

The orders of documents, the orders of activity, and the orders of information

Charles Bazerman

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Abstract The invention of literacy was also the invention of written information. Humanly usable information has been (and will likely continue to be for the foreseeable future) tied to human documents. Any order we impose on or find in information is closely tied to human uses that give rise to it or for which it is repurposed, and those orders are expressed in the documentary genres that mediate human communicative action within social activity systems. These social forms of genres and activity systems shape our consciousnesses, cognitive capacities, social identities, and potentials for action. Making sense of a single claim, sentence, or even datum requires an understanding of what kind of text it appears in, engaged in what sort of inquiry using what methods, and where it stands within the evolving intertextual discussion of the field. Sense making requires integrity of the text and visibility of the provenance and socio-historic dynamic from which it arises. Even as the processes of communication have been less tied to immediate social circumstances, they have fostered new kinds of social relations and communicative circumstances that maintain their social character and functionality. As we convert older technologies of information storage based on the physical texts, to digital technologies that can readily draw together heterogeneous pieces from more heterogeneous circumstances, the user ultimately must make sense of the information, and the technologies will need to find ways to support that sense making.

Keywords Documents · Genre

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C. Bazerman (✉)
Gevirtz Graduate School of Education, University of California Santa Barbara,
Santa Barbara, CA 93106, USA
e-mail: bazerman@education.ucsb.edu

I will argue here, from the perspective of a scholar of writing and literacy, that humanly usable information has been (and will likely continue to be for the foreseeable future) tied to human texts or documents—that is human-made artifacts, using literate, graphic, audio, or multimedia representations that deploy information in relation to human activities and thought. Any order we impose on or find in information is closely tied to human uses that give rise to it or for which it is repurposed, and those orders will be expressed in the documents that mediate those human uses. As we complete the conversion from older technologies of information storage based on the physical texts used directly within recognizable activities to digital inscription, storage, access, and delivery of information, we are faced with choices that can either homogenize information or maintain visibility of human documents (whether material or virtual), the situations from which they arose, and the situations in which they will be used once accessed. Of course great gains are made by rapid search of wide electronic resources, and we can learn much from atomized pieces brought together in a single space, yet for many other purposes we need to understand provenance, genre, activity context, and social and institutional structures from which the information arises and in which it is intended to be used. As we develop tools, systems, and concepts to draw together more heterogeneous pieces from more heterogeneous circumstances, we also need to develop tools, systems, and concepts to see information in its particular circumstances of use.

A prefatory anecdote

A dozen years ago, I published a study of Edison's papers surrounding the research, development, and commercialization of electric light and power (Bazerman 1999a). In it, I examined the many kinds of documents produced as parts of different activity systems—from patent applications and litigation to newspaper interviews, from laboratory notebooks to stockholder reports, from private letters about strategy to scientific papers and technical test reports. Each of these documents took shape in evolving genres within historically changing social systems. Each of these documents also contained specific kinds of information that helped carry out the work of financing, legally protecting, technically validating, producing, publicizing, and commercially delivering the complex electrical power system.

Shortly after publication of my book, an academic reviewer questioned how I characterized the work arrangements in the Menlo Park laboratory, in reference to an argument I had made about how the notebooks were used to coordinate the research work of the invention team and the legal/clerical work of the office during the autumn of 1878. This reviewer claimed that the office was in a separate building. I was sure that the separate office building was not occupied until several months later, but how could I confirm this? Though some of the authoritative primary or secondary sources mentioned the building of this office, none specified the date of completion and occupancy. Having worked on the 97 microfilm reels in Parts I and II of the Edison papers and many other related archives for a decade, I was familiar

with what records were available and what the records might hold. Further, the archivists of the Edison project had organized the materials well and developed excellent finders, so I went directly to the business records of Menlo Park for 1879 (starting on reel 50, frame 487). I rapidly found estimates and agreements for carpentry work on the new office from January and February 1879 after the notebooks I studied, confirming my original claim (Edison 1985, 1987).

