

Author's preprint draft of "An Illustrated Introduction to the Infosphere"

The final version appeared in *Library Trends*, Volume 63, Issue 3, Winter 2015, pages 317-361
and is copyrighted © 2015 The Board of Trustees of the University of Illinois.

An Illustrated Introduction to the Infosphere

Betsy Van der Veer Martens

School of Library & Information Studies
University of Oklahoma

Abstract

This introduction to Luciano Floridi's philosophy of information (PI) provides a short overview of Floridi's work and its reception by the library and information studies (LIS) community, brief definitions of some important PI concepts, and illustrations of Floridi's three suggested applications of PI to library and information studies. It suggests that LIS may just be as important to PI as PI is to LIS in terms of deepening our mutual understanding of information ontologies, the dynamics of informational domains, and the variety of evolving relationships among information organisms and information objects.

Introduction

As the “library of the future” invents and reinvents itself over time, its collection also rearranges itself according to our changing notions of relevance. For instance, back in 1995, a year that saw such technologically important events as the release of DEC’s AltaVista search engine, Microsoft’s Windows 95 operating system, and Netscape’s Navigator browser, as well as the release of such provocatively topical book titles as *Life on the Screen: Identity in the Age of the Internet* (Turkle, 1995) and *Future Libraries: Dreams, Madness, and Reality* (Crawford & Gorman, 1995), it is hardly surprising that a short piece by an academic philosopher, based on an invited talk at a distant meeting, would have gone largely unnoticed by the library and information studies (LIS) community.

In fact, this particular piece by Oxford University’s Luciano Floridi, based on his remarks on “What We Do Not Know” at the fiftieth-anniversary conference in Paris commemorating the founding of UNESCO, did not appear especially striking in the context of the times and seems even less startling today:

Not only has the Internet already enlarged our notion of illiteracy, and produced new forms of cultural isolation and discrimination, but, because it intensifies and amplifies the effects of the digital revolution, the Internet is also transforming some of our most radical conceptions and habits. Take our conception of a text, for example. The enormous

importance of the new model of “spineless textuality” represented by the hypertext, the virtual ubiquity of documents, the appearance of online services and electronic sources that need to be catalogued, have all changed a discipline like librarianship in the most radical way. Even the library itself may disappear, as we move from the holding and lending library, which stores knowledge physically recorded on paper, to the consulting library, which provides access to electronic information on the network; then from an object-oriented culture, which produces multiple copies of physical entities like books and CD-ROMs for each user, to a culture that appreciates the relationship between time and information, and provides services charged per period of use; and finally from the library as a building to the library as a gate node in the virtual space of the digital encyclopedia. (1995a, p. 264)

The quotation also seems quite consistent with contemporary calls within LIS that year “to shift, first thought, then discourse, then research, by initiating a questioning of assumptions and purposes” in a search for new epistemological foundations (Budd, 1995, p. 315), and to give “much thought to meaningfully translating our values into an electronic information context” (Buschman, 1995, p. 213). What is notable about this particular piece is that it can be said to represent the popular point of origin for the combination of Floridi’s previous work in the historical foundations of epistemology (1993, 1994, 1995b), especially the importance of the “encyclopedia” in the emergence of human knowledge (1996), with his coming exploration of the impact of the internet on metaphysical speculation itself (2002c), culminating in the development of his putative “philosophy of information” (PI).

Although certainly not the first to explore the impact of information- and computing-technology advances on philosophy and vice versa (e.g., Agre, 1997; Crane, 1996; Heim, 1993; Pepperell, 1995), Floridi’s work (1999b) has gone beyond much of the early “computational turn” in philosophy (e.g., Bynum & Moor, 1998) with his formulation of a philosophy done informationally (Greco, Paronitti, Turilli, & Floridi, 2005) and offering a formal analytic approach that can be employed metatheoretically in various domains (Floridi, 2008d). The central questions raised by Floridi’s PI project continue to attract critical attention, primarily in philosophy (Adams & de Moraes, in press; Allo, 2010; Beavers, 2011; Caticha, 2014; Crnkovic & Hofkirchner, 2011; Durante, 2011; Ess, 2009) and in areas of computer science (Benini & Gobbo, 2014; Colburn & Shute, 2011; Golan, 2014; Sicart, 2009; Wolf, Grodzinsky, & Miller, 2012), but the provocative questions posed to LIS in particular (Floridi, 2004a, p. 659) still remain largely unaddressed over a decade later

As Hjørland (2014, p. 231) recently commented regarding the core concepts of LIS and the unexplored possibilities of PI, “[w]e need to go from the concrete to the abstract and back again.” This

paper, therefore, will illustrate a few aspects of PI in the context of library and information studies in the twenty years since the publication of Floridi's "Internet: Which Future of Organized Knowledge, Frankenstein or Pygmalion?" (1995a) in hopes of eliciting some further response from the field.

The Philosophy of Library and Information Studies, Then and Now

The philosophy of library and information studies—whether "philosophy" is construed as focusing on first-order questions *within* information studies inquiry or on second-order questions *about* information studies inquiry, and whether LIS is broadly or narrowly construed as librarianship, library science, cataloging, documentation science, information science, archival science, bibliographic studies, book history, information management, knowledge management, informatics, data science, records management, knowledge organization, analytical bibliography, document studies, textual studies, or some or all of the above—has traditionally been a matter of interest to some and indifference to most in these so-called information professions.

As early as 1933, Butler lamented: "Unlike his colleagues in other fields of social activity the librarian is strangely uninterested in the theoretical aspects of his profession. . . . The librarian apparently stands alone in the simplicity of his pragmatism: a rationalization of each immediate technical process by itself seems to satisfy his intellectual interest" (pp. xi–xiv). Shortly afterward, Danton (1934, p. 550) wrote in *The Library Quarterly*:

Sooner or later, however, if the purely pragmatic aspects of our professional thought are to be raised, it must be placed in its complete relations to the history of human thought. The library as a social institution is, after all, but one phase of its philosophical implications. Does the library have a *Wesen* of its own and does it have metaphysical implications? That is, is the library an institution merely or does it contain within itself the germs of a philosophical relation to epistemological progress?

Exploration of these metaphysical implications requires a considerable departure from the pragmatic, positivist approach employed in much of LIS literature, which typically focuses on evaluating the efficacy of practices intended to support user access through optimization of order and organization. Radford (1998, p. 618) neatly described this pragmatic perspective in his observation that

A library is a place where knowledge is first classified and then kept, stored in texts of all kinds such as books, periodicals, and audiovisual materials. Such an understanding imposes a rigid structure of expectations that come to define the library experience for both librarian and library user. . . . For both positivism and the library, the dominant metaphor is that of "the search." In positivist science, the search is for underlying

structures that comprise the truth of the natural world. In the library, the search is among the structures for a truth that will alleviate a specific “information need.”

Perhaps ironically, pragmatism as a movement appears to have been much more influential in such “practical” disciplines as LIS than it has ever been within its own academic discipline of philosophy (Campbell, 2007). Perhaps even more ironically, contemporary metaphysics, which has been one of the dominant approaches within academic philosophy, has recently turned from its classic approach of modeling fundamental concepts about the world to more so-called naturalized attempts at metaphysical modeling of the fundamental nature of the world itself, often employing techniques not dissimilar from those of scientific disciplines (Paul, 2012). Thus, Danton’s question about a possible “metaphysics of the library” may now elicit more focused attention to the potential answers.

There have been a number of authors within LIS over the past eight decades who have concerned themselves specifically with what we might call the metaphysical implications of the library writ large, and they have done so from a strikingly wide variety of philosophical and professional vantage points.¹ Surprisingly little of this often-excellent work has received much attention from outside the LIS field, and, quite often dismally, little attention from inside it. Contrarily, Floridi’s (2002a, 2004a) work relating to LIS has succeeded in attracting more attention from fields outside LIS than from within it, although he notes that LIS appears to be an ideal field in which to practice PI.

Floridi asserts that his PI framework offers philosophically oriented scholars, including those in LIS, a new, information-centric approach to metaphysics, with an explicit focus on metatheoretical applications to various disciplines. Still, despite the publication of his seminal *Philosophy and Computing* (1999b), as well as more recent publications like *Information* (2010a), *The Philosophy of Information* (2011b), *The Ethics of Information* (2013a), and *The Fourth Revolution* (2014b), there has been little discussion of PI and its potential for use in LIS since the two journal special issues—one of *Social Epistemology* edited by Fallis (2002), and one of *Library Trends* edited by Herold (2004)—that first introduced Floridi’s work to the LIS community over a decade ago.

In particular, Floridi’s (2002a, 2004a) proposal that LIS be viewed as an applied form of PI has been countered by arguments that LIS already possesses an adequate philosophical base of its own, often identified as *social epistemology* (Budd, 2002; Fallis, 2006; Zandonade, 2004). Oddly, the concept of social epistemology as it is generally understood today has little or no direct connection with the term as originated by LIS theorists Egan and Shera, even while their original impetus for the concept (that is, in the service of continuous improvement of bibliographic services to users) is still firmly embedded in ongoing library work. The next section, therefore, will discuss that debate in some detail.

Social Epistemology, Then and Now

In 1950, Jesse Shera, of the University of Chicago's Library School, reported in the pages of *American Documentation* that he and his Chicago colleague Margaret Egan had prepared and presented the U.S. report on national bibliographic problems and activities at the UNESCO Conference on the Improvement of Bibliographic Services held in Paris. This conference, he noted, was an important first step in identifying the importance of bibliographic organization to international intellectual cooperation and the problems implicit in any effective program of action toward the improvement of access to recorded knowledge (Shera, 1950). Soon afterwards, Egan and Shera's seminal article "Foundations of a Theory of Bibliography" appeared in the pages of *The Library Quarterly*, introducing their concept of *social epistemology*, which they defined as

the study of those processes by which society as a whole seeks to achieve a perceptive or understanding relation to the total environment—physical, psychological, and intellectual. The derivation of the term is readily apparent. Epistemology is the theory or science of the methods and foundations of knowledge, especially with reference to the limits and validity of knowledge, and through it the philosopher seeks an understanding of how the individual achieves a perceptual or knowing relationship to his environment. Social epistemology merely lifts the discipline from the intellectual life of the individual to that of the society, nature, or culture. (1952, p. 132)

Much of their ensuing emphasis, therefore, was on the improvement of knowledge-organization processes, such as the design, development, and diffusion of both bibliographic records and bibliometric data. After Egan's death, Shera continued to develop the concept of social epistemology further during the next few decades through a series of essays and speeches, such as this presentation at the Foundations of Access to Knowledge conference held at Syracuse University:

The study of social epistemology, which is in reality the study of social cognition, is the proper foundation of the science of librarianship. As a study in its own right it must synthesize and draw upon the work of many disciplines, but it must always focus upon those processes by which society achieves a state of knowing and communicates its knowledge through its constituent parts. The librarian's responsibility is the efficient and effective management of the transcript, the graphic record of all that society knows about itself and its world. It includes that which the social organism has learned, its values as well as its facts, its imagery as well as its reality; it is at once historical, contemporary, and anticipatory. (1968, pp. 24–25)

At the same time, Shera was careful not to discount the influence of technological advances, as he

wrote in “Librarians against Machines” (1967, p. 749):

That librarians are deeply troubled by the new technology can be directly attributed to their devoting excessive attention to the techniques of their craft, and to their neglect of the fundamental questions that they should have been asking. The computer could force them, at long last and in self-defense, to examine the philosophical implications of librarianship. It could also condition them for accommodation with areas of inquiry that have not previously been thought to be related to their work.

In fact, his tenure at Case Western was also notable for his efforts in establishing the Center for Documentation and Communication Research there, the first computerized research center associated with a library school. Despite Shera’s occasionally expressed reservations about this research partnership (Wright, 1988, pp. 28–32), the center’s legacy to LIS (in particular, furthering development of the terms *recall* and *precision* in the evaluation of library information retrieval) has been widely acknowledged.

The term *social epistemology* failed to attract equal notice, with some exceptions, such as Brooks (1973), until, five years after Shera’s death in 1982, it was reinvented and popularized by sociologist Fuller (1987a, 1987b) with the establishment of the journal *Social Epistemology*, but without reference to libraries or librarianship (Zandonade, 2004). A 1992 sidebar in *American Libraries* accompanying Pierce’s (1992) plaintive query as to “Who Are Our ‘Dead Germans’?” listed Shera among library educators’ top choices for significant theorists in LIS, but without specifying social epistemology as his theoretical contribution. Five years later, Zwadlo (1997) insisted in the pages of *The Library Quarterly* that there is no need at all for any philosophy of LIS. In rebuttal, Radford and Budd (1997) maintained that there is—but, again, Shera’s social epistemology failed to make an appearance in that discussion.

Twenty years after Shera’s death, and fifty years after the publication of Egan and Shera’s seminal article, Fallis edited a 2002 special issue of *Social Epistemology* devoted to the topic of social epistemology and information science, in which several articles (Budd, 2002; Dick, 2002; Furner, 2002b) recognized Egan and Shera’s foundational role and their coining of the term *social epistemology*. Floridi’s contribution (2002a) offered a dissenting voice, arguing that social epistemology did not provide an appropriate conceptual structure for LIS. Instead, he suggested that the relationship between social epistemology and LIS is more that of sibling fields rather than of a foundational discipline and its derivative (pp. 37–38). Floridi noted that social epistemology as it is presently understood is comprised of both the sociology of knowledge (SoK), which is the descriptive and empirical study of the historical causes and conditions of what is commonly recognized as knowledge, and the epistemology of social knowledge (ESK), which is the critical and conceptual study of the social dimensions of knowledge.

Describing Shera's view of social epistemology, Floridi discerned an unresolved tension in Shera's writings between his desire to ground the library field in the epistemology of social knowledge as a sort of applied social epistemology and his desire to define the library field as the epistemology of social knowledge itself (p. 40). Floridi rejected both alternatives, pointing out that LIS takes a normative stance, as "the library is a place where educational and communication needs and values are implemented, defended, and fostered, where contents are assessed and selected for the public, and where practices like cataloging, for example, are far from being neutral, evaluation-free activities" (p. 39), but that it cannot and should not be prescriptive in its perspective in the way that both what he called "classic" ESK (the socially distributed discovery and justification of knowledge as truth) and "revolutionary" ESK (the contention that knowledge, truth, and justification are all social constructions) are (p. 40). Further, LIS's concerns are both broader (in terms of the wide range of both factual and fictional content that the library contains) and narrower (in that social epistemology deals with much outside the contents of any library, however broadly construed).

Floridi maintained that LIS's proper concern is not knowledge itself, but the information sources that make it possible, even if only indirectly (p. 41). This, in fact, is consistent with the original emphasis by Egan and Shera (1952, p. 133) on "the analysis of the production, distribution, and utilization of intellectual products in much the same fashions in which the production, distribution, and utilization of material products have long been investigated. Graphic communication provides objective evidence of the process." Egan and Shera proposed two main areas of investigation: *situational analysis*, which involves a complete analysis of the kinds of information, knowledge, and insights developed by all the contributory sciences or disciplines that are brought to bear upon each of the many focal points of human activity (p. 135); and *analysis of the information unit*, involving techniques for the accurate description of the many "thought units" that comprise the flow of information, and to the creation of a method for identifying classes of these units briefly, through the use of symbols (p. 136).

