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SCHRIVER
ON INFORMATION DESIGN

Petra Černe Oven & Cvetka Požar (eds.)



ON INFORMATION DESIGN

Edited by Petra Černe Oven and Cvetka Požar

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Petra Černe Oven

Introduction

Design as a Response to People's Needs (and Not People's Needs as a Response to Design Results)

> *What can be said at all can be said clearly; and whereof one cannot speak thereof one must be silent.*
> *– Ludwig Wittgenstein* [1]

The book you have before you is sediment, an old-fashioned document that registers an event that, in Slovenia, could well represent a utopian or at least an optimistic step into cutting-edge thought, while, in its English version, it contributes important knowledge to the existing, internationally recognized discipline we call information design. In late 2009, Slovenia's Museum of Architecture and Design began its fourth series of lectures in the theory of architecture and design;[2] like the ones before it, this lecture series was founded on the idea that when talking about professional disciplines on the local scale we need to speak from the experience of what is happening globally and must open new doors and seek ideas more at depth than at breadth.

At the time, in Slovenia, the global economic crisis was still just a concept that was happening "elsewhere". Nevertheless, it was clear that the new situation would eventually reach the Slovene market as well – and this, in fact, has since happened. It was clear that we needed to use the crisis to meet new challenges. In the current age, it seemed to me, visual communications design required

1 Ludwig Wittgenstein, *Tractatus Logico-Philosophicus*, Kegan Paul, Trench, Trubner & Co., London 1922, str. 23 (http://www.gutenberg.org/files/5740/5740-pdf.pdf, accessed 16 July 2012).

2 The first three series were "Architectural Epicentres: Inventing Architecture, Intervening in Reality", "Sustainable Alternatives in Design: It's High Time We Start Losing Time", and "Project Architecture: Creative Practice in the Time of Global Capitalism". The concept for the fourth lecture series was developed by Petra Černe Oven. (*Editors' note.*)

serious thinking about our objectives, theories, and methodologies, and especially about our direction and – to use a perhaps too passionate word – our mission. Clearly, we need to suspend established practices and ask ourselves once more what design, in fact, is all about. The problem of contemporary design is that designers have no distance from the profession and do what is dictated to them by the machinery of the design process, or do what they had been taught during their education at a time completely different from now. This was a time that demanded glamorous annual reports for financially successful companies, expensive graphic identities, and so on. What is more, the automatic workings of the profession create a routine in which there is no time to think about things in depth; the real questions remain unasked and, as a result, the real problems remain undefined. Many designers in this position just sit on their artistic pedestals and do not collaborate with other disciplines, for they are not prepared – as blasphemous as it may be to say so – for the challenges involved in a dialogue with legal experts, scientists, politicians, medical doctors, and others.

The financial collapse, which has shown us that the existing socio-economic models have to change, seems an excellent reason to suggest possible alternatives that point to a "soft road" of transformation. Why? The history of design teaches us that more or less radical ideas about how design can change the world have, in fact, been put forward ever since the time when designers first gave a name to their discipline. Just as artistic disciplines almost competed to see who would write the most radical manifesto, so too, it has often happened in history that certain individual designers have stepped off the speeding train and stopped to think. Just as Henry Beck, the creator of the diagram for the London Underground, was able to find distance from the contemporary world in which he worked and look at the future through the user's eyes, so too designers today could put their acquired principles in a drawer somewhere and start thinking about things from the user's point of view. For this, however, we need, by and large, an attitude that is different from the one twentieth-century designers adopted.

The event that has, among other things, led to this book – that is, the lecture series "Information Design 2009/2010"[3] – was not intended to start a revolution. We did not want the kind of media fanfare, fireworks, and fervour that

3 The last four lectures in the series are available as video recordings online at http://videolectures.net/aml2010_ljubljana/ (accessed 14 June 2012).

would die away as soon as the invited speakers left Slovenia. What we wanted to achieve was a gradual and enduring influence, with long-term effects; we wanted to examine possible ways to create change in society. With these lectures, we introduced both Slovenia's professional public (designers, architects, people in advertising, psychologists, linguists, students) and other interested sectors (state institutions, publishing and media businesses, the pharmaceutical and other industries) to the important but, despite its potential, still much-overlooked field of information design.

We live at a time when scientists are asking themselves how they can present their work to the broader society so as to reach consensus on the ethical decisions related to research in the most advanced science; when, because of the complexity of our world, office workers in companies and state agencies no longer understand the language in which they have to communicate and so produce incomprehensible documents that take more and more time to decipher; when the products we need for our everyday lives are so sophisticated they come with complicated instructions hundreds of pages long; when there are increasing numbers of people with special needs in the area of reading and understanding visual communications... There are many definitions for what visual communications are. Richard Hollis, in his legendary book on graphic design,[4] neatly lists three situations in which visual communication can help us: a) in identification, b) in information and explanation, and c) in presentation and promotion. This third situation (which today we would also call "advertising"), he says, is the most idiosyncratic and expressive, while as for the second he tells us point-blank that the profession refers to this activity as "information design".

