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Information Design: Emergence of a New Profession

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Egyptian scribes sat every day in the marketplace and wrote hieroglyphic letters, reports, memos, and proposals for their clients. At least since then, the business of assisting others to make their communications more effective has flourished. Specialists in communication already abound in our society: ghost writers, technical writers, advertising writers and art directors, public relations writers, and marketing consultants are only the most obvious ones. In any field of human endeavor there is a process of, first, specialization and, then, increasing professionalization. Information design is the most recent manifestation of the age-old profession of communications assistance.

What Is Information Design?

Information design is defined as the art and science of preparing information so that it can be used by human beings with efficiency and effectiveness. Its primary objectives are

1. To develop documents that are comprehensible, rapidly and accurately retrievable, and easy to translate into effective action.

2. To design interactions with equipment that are easy, natural, and as pleasant as possible. This involves solving many problems in the design of the human-computer interface.

3. To enable people to find their way in three-dimensional space with comfort and ease—especially urban space, but also, given recent developments, virtual space.

The values that distinguish information design from other kinds of design are efficiency and effectiveness at accomplishing the communicative purpose.

**Need for Information Design**

Why has information design emerged as a profession? First, managing information in our complex modern society requires sophisticated computing and communication devices and networks that operate with ever-increasing efficiency and effectiveness. Simply storing large amounts of information on computers and retrieving it does not solve our information needs. In fact, gigantic storehouses of information overload us with too much information and burden us with navigational problems that have sometimes make us feel that we are “lost in cyberspace.” What we need is not more information but the ability to present the right information to the right people at the right time, in the most effective and efficient form.

The second factor behind the recent push for the professionalization of information design is the increasing cost of time: management, technical, and professional. Much of what most managers and technical professionals do every day is process information. If the information is poorly designed, they operate inefficiently and their organizations are not as effective as they might be. I once hired a secretary who had previously worked as one of four secretaries to a IBM vice president. Three of the secretaries were kept busy full time just summarizing the information coming into the office so the vice president could use it.

**Information Design: Not an Integrated Profession**

Information design is not yet a fully integrated profession. Its practitioners have quite different views of the profession—even different names for it.
In newspaper and magazines it is called information graphics; in business, it's presentation graphics or business graphics; and in science, it's known as scientific visualization. Computer engineers refer to interface design, while conference facilitators use the term graphic recording and architects talk about signage or wayfinding. Graphic designers just call it design. While these practitioners no doubt have distinct interests that might warrant different names, many of their core concerns and practices are similar. The different terms simply indicate that information design is still mostly characterized by separate groups that have little or no contact with each other. Even so, there is undoubtedly an increasing tendency to march under the new banner of information design. This book is an example of that tendency. Moreover, in the last decade, a number of design and consulting companies have begun to assemble their marketing messages around the concept of information design.

**History of Information Design**

It is beyond the scope of this chapter to trace the history of the information design movement in each of the professions mentioned above. Nonetheless, we can look at the history of information design as a profession in itself by considering some of those who contributed to its development (see figure 2.1).

**Inventors**

One of the unusual aspects of information design as a profession is that we can identify many of those who invented particular classes of communication units (e.g., bar charts, pie charts, or time lines). There are towering figures in the history of information design invention and use. William Playfair, who lived at the time of the American Revolution, invented several major types of graphs and charts and popularized them use through his writings on political and economic topics. In addition to her contributions to medicine, Florence Nightingale is credited with inventing new types of statistical graphs and being one of the first to use information design in a public policy report, a massive 800-page document on
hospital administration she prepared for Prime Minister Palmerston during the Crimean War (Cohen 1984). Although Michael George Muhall invented pictorial statistics just before the turn of the century, it was Otto Neurath, the Austrian social scientist, who developed a methodology for displaying them effectively (1973). David Sibbet (1980) has devised a set of techniques for graphically recording the process of group dynamics as they develop during a meeting. James Beniger and Dorothy Robyn (1978) provide a list of the inventors of quantitative charts, and H. G. Funkhouser (1938) usefully summarizes the early history of statistical graphics. I devote a chapter of Visual Language to the history of these innovations (Horn 1998).