In a thoughtful examination of the matter, Furner (2004a) concludes that Egan and Shera's original concept of social epistemology is indeed quite different from previous work on the sociology of knowledge and the epistemology of knowledge that, if not inspired, informed its creation. He notes that it is also quite different from later and distinctive usages of the term *social epistemology* by Fuller (1988), Goldman (1999), and others, and is more in the tradition of Otlet's *bibliology*—another term that never gained wide circulation (Furner, 2002b, pp. 18–19). Nevertheless, much of their social epistemology legacy is still very much alive within LIS, both in *situation analysis*, better known as today's "user studies" (Miksa, 2009), and in *analysis of the information unit*, better known as "knowledge-organization studies" (Smiraglia, 2008)

Much of what Egan and Shera called the “pyramids,” comprising both micro- and macro-bibliographic endeavors (1952, p. 126), and that Wilson (1968, pp. 6–19) subsequently termed the *bibliographical universe*, has now been connected thanks to shared ventures in what Wilson identified as “descriptive control” (bibliographic and metadata formats, cataloging, indexing), as well as significant advances in what he called “exploitative control” (bibliometrics and scientometrics, information retrieval, relevance research). The advent of globally networked information and communication technologies has now made it apparent that society’s graphical records extend far beyond the bibliographical universe as seen from within the library. The “archival multiverse” (Gilliland & McKemmish, 2012) has boundaries far beyond published documents alone, while the “records continuum” (Upward, 2000) extends into the past, present, and future of recorded memory, and even a “hypertextual documental universe” has been suggested (Gnoli & Ridi, 2014). As the Churchlands (1983, p. 5) have observed, “[t]he conglomeration which is the human brain standardly evolves an awesomely-complex world representation in short order and on the basis of scanty input. . . [T]he world-representation evolves, and it evolves not only during the lifetime of one human brain, but across the lifespan of collections of brains.” Or, as Smiraglia (2008, p. 36) elegantly summarizes, Egan and Shera’s vision of social epistemology was “a way of saying that a library arises in response to social demands that the culture of the society be collected and disseminated in a formal way.”

Intriguingly, this aspect of Egan and Shera’s vision connects with Floridi’s (1996) own view of how [t]he emergence of the human *encyclopedia*, as the totality of knowledge stored and inherited by generations of human beings through the centuries, came to be governed by the humanistic prescription to the effect that knowledge is to be preserved at virtually any cost. . . [P]ost-modern philosophy—and I use the adjective only for want of a better label—can be understood as the late philosophy which flourishes *within* the encyclopedia. . . Knowledge is everywhere, and yet little is said upon its nature as an object, as a piece of reality, as an extended domain. Post-modern philosophy has moved too swiftly from reflecting *upon* the process of knowing—the modern concern with method—to reflecting *within* its result, leaving to information technology the task of providing the ontic medium of the domain, and to social sciences the attempt to sketch its ontological description. (p. 30; emphasis in original)

This paragraph appears surprisingly close to one from Shera’s last article (1983), published posthumously, in which he observed that

the library can be seen as three interrelated spheres: the sphere of optimum content, the operational or mechanistic sphere, and the sphere of maximum context. . . Janus-like,

the library looks in two directions simultaneously. It looks toward the social sciences, because it is a creature of society, evolved to meet the needs of human beings working towards the solution of certain problems. . . . But the library is also humanistic in that its characteristics, modes of access to its resources, uses, and values are humanistic. It is not and never has been, a scientific enterprise. (p. 385)

Floridi (2002a) initially described the relationship between LIS and PI in the following terms:

(LIS) Library and Information Science as Applied Philosophy of Information is the discipline concerned with documents, their life cycles and the procedures, techniques and devices by which these are implemented, managed and regulated. LIS applies the fundamental principles and general techniques of PI to solve definite, practical problems and deal with specific, concrete phenomena. In turn, it conducts empirical research for practical service-oriented purposes (*e.g.* conservation, valorization, education, research, communication and co-operation), thus contributing to the development of basic research in PI. (p. 46)

Given these connections, Floridi's contribution to LIS discourse may be significant in a much broader sense than merely as a critique of Egan's and Shera's ideas, and can even be construed as an evolution from their initial effort "to provide a framework for the effective investigation of the whole complex problem of the intellectual processes of society" (Egan & Shera, 1952, p. 132), even as the UNESCO conference in 1995 was a successor to the one in 1950, into an exploration of what Floridi (2001a, pp. 18–19) calls the "infosphere." The next section will discuss Floridi's philosophy of information in an attempt to clarify some of those relationships.

The Philosophy of Information, Then and Now

Although not readily apparent to readers without some familiarity with the ways in which contemporary philosophy is changing (and, for accessible introductions for the nonspecialist to contemporary metaphysics, see Mumford [2012], and to contemporary ontology, see Effingham [2013]), Floridi's PI seems to fall somewhere between two recent naturalistic turns in philosophy, the first being to a naturalized metaphysics, with its privileging of scientific reasoning as a way of constraining purely metaphysical speculation (Kincaid, 2013); and the second to object-oriented ontology, with its principled refusal to privilege human experience over nonhuman things (Bryant, 2011). PI's approach, with its focus on "structural informational realism" in general and "informational objects" in particular, attempts to provide a logically structured way for human reason to transcend its origins in and focus on localized environments, and to address more universal concerns based on a wide variety of data from these localized environments. As Vakarellov (2013) has pointed out, one of the most challenging aspects

of this is the way in which Floridi uses “information” as a way to unify the epistemological and metaphysical aspects of his project rather than as the goal of either. Epistemology and metaphysics are the two faces of the PI coin, while information provides the edge.

PI uses a formal analytic methodology and specialized vocabulary intended to study empirical, scientific, and social “observables” at various levels of abstraction through the explicit application of various theoretical lenses rather than implicitly privileging or reducing any of these. Despite its resemblance to both formal computer modeling and scientific methodology, PI retains its metaphysical identity in its commitment to “open” questions that are associated with “information,” very broadly construed, rather than addressing those questions that can be resolved conclusively through other means of investigation. Floridi’s most specific statement in this context is that “philosophical questions are in principle open, ultimate but not absolute questions, closed under further questioning, possibly constrained by empirical and logico-mathematical resources, which require noetic resources to be answered” (2013b, p. 215). “Noetic resources,” of course, are “informational” ones.

Floridi’s “What Is the Philosophy of Information?” appeared in *Metaphilosophy* in 2002 and described PI as concerning itself with both the historical antecedents and contemporary manifestations of philosophy as

critical and creative investigations [that] identify, formulate, evaluate, clarify, interpret, and explain problems that are intrinsically capable of different and possibly irreconcilable solutions, problems that are genuinely open to debate and honest disagreement, even in principle. These investigations are often entwined with empirical and logico-mathematical issues and so are scientifically constrained, but, in themselves, they are neither. They constitute a space of inquiry broadly definable as normative. It is an open space: anyone can step into it, no matter what the starting point is, and disagreement is always possible. It is also a dynamic space, for when its cultural environment changes, philosophy follows suit and evolves. (2002c, p. 134)

More specifically, he defines the philosophy of information as being the philosophical field concerned with (a) the critical investigation of the conceptual nature and basic principles of information, including its dynamics, utilisation, and sciences, and (b) the elaboration and application of information-theoretic and computational methodologies to philosophical problems. . . . Its task is not to develop a unified theory of information but rather an integrated family of theories that analyse, evaluate, and explain the various principles and concepts of information, their dynamics and utilisation, with special attention to systemic issues arising from different contexts of

application and interconnections with other key concepts in philosophy, such as being, knowledge, truth, life, and meaning. (p. 137)

This programmatic statement for doing philosophy informationally was followed by his “Open Problems in the Philosophy of Information” (2004b), again appearing in *Metaphilosophy*. This paper posed eighteen open problems as being central to PI, a list which can be only briefly summarized as follows:

- Problem 1. What is information?
- Problem 2. What are the dynamics of information?
- Problem 3. Is a grand unified theory of information possible?
- Problem 4. How can data acquire their meaning?
- Problem 5. How can meaningful data acquire their truth values?
- Problem 6. Can information explain truth?
- Problem 7. Can information explain meaning?
- Problem 8. Can cognition be fully and satisfactorily analysed in terms of information processing at some level of abstraction? How is the triad of cognition, information processing, level of abstraction to be interpreted?
- Problem 9. Can natural intelligence be fully and satisfactorily analysed in terms of information processing at some level of abstraction?
- Problem 10. Can natural intelligence be fully and satisfactorily implemented nonbiologically?
- Problem 11. Can an informational approach solve the mind–body problem?
- Problem 12. How can information be audited? If information cannot be transcended but can only be checked against further information—if it is information all the way up and all the way down—what does this tell us about our knowledge of the world?
- Problem 13. Should epistemology be based on a theory of information?
- Problem 14. Is science reducible to information modelling?
- Problem 15. What is the ontological status of information?
- Problem 16. Can information be naturalized?
- Problem 17. Can nature be informationalized?
- Problem 18. Does computer ethics have a philosophical foundation?

As Herold (2003, pp. 562–563) has noted, many of these open questions appear beyond the purview of even the most expansive notion of LIS, but several of them can be considered to be essential questions in even the narrowest view. He identified these as relating to content, meaning, authorship, community,

and ethics. Accordingly, Herold edited a special issue of *Library Trends* in 2004 devoted to “the philosophy of information,” introducing the issue with the statement that

researchers in LIS have increasingly turned to the efficacy of philosophical discourse in probing the more fundamental aspects of our theories, including those involving the information concept. A foundational approach to the nature of information, however, has not been realized, either in partial or accomplished steps, nor even as an agreed, theoretical research objective. It is puzzling that while librarianship, in the most expansive sense of all LIS-related professions, past and present, at its best sustains a climate of thought, both comprehensive and nonexclusive, information itself as the subject of study has defied our abilities to generalize and synthesize effectively. (p. 373)

The issue featured several articles that provided thoughtful critiques of various aspects of Floridi’s PI project in relationship to LIS concerns. In particular, articles by Cornelius (2004) on the failure of PI to account for LIS as a collection of ongoing social practices deeply grounded in information behavior by both information professionals and their communities of users, Fallis (2004) on PI’s utility in assessing the accuracy of information, Frohmann (2004b) on the desirability of subsuming PI under a broader, more historically grounded philosophy of documentation, and Jacob (2004) on classifying as a critical form of information dynamics offered some specific examples and counterexamples.

Floridi (2004a) provided an afterword, expanding on his original (2002a) suggestions as to how PI might supply a better framework for LIS than does social epistemology, however defined. He proposed that a “PI approach to the foundations of LIS may be expected to work on the ontology of its (*i.e.*, LIS’s) ‘objects,’ on a substantial theory of information dynamics, and on an ethical approach to the domain of information” (p. 659).

The issue was received by the LIS community with mixed reactions (see, for example, Benoît, 2006; Buckland, 2005; Rayward, 2004; Wells, 2004) and with little subsequent attention to PI. Furner (2010, pp. 170–171) calls Floridi “the most prolific and most widely celebrated scholar working on problems of philosophy and information,” but one who is relatively infrequently cited in the LIS literature. Floridi is mentioned only once, for instance, in Osburn’s (2009) monograph on important works of “library philosophy,” and PI not at all. Furner (2010, pp. 171–173) listed four main attributes of PI to urge LIS researchers to increase their awareness and appreciation of Floridi’s project: its broadness of scope, its embeddedness in social theory, its utility for ethical analysis, and its foundational position at the heart of contemporary philosophy. According to him, two reasons that PI has failed to attract much sustained attention from LIS may be that Floridi’s books tend to focus on non-LIS-centric concerns, and that Floridi’s articles tend to be published in non-LIS-centric journals.

Two additional reasons may be, first, that his writing as “conceptual engineering” (Floridi, 2011a) offers a challenging blend of interrelated metaphysical and modeling concepts and vocabulary that cannot easily be understood within the context of a single article, and, second, that little effort has been made to situate PI within the LIS context, exploring its advantages and disadvantages. Exceptions to this latter point include Saab and Riis (2011) in their overview of contemporary definitions of information, Tomic (2010) in her analysis of how PI might relate to information science, Fallis (2011) in his discussion of information and disinformation, Watson and Carlin (2012) in their critique of the neglected praxeological considerations involved in studying information, and Durante (2013) in his examination of the competing informational interests between civil rights and societal security within the global information society, as exemplified by legal cases. Thus, the next section provides an elementary “pathfinder” for PI.

A Pathfinder for the Philosophy of Information

It should be noted that PI is clearly a work in progress, subject to a variety of criticisms (Doyle, 2010; Dunn 2013), while Floridi’s own prolific publications about it range from the engagingly accessible (2007) to the dauntingly technical (2008e). The following explanations, therefore, can be considered as elementary interpretations of some of the more basic concepts, using quotes from some of Floridi’s works as appropriate. Any and all errors of explanation or interpretation, however, are my own.

Information Structural Realism.

Floridi (2008a) calls this a “liminal” realism, suggesting that it occupies a position midway between external realism (in which kinds, categories, and structures of the world are not a function of our conceptual schemes, either causally or ontologically) and internal realism (in which they are). Central to this neo-Kantian, intersubjective, socially constructible, dynamic, and flexible perspective is his analytic method of abstraction (the levels of abstraction [LoA] approach) for application to the study, modeling, and analysis of phenomenological and conceptual systems as instantiated by clusters or networks of *observables*, which are identified and interpreted as “typed” variables so that their relationships and behavior can be formalized.

This liminal realism also seems to offer a contact zone between philosopher John Worrall’s (1989) work on “structural realism” and physicist John Wheeler’s (1990) work on “it from bit.” In *Minds and Machines*’s recent special issue on PI, Bynum (2014) has speculated on the possibilities of quantum informational structural realism, which might link intriguingly with what Bawden, Robinson, and Siddiqui (in press) identify as the potentialities of a “quantum turn” in information studies.

Levels of Abstraction and Gradients of Abstraction.

The LoA method is adapted from formalized modeling often used in information system design (Greco, Paronitti, Turilli, & Floridi, 2005), which in itself draws from metaphysics, particularly ontological design (Artz, 1997). A helpful discussion of the uses of abstraction in general, and of Floridi's approach in particular, can be found in Saitta and Zucker (2013).

Floridi differentiates the LoA analytic methodology from other well-known “leveling” methods of abstraction, such as the so-called LoO (levels of organization), which supports an ontological approach based on particular systemic attributes, and LoE (levels of explanation), which supports an epistemological approach based on particular nonsystemic attributes (2008d, p. 319). Both of these approaches can be embedded within the LoA approach, as it also offers the opportunity through an “interface” named the “gradients of abstraction” (GoA) to compare multiple LoAs. Floridi notes that LoA analysis always requires a theoretical lens through which the *observables* can be studied, although these theoretical lenses can be of any kind. This allows him to defend LoA analysis from criticisms that have been leveled at seemingly similarly structured conceptual schemes (pp. 321–324).

Additional discussions of the challenges posed by LoA/GoA work are offered by Gobbo and Benini (2014), who stress the potential value of category theory in developing these levels of abstraction, and by van Leeuwen (2014), who suggests that an explicit system of annotations similar to those used in programming languages would help to specify boundaries and constraints. Such proposed enhancements to the LoA/GoA approach may help to make it more readily accessible to interested scholars.

Data and Dedomena.

Floridi (2008c, p. 235) posits that a more basic, metaphysical concept of data is required than most definitions provide: neither the epistemic, which views data as facts, nor the informational, which views them as information, nor the computational, which views them as collections of binary elements, is sufficiently fundamental. He asserts that data in themselves are unknowable without some “difference” to distinguish them. Therefore, he suggests that data be viewed as “diaphoric”; in other words, that *difference* is what defines data from nondata, and that a datum is ultimately reducible to a lack of uniformity. He proposes that “data in the wild”—that is, proto-epistemic data that have no interpretation—be termed *dedomena*, and notes that they cannot be accessed or elaborated independently of some level of abstraction. Thus, dedomena are whatever lack of uniformity in the world that serve as the source of whatever we interpret as data.

Lack of interpretation or misinterpretation, of course, does not preclude future interpretation or reinterpretation. Interpreted (or misinterpreted), dedomena can become what we term *data*. Such interpretation entails either the lack of uniformity between (the perception of) at least two physical

states, such as that of a system (for instance, between connection and disconnection within an electrical circuit), or it can be the lack of uniformity between two symbols of a code (for instance, the letters “A” and “B” in the English alphabet). Floridi (2011b, pp. 87–88) notes that the actual format, medium, and language in which data are encoded are often irrelevant and hence disregardable. His proposal of *dedomena* as proto-epistemic data provides a potentially useful way of distinguishing it from *data*, which can then be subdivided into the five commonly used categories of primary, secondary, metadata, operational, and derivative data. All such data might then be further interpreted as “informational objects.”

