214.

Burns, T. and G. M. Stalker (1961) *The Management of Innovation*. London: Tavistock Institute.

Canning, R. (1956) *Electronic Data Processing for Business and Industry*. New York: Wiley.

Checkland, P. and S. Holwell (1998) *Information, Systems and Information Systems: Making Sense of the Field*. New York: John Wiley and Sons.

Culnan, M. J. (1986) "The Intellectual Development of Management Information Systems, 1972-1982: A Co-Citation Analysis," *Management Science* (32) 2, pp. 156-172.

Cuvier, G. (1800-1805) *Leçons d'anatomie comparée (Lessons of comparative anatomy)*. Paris.

Darwin, C. (1859) *On the Origin of Species*. London: John Murray.

Davis, G. B. and M. Olson (1985) *Management Information Systems: Conceptual Foundations, Structure, and Development*. New York, NY: McGraw-Hill.

Dearden, J. (1964) "Can Management Information be Automated?," *Harvard Business Review* (42) 2, pp. 128-135.

Dickson, G. (1968) "Management Information-Decision Systems," *Business Horizons* (11) 6, pp. 17-26.

Dickson, G. W. (1981) “Management Information Systems: Evolution and Status,” in M. C. Yovits (Ed.) *Advances in Computers*, New York: Academic Press, pp. 1-37.

Diderot, D. (1713-1784/1964) *Eléments de Physiologie*. Paris: Librairie M. Didier.

Ellis, D., D. Allen, and T. Wilson (1999) "Information Science and Information Systems: Conjunct Subjects Disjunct Disciplines," *Journal of the American Society for Information Science* (50) 12, pp. 1095-1107.

Emery, J. C. (1973) "An Overview of Management Information Systems," *Data Base* (5) 1, pp. 1-15.

Foucault, M. (1970) *The Order of Things: An Archeology of the Human Sciences*. New York: Pantheon Books.

Foucault, M. (1972) *The Archaeology of Knowledge and the Discourse on Language*. New York: Pantheon Books.

Galliers, R. D. (2003) "Change as Crisis or Growth? Toward a Trans-Disciplinary View of Information Systems as a Field of Study: A Response to Benbasat and Zmud's Call for Returning to the IT Artifact," *Journal of the AIS* (4) 6, pp. 337-351.

Garfield, E. (1955) "Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas," *Science* (122) 3159, pp. 108-111.

Grammont, S. d. (1620) *Le Denier Royal; Traicté Curieux de l'or et de l'argent (The Royal Sum of Money)*. Paris: Toussaint Du Bray.

Gray, P. (2003) "Introduction to the Debate on the Core of the Information Systems Field," *Communications of the AIS* (12) 42.

Grigg, L., R. Johnston, and N. Milson. (2003) *Emerging issues for cross-disciplinary research: Conceptual and empirical dimensions*. Higher Education Group, Department of Education, Science and Training, Australia.

Hackhausen, H. (1972) “Discipline and Interdisciplinarity,” in *Interdisciplinarity: Problems of Teaching and Research in Universities*, Paris: Organization for Economic Cooperation and Development (OECD), pp. 83-89.

Hartley, R. V. L. (1928) "Transmission of Information," *Bell Systems Technical Journal* (7), pp. 535-563.

Higgins, J. A. and J. S. Glickauf (1954) "Electronics down to earth," *Harvard Business Review* (32) 2, pp. 97-106.

Hirschheim, R. A. and H. K. Klein (2003) "Crisis in the IS Field? A Critical Reflection on the State of the Discipline," *Journal of the AIS* (4) 5, pp. 237-293.

Huber, G. P. (1983) "Cognitive Style as a Basis for MIS and DSS Designs: Much Ado About Nothing?," *Management Science* (29) 5, pp. 567-579.

Ives, B., S. Hamilton, and G. B. Davis (1980) "A Framework for Research in Computer-Based Management Information Systems," *Management Science* (26) 9, pp. 910-934.

Keen, P. (1980) “MIS Research: Reference Disciplines and a Cumulative Tradition.” *International Conference on Information Systems (ICIS), Philadelphia, PA*.

Keen, P. (1987) “MIS Research: Current Status, Trends and Needs,” in R. Buckingham, R. A. Hirschheim, F. Land, and C. Tully (Eds.) *Information Systems Education: Recommendations and Implementation*, Cambridge: Cambridge University Press, pp. 1-13.