This is a typical story of scholarly archival work of the kind analyzed by Yakel and Torres (2003), where a scholar knows the way around the story and around the archives, and has the assistance of able archivists who have cataloged, indexed, and arranged the available materials. Given the work of the archivists, what did it take for me to locate and make sense of the information? I first needed a concept of what kind of information might exist that might count as evidence, which depended on knowing the different kinds of documents or genres contained in the archive files and the kinds of information associated with each of the genres. I also had to have some idea of the kinds of activities of various groups of peoples at various times and how those activities might leave documentary traces. I also needed to rely on and understand how the archivists arranged and indexed the material and the relation of the index numbers to numbered files and microfilm reel and frame. I needed to understand all these ordering principles to locate the evidence to draw a conclusion that was not directly stated in any document.

As a writer I make documents, documents usually containing information—sometimes new information I have produced in my own investigations and sometimes reporting and making sense of information I have gotten from elsewhere—to carry out various tasks in my life, whether making a claim on my insurance company or arguing for theories of social practices of writing. In my teaching, I help students locate, use, and interpret information so they can write more effectively—particularly in an academic context where they are surrounded by the information of their disciplines, the libraries, and their fresh inquiries. In my work and the work of my students, we regularly come in contact with the information made available and ordered in real and virtual collections, so the orders of information we make in our writing, our utterances, are dependent on and interactive with the orders created in the systems of Library and Information Sciences. Early in my career, prior to widespread digital resources, long educational and professional experience was needed to learn to move around these various orders and to create new orders. As a student I was introduced to the organization of collections and indexing tools, but only after working on many projects could I efficiently get what I needed, imagine what might be there that I could want, and make hypotheses that would be supportable by the available information. Nonetheless, I continued to have false leads, failed searches, and moments of bafflement in which I consulted other experienced users, both scholars and LIS professionals. Sometimes the only conclusion I could come to was the information I would want was just not there or could not be accessed. Further, each time I entered a new area of inquiry I needed some time to become familiar with the relevant resources and the ordering principles specific to that area. As orderly as we can make the information and as visible as we could make the orders, ultimately we need human synthesis, hypothesis, and creativity to make sense of it all—and thus we need to provide the materials for human sense-making processes.

A brief history of knowledge

The production and transmission of knowledge has from the beginning been embedded within human communicative action and organized within the social systems that carry forward those actions and activities. Even as the processes of communication have been less tied to immediate social circumstances, they have fostered new kinds of social relations and communicative circumstances that maintain their social character and functionality. In societies without literacy, knowledge is daily produced in spoken reports of food and threats, requests for help, directives for coordinated action, accounts of human relations, and so on. In each kind of talk, people inform each other about different objects, states of affairs, obligations. Such knowledge, in order to be more enduring than changing circumstances of utterances and the vagaries of memory, must move from spontaneous spoken genres into more ritualized utterances attached to regularized occasions of performance, such as the songs of the griots and bards who use mnemonic devices for recall and recreating stories. Architectural design such as monuments and Stonehenge can also prompt and stabilize memory, as can graphics.

The invention of literacy was also the invention of written information—in fact, the transcription of information was the driver of writing invention and development—starting with the kinds of agricultural records initially captured by clay pebbles that were then impressed on the exterior of clay envelopes (Schmandt-Besserat 1992). Clay tablets soon held many kinds of economic, government, and legal documents and were collected in government-sponsored Houses of Tablets. Records included laws, tax rolls, population census, military forces, and other records that aided in governance. Even in such early examples we see the conjunction of several kinds of orders arrayed around information, and at the nexus of which information resided: material texts located within organized collections, texts as symbolic utterances recognizable in genres, knowledge, knowledge domains, humans who write and read as part of other kinds of activities for which the literate activity is instrumental. Since knowledge for these activities was of persistent and enduring use, these collections of recorded information needed to be maintained and findable for later reference.