Informational Objects.

Informational objects, or, as Floridi (2012b, p. 268) has recently dubbed them, “i-objects,” are also foundational to his view of reality, or what he calls “information structural realism.” He (2008a, p. 236) states that a “straightforward way of making sense of these structural objects is as *informational objects*, that is, as cohering clusters of *data*, not in the alphanumeric sense of the word, but in an equally common sense of *differences de re*, i.e., mind-independent, concrete points of lack of uniformity.” These informational objects then can be viewed as *observables* at various levels of abstraction, giving different pictures of their data structure and associated behavior appropriate to each level (2008a).

Information.

Floridi’s (2009, p. 13) definition of *information* is clearly a semantic one. He notes that “[i]nformation is notoriously a polymorphic phenomenon and a polysemantic concept so, as an explicandum, it can be associated with several explanations, depending on the level of abstraction adopted and the cluster of requirements and desiderata orientating a theory.” A simple schematic of how information may appear to PI is as follows: any initial appearance of “structured” data can presumably be separated into either environmental data or semantic content. Semantic content can further be separated into instructional or factual content. Factual content can further be separated into untrue and true content. Untrue content can be further separated into disinformation (intentional untruth) and misinformation (unintentional untruth). True content cannot be subdivided further, and may result in knowledge (p. 15).

Ultimately, Floridi wishes to refine the *generalized definition of information* (GDI), which is normally defined as semantic content consisting of one or more data that are well-formed and meaningful (p. 16). His preferred revision is that declarative, objective, and semantic information should consist of well-formed, meaningful, and truthful data (2005, p. 367). There have been a number of critiques (Fetzer, 2004; Long, 2014; Scarantino & Piccinini, 2010), as well as defenses (Sequoia-Grayson, 2007) of Floridi’s definitions of information.

Of particular interest to LIS is Floridi's "correctness" theory of truth, which provides for those special instances in which categories of fictional, empirical, ethical, modal, dispositional, metaphorical, and other semantic content are of interest (2011b, pp. 182–208). All these can be dealt with as *information*, provided that attention is given to the levels of abstraction at which they are being analyzed. For instance, "Dr. Watson is Sherlock Holmes's best friend" is true within a level of abstraction that deals specifically with that fictional world (pp. 203–204), but not within a level that deals with historical data from the nineteenth century.

Infosphere.

Floridi's PI is perhaps most widely associated with this term, even though it was actually originated by Boulding in 1970. Boulding viewed the *infosphere* as one among the six "spheres" in his own system (which also included the sociosphere, biosphere, hydrosphere, lithosphere, and atmosphere), and suggested that each individual or group of individuals exists as a node in a network of inputs and outputs of information, symbols, and language. He claimed that

[t]he infosphere then consists of inputs and outputs of conversation, books, television, radio, speeches, church services, classes, and lectures as well as information received from the physical world by personal observation. . . . [I]t is clearly a segment of the sociosphere in its own right, and indeed it has considerable claim to dominate the other segments. It can be argued that development of any kind is essentially a learning process and that it is primarily dependent on a network of information flows. (pp. 15–16)

Unsurprisingly, given that he was writing almost thirty years later, Floridi's reinvention of the term *infosphere* is independent of, and quite significantly different from, that of Boulding. Floridi (1999b) states that

The computerised description and control of the physical environment, together with the digital construction of a synthetic world, are, finally, intertwined with a fourth area of application, represented by the transformation of the encyclopaedic macrocosm of data, information, ideas, knowledge, beliefs, codified experiences, memories, images, artistic interpretations, and other mental creations into a global *infosphere*. The infosphere is the whole system of services and documents, encoded in any semiotic and physical media, whose contents include any sort of data, information and knowledge . . . with no limitations either in size, typology, or logical structure. Hence it ranges from alphanumeric texts (i.e., texts, including letters, numbers, and diacritic symbols) and multimedia products to statistical data, from films and hypertexts to whole text-banks and collections of pictures, from mathematical formulae to sounds and videoclips. (p. 8)

More recently, Floridi (2009) has claimed that the infosphere is being both developed and defragmented as it continues more or less simultaneously and spontaneously to erase barriers between production and consumption of information, between databases of information, between who does and does not have effective availability and accessibility to information, between physical and global access to information, and, ultimately, between here (offline, analog, carbon-based) and there (online, digital, silicon-based). He argues that the infosphere serves as our access to foundations of the information reality that is the universe, even though he asserts that this does not entail a so-called computational universe, such as that posited by the “digital metaphysics” of Steinhart (1998), for example. PI views information as not only foundational, but fundamental in a way that Boulding’s concept clearly does not. But our access to these foundations is necessarily mediated through our augmented ability to explore and observe them (Floridi, 2003).

Reontologization.

Floridi (2007) states that *reontologization* is another neologism that he created to refer to a very radical form of reengineering, one that fundamentally transforms the intrinsic nature of a particular system. The term clearly carries connotations related to the distinctive usages of *ontology* in both analytical philosophy and software engineering, and is also reminiscent of Heidegger’s (1953/2010) somewhat similar creation of neologisms from familiar technical terms in *Being and Time*.

Floridi (2001b) claims that digital information and communication technologies are reontologizing the very nature of (and hence what we mean by) the infosphere as reality by making it “frictionless” through the transition from analog to digital data and the ever-increasing growth of digital space. He warns that this reontologization will have serious societal consequences, as the “digital divide” will be not only between those who do and do not have access, but also between those who can impact and those who can only be impacted by the results. His concern is the greater because of the awareness that

it is precisely those high-technology societies, which have brought about the information revolution, [that] seem to be the least able to cope with its ethical impact. Pre- or non-industrial cultures, which have been able to maintain a non-materialistic and nonconsumistic approach to the world, are still spiritual enough to perceive in both physical and immaterial realities something intrinsically worthy of respect, simply as forms of existence. They may not be environmentally sensitive, but they can be important sources to develop an ecological approach that will make the infosphere a more civilized space for all. The environmental ethics of the infosphere must be built by considering also the needs and input of its ‘outsiders.’ (p. 4)

Fourth Revolution.

Floridi (2008b, 2014b) claims that we have entered a *fourth revolution* in human thinking about the universe and our place in it, although this realization is not yet widespread and certainly not universal. He posits that the first revolution was the Copernican in which we became aware that the earth was not the center of the universe; the second was the Darwinian in which we became aware that human beings were subject to the same evolutionary processes as other organisms; and the third was the Freudian in which we became aware that our cognitive processes can be both complex and opaque beyond our conscious knowledge. This fourth revolution currently in progress, according to Floridi (2012c, p. 3540), the “Turingian,” is grounded on the idea that we are becoming aware that we are informationally embodied organisms or *inborgs* who are mutually connected and embedded in an informational environment, the *infosphere*, which we share with both natural and artificial agents similar to us in many respects. Although there are several potential milestones with which to date the start of this revolution, Floridi (2014b, pp. 93–94) marks it by that vital period of intellectual activity leading up to the 1950 publication of Turing’s seminal paper in *Mind* on computing machinery and intelligence.

Floridi’s (2001b, pp. 2–3) informational revolution also presents two gaps. The first is what he terms *vertical and ahistorical*: this divide is between *past modernity*, which focuses purely on mastery of the physical world, and *post-modernity*, which focuses on the alternative, nonnatural environments that replace or underpin it. The second gap is what he terms *horizontal and ethical*: this divide is between those who do and those who do not have digital access, which mandates the creation of a universal information ethics that would ensure a safe, equitable, and public infosphere for all.

Information Ethics.

Although *information ethics* (IE) has become a well-known term within both philosophical (e.g., Moor, 1985) and professional (e.g., Mason, 1986) practice since Weiner’s early work on “computer ethics” (Bynum, 2008, 2010), Floridi’s (2013a) development of IE is novel in that it has broadened the scope of discourse to an almost universal macro-ethics centered on information. His more expansive concerns are expressed as follows:

In IE, the ethical discourse concerns any entity, understood informationally, that is, not only all persons, their cultivation, well-being and social interactions, not only animals, plants and their proper natural life, but also anything that exists, from paintings and books to stars and stones; anything that may or will exist, like future generations; and anything that was but is no more, like our ancestors or old civilizations. IE is impartial and universal because it brings to ultimate completion the process of enlargement of the concept of what may count as a centre of a (no matter how minimal) moral claim, which

now includes every instance of *being* understood informationally . . . no matter whether physically implemented or not. (2006a, p. 26; emphasis in original)

IE thus suggests that there is something even more valuable than life and consciousness—namely, *being*, understood as information; and something more wrongful than pain and suffering—namely, a lack of meaningfulness that is seen as information entropy. According to IE, one should evaluate the duty of any rational being in terms of his or her contribution to the growth of the infosphere, and any process, action, or event that negatively affects the whole infosphere—not just an information object—as an increase in its level of entropy and hence an instance of evil. Without information there is no moral action, but in IE, information moves from being a necessary prerequisite for any morally responsible action to being its primary object (Floridi & Sanders, 2002).

Central to Floridi's argument for an information macro-ethics is the notion that all entities, even those that do not qualify as “information organisms” as such, may possess a minimal informational value that qualify them as “moral patients” worthy of at least some respect by other agents, notably by human beings (Floridi & Sanders, 2002). Thus, both information organisms and informational objects can be *agents* (that is, actively affecting other entities) or *patients* (that is, being actively affected by other entities) at any given time, regardless of whether either agent or patient is a living entity.

Floridi's information macro-ethics therefore requires that ethical considerations expand beyond the traditional ones that have been centered around human beings and certain living entities considered as close to human beings. While there are a number of philosophical precedents concerning moral agency among humans and nonhumans (Mitcham, 2014), this is clearly one of the most provocative aspects of Floridi's PI proposals. Critics such as Brey (2008) and Byron (2010) argue that Floridi's ethical expansion of IE beyond the current boundaries of both bio-ethics and eco-ethics has failed so far to make an acceptable case for treating all entities as having any such intrinsic value, informational or otherwise.

Information Entropy.

As noted above, Floridi's information ethics is partially predicated on mitigating the evil of what he calls “information entropy” in the infosphere. The four tenets regarding this are that entropy ought not to be caused in the infosphere (null law); entropy ought to be prevented in the infosphere; entropy ought to be removed from the infosphere; and information welfare ought to be promoted by extending (information quantity), improving (information quality), and enriching (information variety) the infosphere (Floridi, 1999a, p. 47).

Again, this has attracted criticism, notably from McKinlay (2013), who comments that Floridi's use of the term *entropy* in connection with information needs much clearer definition, as it has little in

common with the more familiar use of entropy in physics. In particular, McKinlay suggests that information entropy is not necessarily an evil, but rather an unavoidable consequence of informational activity creating desired complexity elsewhere in the infosphere. And, even in the case of the information entropy presumably caused by “bad objects” like computer viruses and spam, there are those who would advocate for a more nuanced response to their existence (Parikka & Sampson, 2009), making the issue considerably more complex than Floridi’s tenets would appear to allow.

Information Organism.

Floridi’s term *information organism*, or *inforg*, while both related to and reminiscent of *cyborg* (Clynes & Kline, 1960; Haraway, 1991) and *informavore* (Miller, 1983), is intended to encompass all information-processing mechanisms, ranging from those that can only process data at an elementary level (for instance, a sunflower responding to sunlight as information) to the most advanced (a network of supercomputers). While Floridi’s focus is on human beings as inforgs because of their special nature as “structuring structures” that are self-conscious and self-determining (2010c, pp. 279–280), there seems to be room in his definition to include not only nonhumans like poker bots and bomb-disposal robots, but also self-organizing social structures that process information, such as corporations or nations. While Floridi’s PI may possess surface similarities to other contemporary projects centered around the recognition of the importance of the nonhuman, it remains distinctive, in that PI is grounded in information rather than materialism as in the work of Harman (2005) and other object-oriented philosophers, or in networks as in the work of Latour (2005) and other actor-network sociologists, as well as in its implications for the future (Giardino, 2012).

Knowledge.

Information, whether transmitted via perception or testimony, according to Floridi (2014a), “upgrades” to knowledge only if it can be correctly “accounted for” through an active process of question and answer by the knower. This definition of *knowledge* is supported by an extensive infrastructure of his earlier work on the symbol grounding problem (Taddeo & Floridi, 2005), action-based semantics (Taddeo & Floridi, 2007), definitions of semantic information (Floridi, 2005, 2010b), the logic of “being informed” (Floridi, 2006b), epistemic relevance (Floridi, 2008e), and a network theory of account (Floridi, 2012a). Floridi (2014a) concludes that the philosophical “problem of justification” (that is, defining “justified, true belief” by a knower) can be addressed more pragmatically by viewing knowers as reality’s active, problem-solving designers rather than its passive observers:

We are cognitive amphibians: as embodied and embedded physical agents, we live in, and interact with the world in itself, Kant’s *noumena*. We eat and drink, handle and build, avoid and crash into *noumena*. But as informational organisms, we experience and

inhabit the world as a semantic reality both afforded and constrained by the world in itself. Our ontology is entirely semantic, so we know the world when we are informed about it and are able to account for such information. For a knower is “the man who knows how to ask and answer questions” (Plato, *Cratylus*), giving an account, that is, about the information that he holds. (p. 93)

Although this account of knowledge as “upgraded” information of shared perceptions and testimonies within a social network of “cognitive amphibians” over time is clearly still a subject of much philosophical debate (Allo, 2014; Harnad, 2011; Piazza, 2010; Primiero, 2013), it also serves to connect the philosophy of information to some of the most central concepts and concerns of LIS. The next section will now turn to some of PI’s possible applications within library and information studies.

The Infosphere of Information Studies

As noted above, Floridi (2004a, p. 659) suggests that a PI approach to the foundations of LIS may be expected to work on the ontology of its (that is, LIS’s) “objects,” on a substantial theory of information dynamics, and on an ethical approach to the domain of information. This section will address how PI might relate to other LIS works in progress in each of these areas.

The Ontology of LIS Objects

Despite an increasing interest in ontological development within the field, most ontic models in LIS are not intended for general use, as they tend to reflect a single concrete area of researcher interest. The one well-known model in LIS that does arguably resemble an abstract ontology of generic information “objects” is the so-called DIKW (data-information-knowledge-wisdom) Pyramid or Hierarchy, variously attributed to Adler, Ackoff, Zeleny, and others (Rowley, 2007). However, Frické (2009) has deftly exposed its definitional deficiencies, logical inconsistencies, and faulty dependencies, pointing to its outmoded reliance upon a systems worldview based on operationalism and instrumentalism and stating that it should be abandoned as a model.

As Floridi (2004a, p. 662) notes, “LIS deals with contents understood as meaningful data [and] connected with the activity of stewardship of a semantic environment.” But in order to be considered as a foundational philosophy for LIS, PI must offer a useful way of looking at a perennial “open problem” in LIS: what should be construed as the “objects” of information studies when there are so many possibilities from the disparate domains from which all these are drawn? Since the primary concerns of LIS include both the stewardship of collections of LIS objects and, critically, the responsibility for the accuracy and accessibility of their representations as well, this will be an increasingly complex issue in the “reontologized” world that PI presupposes.

Although Floridi has proposed that LIS’s data consist of documents and their life cycles, that itself is

an open question, as “documents,” even within the more traditional LIS contexts, are largely undefined. (See Buckland, 1991, 1997; Frohmann, 2009; Hjørland, 2002a; and Lund 2009, 2010 for discussions of the nature of documents.) Buckland has observed, following Briet (1951/2006), that “the document,” rather than being viewed solely as texts or as variations in textual format, should be more accurately viewed as any “thing” that can be interpreted as some kind of evidence, whether textual or otherwise. Documents can take physical or virtual form, or both, at different times. “Evidence” also is problematic, as library examples of even clearly textual documents include an extensive variety of both evidentiary (Furner, 2004b) and nonevidentiary (Hanley, 2004) instances that can only begin to indicate the range of potential interpretations, both factual and fictional, over the millennia. The Cuneiform Digital Library Initiative, for instance, has facilitated interpretations of accounting practices in ancient Mesopotamia (Monaco, 2005), while the Neo-Assyrian Text Corpus Project has done the same for investigations into the mythological roots of the First Dynasty of Uruk there (Woods, 2012).