**Systematizers and Analysts**

The systematizers have tried to bring all the pieces of the graphic language together to analyze them from a particular point of view. Jacques Bertin developed a comprehensive semiotic analysis of large portions of information design in his *Semiology of Graphics* (1983). Another early pioneer in
this area was Gui Bonsiepe (1966), whose early studies demonstrated that the visual language of graphics has analogues to many traditional rhetorical devices. Scott McCloud's *Understanding Comics* (1993) and Will Eisner's *Comics and Sequential Art* (1985) are excellent analyses of one "dialect" of visual language, the comic book. William Bowman (1968) produced an important early taxonomy of graphic communication, while Michael Twyman (1973) has provided an important analysis of how many types of static information design direct eye movement. My own book, *Mapping Hypertext* (1989), is not only an introduction to the world of on-line applications for information design but also (in its three central chapters) an overview of the structured analysis of subject matters and structured writing (see below).

**Universalists**

From time to time, individuals have hoped that purely visual communication, without the use of words, could become an international auxiliary language. A purely iconic language could substitute in certain situations, such as travel, for normal spoken language. In the optimistic era that followed World War II, the movement for iconic language attracted advocates like the eminent anthropologist Margaret Mead and her principal graphic-language compatriot, Rudolf Modley (1952). E. K. Bliss (1965), who developed an enormous and extremely clever iconic language of upwards of ten thousand symbols, was a prolific inventor and supporter of universalism. Like Mead, Modley, and Neurath, Bliss wanted to devise a purely iconic common language to free humanity from the tower of Babel created by its thousands of spoken languages. Purely iconic languages do not usually catch on, however, except in the field of transportation, which now uses internationally recognized symbols for all aspects of transportation and travel.

**Collectors**

Once any profession starts to grow, writers and publishers bring out reference books about it. Information design has its share of these. Among the
more interesting, from a systematic point of view, is that of Henry Dreyfus (1984), who collected all the specialized icons from several dozen fields and incorporated them into a still-valuable reference book. Thompson and Davenport (1980) put together an engaging visual dictionary of the images and metaphors found in contemporary advertising.

**Writers of Instruction Manuals**

Once a profession thinks it knows something that others do not know, a spate of how-to books appears. At Stanford University, Robert McKim (1972, 1990) pioneered in demonstrating that visual thinking is not solely a means of artistic expression but is also a powerful tool for problem solving in many professions. Stephen Kosslyn’s recent book on designing graphs and charts (1994) is a good example of a practical information design instruction manual. Gene Zelazny (1991) has written a similar book on business charts. Gary Glover’s introduction to the new field of clip art (1994) will enable many more people to use icons and illustrations in their information design. A book by William Horton on icon design (1994) is another excellent example of an instruction manual on a limited topic.

**Aestheticians**

Information design has great variability in style and quality, which often affects its usefulness to researchers concerned about issues of precision and clarity. Foremost among the aestheticians is Edward Tufte, whose concepts of *data-to-ink ratio* and *chartjunk* stand as enduring signposts in the skillful and graceful use of visual language. His three books, *The Visual Display of Quantitative Information* (1983), *Envisioning Information* (1990), and *Visual Explanations* (1997), have provided the field of information design with pioneering studies in how communication can be both beautiful and useful.

**Popularizers**

In recent decades, magazines and newspapers have been leaders in the popularization of information design. Stephen Baker’s (1961) book, *Visual
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Persuasion, is an extraordinary window into methods advertising designers have long known about and practiced to make information attractive and persuasive. Nigel Holmes, longtime art director at Time, is an acknowledged teacher and pioneer in this area. He recognized, in particular, how design attractiveness affects whether readers will actually read and use information. Recently he described these “infotainment” values in several books (Holmes 1984, 1991, 1993). David Macaulay’s The Way Things Work (1988) is another brilliant example of information design at work. We must also credit Richard Saul Wurman with raising public awareness of the importance of information design in his books, Information Anxiety (1989), Follow the Yellow Brick Road: Learning to Give, Take and Use Instructions (1992), and Information Architects (1997).