Writing brought with it new forms of knowledge memory in signs and lists of property, people, and events, then inscription on objects about their ownership, authority, or meaning (Schmandt-Besserat 2007). Events became memorialized in description and transcription of speeches and odes (Havelock 1963). Laws were promulgated, copied, and displayed throughout kingdoms (Goody 1986). Letters proliferated into genres of business, governance, amity, and affiliation (Bazerman 1999b). Each kind of text contained specific kinds of knowledge, and those familiar with texts became skillful at locating knowledge they needed as well as to compare and aggregate multiple accounts. Within specific domains of practice, knowledge could be stabilized, sorted out, and evaluated, such that certain knowledge had increased authority. All knowledgeable practitioners were expected to be familiar with a canon of authoritative texts, whether of rhetoric, astronomy, the law, or commerce. Education meant familiarizing students with the body of texts that contained the foundational knowledge of areas of practice, and how those texts

might be applied in concrete circumstances—and perhaps (though far from always) how those texts might themselves be evaluated and produced. Authoritative texts were widely copied, distributed, and preserved despite the expense and inconvenience. Texts that did not become central to vibrant social systems existed in few and dispersed copies, and at times vanished.

With printing the ease of multiplication of copies meant greater number of reference points could be shared among experts and more complex and multiple knowledges could be applied within communities of practice. This diversity of available texts allowed more comparison among more people and more sharing in the evaluation and construction of knowledge texts. Substantial aggregation was possible beyond the few earlier centers of learning such as in Alexandria, Cordova, Bologna, or the Chinese Imperial court. Decreasing costs of print and paper increased collaboration and mutual correction, fostered societies and journals, created correspondence and discussion over shared texts. Multiple competing sites of knowledge production arose as well as an international Republic of Letters sharing the results of their labors (Eisenstein 1979). The public sphere grew with news media and markets grew around transmission of business information in the commercial press (Bazerman and Rogers 2008a, b). Institutions devoted to the production of information such as universities, academies, and national research institutes grew, as did attempts to make knowledge widely available through encyclopedias and working class education.

Texts in the storage and access of knowledge

On what principles should these texts produced within these activities and institutions be organized and indexed? This problem has formed the basis of the work of library and information sciences, and many solutions have been found over the millennia, starting with physical storage criteria, such as the size of scrolls or codices, and evolving to knowledge domain criteria in nineteenth and twentieth century indexing systems, such as the Dewey Decimal and Library of Congress systems. Multiple forms of indexing, such as embodied in card catalogs with separate entries for title, author, subject, and shelf number provided alternative ways of locating the text on shelves according to different ordering principles. As citation networks came to be understood as important ways to access related texts, citation indexes were invented. Further, when collections were special use, texts and physical arrangement might be rearranged to facilitate the typical activity uses, as in legal and medical libraries. Though multiple systems of order were laid on top of or intersected with the order of texts, it was still how physical texts were to be placed on the shelf that provided a material substrate of the LIS profession, and it was the texts that contained the specific information and reasoning that readers sought. Bibliographic information supported finding the texts that contained substantive information, but it was not a replacement for it. Further, the physical documents provided a material reminder of the text's provenance and the people who wrote, printed, bound, marketed, and shared the texts. The text then provided clues to begin to make sense of what was inscribed and for what purpose. Even anthologies,

collections, and reprints carried their own social story. In the print world, the intersection of the orders of knowledge and the orders of documents produced by people in particular circumstances was not a theoretical issue; it was a practical one.

Digitally created, distributed, stored, accessed, and manipulable information has made possible new kinds of documents, new forms of access to information across documents, and new uses for information. Many of these forms seem to erase the traces of the occasions of creation and the organization and purposes of the original document.

Information can be extracted easily in pieces; databases can be combined; search interfaces and the underlying search algorithms can bring together heterogeneous materials from different kinds of communicative networks under a common format. Further, the information can be “read” and processed by digital means with humans seeing only final residues, aggregate reports, or consequent actions. These possibilities suppress the original documents and their role in interaction that have guided human literate sense making over millennia.

Information apart from documents?

Can we bypass the structure of documents we have so long relied on? Of course there will always be problems of legacy systems of print documents that either have to be referenced according to their older structures even if they are electronically stored, unless they are disassembled and reconstructed in the flat universe of digits. But at least from this time forward, can we simply produce information, stored as data, infinitely reconfigurable, findable as data? The reference librarian then no longer must worry about the structure of documents, but only the search terms and modalities to pull the atomized data from the ether. So are we on the way to doing away with texts and documents, left only with a non-hierarchical mega-server with a database of all information, to be queried with a universal interface?