Another critically important informational object closely related to questions of evidence is the *record*, which has also been undergoing substantial and substantive reconsiderations in both archival and records-management studies (Yeo, 2007, 2008, 2012b). Questions problematizing the definition and description of records (Conway, in press; Duff & Harris, 2002; MacNeil, 2005; Millar, 2002; Yakel, 2003), the construction of their identity (Rowat, 1993; Trace, 2002; Yeo, 2010), their contextual aspects (McKemmish & Piggott, 2013; Nesmith, 2006), their temporal aspects (K. Anderson, 2013; Brothman, 2006; Cumming, 2010; Meehan, 2006, 2009; Upward, 1996, 2009), and their custodial communities (Bastian, 2002; Caswell, 2013; Christen, 2012; Huvala, 2008) have become endemic within the archival field, leading Upward and colleagues (2013, p. 40) to lament that “we cannot reliably say what a record as a thing is as our conceptual understanding of it blurs into data, documents, information, the archive, and the plurality of archives. . . . Our new information spaces with their vibrant diversity are paradoxically producing a collapse of collective memory.” In their examination of the archival literature and the concept of *collective memory*, however, Jacobsen and colleagues (2013) note that the archival field has been more insulated from other disciplines engaging in memory studies and the encompassing environment of collective-memory work in the world at large than archivists themselves may realize. Thus, all this may portend less a collapse than a convergence in which these critical questions about evidence, significance, and temporality will become far more widely appraised both inside and outside LIS (Cook, 2011, 2013).

In addition to documents and records, there are other potentially viable candidates for roles as LIS objects. For instance, Ekbja (2009) has advanced a processual and relational theory of digital artifacts as *quasi-objects* in which he draws together actor-network theory, documentation theory, and object-

oriented philosophy—a proposed advance on traditional document studies. Also, Budd (2013b) has recently published a quantum theory approach to information studies that addresses the problematic of perceiving information with the aim of finding meaning in the micro-structures of small linguistic elements rather than the macro-level of texts, which could dramatically both increase and impact LIS research endeavors.

Miksa (1998) has examined and dismissed the notion that library classifications such as Dewey's have historically had anything more than a tenuous connection with direct classification efforts in the sciences or knowledge in general. Representation of objects, such as books, in LIS has traditionally worked from an indirect or “second-hand knowledge” (Wilson, 1983) perspective: for instance, the *aspect classification* of bibliographic description, which loosely resembles a compilation of categories based on the informal ontologies of various phenomena as viewed from within disciplines; and the *occurrence representation* of records management, which loosely resembles an account-driven data-file structure within organizations rather than through the creation of more abstract and formal ontologies. However, there has been growing concern that such representation must inevitably fail to accurately reflect the wide range of relevant worldviews on actual content and should be completely rethought (Feinberg, 2007; Mai, 2010, 2011; Szostak, 2013).

Nevertheless, representation of content remains absolutely essential to LIS despite these challenges. Certain efforts appear to be successfully maneuvering through these thorny thickets of complexity. For instance, Smiraglia's seminal publications (2001, 2002, 2005) on “works” include the phenomenon of instantiation in the bibliographic representation of knowledge about works, which are increasingly likely to have multiple manifestations in space (a series of filmed performances, for instance) and/or time (several editions of a book, for instance) that constitute sets of representations of a work. All these, then, form a *content genealogy* important to identifying information objects of any kind. In addition, Furner (2002a) has observed that works are entangled in extensive networks of document relatedness, such as associated metadata frameworks or citation networks, which may be considered as LIS objects in their own right as well, while Day (2008b) has made an equally far-ranging exploration of the entanglements of works of art. Beyond these classic approaches, yet another emerging knowledge-representation initiative is the León Manifesto, which proposes treating each “knowledge item” itself as the basic unit for classification rather than employing the disciplinary approach of traditional cataloging, but which would also allow for more global-level descriptors (Gnoli, 2010).

Further, there is the question of information objects, whatever they may be, as part of sets or collections or as sets or collections in themselves (Wickett, Renear, & Furner, 2011). Moreover, even the question of “what is a collection” in LIS is far from resolved, although a number of researchers have

addressed it (Currall, Moss, & Stuart, 2005, 2006; Lee, 2000; Manoff, 2006, 2010; Martens, 2011; Yeo, 2012a, 2012b).

All of this points to a key advantage for PI as a framework for LIS: that despite an understandable concentration on and commitment to veridical truth in defining *information*, which Floridi shares with the many other philosophers since Bertrand Russell who have faced the so-called problems of reference (see Pepp [2012] for a useful contemporary introduction to these), Floridi's informational framework for semantic content can make provision for fiction (that is, the rich imaginary that provides the majority of our cultural heritage) as well as fact when employed at the appropriate level(s) of abstraction, without resorting to relativism.

There are certainly sufficient precedents in the philosophical literature to warrant the further exploration of fictional semantic content (*e.g.*, Lewis, 1978; Thomasson, 1999; Voltolini, 2006; Walton, 1990) in LIS, in addition to that of factual semantic content, especially as the “fictions” involved can also be said to be somewhat similar to those routinely employed in mathematical and scientific modeling (Contessa, 2010; Frigg, 2010).

Floridi (2004a, p. 662) writes that “[t]he semanticization of data is a modeling process at some level of abstraction [LoA]. . . . According to the [LoA] methodology, any access to data (and hence any access to whatever aspect of the world is under scrutiny) is mediated by an ontological commitment to a level of abstraction that can be roughly understood as an interface.” He goes on to assert: “We neither discover nor invent the world; we design it. So we understand it derivatively, only insofar as we understand its models. The world as we experience it every day is the outcome of our modeling its data with a degree of intra-LoAs coherence as great as one may wish. This is neither a realist nor an antirealist but a *constructionist* view of information” (p. 663; emphasis in original).

For LIS, whether called documents, records, or works, all such evidence or documentary reality is, in reality, somehow constructed by human beings directly through creation and elaboration or more indirectly through observation and explanation. Although the interpretations may be lost, as is the case with the Voynich manuscript and the Tartaria tablets, or yet to be completed, as with the cladistics of viruses and the Langlands conjectures in mathematics, or are fully shared only within a certain group, as with string theorists and song-line speakers, all these still remain part of the library. The library encompasses much more than reified technical knowledge, although our current, taken-for-granted emphasis on science, and particularly “information science,” tends to obscure this fact. Floridi's (2009, p. 15) own schematic of information may well need to be redrawn to incorporate some of these major contributions from LIS's enduring stewardship of the full social transcript into the overall PI project itself.

This vast residual category in PI's general metaphysical framework for exploring the meanings and interpretations of information objects reveals enormous scope for LIS investigations in support of what Floridi (2002a, p. 46) himself views, in MacLeish's words (1972, p. 361), as "the library's implicit assertion of the immanence of meaning." Whether or not Floridi's *fourth revolution* occurs as he suggests, LIS will continue to include *The Analects of Confucius*, *The Epic of Gilgamesh*, and *The Tale of Genji*, as well as base-ten arithmetic, the periodic table, and the solar calendar. Thus, the ontological concerns of LIS are likely to have important implications for PI as well.

Information Dynamics

Floridi's (2002c) recommended second foundational focus of attention for LIS is "a substantial theory of information dynamics." He describes *information dynamics* for PI in general as

(i) *the constitution and modelling of information environments*, including their systemic properties, forms of interaction, internal developments, and so on; (ii) *information life cycles*, that is, the series of various stages in form and functional activity through which information can pass, from its initial occurrence to its final utilisation and possible disappearance; and (iii) *computation* both in the Turing-machine sense of *algorithmic processing* and in the wider sense of *information processing*. . . . PI privileges 'information' over 'computation' as the pivotal topic of the new field because it analyses the latter as presupposing the former. (p. 138)

Among the most substantial and substantive theories relevant to LIS-related information environments developed over the past two decades is Hjørland's seminal work on domain analysis (Hjørland & Albrechtsen, 1995), which Tomic (2010) has suggested provides a useful complementary approach to Floridi's PI, with connections that could be further explored. While Tomic detailed some specific philosophical avenues of connection, this section will focus on a more general discussion of the two.

Domain analysis as defined by Hjørland (2002b) offers a philosophical foundation, as well as a practical toolkit of recommended techniques (2002a). Hjørland's (2010) socio-cognitive approach posits that studying specific discourse communities, such as a scientific specialty, professional field, or other interacting group of participants who share a common area of expertise, is the optimal way to understand the creation, dissemination, and utilization of knowledge, as the shared concepts, vocabularies, activities, and communication processes of such groups of subject experts will eventually result in the research findings and other recommendations described in the various publications that will be acquired and accessed through libraries, also providing the foundation for the development of subject headings, keywords, and other bibliographic infrastructures, thus forming the basis of society's

knowledge as a whole. This inherent privileging of the cognitive aspects over the social in Hjørland's approach to discourse communities has been seen as problematic (Fry, 2006), but it also helps to maintain a clear focus on epistemic considerations.

Domain analysis does allow for individual variations both within and between such groups, recognizing that the growth of knowledge is both a competitive and cooperative concern among the group members, and that their cognitive and social backgrounds, styles, and interactions all play key roles (Hjørland & Hartel, 2003). While Hjørland's (2000b) domain-analytic project is grounded in both the philosophy of science and the sociology of science, it also draws from both the information-retrieval and knowledge-organization aspects of LIS. Unlike many other research specialty studies, which have tended to focus primarily on the specialists themselves, their processes, and/or their research products (Velden & Lagoze, 2013), domain analysis is particularly suited for the study of how various domains interface with LIS. For instance, it has been used to: chart changes in interdisciplinary journal choices within the computational sciences over a fifty-year time frame (Tanaka, 2010); to compare the curricula for "relevance work" in archival, reference, and competitive intelligence education at ALA-accredited library schools (Martens & Van Fleet, 2012); and to analyze factors impacting the sharing of research data within five subdomains of earth systems sciences (Weber, Baker, Thomer, Chao, & Palmer, 2012).

As Tennis (2012) has pointed out, domain analysis can be practiced in several ways: as a descriptive analysis for basic research; as an instrumental analysis for practical applications; and as a contextual analysis for a deeper understanding of the domain itself, its possible changes over time, and how it is being analyzed. PI appears as though it could be especially helpful in this third, more reflexive mode of domain analysis. A domain analytic approach informed by PI might use the LoA/GoA approach to view domains at various levels of abstraction, using different theories, and focusing on different observables to provide a more coherent picture of those parts of the infosphere of special interest to LIS over time.

While there has been criticism directed at LoA in PI because "it trades upon decontextualized uses and recontextualizes 'information' for the practical purposes of formal analysis" (Watson & Carlin, 2012, p. 327), PI clearly does not prescribe or proscribe the methods of investigation, as seen above, but may provide a structure and syntax to facilitate considered comparisons at various levels.

In summary, PI is not intended to provide a replacement for scientific methods of investigation. It can serve as more of an meta-analytic overlay on all existing research practices, providing a metaphysical commentary on what is being researched, and why. In the current LIS research environment, which largely focuses on methodological rigor and practical applications, this can be seen as both unrealistic and unnecessary, but there is clearly a place for such deeper "philosophical" perspectives on our own domain. Whether LIS is willing to undertake such an effort certainly remains

an open question as well.

Information Ethics

As noted above, Floridi's information macro-ethics (IE) is largely predicated on our developing sense of stewardship of the infosphere. His proposal that information objects should have moral rights because they also embody information is probably the most controversial and celebrated part of his PI project, as it goes far beyond Weiner's foundational work pertaining to "the human use of human beings" (Bynum, 2008). One obvious application of this thesis for LIS is the destruction of archives, books, and libraries, referred to as "archivicide," "bibliocide," and "libricide" respectively. Although other authors have discussed historical cases and causes in exhaustive detail (Báez, 2008; Fishburn, 2008; Knuth, 2003, 2006; Owens, 2012; Polastron, 2007), there has been little discussion of any possible moral rights of the documents themselves, either individually or collectively, apart from those of their creators or possessors. Such a discussion is almost inevitable in the context of Floridi's fourth revolution.

The fourth revolution, both creating and being created by the infosphere, involves subjective, radical change even beyond the two gaps to which Floridi (2001b) refers: the vertical, ahistorical gap between modernity and post-modernity, and the horizontal and ethical gap between access and nonaccess. A third gap exists, one that is orthogonal and unpredictable: the sudden, subjective realization that one is oneself embedded in the infosphere is likely to be empowering, unsettling, or both, depending on the individual's own information-seeking and information-processing proclivities, and is not contingent simply on the availability of access to these alternative environments.

The human rights of displaced refugees, for instance, can easily be foreclosed within the "virtualized" mapping system of protected territories imposed by international agencies in which the actual persons may not "count" for more than their digital surrogates (Franke, 2009). Similarly, global digital surveillance of suspect individuals have become proactive rather than reactive, and is rapidly reaching a state in which it is being considered predictive of their real-world actions (Amoore, 2009). Current revelations of the massive level of "dataveillance" of individuals, groups, organizations, and even nation-states within the infosphere (Newkirk, 2013; Wood, 2009) may further serve to accelerate this realization of the reontologization of reality for others. For those already deeply concerned about the commodification of information in contemporary capitalist society (*e.g.*, Enright, 2011), this can hardly be reassuring. For the employees of organizations such as Google X, however, the fourth revolution is already here and presumably profitable (Stone, 2013).

Floridi's fourth revolution might easily be added to the list of examples in typologies of the so-called information society devised by sociologists, such as Feather (2013) and Webster (2002), to organize the

variety of empirical efforts at categorizing information “products” that followed Machlup’s pioneering effort (1962). An information society that is subjectively defined by its members in the way that Floridi suggests would then fall squarely into the subjective, radical change quadrant of Fuchs’s (2013, p. 415) typology of information society theories. The information “products” in such a radically reontologized information society would include both information objects and information organisms, and the boundaries would appear much more permeable. Even as the Turing test has devolved over time into a simple way for machines to distinguish human beings from other machines through the use of CAPTCHAs and as Amazon’s Mechanical Turk computer program harnesses collective efforts by human beings for micro-tasks unsuitable for computers, for instance, there is increasing space for more metaphysical considerations of these boundaries.

It is useful to keep in mind that PI is grounded in a metaphysical approach, and that conceptual analysis in metaphysics, although both connected and committed to our common-sense thinking and scientific reasoning about reality (Jackson, 1998), works in a manner that is somewhat different from both. For instance, Nagel’s (1974) classic exploration of the open question of the phenomenon of what it would be like to be a bat differs in approach from the scientific approach of exploring bat biology (Kunz & Parsons, 2009), the social scientific approach of examining our lay perceptions about bats (Knight, 2008), or the technological approach of extending our efforts to conserve bats (Boyles, Cryan, McCracken, & Kunz, 2011).

Similarly, PI offers LIS the unique opportunity to consider the open question of the document or the record from the point of view of the document or record itself. As Day (2011) has noted in his “Death of the User,” the current understanding in LIS of the manifold relationships among human beings and information objects is in serious need of revision. Although it is extraordinarily difficult to guess what it might be to “be” other nonhuman entities with various informational properties, especially due to our innate tendency to anthropomorphize other entities, it is perhaps not beyond our powers to imagine what documents we ourselves are now or may become in the future. Such an exercise in empathy might be the beginnings of an “informational macro-ethics” turn, which could then be extended beyond our selves.

Viewing Turing himself as a representative figure of the very early stages of the fourth revolution may help illustrate this issue. The story of Turing’s suicide (Hodges, 2012) indicates that the classification of one’s “record” within particular sectors of a society’s graphical records can have profound personal consequences far different from any other manifestations of one’s work and survive long after one’s physical death, whether that death is of an individual, such as Turing, or a group, such as the authors of the clandestine Shabbat Oneg archives in the Warsaw Ghetto (Kassow, 2011).