Researchers

Research on communication, education, learning, human factors in technology, computer interface design, and perception all bear on the use of information design. However, most of the research does not use that term, even as an indexing category. To locate citations relevant to information design on research databases, therefore, we have to check many other keywords. But, as information designers begin to bring this research together, they can build on such firm foundations as the work of William Cleveland (1985), who has made important discoveries in the field of understanding quantitative graphics and charts. The research in structured writing (summarized in Horn 1993) is another area that is providing more secure foundations. Excellent summaries of the research on diagrams and other methods of presenting information graphically can be found in Winn (1982, 1990) and Horton (1991).

The British Information Design Society

In the history of information design a unique place must be reserved for the Information Design Society. As far as I can tell, this group invented and popularized the term information design. Its conferences have brought together users from several disciplines: design practitioners, researchers in
psychology and education, computer graphics specialists, and teachers. Many practitioners of information design in the United States are members of this organization, as there is no comparable association in their own country. The society’s *Information Design Journal*, currently edited by Paul Stiff, has been a major source of coherence for development of the profession. Great Britain has also led the United States in the development of interdisciplinary university programs in information design. The program at the Department of Typographic and Graphic Communication at Reading University, chaired by Michael Twyman, is an outstanding example of such a program.

**Research Foundations for Information Design**

Although there has always been a component of skilled practitioners thinking analytically about information design, research is becoming increasingly specialized—and fundamental. Compared to other professions, however, information design has barely begun to develop and integrate its own research community; it still draws on other fields for its research base. Fortunately, more and more researchers are becoming interested in the problems information designers must solve.

Information design rests, therefore, on a variety of research foundations, including such disciplines and subject areas as human factors in technology, educational psychology, computer interface design, performance technology, documentation design, typography research, advertising, communications, and structured writing. Some of the more important summaries of the research in these areas are

- Educational materials design: Fleming and Levie (1993)
- Quantitative display of information: Cleveland (1985)
Research in cognition, which provides both a theoretical base and experimental data, is becoming fundamental to all of these fields (see, e.g., Eysenck and Keane 1990). In medicine, information design research and applications parallel work carried out in many of the above-mentioned research domains, under the name medical informatics.

Foundational Research: Structured Writing

Structured writing (called Information Mapping® in its commercial applications) is foundational to some areas of information design.² It provides a systematic way of analyzing any subject matter to be conveyed in a written document. Production of a written communication (such as a report, memo, proposal, training manual, procedural or operations manual, or electronic performance-support system) requires a method for ensuring that all relevant subject matter has been obtained and is presented in the form the user needs. Structured writing is such a method. It consists of a set of techniques for analyzing, organizing, sequencing, and displaying the various units of information.

One of the insights gained from structured writing is that the paragraph is too poorly defined to be a basic unit of the analysis. Instead, structured writing divides information into domains in which basic units—called information blocks—can be precisely described. Forty such information blocks can be used to sort 80 percent of the sentences found in writing about most relatively stable subject matters (such as the sentences found in training manuals and introductory textbooks). The ability to provide such precise functional descriptions has been used in the design of various training and reference documents. Although this is not the place for a full description of structured writing, we should point out that it is a mature methodology based on over twenty-five years of research and business implementation (Horn 1989, 1992a, 1992b, 1993, 1997). It has more than 200,000 users in the business and technical writing professions and has become part of the democratization of information design. So far, structured writing has been used primarily by writers. Information designers
working in other fields are only now beginning to understand the importance of using structured writing as one of the secure foundations for analyzing the subject matter of documents.

**Failure to Fully Integrate Research**

It is symptomatic of a recently self-conscious profession that its knowledge of itself, its practices, and its research foundations are only partially known to practitioners. Many information designers have not read much of the research relevant to the profession. Perhaps one example will show what I mean. There is widespread interest among information designers in devising iconic signage for public places, even though research has cast doubts on the viability such an enterprise at this point in history. In one study of 108 international symbols (32 of which are widely used), fewer than half of the respondents clearly understood what 86 of them meant. Only three of the symbols were understood by more than two-thirds of the sample (Easterby and Graydon 1981, summarized in Sless 1986).