Keen, P. G. W. (1991) “Relevance and Rigor in Information Systems Research: Improving Quality, Confidence, Cohesion and Impact,” in H.-E. Nissen, H. K. Klein, and R. Hirschheim (Eds.) *Information Systems Research: Contemporary Approaches and Emergent Traditions*, North-Holland: Elsevier Science Publishers B. V., pp. 27-49.

Kennevan, W. J. (1970) "MIS Universe," *Journal of Data Management* (8) 9, pp. 62-64.

King, J. L. and K. Lyytinen (2004) "Reach and Grasp," *MIS Quarterly* (28) 4, pp. 539-552.

Klein, J. T. (1990a) “The Disciplinary Paradox,” in *Interdisciplinarity: History, Theory, & Practice*, Detroit: Wayne State University Press.

Klein, J. T. (1990b) *Interdisciplinarity: History, Theory, & Practice*. Detroit: Wayne State University Press.

Klein, J. T. (1993) “Blurring, Cracking, and Crossing: Permeation and the Fracturing of Discipline,” in E. Messer-Davidow, D. R. Shumway, and D. J. Sylvan (Eds.) *Knowledges: Historical and Critical Studies in Disciplinarity*, Charlottesville: University Press of Virginia, pp. 185-211.

Koontz, H. (1961) "The Management Theory Jungle," *The Journal of the Academy of Management* (4) 3, pp. 174-188.

Koontz, H. (1980) "The Management Theory Jungle Revisited," *The Academy of Management Review* (5) 2, pp. 175-187.

Kozmetzky, G. and P. Kircher (1956) *Electronic Computers and Management Control*. New York: McGraw-Hill.

Kramer-Friedrich, S. (1986) “Information Measurement and Information Technology: A Myth of the Twentieth Century,” in C. Mitcham and A. Huning (Eds.) *Philosophy and Technology II: Information Technology and Computers in Theory and Practice*, Boston: D. Reidel Publishing Company.

Lamarck, J. B.-. (1809/1960) *Philosophie Zoologique (Zoological Philosophy)*. New York: Hafner.

Landry, M. and C. Banville (1992) "A Disciplined Methodological Pluralism for MIS research," *Accounting, Management and Information Technology* (2) 2, pp. 77-97.

Laubach, P. B. and L. E. Thompson (1955) "Electronic Computers: A Progress Report," *Harvard Business Review* (33) 2, pp. 120-128.

Le Branchu, J.-Y. (1934) *Ecrits Notables Sur La Monnaie (Notable Writings on Currency)*. Paris, France: Librairie Felix Alcan.

Leavitt, H. and T. Whisler (1958) "Management in the 1980s," *Harvard Business Review* (36) 6, pp. 41-48.

Linnaeus, C. (1737) *Genera Plantarum*. Paris: M.A. David.

Lyytinen, K. and J. L. King (2004) "Nothing at the Center?: Academic Legitimacy in the Information Systems Field," *Journal of the AIS* (5) 6, pp. 220-246.

Markus, M. L. (1999) “Thinking the Unthinkable: What Happens If the IS Field as We Know It Goes Away?,” in W. Currie and B. Galliers (Eds.) *Rethinking Management Information Systems*, New York: Oxford University Press.

Markus, M. L. (2005) "Personal Communication with Lynne Markus on Drucker's Comment," Minneapolis, May 13, 2005.

Mason, R. O. and I. I. Mitroff (1973) "A Program for Research on Management Information Systems," *Management Science* (19) 5, pp. 475-487.

McFarlan, W. F. (1984) "Information Technology Changes the Way you Compete," *Harvard Business Review* (62) 3, pp. 98-103.

Mingers, J. and F. Stowell (eds.) (1997) *Information Systems: An Emerging Discipline?*, London: McGraw-Hill.

Mingers, J. C. (1995) "Information And Meaning--Foundations for an Intersubjective Account," *Information Systems Journal* (5) 4, pp. 285-306.

Mingers, J. C. (1996) "An Evaluation of Theories of Information with Regard to the Semantic and Pragmatic Aspects of Information Systems," *Systems Practice* (9) 3, pp. 187-209.

Monod, E. (2001) "About AIS," Association for Information Systems, http://www.aisnet.org/admin.shtml (Oct 27, 2005).

Myers, M. D. (2003) "The IS Core – VIII: Defining the Core Properties of the IS Disciplines: Not Yet, Not Now," *Journal of the AIS* (12).