A better-known example is Anne Frank, arguably the most important single voice of the Holocaust

(Kluger, 2008, p. x). And yet Frank would most likely be as unknown as the other 1.5 million child victims listed in the Yad Vashem records had her diary had not survived as a document, the publication of which has allowed generations after her death to not only know of her, but to feel that they know her (Spector & Jones, 2007). It is also apparent that her document has been appropriated across cultures over time in multiple ways that she herself might well find unrecognizable (Wilson, 2013).

Young people leaving their own digital traces today, whether as postings on Facebook or elsewhere in the infosphere, may similarly form part of the historical record without realizing that they too are in the process of “becoming” a document. The creation and destruction of documents, therefore, whether through accidental or deliberate means, becomes a matter for more serious contemplation than it has received to date in most of LIS, where there is a tendency to focus on matters of retention and de-selection on a purely mundane basis of increased efficiencies in storage and/or retrieval. Only very recently has the “afterlife” of digital documents attracted broader research attention (Bollmer, 2013).

Another celebrated example can be found in research on medical records. It is perhaps not widely appreciated that medical records have been more or less tightly connected with librarianship for well over a century (Henry, 2011), although usually differentiated and sometimes marginalized as “medical records librarianship.” This relationship developed as hospitals became increasingly institutionalized and instrumental in the rationalization of what were originally separate records formally and informally kept for various purposes by physicians, nurses, pharmacists, surgeons, and the hospital itself (Craig, 1989, 1990).

The evolution and aggregation of these different records over time into today’s electronic medical record has reemphasized its importance in information studies (Siegler, 2010). Medical records have multiple purposes, both administrative and medical, and these have converged over time to the extent that Berg and Bowker (1997) can refer to “the multiple bodies of the medical record,” and claim that these records do not merely represent the patients’ bodies, but materially rewrite them, incorporating them into both the body politic and into bodies of knowledge.

The commonly used term *patient* in medical discussions is, of course, quite distinct from how it is used in ethical discussions, but Floridi’s “On the Intrinsic Value of Information Objects and the Infosphere” (2002b) provides an instructive connection between them through viewing a human being (“Mary”) as a patient at different levels of abstraction in the medical-record context. While Mary obviously has rights as a living patient in the hospital, including both legal and moral rights, the extent to which she also becomes a patient in the medical-records context exemplifies the utility that PI could bring to these discussions.

Floridi notes that Mary has certain, presumably inalienable rights as both a living patient and moral

“patient” (that is, a patient as the subject of agency by another, such as doctors and nurses in the hospital) that do not depend on the normal functioning of a human being. For instance, an unconscious, comatose, or brain-dead Mary (p. 294) still enjoys these rights as a patient. Floridi states that even after death, her body “still enjoys a degree of intrinsic moral worth because of its nature as an information object [in this case, pertaining to Mary’s unique identity] and as such it can exercise a corresponding claim to moral respect” (p. 296).

He also claims that the moral worth of an informational object such as Mary has become does not end here:

This is not a good reason to conclude that, if Mary is reduced to an information object . . . [such as] an entry in a database, then this information object is devoid of any moral value and can be rightly vandalised, exploited, degraded, or carelessly manipulated irrespectively of any moral concern and constraint . . . an entity x can be respected at different LoA, including the level at which x is only an information object. (2002b, p. 296.)

Although Mary is a fictional example, Henrietta Lacks (or “HeLa,” as her cell line subsequently became known as an important informational object in cancer research) is not (Acker, in press; Skoot, 2010), and Floridi’s argument here may explain why her case (W. Anderson, 2013) resonates so deeply with us. According to Floridi (2002b), PI’s information macro-ethics will allow us

[t]o be able to expand ‘the everwidening circle of ecological consciousness’ . . . and to appreciate what a has in common with p when p is an information object, [thus] a should try to transcend a ’s own particular nature, recognise a ’s own minimal status as an information object as well, and then extend the respect—which a would expect any other agent to pay to a as an information object—to any other information object that may be the patient of a ’s actions. All this requires a change in ethical sensibility. If over-simplified, the perspective can easily be made absurd or ridiculous. Of course, IE does not argue that destroying an old copy of a database is a moral crime in itself. This is just too silly. IE argues that destroying a unique database can be morally evaluated at different levels of abstraction, and that most macroethics work at the low level represented by anthropocentric or biocentric interests, and are perfectly justified in doing so, but that there is also a higher, more minimalist level at which all entities share a lowest common denominator, their nature as information objects, and that this level too can contribute to our ethical understanding. (p. 302)

Were we to accept Floridi’s view of information ethics as encompassing informational objects,

especially those whose “content genealogy” shows clear connections with human lineages, it would deepen the LIS discourse substantially, from the present practical focus on maintaining privacy, maximizing efficiency, and fulfilling legal requirements to viewing these documents as informational objects worthy of respect in their own right. Other examples particularly worth considering as informational patients in this regard might be fetal images (Raucher, 2009), photographs of unclaimed modern human remains (Kimmerle, Falsetti, & Ross, 2010) or cremains (Maisel, 2007), and biobanks and other genetic databases (Cordell, 2011). They raise important questions as to when and whether informational objects like these begin to acquire moral worth in Floridi’s sense sufficient to make their survival beyond the present transcend other more pragmatic considerations. Other “embodied” records, such as the photographs found at so-called trauma sites like Tuol Sleng in Cambodia (Violi, 2012), offer compelling examples. Certainly, burned archives and looted libraries also could be considered trauma sites and their contents equally worthy of respect and preservation. A similar logic might apply to other documents like art and other informational objects of cultural heritage (Sax, 1999) or natural heritage (Carmichael, Hubert, Reeves, & Schanche, 1994), as well as elsewhere in the infosphere.

According to Floridi (2002b), PI attempts to draw

our attention to problems that will become increasingly important the more dephysicalised and digitalised our environment becomes. In a society that calls itself ‘the information society’ it is vital to develop an ethical theory that has the conceptual resources to take into account the status of information objects. IE is an ‘architectural’ ethics, an ethics addressed not only to the users but also to the creators and designers of the infosphere. (p. 302)

This IE element of the fourth revolution would mean not only a continuation of the current trend to more collective stewardship of the global cultural heritage, but perhaps might lead to a more thoughtful reexamination of documents of all descriptions as providing useful “observables” for this endeavor. Floridi has left this question open to LIS investigation. When and if the philosophy of library and information studies extends so far beyond the concerns of the local collection, it may become no longer acceptable to remain indifferent to the documented presence of agnotology (Proctor, 2008), anti-epistemology (Galison, 2004), or apathy (Andersen, 2005) elsewhere in the infosphere and consequently make Floridi’s concerns even more meaningful to us.

Conclusion

This introductory essay has attempted to provide an accessible guide to some of the many apparent possibilities and potential problems for LIS in Floridi’s philosophy of information. These seem to suggest that LIS may just be as important to PI as PI is to LIS in terms of deepening our mutual

understanding of information ontologies, the dynamics of informational domains, and the variety of evolving relationships among information organisms and information objects.

The reader is urged to consult Floridi's own works, particularly his books (1999b, 2010a, 2011b, 2013a, 2014b), for a much deeper understanding of his ideas, which have been only cursorily discussed here, and to consider whether PI can indeed offer new energies and synergies to the LIS research enterprise, as well as what might be considered a poetic for LIS practice:

In the informational fabric that we call Being, there are some special nodes. . . [T]hese nodes are informational structures like all other nodes, encapsulated packets of differences, relations and processes, which contribute to the value and richness of the whole. Their special nature lies not in what they are—in their physics and biochemistry, to use a different level of abstraction—but in what they can do, for they are *structuring structures*, the ultimate defence against entropy/evil. They are the *loci* where the flow of information reaches its maturity and becomes self-conscious, capable of self-determination and able to decouple itself from the rest of the fabric and reflecting on its own nature and status, thus shifting from a Darwinian, physical evolution to a Lamarckian, mental development (we have developed incommensurably faster than our bodies). Such nodes, you and I included, have an unclear destiny. They might hope that their moral struggle against entropy is actually a small episode in a divine plan. If so, this can only be reason for rejoicing. Or they might fear that such a struggle is unfortunately only a titanic effort in an unrewarding and lonely universe, a thin red line against the vandalism of time, whose failure can be delayed and mitigated, but not avoided. If so, this should still be reason for some modest rejoicing, for they will have helped reality to die a more graceful death. Such nodes are the stewards of Being. They may do whatever they like, as long as they are careful. (Floridi, 2010c, pp. 279–280)

This, as we may think, seems entirely consistent with a “metaphysics of the library.”

Note

1. Notable contributions to this discussion include: Artandi, 1973; Bade, 2013; Bates, 2005; Benediktsson, 1989; Benoît, 2002; Bivens-Tatum, 2006; Brier, 1996; Brothman, 2001, 2002; Budd, 2001, 2011, 2013a, 2013b; Buschman, 2003, 2006; Butler, 1952; Capurro, 2009; Cook, 1984; Cornelius, 1996, 2014; Day, 1996, 2005, 2008a; Dick, 1999, 2002, 2013; Dow, 1977; Eastwood, 2002; Fallis, 2008; Fox, 1983; Frohmann 2004a; Furner, 2014; Hansson, 2005; Harris, 1986; Hjørland, 1997, 1998, 2000a, 2004, 2005; Hoel, 1992; Hofkirchner, 2014; Jones, 2005, 2008; Ketelaar, 2001, 2002, 2012;

Kolitsch, 1945; Lingard, 2013; Lloyd, 2007; Lor, 2014; Madden, 2014; Mai, 2013; Manoff, 2001, 2004; Mukherjee, 1966; Natoli, 1982; Neill, 1992; Nesmith, 2002; Nitecki, 1979, 1985; O'Toole, 1993; Olson, 1997; Radford, 1992, 1998; Rawski, 1973; Rudd, 1983; Shera, 1973; Smiraglia & Van den Heuvel, 2013; Sundin & Johannesson, 2005; Talja, Tuominen, & Savolainen, 2005; Thornley, 2012; Trosow, 2001; Warner, 2008; Wilson, 1983; Wright, 1978; Zins, 2007.

References

- Acker, A. (in press). How cells became records: Standardization and infrastructure in tissue culture. *Archival Science*. doi: 10.1007/s10502-013-9213-x
- Adams, F., & de Moraes, J. A. (in press). Is there a philosophy of information? *Topoi*. doi 10.1007/s11245-014-9252-9
- Agre, P. E. (1997). *Computation and human experience*. New York: Cambridge University Press.
- Allo, P. (2010). Putting information first: Luciano Floridi and the philosophy of information. *Metaphilosophy*, 41(3), 247–254.
- Allo, P. (2014). Relevant information and relevant questions: Comment on Floridi's "Understanding epistemic relevance." *Minds and Machines*, 24(1), 71–83.
- Amoore, L. (2009). Lines of sight: On the visualization of unknown futures. *Citizenship Studies*, 13(1), 17–30.
- Andersen, J. (2005). Information criticism: Where is it? *Progressive Librarian*, 25, 12–22.
- Anderson, K. (2013). The footprint and the stepping foot: Archival records, evidence, and time. *Archival Science*, 13(4), 349–371.
- Anderson, W. (2013). The case of the archive. *Critical Inquiry*, 39(3), 532–547.
- Artandi, S. (1973). Information concepts and their utility. *Journal of the American Society for Information Science*, 24(4), 242–245.
- Artz, J. M. (1997). A crash course in metaphysics for the database designer. *Journal of Database Management*, 8(4), 25–30.
- Bade, D. (2013). What happened to politics and ethics? *Journal of Information Ethics*, 22(1), 80–108.
- Báez, F. (2008). *A universal history of the destruction of books: From ancient Sumer to modern Iraq*. (A. McAdam, Trans.). New York: Atlas & Co.
- Bastian, J. A. (2002). Taking custody, giving access: A postcustodial role for a new century. *Archivaria*, 53, 76–93.

- Bates, M. J. (2005). Information and knowledge: An evolutionary framework for information science. *Information Research*, 10(4), paper 239. Retrieved July 14, 2014, from <http://InformationR.net/ir/10-4/paper239.html>
- Bawden, D., Robinson, L., & Siddiqui, T. (in press2014). Potentialities or possibilities: Towards a quantum information science? *Journal of the American Society for Information Science and Technology*. doi 10.1002/as.23192
- Beavers, A. F. (2011). Historicizing Floridi: The question of method, the state of the profession, and the timeliness of Floridi's philosophy of information. *Ethics and Politics*, 13(2), 255–275.
- Benediktsson, D. (1989). Hermeneutics: Dimensions toward LIS thinking. *Library and Information Science Research*, 11(3), 210–234.
- Benini, M., & Gobbo, F. (2014). Algorithms and their explanations. In A. Beckmann, E. Csuhag-Varjú, & K. Meer (Eds.), *Language, Life, Limits* (pp. 32–41). Cham, Switzerland: Springer.
- Benoît, G. (2002). Toward a critical theoretic perspective in information systems. *The Library Quarterly*, 72(4), 441–471.
- Benoît, G. (2006). The philosophy of information. *Library and Information Science Research*, 28(1), 160–165.
- Berg, M., & Bowker, G. (1997). The multiple bodies of the medical record: Toward a sociology of an artifact. *The Sociological Quarterly*, 38(3), 513–537.
- Bivens-Tatum, W. (2006). Technological change, universal access, and the end of the library. *Library Philosophy and Practice*, paper 88. Retrieved July 14, 2014, from <http://digitalcommons.unl.edu/libphilprac/88>
- Bollmer, G. D. (2013). Millions now living will never die: Cultural anxieties about the afterlife of information. *The Information Society*, 29(3), 142–151.
- Boulding, K. E. (1970). *Economics as a science*. New York: McGraw-Hill.
- Boyles, J. G., Cryan, P. M., McCracken, G. F., & Kunz, T. H. (2011). Economic importance of bats in agriculture. *Science*, 332(6025), 41–42.
- Brey, P. (2008). Do we have moral duties toward information objects? *Ethics and Information Technology*, 10, 109–114.
- Brier, S. (1996). Cybersemiotics: A new interdisciplinary development applied to the problems of knowledge organisation and document retrieval in information science. *Journal of Documentation*, 52(3), 296–344.
- Briet, S. (2006). *What is documentation?* (R. E. Day and L. Martinet, Trans.). Lanham, MD: Scarecrow Press. (Original work published 1951)

- Brooks, B. C. (1973). Jesse Shera and the theory of bibliography. *Journal of Librarianship*, 5(4), 233–245, 258.
- Brothman, B. (2001). The past that archives keep: Memory, history, and the preservation of archival records. *Archivaria*, 51, 48–80.
- Brothman, B. (2002). Afterglow: Conceptions of record and evidence in archival discourse. *Archival Science*, 2(3–4), 311–341.
- Brothman, B. (2006). Archives, life cycles, and death wishes: A helical model of record formation. *Archivaria*, 61, 235–269.
- Bryant, L. R. (2011). *The democracy of objects*. Ann Arbor, MI: Open Humanities Press.
- Buckland, M. K. (1991). Information as thing. *Journal of the American Society for Information Science*, 42(5), 351–360.
- Buckland, M. K. (1997). What is a “document”? *Journal of the American Society for Information Science*, 48(9), 804–809.
- Buckland, M. K. (2005). The philosophy of information. *Journal of Documentation*, 61(5), 684–686.
- Budd, J. M. (1995). An epistemological foundation for library and information science. *The Library Quarterly*, 65(3), 295–318.
- Budd, J. M. (2001). *Knowledge and knowing in library and information science: A philosophical framework*. Lanham, MD: Scarecrow Press.
- Budd, J. M. (2002). Jesse Shera, social epistemology, and praxis. *Social Epistemology*, 16(1), 95–98.
- Budd, J. M. (2011). Meaning, truth, and information: Prolegomena to a theory. *Journal of Documentation*, 67(1), 56–74.
- Budd, J. M. (2013a). A reply to Lingard. *Journal of Documentation*, 69(4), 500–506.
- Budd, J. M. (2013b). Re-conceiving information studies: A quantum approach. *Journal of Documentation*, 69(4), 567–579.
- Buschman, J. (1995). Libraries and the underside of the information age. *Libri*, 45(9), 209–215.
- Buschman, J. (2003). *Dismantling the public sphere: Situating and sustaining librarianship in the age of the new public philosophy*. Westport, CT: Libraries Unlimited.
- Buschman, J. (2006). “The integrity and obstinacy of intellectual creations”: Jürgen Habermas and librarianship’s theoretical literature. *The Library Quarterly*, 76(3), 270–299.
- Butler, P. (1933). *An introduction to library science*. Chicago: University of Chicago Press.
- Butler, P. (1952). The cultural function of the library. *The Library Quarterly*, 22(2), 79–91.