Other studies producing similar results induced me to advocate the use of what I call VLIcons™ (Visual Language icons) rather than icons. VLIcons integrate words and images in the same small communication unit (Horn 1998) and often perform some of the same important semantic functions as icons. They identify, they focus attention, they help set a mood, and they may aid in retrieval. But they differ from icons in that they do not attempt the task of full communication with images alone. Instead, VLIcons take advantage of the best aspects of words and images and integrate them tightly to convey meaning. They utilize the possibility that words and images effectively combined can disambiguate each other. Information design is still to some degree the prisoner of an old either-or paradigm in which words and images exist in completely separate domains of use.

**Tensions in Information Design**

As a profession, information design is currently experiencing a variety of tensions. Often these result from the clash of different ideologies or
Figure 2.2
Tensions among Practitioners of Information Design.

Value Differences

There is, for example, a considerable tension between (1) graphic designers—who learn in art school to worship the gods of Style and Fashion, Novelty, Impact and Self-expression—and (2) technical communication people—who worship the gods of Clarity, Precision, Legibility, Comprehensibility, and (often) Simplicity. The graphic designers grew up in schools where Advertising and Fashion were the Senior Deities. The technical people’s Senior Deity is Communication. Some graphic designers fall in love with a particular typeface and size and use it at the expense of clarity of communication. Many graphic designers assigned to help the training and documentation organizations of a company appear to be incapable of imagining that someone else might have a different set of values. When I was CEO of an information design consulting company, I often asked documentation and training managers to state their major problem. I expected to hear that it was tight budgets or short deadlines for producing documents (especially in the software industry). This is what
they told me: “Graphic designers are my biggest headache, because they simply won’t produce simple illustrations for our manuals. They won’t listen.”

The information design community is just beginning to create a self-identification. As a result, working relationships among the different professions out of which it is growing are often uneasy. Practitioners sometimes see themselves, first and foremost, as engineers, architects, graphic designers, or illustrators (or as psychologists, educators, or writers) and only secondly as information designers. Nonetheless, when asked about their problems, they usually point to common issues. They also admire a common set of books (many of which are cited in this article). What they get excited about is information design, not the problems of their particular profession.

The tension between the graphic designers and researchers is also important. Researchers tend to avoid trying to measure style, novelty, and self-expression, partly because it is very difficult and partly because their research grants and contracts usually come from organizations whose major commercial priority is evaluating the clarity, legibility, and efficiency of communications. This tension sometimes also grows out of the vastly different social, economic, or moral values of designers and researchers working in advertising, and information designers and researchers in more technical communication fields.

Democratization

Every profession has the problem of trying to exclude those who “don’t know what we know.” The professional says, “Let us do it. We’re the professionals. We have secret knowledge. You don’t really know how to do it right.” This possessiveness is to be expected. Information design has already begun trying to defend its boundaries. Unfortunately, some information designers perceive a threat in the democratization of information design that has resulted from putting information design features into computer software.
Already, there are business graphics and statistical packages advertising that the charts and graphs they produce follow principles researched and outlined by information design pioneers Edward Tufte and William Cleveland. This is occurring even though some people who call themselves information designers have not yet heard of Tufte and Cleveland!

Other software packages being designed today are gobbling up various areas of information design expertise. There is software that incorporates publishing and page-design principles commonly taught in art school. Some software packages provide templates that automatically incorporate principles of color combination, so that a user only needs to choose a cluster of colors that work together. When you can describe rules and guidelines with sufficient precision and stand behind them with sufficient research, you can put them into software so that anybody who buys the software can use them.

The ubiquity of the computer prevents us from even asking whether further democratization of this nascent profession should be welcomed. We do not have a choice. The computer provides millions, if not tens of millions, of people with the capacity to do at least a modicum of information design in the everyday documents they prepare. Thus tensions between a profession trying to emerge and consolidate and the multitude of amateurs performing many of the same tasks are likely to continue.

**Information Design and Visual Language**

Information design can be thought of as the professionalization of another communication phenomenon: the emergence of a new language. Visual language is defined as the tight coupling of a words, images, and shapes into a unified communication unit (Florn 1998). “Tight coupling” means that you cannot remove the words or the images or the shapes from a piece of visual language without destroying or radically diminishing the meaning a reader can obtain from it. In diagrams, for example, you cannot remove the boxes or arrows without severely damaging or destroying the communication. Words and images are tightly integrated in most business
slide presentations and in many examples of information graphics used by newspapers and magazines. Similarly, tight integration is apparent in the words and images in comic books, in most advertising, as well as in most video, film, and animation. A great many publications, both in paper and on-line, are now composed at least partly of visual language.