Osborn, R. F. (1954) "GE and UNIVAC: Harnessing the High-Speed Computer," *Harvard Business Review* (32) 4, pp. 99-107.

Popper, K. R. (1963) *Conjectures and Refutations: The Growth of Scientific Knowledge*. London: Routledge.

Porter, M. E. (1980) *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. New York, NY: Free Press.

Porter, M. E. and V. E. Millar (1985) "How Information Technology Gives You Competitive Advantage," *Harvard Business Review* (63) 4, pp. 149-160.

Ray, J. (1682) *Methodus Plantarum Nova*. London.

Revens, L. (1972) "The first twenty-five years: ACM 1947-1962," *Communications of the ACM* (15) 7, pp. 485 - 490.

Ricardo, D. (1817) *On the Principles of Political Economy and Taxation*. London.

Robey, D. (1996) "Diversity in Information Systems Research: Threat, Promise, and Responsibility," *Information Systems Research* (7) 4, pp. 400-408.

Rockart, J. F. and D. W. DeLong (1988) *Executive Support Systems*. Homewood, Ill.: Dow Jones-Irwin.

Rockart, J. F. and M. E. Treacy (1982) "The CEO goes on-line," *Harvard Business Review* (60) 1, pp. 82-88.

Shannon, C. E. (1948) "A Mathematical Theory of Communication," *The Bell System Technical Journal* (27) 3, pp. 370-656.

Shannon, C. E. and W. Weaver (1949) *The Mathematical Theory of Communication*. Urbana, IL: University of Illinois Press.

Shortliffe, E. H. and M. S. Blois (2001) “The Computer Meets Medicine and Biology: Emergence of a Discipline,” in E. H. Shortliffe and L. E. Perreault (Eds.) *Medical Informatics: Computer Applications in Health Care and Biomedicine*, New York: Springer-Verlag, pp. 3-40.

Shumway, D. R. (1994) *Creating American Civilization: A Genealogy of American Literature as an Academic Discipline*. Minneapolis: University of Minnesota Press.

Sjölander, S. (1985) “Long-Term and Short-Term Interdisciplinary Work: Difficulties, Pitfalls, and Built-in Failures,” in L. Levin and I. Lind (Eds.) *Inter-Disciplinarity Revisited : Re-Assessing the Concept in the Light of Institutional Experience*, Paris, France: OECD/CERI, pp. 85-101.

Small, H. (1978) "Cited Documents as Concept Symbols," *Social Studies of Science* (8), pp. 327-340.

Smith, A. (1776) *An Inquiry into the Nature and Causes of the Wealth of Nations*. Glasgow.

Spencer, H. (1897) *The Principles of Sociology*. New York: D. Appleton.

Steuart, J. (1767) *An Inquiry into the Principles of Political Economy*. London: A. Millar and T. Cadell.

Strombach, W. (1986) “Information in Epistemological and Ontological Perspective,” in C. Mitcham and A. Huning (Eds.) *Philosophy and Technology II: Information Technology and Computers in Theory and Practice*, Boston: D. Reidel Publishing Company.

Weber, M. (1947) *The Theory of Social and Economic Organizations*. New York, NY: Free Press.

Westland, J. C. (2004) "The IS Core XII: Authority, Dogma, and Positive Science in Information Systems Research," *Communications of the AIS* (13).

Wilson, E. V. and N. K. Lankton (2004) "Interdisciplinary Research and Publication Opportunities in Information Systems and Health Care," *Communications of the AIS* (14) 17.

Zani, W. M. (1970) "Blueprint for MIS," *Harvard Business Review* (48) 6, pp. 95-100.

BRIEF GLOSSARY OF FOUCAULDIAN TERMS

Analytic of Finitude	An analysis of human limitations. A Kantian perspective stating that the limits of knowledge become the conditions of possibility of knowledge.
Archeology of Knowledge	Foucault’s methodology of analyzing the pre-conceptual level of the nature and creation of historical knowledge
Discourse	A group of statements that obeys a specific set of rules or belongs to a system of formation
Discursive Formation	The law or set of rules defining the creation of objects of study
Enunciative Function	An operation borne by a statement that works beyond the statement’s grammatical and logical levels.
Positivity	A specific character of discourse
Statement	A group of signs that is more than a series of marks, related to a domain of objects, prescribes a definite position to any possible subject, and endowed with repeatable materiality.

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