- Bynum, T. W. (2008). Norbert Wiener and the rise of information ethics. In J. van den Hoven & J. Weckert (Eds.), *Information technology and moral philosophy* (pp. 8–25). New York: Cambridge University Press.
- Bynum, T. W. (2010). Philosophy in the information age. *Metaphilosophy*, 41(3), 420–442.
- Bynum, T. W. (2014). On the possibility of quantum informational structural realism. *Minds and Machines*, 24(1), 123–139.
- Bynum, T. W., & Moor, J. H. (1998). How computers are changing philosophy. In T. W. Bynum & J. H. Moor (Eds.), *The digital phoenix: How computers are changing philosophy* (pp. 1–14). Oxford: Blackwell Publishers.
- Byron, M. (2010). Floridi's fourth revolution and the demise of ethics. *Knowledge, Technology and Policy*, 23(1–2), 135–147.
- Campbell, J. (2007). One hundred years of pragmatism. *Transactions of the Charles S. Peirce Society*, 43(1), 1–15.
- Capurro, R. (2009). Past, present, and future of the concept of information. *tripleC: Communication, Capitalism and Critique*, 7(2), 125–141.
- Carmichael, D. L., Hubert, J., Reeves, B., & Schanche, A. (1994). *Sacred sites, sacred spaces*. Abingdon, UK: Routledge.
- Caswell, M. (2013). On archival pluralism: What religious pluralism (and its critics) can teach us about archives. *Archival Science*, 13(4), 273–292.
- Caticha, A. (2014). Towards an informational pragmatic realism. *Minds and Machines*, 24(1), 37–70.
- Christen, K. A. (2012). Does information really want to be free? Indigenous knowledge systems and the question of openness. *International Journal of Communication*, 6, 2870–2893.
- Churchland, P. M., & Churchland, P. S. (1983). Stalking the wild epistemic engine. *Noûs*, 17(1), 5–18.
- Clynes, M. E., & Kline, N. S. (1960). Cyborgs and space. *Astronautics*, (September 1960), 26–27, 74–76.
- Colburn, T., & Shute, G. (2011). Abstraction, law, and freedom in computer science. In P. Allo (Ed.), *Putting information first: Luciano Floridi and the philosophy of information* (pp. 97–115). Oxford: Wiley-Blackwell.
- Contessa, G. (2010). Scientific models and fictional objects. *Synthese*, 172(2), 215–229.
- Conway, P. (in press). Digital transformations and the archival nature of surrogates. *Archival Science*. doi 10.1007/s10502-014-9219-z
- Cook, T. (1984). From information to knowledge: An intellectual paradigm for archives. *Archivaria*, 19, 28–49.

- Cook, T. (2011). "We are what we keep; we keep what we are": Archival appraisal past, present and future. *Journal of the Society of Archivists*, 32(2), 173–189.
- Cook, T. (2013). Evidence, memory, identity, and community: Four shifting archival paradigms. *Archival Science*, 13(2–3), 95–120.
- Cordell, S. (2011). The biobank as an ethical subject. *Health Care Analysis*, 19(3), 282–294.
- Cornelius, I. (1996). *Meaning and method in information studies*. Norwood, NJ: Ablex Publishing.
- Cornelius, I. (2004). Information and its philosophy. *Library Trends*, 52(3), 377–386.
- Cornelius, I. (2014). Epistemological challenges for information science: Constructing information. In F. Ibekwe-SanJuan & T. M. Dousa (Eds.), *Theories of information, communication and knowledge: A multidisciplinary approach* (pp. 181–203). Dordrecht, Netherlands: Springer.
- Craig, B. L. (1989). Hospital records and record-keeping, c. 1850–c. 1950, part I: The development of records in hospitals. *Archivaria*, 29, 57–87.
- Craig, B. L. (1990). Hospital records and record-keeping, c. 1850–c. 1950, part II: The development of record-keeping in hospitals. *Archivaria*, 30, 21–38.
- Crane, T. (1996). *The mechanical mind: A philosophical introduction to minds, machines and mental representation*. London: Penguin.
- Crawford, W., & Gorman, M. (1995). *Future libraries: Dreams, madness, and reality*. Chicago: American Library Association.
- Crnkovic, G. D., & Hofkirchner, W. (2011). Floridi's "Open problems in philosophy of information," ten years later. *Information*, 2(2), 327–359.
- Cumming, K. (2010). Ways of seeing: Contextualising the continuum. *Records Management Journal*, 20(1), 41–52.
- Currall, J. E. P., Moss, M., & Stuart, S. (2005). What is a collection? *Archivaria*, 58, 131–146.
- Currall, J. E. P., Moss, M., & Stuart, S. (2006). Privileging information is inevitable. *Archives and Manuscripts*, 34(1), 98–122.
- Danton, J. P. (1934). Plea for a philosophy of librarianship: *Philosophia vero omnium mater artium. The Library Quarterly*, 4(4), 527–551.
- Day, R. E. (1996). LIS, method, and postmodern science. *Journal of Education for Library and Information Science*, 37(4), 317–324.
- Day, R. E. (2005). Poststructuralism and information studies. *Annual Review of Information Science and Technology*, 39, 575–609.
- Day, R. E. (2008a). *The modern invention of information: Discourse, history, and power*. Carbondale: Southern Illinois University Press.

- Day, R. E. (2008b). Works and representation. *Journal of the American Society for Information Science and Technology*, 59(10), 1644–1652.
- Day, R. E. (2011). Death of the user: Reconceptualizing subjects, objects, and their relations. *Journal of the American Society for Information Science and Technology*, 62(1), 78–88.
- Dick, A. L. (1999). Epistemological positions and library and information science. *The Library Quarterly*, 69(3), 305–323.
- Dick, A. L. (2002). Social epistemology, information science, and ideology. *Social Epistemology*, 16(1), 23–35.
- Dick, A. L. (2013). Why epistemology matters. *Information Development*, 29(1), 7–9.
- Dow, J. I. (1977). A metatheory for the development of a science of information. *Journal of the American Society for Information Science*, 28(6), 323–331.
- Doyle, T. (2010). A critique of information ethics. *Knowledge, Technology and Policy*, 23(1–2), 163–175.
- Duff, W. M., & Harris, V. (2002). Stories and names: Archival description as narrating records and constructing meanings. *Archival Science*, 2(3–4), 263–285.
- Dunn, J. M. (2013). A guide to the Floridi keys. *Metascience*, 22, 93–98.
- Durante, M. (2011). Normativity, constructionism, and constraining affordances. *Ethics and Politics*, 13(2), 180–200.
- Durante, M. (2013). Dealing with legal conflicts in the information society: An informational understanding of balancing competing interests. *Philosophy and Technology*, 26(4), 437–457.
- Eastwood, T. (2002). Reflections on the goal of archival appraisal in democratic societies. *Archivaria*, 54, 59–71.
- Effingham, N. (2013). *An introduction to ontology*. Cambridge: Polity Press.
- Egan, M. E., & Shera, J. H. (1952). Foundations of a theory of bibliography. *The Library Quarterly*, 22(2), 125–137.
- Ekbia, H. R. (2009). Digital artifacts as quasi-objects: Qualification, mediation, and materiality. *Journal of the American Society for Information Science and Technology*, 60(12), 2554–2566.
- Enright, N. F. (2011). You can't polish a pumpkin: Scattered speculations on the development of information ethics. *Journal of Information Ethics*, 20(2), 103–126.
- Ess, C. (2009). Floridi's philosophy of information and information ethics: Current perspectives, future directions. *The Information Society*, 25(3), 159–168.
- Fallis, D. (2002). Introduction: Social epistemology and information science. *Social Epistemology*, 16(1), 1–4.

- Fallis, D. (2004). On verifying the accuracy of information: Philosophical perspectives. *Library Trends*, 52(3), 463–487.
- Fallis, D. (2006). Social epistemology and information science. *Annual Review of Information Science and Technology*, 40, 475–519.
- Fallis, D. (2008). Toward an epistemology of Wikipedia. *Journal of the American Society for Information Science and Technology*, 59(10), 1662–1674.
- Fallis, D. (2011). Floridi on disinformation. *Ethics and Politics*, 13(2), 201–214.
- Feather, J. (2013). *The information society: A study of continuity and change* (6th ed.). London: Facet Publishing.
- Feinberg, M. (2007). Hidden bias to responsible bias: An approach to information systems based on Haraway's situated knowledges. *Information Research*, 12(4), 12–4. Retrieved July 14, 2014 from <http://www.informationr.net/ir/12-4/colis/colis07.html>
- Fetzer, J. H. (2004). Information: Does it have to be true? *Minds and Machines*, 14(2), 223–229.
- Fishburn, M. (2008). *Burning books*. New York: Palgrave Macmillan.
- Floridi, L. (1993). The problem of the justification of a theory of knowledge: (1) Some historical metamorphoses. *Journal for General Philosophy of Science*, 24, 205–233.
- Floridi, L. (1994). The problem of the justification of a theory of knowledge: (2) Morphology and diagnosis. *Journal for General Philosophy of Science*, 25, 17–49.
- Floridi, L. (1995a). Internet: Which future for organized knowledge, Frankenstein or Pygmalion? *International Journal of Human-Computer Studies*, 43, 261–274.
- Floridi, L. (1995b). The diffusion of Sextus Empiricus's works in the Renaissance. *Journal of the History of Ideas*, 56(1), 63–85.
- Floridi, L. (1996). *Scepticism and the foundations of epistemology: A study in the metalogical fallacies*. Leiden, Netherlands: E. J. Brill.
- Floridi, L. (1999a). Information ethics: On the philosophical foundation of computer ethics. *Ethics and Information Technology*, 1, 37–56.
- Floridi, L. (1999b). *Philosophy and computing: An introduction*. New York: Routledge.
- Floridi, L. (2001a). Ethics in the infosphere. *The Philosopher's Magazine*, 6, 18–19.
- Floridi, L. (2001b). Information ethics: An environmental approach to the digital divide. *Philosophy in the Contemporary World*, 9(1), 1–7.
- Floridi, L. (2002a). On defining library and information science as applied philosophy of information. *Social Epistemology*, 16(1), 37–49.
- Floridi, L. (2002b). On the intrinsic value of information objects and the infosphere. *Ethics and Information*

- Technology*, 4, 287–304.
- Floridi, L. (2002c). What is the philosophy of information? *Metaphilosophy*, 33(1–2), 123–145.
- Floridi, L. (2003). Informational realism. In J. Weckert & Y. Al-Saggaf (Eds.), *Selected papers from the conference on computers and philosophy—Volume 37 (CRPIT '03)* (pp. 7–12). Darlinghurst, Australia: Australian Computer Society.
- Floridi, L. (2004a). Afterword. LIS as applied philosophy of information: A reappraisal. *Library Trends*, 53(3), 658–685.
- Floridi, L. (2004b). Open problems in the philosophy of information. *Metaphilosophy*, 35(4), 554–582.
- Floridi, L. (2005). Is semantic information meaningful data? *Philosophy and Phenomenological Research*, 70(2), 351–370.
- Floridi, L. (2006a). Information ethics, its nature and scope. *ACM SIGCAS Computers and Society*, 36(3), 21–36.
- Floridi, L. (2006b). The logic of being informed. *Logique et Analyse*, 196, 1–28.
- Floridi, L. (2007). A look into the future impact of ICT on our lives. *The Information Society*, 23, 59–64.
- Floridi, L. (2008a). A defence of informational structural realism. *Synthese*, 161(2), 219–253.
- Floridi, L. (2008b). Artificial intelligence's new frontier: Artificial companions and the fourth revolution. *Metaphilosophy*, 39(4–5), 651–655.
- Floridi, L. (2008c). Data. In W. A. Darity (Ed.), *International encyclopedia of social sciences* (Vol. 2) (2nd ed.) (pp. 234–237.) Farmington Hills, MI: Macmillan Reference.
- Floridi, L. (2008d). The method of levels of abstraction. *Minds and Machines*, 18, 303–329.
- Floridi, L. (2008e). Understanding epistemic relevance. *Erkenntnis*, 69(1), 69–92.
- Floridi, L. (2009). Philosophical concepts of information. In G. Sommaruga (Ed.), *Formal theories of information: From Shannon to semantic information theory and general concepts of information* (pp. 13 –53). Lecture notes in computer science 5363. Berlin: Springer.
- Floridi, L. (2010a). *Information: A very short introduction*. New York: Oxford University Press.
- Floridi, L. (2010b). Semantic information and the correctness theory of truth. *Erkenntnis*, 74(2), 147–175.
- Floridi, L. (2010c). The philosophy of information as a conceptual framework. *Knowledge, Technology and Policy*, 23, 253–281.
- Floridi, L. (2011a). A defence of constructionism: Philosophy as conceptual engineering. *Metaphilosophy*, 42(3), 282–304.
- Floridi, L. (2011b). *The philosophy of information*. New York: Oxford University Press.
- Floridi, L. (2012a). Semantic information and the network theory of account. *Synthese*, 184(3), 431–454.
- Floridi, L. (2012b). The road to the philosophy of information. In H. Demir (Ed.), *Luciano Floridi's*

- philosophy of technology: Critical reflections* (pp. 245–271). Dordrecht, Netherlands: Springer.
- Floridi, L. (2012c). Turing's three philosophical lessons and the philosophy of information. *Transactions of the Royal Society A*, 370, 3535–3542.
- Floridi, L. (2013a). *The ethics of information*. New York: Oxford University Press.
- Floridi, L. (2013b). What is a philosophical question? *Metaphilosophy*, 44(3), 195–221.
- Floridi, L. (2014a). Perception and testimony as data providers. In F. Ibekwe-SanJuan & T. M. Dousa (Eds.), *Theories of information, communication and knowledge: A multidisciplinary approach* (pp. 71–95). Dordrecht, Netherlands: Springer.
- Floridi, L. (2014b). *The fourth revolution: How the infosphere is reshaping human reality*. New York: Oxford University Press.
- Floridi, L., & Sanders, J. W. (2002). Mapping the foundationalist debate in computer ethics. *Ethics and Information Technology*, 4(1), 1–9.
- Fox, C. J. (1983). *Information and misinformation: An investigation of the notions of information, misinformation, informing, and misinforming*. Westport, CT: Greenwood Press.
- Franke, M. F. (2009). Refugee registration as foreclosure of the freedom to move: The virtualisation of refugees' rights within maps of international protection. *Environment and Planning D: Society and Space*, 27(2), 352–369.
- Frické, M. (2009). The knowledge pyramid: A critique of the DIKW hierarchy. *Journal of Information Science*, 35(2), 131–142.
- Frigg, R. (2010). Models and fiction. *Synthese*, 172(2), 251–268.
- Frohmann, B. (2004a). *Deflating information: From science studies to documentation*. Toronto: University of Toronto Press.
- Frohmann, B. (2004b). Documentation redux: Prolegomenon to (another) philosophy of information. *Library Trends*, 52(3), 387–407.
- Frohmann, B. (2009). Revisiting “what is a document?” *Journal of Documentation*, 65(2), 291–303.
- Fry, J. (2006). Scholarly research and information practices: A domain analytic approach. *Information Processing and Management*, 42(1), 299–316.
- Fuchs, C. (2013). Capitalism or information society? The fundamental question of the present structure of society. *European Journal of Social Theory*, 16(4), 413–434.
- Fuller, S. (1987a). On regulating what is known: A way to social epistemology. *Synthese*, 73(1), 145–183.
- Fuller, S. (1987b). Social epistemology: A statement of purpose. *Social Epistemology*, 1(1), 1–4.
- Fuller, S. (1988). *Social epistemology*. Bloomington: Indiana University Press.