Visual language is a language, I maintain, because one cannot understand its syntax, semantics, or pragmatics by using only the linguistic concepts developed to analyze spoken languages. Nor are the tools of analysis used by either the visual arts or linguistics sufficient to analyze what is happening in visual language. To create a true linguistics of visual language we need new concepts that focus on how words and images work together.

Visual language has emerged just as other languages have—by people creating it and speaking it. It has evolved, I believe, because of the urgent needs of contemporary individuals and organizations to deal with complexity. Many ideas are best expressed with visual language, and others can only be expressed by visual language.

Along with information design, visual language has also developed rapidly in the past decade because of the personal computer and, especially, the widespread availability of computer graphics programs—software that allows the user to draw, paint, and present quantitative information in chart form. In many ways, practitioners of information design have been the inventors and first users of visual language. They have helped it spread. And, as visual language has become democratized into what some now call our visual culture, many people have realized that there is a great need for more professionalized information design.

*Changes in the Ratio of Visual Elements to Words*

One major shift to which research has called attention is the dramatic increase in the image-to-word ratio in documents of all kinds (Horn 1998). Many publications that in the past might have used one illustration per article now have one illustration per page. Thus the sheer volume of visual
elements has changed. But that is not all. In my characterization of visual language, I focus attention on the tight integration of words and visual elements, whereas in the old document paradigm, words and images are separated. Images were referred to as *figures* and often did not even appear on the page on which they were discussed. That practice is changing; more and more, words and images are coming together.

Also underway is “the Great Sorting Out of the Functions of Words and Images When They Are Tightly Integrated.” In the Sorting Out, we study what words do best and what it is that the visual elements do best when the two are tightly integrated; that is, we are developing the functional semantics of visual language. It turns out that we need a whole set of new guidelines and rules for understanding this tight integration, principles that are quite different from those used when words and images operate separately (Horn 1998). As we understand this integration more comprehensively and deeply, we apparently increase the integration of our own words and images. This has happened in my own work on the analysis of the words and images in diagrams: they have become more integrated. The functional semantics of visual language can now be extended to fully effect the tight integration of visual elements and words.

**Conclusion**

In ancient times, scribes had to invent the papyrus on which they wrote. Over many centuries they modified writing symbols from ideographs to phonetic script to meet the changing needs of their times. Their modern counterparts, tomorrow’s information designers, will also have to improve the tools and techniques of their trade to meet the even more rapid and complex changes of the twenty-first century.

The profession may well develop along the lines taken by medicine, where training in the foundational sciences is combined with internships, residencies, and practice to train the effective professional. In many ways we already see this kind of training emerging in the field of interactive interface design (Winograd 1996).
If the profession becomes more unified and practitioners understand that it rests on a multifaceted foundation of both creative design and rigorous research, it will continue to make major contributions to solving human communication problems. This future will require greater professional self-consciousness, the development and sharing of good practices, and increased incorporation of research findings into the design process. And, finally, it will require all of us to accept the democratization of information design.

Notes

1. Current research on the use of information can be found in many sources, including Special Interest Group on Graphics (SIGGRAPH) and Special Interest Group on Computer-Human Interaction (SIGCHI); all publications of the Association of Computing Machinery (ACM); research journals in human factors engineering and the graphics arts; and, especially, the Information Design Journal (address: Information Design Association, PO Box 239, Reading RG6 2AU, England; e-mail: info@reading.ac.uk) and Visible Language (U.S.A.), published by the Rhode Island School of Design (R.I.S.D., Graphic Design Dept., 2 College Street, Providence, R.I. 02903).

2. The primary source of training in structured writing is Information Mapping, Inc. (address: 300 Third Avenue, Waltham, Mass. 02154; telephone: 617-890-7003). Information Mapping is a registered trademark of Information Mapping, Inc.

3. VLIcon is a trademark of the visual language and information design work of Robert E. Horn, 2819 Jackson Street #101, San Francisco, Calif. 94115. For a complete discussion of the functional semantics of VLIcons, see Horn 1997.

References


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