Of course our current search engines are not there yet, and perhaps for good reasons, though potential indicators of human use are being explored. Current search engines have factored in the logic of intertextualities and user networks, which embed much human sense making and decision making about document selection. Metadata as well often include information about provenance and use. Even lexicon and semantics are a consequence of the attention and communication among users. More directly, attempts at developing relevance systems have tried to match text characteristics with user characteristics (Barry and Schamber 1998; Borlund 2003), including visual display of individualized relevance projections (Beresi et al. 2010a, b, c). Further, means of encoding and using genre in search have been explored (Andersen 2008; Oliver et al. 2008). Yet no matter how efficiently search technology may offer candidate texts of potential interest, the human user must ultimately decide which of the offered citations is worth pursuing and what to make of each. To better assist that user, I would suggest that the human orders of texts be made more explicit to attach the contained information to its uses.

Information and knowledge within utterances as part of activities

The sociological phenomenologists following Alfred Schutz (1967), the Soviet cultural psychologists following Lev Vygotsky (1987), and the American pragmatists following George Herbert Mead (1934) share an account of humans as action oriented, meaning making selves, using socially distributed symbolic forms. They all provide an answer to the problem of how we can create joint understanding and coordinated actions with those around us despite the variety of places we may focus our attention and the welter of interpretations we may give to the acts of others. All three approaches suggest we shape our behaviors and our utterances to be intelligible to each other by adopting and aligning with the social and cultural forms that are constantly being produced and reproduced around us. These forms shape our consciousnesses, cognitive capacities, social identities, and potentials for action. Even as we define our individuality and difference within our communities, we are always surrounded by and immersed within the sea of cultural and social types. It is only by learning the social forms by which others communicate and act do we discover means of making sense of their behavior, actions, and utterances and of sharing our actions and utterances to be meaningful to others. Our meanings arise within our actions and our words are saturated with our intentions, even as they are borrowed from the common stock as Bakhtin (1984) has argued. Genres are typified forms of utterances, and meaning is made and conveyed within the frames of these action-oriented genres. This approach to genre has been elaborated in writing studies by Miller (1984); Bazerman (1988, 1994, 2011); and others reviewed in Bawarshi and Reiff (2010).

More specifically, information and knowledge are created within utterances as part of communicative action. While the world may exist without our speaking about it, information is created only by our action to create a parallel symbolic world of representations in response to our needs and desires as humans—even when we create and direct machines to inscribe, collect, and analyze that information. This information and its purposeful aggregation in knowledge then serves to inform and guide our actions—including creating shared representations that allow the coordination of perceptions, goals, and actions among larger groups of people.

It is within texts that we record and share our information; in fact, we often gather information for the purpose of creating texts to carry out a desired action. Thus, there is a correspondence between genre and the kind of information contained in it. Bakhtin (1981) characterized this as chronotope—the typical time-place of a genre, which then implied the scenery, actors, and actions. So just as fairytales occur in kingdoms long ago and far away, where princes overcome obstacles of dragons and evil sorcerers to gain the hand of princesses, so do national economic policy reports include trends in jobs, gross domestic product, national indebtedness, and interest rates, as well as projections of future growth and inflation, so as to justify policy decisions, such as adjustments of bank rates. Psychiatric reports prepared as part of sentencing of criminal defendants would contain a very different chronotope of information, looking into the time-space of the defendant's life and psyche and prognoses under different incarceration conditions. We would

be very surprised to find the information from the criminal psychiatric report in the economic policy document, or vice versa. And even closely related documents might differ greatly on their chronotopes based on the purpose, as the psychiatric sentencing document would contain different information from a psychiatric journal article on the pharmacological treatment of certain forms of violent behavior.