- Furner, J. (2002a). Bibliographic relationships, citation relationships, relevance relationships, and bibliographic classification: An integrative view. *Advances in Classification Research Online*, 13, 29–37.
- Furner, J. (2002b). Shera's social epistemology recast as psychological bibliology. *Social Epistemology*, 16(1), 5–22.
- Furner, J. (2004a). "A brilliant mind": Margaret Egan and social epistemology. *Library Trends*, 52(4), 792–809.
- Furner, J. (2004b). Conceptual analysis: A method for understanding information as evidence, and evidence as information. *Archival Science*, 4, 233–265.
- Furner, J. (2010). Philosophy and information studies. *Annual Review of Information Science and Technology*, 44, 159–200.
- Furner, J. (2014). Information without information studies. In F. Ibekwe-SanJuan & T. M. Dousa (Eds.), *Theories of information, communication and knowledge: A multidisciplinary approach* (pp. 143–179). Dordrecht, Netherlands: Springer.
- Galison, P. (2004). Removing knowledge. *Critical Inquiry*, 31(1), 229–243.
- Giardino, V. (2012). I mean it! (and I cannot help it): Cognition and (semantic) information. In H. Demir (Ed.), *Luciano Floridi's philosophy of technology: Critical reflections* (pp. 105–122). Dordrecht, Netherlands: Springer.
- Gilliland, A. J., & McKemmish, S. (2012). Recordkeeping metadata, the archival multiverse, and societal grand challenges. In *Metadata for meeting global challenges: Proceedings of the 2012 international conference on Dublin Core and metadata applications, Kuching, Sarawak, Malaysia, Sept. 3–7, 2012* (pp. 106–115). Retrieved July 14, 2014, from <http://dcevents.dublincore.org/index.php/IntConf/dc-2012/schedConf/presentations>
- Gnoli, C. (2010). Classification transcends library business. *Knowledge Organization*, 37(3), 223–229.
- Gnoli, C., & Ridi, R. (2014). Unified theory of information, hypertextuality and levels of reality. *Journal of Documentation*, 70(3), 443–460.
- Gobbo, F., & Benini, M. (2014). The minimal levels of abstraction in the history of modern computing. *Philosophy and Technology*, 27(3), 327–343.
- Golan, A. (2014). Information dynamics. *Minds and Machines*, 24(1), 19–36.
- Goldman, A. (1999). *Knowledge in a social world*. New York: Oxford University Press.
- Greco, G. N., Paronitti, G., Turilli, M., & Floridi, L. (2005). How to do philosophy informationally. In K.-D. Althoff, A. Dengel, R. Bergmann, M. Nick, & T. Roth-Berghofer (Eds.), *Professional knowledge*

- management: Third biennial conference, WM 2005, Kaiserslautern, Germany, April 10–13, 2005, revised selected papers* (pp. 623–634). Berlin: Springer.
- Hanley, R. (2004). As good as it gets: Lewis on truth in fiction. *Australasian Journal of Philosophy*, 82(1), 112–128.
- Hansson, J. (2005). Hermeneutics as a bridge between the modern and the postmodern in library and information science. *Journal of Documentation*, 61(1), 102–113.
- Haraway, D. (1991). A cyborg manifesto: Science, technology, and socialist-feminism in the late twentieth century. In *Simians, cyborgs, and women: The reinvention of nature* (pp. 149–181). New York: Routledge.
- Harman, G. (2005). *Guerrilla metaphysics: Phenomenology and the carpentry of things*. Chicago: Open Court.
- Harnad, S. (2011). Lunch uncertain. *Times Literary Supplement*, 5664, 22–23.
- Harris, M. H. (1986). The dialectics of defeat: Antimonies in research in library and information science. *Library Trends*, 34, 515–531.
- Heidegger, M. (2010). *Being and Time*. D. J. Schmidt (Ed.). (J. Stambaugh, Trans.). Albany: State University of New York Press. (Original work published 1953)
- Heim, M. H. (1993). *The metaphysics of virtual reality*. New York: Oxford University Press.
- Henry, G. F. (2011). Grace Whiting Myers (1859–1957): Library director, reference librarian, archivist, and records manager all in one! *Watermark: Newsletter of the Archivists and Librarians in the History of the Health Sciences*, 34(4), 10–15.
- Herold, K. (2003). An information continuum conjecture. *Minds and Machines*, 13(4), 553–566.
- Herold, K. (2004). Introduction to the special issue on the philosophy of information. *Library Trends*, 52(3), 373–376.
- Hjørland, B. (1997). *Information seeking and subject representation: An activity-theoretical approach to information science*. Westport, CT: Greenwood Press.
- Hjørland, B. (1998). Theory and metatheory of information science: A new interpretation. *Journal of Documentation*, 54(5), 606–621.
- Hjørland, B. (2000a). Documents, memory institutions and information science. *Journal of Documentation*, 56(1), 27–41.
- Hjørland, B. (2000b). Library and information science: Practice, theory, and philosophical basis. *Information Processing & Management*, 36(3), 501–531.
- Hjørland, B. (2002a). Domain analysis in information science: Eleven approaches—traditional as well as innovative. *Journal of Documentation*, 58(4), 422–462.

- Hjørland, B. (2002b). Epistemology and the socio-cognitive perspective in information science. *Journal of the American Society for Information Science and Technology*, 53(4), 257–270.
- Hjørland, B. (2004). Arguments for philosophical realism in library and information science. *Library Trends*, 52(3), 488–506.
- Hjørland, B. (2005). Empiricism, rationalism and positivism in library and information science. *Journal of Documentation*, 61(1), 130–155.
- Hjørland, B. (2010). The foundation of the concept of relevance. *Journal of the American Society for Information Science and Technology*, 61(2), 217–237.
- Hjørland, B. (2014). Information science and its core concepts: Levels of disagreement. In F. Ibekwe-SanJuan & T. M. Dousa (Eds.), *Theories of information, communication and knowledge: A multidisciplinary approach* (pp. 205–235). Dordrecht, Netherlands: Springer.
- Hjørland, B., & Albrechtsen, A. (1995). Toward a new horizon in information science: Domain-analysis. *Journal of the American Society for Information Science*, 46(6), 400–425.
- Hjørland, B., & Hartel, J. (2003). Afterword: Ontological, epistemological and sociological dimensions of domains. *Knowledge Organization*, 30(3), 239–245.
- Hodges, A. (2012). *Alan Turing, the enigma*. Princeton, NJ: Princeton University Press.
- Hoel, I. A. L. (1992). Information science and hermeneutics: Should information science be interpreted as a historical and humanistic science? In P. Vakkari & B. Cronin (Eds.), *Conceptions of library and information science: Historical, empirical and theoretical perspectives* (pp. 69–81). London: Taylor Graham.
- Hofkirchner, W. (2014). Epistemology and the study of social information within the perspective of a unified theory of information. In F. Ibekwe-SanJuan & T. M. Dousa (Eds.), *Theories of information, communication and knowledge: A multidisciplinary approach* (pp. 51–69). Dordrecht, Netherlands: Springer.
- Huvila, I. (2008). Participatory archive: Towards decentralized curation, radical user orientation, and broader contextualization of records management. *Archival Science*, 8(1), 15–36.
- Jackson, F. (1998). *From metaphysics to ethics: A defence of conceptual analysis*. Oxford: Oxford University Press.
- Jacob, E. K. (2004). Classification and categorization: A difference that makes a difference. *Library Trends*, 52(3), 515–540.
- Jacobsen, T., Punzalan, R. L., & Hedstrom, M. L. (2013). Invoking “collective memory”: Mapping the emergence of a concept in archival science. *Archival Science*, 13(2–3), 217–251.
- Jones, B. (2005). Revitalizing theory in LIS: The contribution of process philosophy. *The Library*

- Quarterly*, 75(2), 101–121.
- Jones, B. (2008). Reductionism and library and information science philosophy. *Journal of Documentation*, 64(4), 482–495.
- Kassow, S. D. (2011). *Who will write our history? Rediscovering a hidden archive from the Warsaw Ghetto*. New York: Random House.
- Ketelaar, E. (2001). Tacit narratives: The meanings of archives. *Archival Science*, 1(2), 131–141.
- Ketelaar, E. (2002). Archival temples, archival prisons: Modes of power and protection. *Archival Science*, 2(3–4), 221–238.
- Ketelaar, E. (2012). Cultivating archives: Meanings and identities. *Archival Science*, 12(1), 19–33.
- Kimmerle, E. H., Falsetti, A., & Ross, A. H. (2010). Immigrants, undocumented workers, runaways, transients and the homeless: Towards contextual identification among unidentified decedents. *Forensic Science Policy and Management*, 1(4), 178–186.
- Kincaid, H. (2013). Introduction: Pursuing a naturalist metaphysics. In D. Ross, J. Ladyman, & H. Kincaid (Eds.), *Scientific metaphysics* (pp. 1–26). Oxford: Oxford University Press.
- Kluger, R. (2008). Preface. In G. Aly, *Into the tunnel: The brief life of Marion Samuels, 1931–1943*. New York: Palgrave Macmillan.
- Knight, A. J. (2008). “Bats, snakes and spiders, Oh my!” How aesthetic and negativistic attitudes, and other concepts predict support for species protection. *Journal of Environmental Psychology*, 28(1), 94–103.
- Knuth, R. (2003). *Libricide: The regime-sponsored destruction of books and libraries in the twentieth century*. Westport, CT: Greenwood Press.
- Knuth, R. (2006). *Burning books and leveling libraries: Extremist violence and cultural destruction*. Westport, CT: Greenwood Press.
- Kolitsch, M. (1945). Toward a philosophy of librarianship. *The Library Quarterly*, 15(1), 25–31.
- Kunz, T. H., & Parsons, S. (2009). *Ecological and behavioral methods for the study of bats* (2nd ed.). Baltimore: Johns Hopkins University Press.
- Latour, B. (2005). *Reassembling the social: An introduction to actor-network theory*. New York: Oxford University Press.
- Lee, H.-L. (2000). What is a collection? *Journal of the American Society for Information Science*, 51(12), 1106–1113.
- Lewis, D. (1978). Truth in fiction. *American Philosophical Quarterly*, 15, 37–46.
- Lingard, R. G. (2013). Information, truth and meaning: A response to Budd's prolegomena. *Journal of Documentation*, 69(4), 481–499.

- Lloyd, A. (2007). Guarding against collective amnesia? Making significance problematic: An exploration of issues. *Library Trends*, 56(1), 53–65.
- Long, B. R. (2014). Information is intrinsically semantic but alethically neutral. *Synthese*, 191(14), 3447–3467.
- Lor, P. J. (2014). Revitalizing comparative library and information science: Theory and metatheory. *Journal of Documentation*, 70(1), 25–51.
- Lund, N. W. (2009). Document theory. *Annual Review of Information Science and Technology*, 43, 1–55.
- Lund, N. W. (2010). Document, text and medium: Concepts, theories and disciplines. *Journal of Documentation*, 66(5), 734–749.
- Machlup, F. (1962). *The production and distribution of information in the United States*. Princeton, NJ: Princeton University Press.
- MacLeish, A. (1972). The premise of meaning. *The American Scholar*, 41(3), 357–362.
- MacNeil, H. (2005). Picking our text: Archival description, authenticity, and the archivist as editor. *American Archivist*, 68(2), 264–278.
- Madden, A. D. (2014). Interpreting the world across a boundary: The evolution of information from life's first decisions to the information society. *Journal of Documentation*, 70(4), 676–686.
- Mai, J.-E. (2010). Classification in a social world: Bias and trust. *Journal of Documentation*, 66(5), 627–642.
- Mai, J.-E. (2011). The modernity of classification. *Journal of Documentation*, 67(4), 710–730.
- Mai, J.-E. (2013). The quality and qualities of information. *Journal of the American Society for Information Science and Technology*, 64(4), 675–688.
- Maisel, D. (2007). *Library of dust*. San Francisco: Chronicle Books.
- Manoff, M. (2001). The symbolic meaning of libraries in a digital age. *portal: Libraries and the Academy*, 1(4), 371–381.
- Manoff, M. (2004). Theories of the archive from across the disciplines. *portal: Libraries and the Academy*, 4(1), 9–25.
- Manoff, M. (2006). The materiality of digital collections: Theoretical and historical perspectives. *portal: Libraries and the Academy*, 6(3), 311–325.
- Manoff, M. (2010). Archive and database as metaphor: Theorizing the historical record. *portal: Libraries and the Academy*, 10(4), 385–398.
- Martens, B. V. (2011). Approaching the anti-collection. *Library Trends*, 59(4), 568–587.
- Martens, B. V., & Van Fleet, C. (2012). Opening the black box of “relevance work”: A domain analysis. *Journal of the American Society for Information Science and Technology*, 63(5), 936–947.

- Mason, R. O. (1986). Four ethical issues of the information age. *MIS Quarterly*, 10(1), 5–12.
- McKemmish, S., & Piggott, M. (2013). Toward the archival multiverse: Challenging the binary opposition of the personal and corporate archive in modern archival theory and practice. *Archivaria*, 76, 111–144.
- McKinlay, S. T. (2013). Information ethics and entropy. In *Proceedings of the 2013 Meeting of the International Association for Computing and Philosophy*. Retrieved July 14, 2014, from http://www.iacap.org/conferences/iacap2013/iacap_2013_proceedings/
- Meehan, J. (2006). Towards an archival concept of evidence. *Archivaria*, 61, 127–146.
- Meehan, J. (2009). The archival nexus: Rethinking the interplay of archival ideas about the nature, value, and use of records. *Archival Science*, 9(3–4), 157–164.
- Miksa, F. L. (1998). *The DDC, the universe of knowledge, and the post-modern library*. Albany, NY: Forest Press.
- Miksa, F. L. (2009). Information organization and the mysterious information user. *Libraries and the Cultural Record*, 44(3), 343–370.
- Millar, L. (2002). The death of the *fonds* and the resurrection of provenance: Archival context in space and time. *Archivaria*, 53, 1–15.
- Miller, G. A. (1983). Informavores. In F. Machlup & U. Mansfield (Eds.), *The study of information: Interdisciplinary messages* (pp. 111–113). New York: Wiley.
- Mitcham, C. (2014). Agency in humans and in artifacts: A contested discourse. In P. Kroes and P.-P. Verbeek (Eds.), *The moral status of technical artefacts* (pp. 11–29). Dordrecht, Netherlands: Springer.
- Monaco, S. F. (2005). Unusual accounting practices in archaic Mesopotamian tablets. *Cuneiform Digital Library Journal*, 1, 1–7. Retrieved July 14, 2014, from http://cdli.ucla.edu/pubs/cdlj/2005/cdlj2005_001.html
- Moor, J. (1985). What is computer ethics? *Metaphilosophy*, 16(4), 266–275.
- Mukherjee, A. K. (1966). *Librarianship: Its philosophy and history*. Bombay: Asia Publishing House.
- Mumford, S. (2012). *Metaphysics: A very short introduction*. New York: Oxford University Press.
- Nagel, T. (1974). What is it like to be a bat? *The Philosophical Review*, 83(4), 435–450.
- Natoli, J. P. (1982). Librarianship as a human science: Theory, method and application. *Library Research*, 4(2), 163–174.
- Neill, S. D. (1992). *Dilemmas in the study of information: Exploring the boundaries of information science*. Westport, CT: Greenwood Press.

- Nesmith, T. (2002). Seeing archives: Postmodernism and the changing intellectual place of archives. *American Archivist*, 65(1), 24–41.
- Nesmith, T. (2006). Reopening archives: Bringing new contextualities into archival theory and practice. *Archivaria*, 60, 259–274.
- Newkirk, A. (2013). The rise of the fusion-intelligence complex: A critique of political surveillance after 9/11. *Surveillance and Society*, 8(1), 43–60.
- Nitecki, J. Z. (1979). Metaphors of librarianship: A suggestion for a metaphysical model. *The Journal of Library History*, 14(1), 21–42.
- Nitecki, J. Z. (1985). The concept of information-knowledge continuum: Implications for librarianship. *The Journal of Library History*, 20(4), 387–407.
- Olson, H. A. (1997). The feminist and the emperor's new clothes: Feminist deconstruction as a critical methodology for library and information studies. *Library and Information Science Research*, 19(2), 181–198.
- Osburn, C. B. (2009). *The social transcript: Uncovering library philosophy*. Westport, CT: Libraries Unlimited.
- O'Toole, J. M. (1993). The symbolic significance of archives. *American Archivist*, 56(2), 234–255.
- Owens, B. M. (2012). The archival manuscript and the book: Tools of knowledge and artifacts of destruction during the Napoleonic Wars and the War of 1812. *Library and Archival Security*, 25(1), 5–19.
- Parikka, J., & Sampson, T. D. (2009). *The spam book: On viruses, porn, and other anomalies from the dark side of digital culture*. New York: Hampton Press.
- Paul, L. A. (2012). Metaphysics as modeling: The handmaiden's tale. *Philosophical Studies*, 160(1), 1–29.
- Pepp, J. (2012). Reference and referring: A framework. In W. P. Kabasenche, M. O'Rourke, & M. H. Slater (Eds.), *Reference and referring* (pp. 1–31). Cambridge, MA: MIT Press.
- Pepperell, R. (1995). *The posthuman condition: Consciousness beyond the brain*. Bristol, UK: Intellect Books.
- Piazza, T. 2010. Perceptual evidence and information. *Knowledge, Technology and Policy*, 23(1), 75–95.
- Pierce, S. (1992). Who are our “dead Germans”? *American Libraries*, 23(8), 641–643.
- Polastron, L. X. (2007). *Books on fire: The destruction of libraries throughout history*. Rochester, VT: Inner Traditions.
- Primiero, G. (2013). Offline and online data: On upgrading functional information to knowledge. *Philosophical Studies*, 164(2), 371–392.

- Proctor, R. N. (2008). A missing term to describe the cultural production of ignorance (and its study). In R. N. Proctor & L. Schiebinger (Eds.), *Agnostology: The making and unmaking of ignorance* (pp. 1–33). Palo Alto, CA: Stanford University Press.
- Radford, G. P. (1992). Positivism, Foucault, and the fantasia of the library: Conceptions of knowledge and the modern library experience. *The Library Quarterly*, 62(4), 408–424.
- Radford, G. P. (1998). Flaubert, Foucault, and the *bibliotheque fantastique*: Toward a postmodern epistemology for library science. *Library Trends*, 46(4), 616–634.
- Radford, G. P., & Budd, J. M. (1997). We do need a philosophy of library and information science: We're not confused enough. A response to Zwadlo. *The Library Quarterly*, 67(3), 315–321.
- Raucher, M. S. (2009). What they mean by “good science”: The medical community's response to boutique fetal ultrasounds. *Journal of Medical Philosophy*, 34(5), 528–544.
- Rawski, C. H. (1973). The interdisciplinarity of librarianship. In C. H. Rawski (Ed.), *Toward a theory of librarianship: Papers in honor of Jesse H. Shera* (pp. 115–146). Metuchen, NJ: Scarecrow Press.
- Rayward, W. B. (2004). Scientific and technical information systems in their many contexts. In W. B. Rayward & M. E. Bowden (Eds.), *The history and heritage of scientific and technological information systems: Proceedings of the 2002 conference* (pp. 1–11). Medford, NJ: Information Today.
- Rowat, T. (1993). The record and repository as a cultural form of expression. *Archivaria*, 36, 198–204.
- Rowley, J. (2007). The wisdom hierarchy: Representations of the DIKW hierarchy. *Journal of Information Science*, 33(2), 163–180.
- Rudd, D. (1983). Do we really need World III? Information science with or without Popper. *Journal of Information Science*, 7(3), 99–105.
- Saab, D. J., & Riis, U. W. (2011). Information as ontologization. *Journal of the American Society for Information Science and Technology*, 62(11), 2236–2246.
- Saitta, L., & Zucker, J.-D. (2013). *Abstraction in artificial intelligence and complex systems*. New York: Springer.
- Sax, J. L. (1999). *Playing darts with a Rembrandt: Public and private rights in cultural treasures*. Ann Arbor: University of Michigan Press.
- Scarantino, A., & Piccinini, G. (2010). Information without truth. *Metaphilosophy*, 41(3), 313–330.
- Sequoiah-Grayson, S. (2007). The metaphilosophy of information. *Minds and Machines*, 17(3), 331–344.
- Shera, J. H. (1950). The UNESCO conference on the improvement of bibliographic services: A preliminary report. *American Documentation*, 1(3), 143–146.
- Shera, J. H. (1967). Librarians against machines. *Science*, 156(3776), 746–750.

- Shera, J. H. (1968). An epistemological foundation for library science. In E. B. Montgomery (Ed.), *Foundations of access to knowledge: A symposium* (pp. 7–25). Syracuse, NY: Syracuse University Press.
- Shera, J. H. (1973). Toward a theory of librarianship and information science. In *Knowing books and men; Knowing computers, too* (pp. 93–110). Metuchen, NJ: Scarecrow Press.
- Shera, J. H. (1983). Librarianship and information science. In F. Machlup & U. Mansfield (Eds.), *The study of information: Interdisciplinary messages* (pp. 379–388). New York: Wiley.
- Sicart, M. (2009). The banality of simulated evil: Designing ethical gameplay. *Ethics and Information Technology*, 11(3), 191–202.
- Siegler, E. L. (2010). The evolving medical record. *Annals of Internal Medicine*, 153, 671–677.
- Skoot, R. (2010). *The immortal life of Henrietta Lacks*. New York: Crown Publishers.
- Smiraglia, R. P. (2001). *The nature of “a work”: Implications for the organization of knowledge*. Lanham, MD: Scarecrow Press.
- Smiraglia, R. P. (2002). Further reflections on the nature of “a work”: An introduction. *Cataloging and Classification Quarterly*, 33(3–4), 1–11.
- Smiraglia, R. P. (2005). Instantiation: Empirical emergence of a global phenomenon. In L. Vaughn (Ed.), *Data, information, and knowledge in a networked world: Proceedings of the CASI/ACSI annual conference, University of Western Ontario, London, June 2–4, 2005*. Retrieved July 14, 2014, from <http://www.cais-acsi.ca/conferences.htm>
- Smiraglia, R. P. (2008). Rethinking what we catalog: Documents as cultural artifacts. *Cataloging and Classification Quarterly*, 45(3), 25–37.
- Smiraglia, R. P., & Van den Heuvel, C. (2013). Classifications and concepts: Towards an elementary theory of knowledge interaction. *Journal of Documentation*, 69(3), 360–383.
- Spector, K., & Jones, S. (2007). Constructing Anne Frank: Critical literacy and the Holocaust in eighth-grade English. *Journal of Adolescent and Adult Literacy*, 51(1), 36–48.
- Steinhart, E. (1998). Digital metaphysics. In T. Bynum & J. Moor (Eds.), *The digital phoenix* (pp. 117–134). New York: Blackwell Publishers.
- Stone, B. (2013). Inside Google’s secret lab. *BusinessWeek*, May 13, 2013. Retrieved July 14, 2014, from <http://www.businessweek.com/articles/2013-05-22/inside-googles-secret-lab>
- Sundin, O., & Johannesson, J. (2005). Pragmatism, neo-pragmatism and sociocultural theory: Communicative participation as a perspective in LIS. *Journal of Documentation*, 61(1), 23–43.
- Szostak, R. (2013, June). *Classifying for diversity*. Paper presented at the Fourth Annual North American Symposium on Knowledge Organization, Milwaukee. Retrieved July 14, 2014, from

- <http://journals.lib.washington.edu/index.php/nasko/article/view/14659>
- Taddeo, M., & Floridi, L. (2005). Solving the symbol grounding problem: A critical review of fifteen years of research. *Journal of Experimental and Theoretical Artificial Intelligence*, 17(4), 419–445.
- Taddeo, M., & Floridi, L. (2007). A practical solution of the symbol grounding problem. *Minds and Machines*, 17(4), 369–389.
- Talja, S., Tuominen, K., & Savolainen, R. (2005). "Isms" in information science: Constructivism, collectivism and constructionism. *Journal of Documentation*, 61(1), 79–101.
- Tanaka, M. (2010, February). Domain analysis of computational science: Fifty years of a scientific computing group. Paper presented at the Eleventh International ISKO Conference, Rome. Retrieved July 14, 2014, from <http://www.bnl.gov/isd/documents/71410.pdf>
- Tennis, J. (2012). What does a domain analysis look like in form, function, and genre? *Brazilian Journal of Information Science*, 6(1), 3–14.
- Thomasson, A. L. (1999). *Fiction and metaphysics*. New York: Cambridge University Press.
- Thornley, C. (2012). Information retrieval (IR) and the paradox of change: An analysis using the philosophy of Parmenides. *Journal of Documentation*, 68(3), 402–422.
- Tomic, T. (2010). The philosophy of information as an underlying and unifying theory of information science. *Information Research*, 15(4). Retrieved July 14, 2014, from <http://informationr.net/ir/15-4/colis714>
- Trace, C. B. (2002). What is recorded is never simply "what happened": Record keeping in modern organizational culture. *Archival Science*, 2(1–2), 137–159.
- Trosow, S. (2001). Standpoint epistemology as an alternative methodology for library and information science. *The Library Quarterly*, 71(3), 360–382.
- Turkle, S. (1995). *Life on the screen: Identity in the age of the internet*. New York: Simon & Schuster.
- Upward, F. (1996). Structuring the records continuum, part one: Postcustodial principles and properties. *Archives and Manuscripts*, 24(2), 268–285.
- Upward, F. (2000). Modelling the continuum as paradigm shift in recordkeeping and archiving processes, and beyond: A personal reflection. *Records Management Journal*, 10(3), 115–139.
- Upward, F. (2009). Structuring the records continuum, part two: Structuration theory and recordkeeping. *Archives and Manuscripts*, 25(1), 10–35.
- Upward, F., Reed, B., Oliver, G., & Evans, J. (2013). Recordkeeping informatics: Re-figuring a discipline in crisis with a single minded approach. *Records Management Journal*, 23(1), 37–50.
- Vakarelou, O. (2013). Review of Luciano Floridi's *The Philosophy of Information and Information: A Very Short Introduction*. *Philosophy in Review*, 33(2), 109–113.

- van Leeuwen, J. (2014). On Floridi's method of levels of abstraction. *Minds and Machines*, 24(1), 5–17.
- Velden, T., & Lagoze, C. (2013). The extraction of community structures from publication networks to support ethnographic observations of field differences in scientific communication. *Journal of the American Society for Information Science and Technology*, 64(12), 2405–2427.
- Violi, P. (2012). Trauma site museums and politics of memory: Tuol Sleng, Villa Grimaldi and the Bologna Ustica Museum. *Theory, Culture and Society*, 29, 36–75.
- Voltolini, A. (2006). *How ficta follow fiction: A syncretistic account of fictional entities*. Dordrecht, Netherlands: Springer.
- Walton, K. (1990). *Mimesis and make-believe*. Cambridge, MA: Harvard University Press.
- Warner, J. (2008). Organs of the human brain, created by the human hand? The social epistemology of information technology. *Journal of Documentation*, 64(5), 738–759.
- Watson, R., & Carlin, A. P. (2012). "Information": Praxeological considerations. *Human Studies*, 35(2), 327–345.
- Weber, N. M., Baker, K. S., Thomer, A. K., Chao, T. C., & Palmer, C. L. (2012). Value and context in data use: Domain analysis revisited. In A. Grove (Ed.), *Proceedings of the Seventy-fifth Annual Meeting of the American Society for Information Science and Technology*. Retrieved July 14, 2014 from <http://onlinelibrary.wiley.com/doi/10.1002/meet.14504901168/abstract>
- Webster, F. (2002). The information society revisited. In L. Lievrouw & S. Livingstone (Eds.), *Handbook of New Media* (pp. 255–266). London: Sage Publications Ltd.
- Wells, D. N. (2004). Review of *The Philosophy of Information*. *Australian Academic and Research Libraries*, 36(1), 87.
- Wheeler, J. A. (1990). Information, physics, quantum: The search for links. In W. Zurek (Ed.), *Complexity, entropy, and the physics of information* (pp. 5–28). London: Addison-Wesley.
- Wickett, K. M., Renear, A. H., & Furner, J. (2011). Are collections sets? In A. Grove (Ed.), *Proceedings of the Seventy-fourth Annual Meeting of the American Society for Information Science and Technology*. Retrieved July 14, 2014 from <http://onlinelibrary.wiley.com/doi/10.1002/meet.2011.14504801145/abstract>
- Wilson, K. (2013). Anne Frank abroad: The emergence of world atrocity literature. *World Literature Today*, 87(3), 28–33.
- Wilson, P. (1968). *Two kinds of power: An essay on bibliographic control*. Berkeley: University of California Press.
- Wilson, P. (1983). *Second-hand knowledge: An inquiry into cognitive authority*. Westport, CT: Greenwood Press.

- Wolf, M. J., Grodzinsky, F. S., & Miller, K. W. (2012). Artificial agents, cloud computing, and quantum computing: Applying Floridi's method of levels of abstraction. In H. Demir (Ed.), *Luciano Floridi's philosophy of technology: Critical reflections* (pp. 23–41). Dordrecht, Netherlands: Springer.
- Wood, D. E. (2009). Spies in the information economy: Academic publishers and the trade in personal information. *ACME: An International E-Journal for Critical Geographies*, 8(3), 484–493.
- Woods, C. (2012). Sons of the sun: The mythological foundations of the first dynasty of Uruk. *Journal of Ancient Near Eastern Religions*, 12, 78–96.
- Worrall, J. (1989). Structural realism: The best of both worlds? *Dialectica*, 43(1–2), 99–124.
- Wright, H. C. (1978). Inquiry in science and librarianship. *The Journal of Library History*, 13(3), 250–264.
- Wright, H. C. (1988). *Jessa Shera, librarianship, and information science*. Occasional research paper no. 5. Provo, Utah: Brigham Young University School of Information Sciences.
- Yakel, E. (2003). Archival representation. *Archival Science*, 3(1), 1–25.
- Yeo, G. (2007). Concepts of record (1): Evidence, information, and persistent representations. *American Archivist*, 70(2), 315–343.
- Yeo, G. (2008). Concepts of record (2): Prototypes and boundary objects, *American Archivist*, 71(1), 118–143.
- Yeo, G. (2010). “Nothing is the same as something else”: Significant properties and notions of identity and originality. *Archival Science*, 10(2), 85–116.
- Yeo, G. (2012a). Bringing things together: Aggregate records in a digital age. *Archivaria*, 74, 43–91.
- Yeo, G. (2012b). The conceptual *fonds* and the physical collection. *Archivaria*, 73, 43–80.
- Zandonade, T. (2004). Social epistemology from Jesse Shera to Steve Fuller. *Library Trends*, 52(4), 810–832.
- Zins, C. (2007). Conceptual approaches for defining data, information, and knowledge. *Journal of the American Society for Information Science and Technology*, 58(4), 479–493.
- Zwadlo, J. (1997). We don't need a philosophy of library and information science: We're confused enough already. *The Library Quarterly*, 67(2), 103–121.

Author Biography

Betsy Van der Veer Martens is an associate professor in the School of Library and Information Studies at the University of Oklahoma. Her research focuses on the diffusion and nondiffusion of theories.