Our daily actions now require we move rapidly among many kinds of information in many kinds of documents. To purchase an international air ticket, we must establish our plans with precise dates, find out about our destinations, examine our finances, obtain visa information for international travel, and consider airline schedules. We must gather credit card numbers, frequent flier numbers, travel document numbers, and so on to complete the transaction. Each kind of this human-made information resides in specific kinds of databases, created to carry specific kinds of transactions. Airlines create databases of flights and reservations so as to be able to sell tickets and keep track of customers and open seats. Airlines have created another kind of information around frequent flier inducements to build a regular clientele and maintain relations with the most valuable customers. Governments develop documentary systems to control borders and to provide protection for their citizens out of the country. The banking and credit card systems are designed for the holding and transfer of funds. We are able to navigate and coordinate these multiple systems to carry out now common actions because we understand to some degree each of their systems and understand the activities, documents, and information associated with each (at least at the consumer level—a different level is needed by the airline clerk, border official, or banking officer).

Each of these kinds of information holds specific meanings within its specific system. If the systems themselves create equivalences and conversions, they must be worked out through ordered procedures that are often dynamic in response to changing conditions. For example, consider the systems now in place to constantly adjust ticket prices in relation to seat availabilities on each flight. We as consumers need to merge the information from these various systems so as to make decisions and meet the informational requirements of each, even though the core unit in some of them is money, in others seats, in others frequent flier miles, and others citizenship. In order to make reasonable action choices at the intersection of the systems, we need some understanding of the different principles by which the different kinds of information are ordered within the relevant documents and our relation to each of these information orders. In our decision making, we may also consider other kinds of information, such as our awareness of special events that might influence travel density or alternative modes of travel. Air ticket purchase interfaces have in fact recently evolved in order to provide more information of different types to allow consumer sense making and choice making (ability to search other nearby airports, charts for seat choice, ability to combine different sets of flights, comparing best prices of neighboring days). Thus, we see the formation of an activity shaped informational genre to facilitate multi-dimensional sense making and action. (For another example of how complex the transfer of information from one activity system to another, see Bazerman 2009).

Even scientific knowledge is textually constructed through social processes of argument and interchange carried out through papers in seminars, congresses, and

journals. Although science seeks to escape the vagaries of social belief and limited human perception to develop an empirical understanding of the world, its information, too, gains its existence and meaning in complex, genre-typified social worlds of communication. Even in the production of a single article information is sought, collected, selected, and reported in aggregate in relation to arguments advanced in the article or document as a whole (Bazerman 1988). To make sense of articles and evaluate them, scientists consider authors, topics, research programs, and research methods, in relation to their own constantly evolving interests. They create their own intertextual web of articles to advance their claims in a communicative world intelligible to and shared by their colleagues. Knowledge (in the form of claims/arguments/documents) is sorted out as reliable, important, and related to the communal system of knowledge through a kind of rolling codification based on the sense making, evaluation, and choices of individual authors over time—all of which is document and genre dependent (Bazerman 1991). Most articles are rarely cited and drop from view as not consequential for the building of knowledge. Treating all articles (and each datum contained in each of those articles), as equal in importance, and equally connected to others goes against the grain of the very social processes of knowledge making. Even the more overtly aggregating documents like handbooks and textbooks are built on reading and evaluating the literature, relying greatly on the sorting out that has been occurring across articles and in reviews of literature. Even the temporalities of documents have different meaning, so if a claim was to be introduced in a textbook before it had been sorted out in the research literature, the reliability of the textbook might be called into question. Making sense of a single claim, sentence, or even datum requires an understanding of what kind of text it appears in, engaged in what sort of inquiry using what methods, and where it stands within the evolving intertextual discussion of the field.

Of course, those textbooks, handbooks, reviews of literature, and other aggregating documents do much to stabilize and share a common view, provide common reference points, and orient newcomers to the field of study. But the handbook of fifty or even five years ago may hardly be an authoritative source, even though it may be of great interest to understand theoretical positions, research programs, and the evolving history of inquiry. Rather the pieces of information from it need to be read in relation to the perspective developed within the text, within the history of field development, and with respect to the goals, purposes, and even sponsors of the inquiry. Sense making requires integrity of the text and visibility of the provenance and socio-historic dynamic from which it arises.

The orders of knowledge and the orders of texts

In such ways the orders of information and knowledge are dependent on the orders of texts, both as whole texts that convey an integrated meaning and as ordered genres that convey anticipatable kinds of meanings within recognizable social actions. These in turn are dependent on the orders of social systems within which social relations and actions are formed. In a structurationist way (Giddens 1984), the

texts themselves are part of the formation and maintenance of these systems, and each new text within these genres and activity systems carries these socially organized activities and systems forward. The stabilization, proper ordering, and maintenance of these texts are often essential to the operations and vitality of the social organization. Consider, for example, a hospital that relies on patient, insurance, and financial cost records; procedural rules and guidelines; plans for action for individual patients, working groups, facilities development and management; proper flow of documents among hierarchies; information about available medical and more quotidian products (such as cleaning materials); ordering records; the most current biomedical literature; and many other kinds of information within documents. If any of these textual systems become disordered or the appropriate distribution of these documents fail, the organization will be impaired, perhaps even to the point of immobility and collapse.

Final comments

Because so many of our institutions and more complex forms of social life have become so dependent on access to and distribution of activity-specific information cast within documents that give the information meaning, information science professionals have a special importance. From the first librarians in Alexandria or the keepers of the houses of tablets in Sumeria, individuals have created ordering principles for shelving and indexing works for readers to find them. Sometimes these principles were very far from the actual use people would make of the information and the sense they would make of them—such as shelving by date of acquisition or the arbitrariness of the alphabet. Sometimes the ordering principles were a bit more mnemonic, such as *incipits* or book titles once printing facilitated discrete editions of works. Innovations tried to cope with content, such as topic-based indexing systems or keyword identifiers. Yet ultimately the knowledgeable user had to work with the whole text and place it into relevant social and intertextual contexts to make sense of the information within. This ability required long apprenticeship leading to expert judgment making.

Digital technologies now store documents (whether traditional or newly formed databases) on binary electronic media unreadable by humans until accessed and transformed into humanly intelligible forms of representation—language, numbers, graphics, or the like. Sophisticated programs will increasingly be able to gather network, relevance, intertextual, and genre data to select material for individualized users, rapidly identifying texts and fragments of potential interest, but the user ultimately must make sense of the information. In a sense we are all now put increasingly in the position of archival researchers who have to learn how to locate and make sense of documents from a great remove from their current circumstances, and we all need the means for us to build archival intelligence (Yakel and Torres 2003). In the digital age, the archival scholar will still need to understand the structure of the archive, the structure of the documents, and the role the documents took within the activities that produced and used them, in order to locate and understand the documents they seek, but so will we all. Unless our new information

technologies orient us to the structure of the data system that stores and provides access to information, offer us clues to understand the time and situation that initially motivated the inscription of information and how it was used, and position the information within the surrounding representations within the original document or data sources and in related documents, it becomes increasingly difficult for us to make human sense of what we are getting as piecemeal or reprocessed information built around abstract principles that do not reflect the uses and meanings that the information is part of nor even contain clues as to the process by which it was selected for our use and delivered to us. Digital technologies are already fostering new kinds of social arrangements and actions, along with new genres and even new kinds of information to be chronotopically arranged within dynamic documents. But if they are to be used by humans for human purposes, humans will need to be able to make sense of them, and the technologies will need to find ways to support that sense making. I suggest documents will have a greater obduracy than our visions of endlessly reconfigurable bits might suggest.

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Author Biography

Charles Bazerman Professor of Education at the University of California, Santa Barbara and recent chair of the Conference on College Composition and Communication, has studied the social dynamics of writing, rhetorical theory, and the rhetoric of knowledge production and use. He has written or edited over 25 scholarly volumes and many textbooks, as well over a hundred scholarly articles and chapters. His recently edited *Handbook of Research on Writing* won the 2009 CCCC Outstanding Book Award. His earlier books, *The Languages of Edison's of Edison's Light* and *Shaping Written Knowledge: The Genre and Activity of the Experimental Article in Science* also won major awards. His work has been translated into Chinese, French, Italian, Spanish, and Portuguese.