And it is precisely the challenges just mentioned – which every person in our society encounters every day at every step – that information designers seek to address. Richard Grefé, the executive director of the American design organization AIGA, has put it very well: "Designers make the complex clear. They are the intermediaries between information and understanding."[5] Information design, then, deals with communication in public transportation (road

4 Richard Hollis, *Graphic Design: A Concise History* (London: Thames and Hudson, 1994), p. 10.

5 "The need for design can only increase", *From the Desk of Richard Grefé* (blog), 8 March 2012, http://grefe.tumblr.com/post/18947855716/the-need-for-design-can-only-increase (accessed 12 Aug. 2012).

signs, timetables, maps, pictograms); in public urban spaces (wayfinding systems at airports, hospitals, museums, hotels, etc.); in health care, medicine, and pharmaceuticals (drug packaging, professional medical and educational aids); in information technologies (on the Internet, display screens on products); in telecommunication technologies and the media (telephones, newspapers, television); in education and science (educational publications, charts and explanations for complex scientific material); and in numerous other areas.

In Slovenia, information design is still a deficient and largely undeveloped discipline. Because of the specific yet undefined nature of such projects, designers lack opportunities for involving themselves in these activities, nor do they possess the specialized knowledge from the field itself; on the other side of the coin, clients often do not see the advantages of including designers in the process, even though this could bring improved results. And, with the exception of certain isolated examples of trial projects and the introductory lectures in information design that take place in the Department of Visual Communications Design at the Academy of Fine Art and Design in Ljubljana, the field has not yet become part of the college curriculum.

There were, then, some very rational decisions and reasons behind our plans for the lecture series. New times call for a new mentality. More than just a specific field within visual communications, information design could be described as the method for addressing, or rather, improving communication that is best suited to the present age. It is concerned with "translating complex, unorganized, or unstructured data into valuable, meaningful information",[6] with an emphasis on legibility, comprehensibility, and the end usability of documents. Today, when society is growing ever more complex and saturated with all kinds of data, clear and unambiguous information is of exceptional importance. (An excellent illustration of just how important information design can be is the now world-famous example of the Florida ballots for the US presidential election in 2000; as we know, their poor design created confusion among voters and led to mistakes in filling them out, resulting in the mass invalidation of ballots and George W. Bush's eight-year presidency; it is entirely possible that, had the ballots been properly designed and, therefore,

6 "Definitions of Information Design", website of the Information Design and Architecture Special Interest Group of the Society for Technical Information, http://www.stcsig.org/id/id_definitions.htm (accessed 13 Aug. 2012).

not invalidated, Al Gore, and not Bush, would have won the 2000 presidential elections.) Information design, then, can also contribute to more transparent information in the public sector and to the more democratic communication of content that affects the local and global society. In his book on the topic, Robert Jacobson tells us why information design is so important for today's age: namely, because it underscores two interrelated concepts: "edification and commutativity".[7] The first refers to personal enlightenment; the second, to the process of communal change. Or as he goes on to say: "Contemporary information designers seek to edify more than persuade, to exchange ideas rather than foist them on us."[8]

In the lecture series at the museum, which ran from November 2009 to October 2010, six internationally recognized experts presented the field of information design to the Slovene public. They spoke about the selection, visualization, interpretation, and communication of data. In contrast to many other branches of visual communications, what is crucial to information design is the interdisciplinary way the designer must connect the experience and knowledge of many different fields, such as graphic design, psychology, applied linguistics, architecture, information technologies, writing, editing, and numerous others. For this reason, we invited not only designers to attend these lectures, but also – and this was critical – members of other professions whose participation is absolutely essential for achieving successful solutions in information design. These professions were chosen on the basis of the topics of the individual talks. Apart from their educational function, we saw these lectures as an opportunity for connecting and exchanging experiences between experts – and disciplines – that would likely be involved in information design. To this end we regularly invited not only professionals but also representatives from companies and government organizations.

Given that these were the first lectures in our cultural region ever to focus on the topic of information design, we also had to contend with terminology – and not only regarding basic explanations of what is and is not information design, as understood by different disciplines in the world; we also had to try to be, at least in this book, as precise as possible with regard to the even more

7 Robert Jacobson, ed., *Information Design* (Cambridge, Mass.: MIT Press, 1999), p. 1.

8 Ibid.

basic terminology of visual communications and design, which, sadly, in Slovenia is still not fully self-evident.[9] With the concept of "information design", the problems become even more difficult. Various disciplines, after all, are active in different areas of information design, and each has its own expressions for its part of the process. Architects deal with spatial navigation and the labelling of buildings, and they call this "signage", "wayfinding", or "environmental graphic design"; designers of interactive media, typographers, and graphic designers deal with editorial and "information graphics" and design forms and questionnaires ("form design"); interactive-media designers also deal with "information architecture"; and so on. Given their potentially similar methodologies, all these fields (and many others, listed above) can be grouped together under the common denominator "information design".

Because information design is such a new field, it was important that we invited a variety of different speakers and that each of them addressed a specific aspect of the discipline. While the present book might at first seem like a collection of theses and approaches without inherent unity, the contributions nevertheless have quite a few themes in common. They speak of a design that is focused on the needs of people rather than simply the needs of capital;[10] they describe a rapidly developing discipline that, because of its holistic and humane nature, is gaining interest among an increasing number of visual communications designers; they present an aspect of design that in its analysis and solving of problems depends less on intuition ("I like this", "I feel this is a good solution") and more on theory and empirical research and that, in the process, employs various forms of testing; finally, all the contributions share an attitude

9 The problems of terminology were addressed by Barbara Predan and Tanja Berčon Potić in the book they co-edited, *Nazaj k oblikovanju: Antološki pregled teorije oblikovanja v slovenskem prostoru* [Back to design: An anthological survey of design theory in Slovenia] (Maribor: Litera, 2007), where in their own contributions ("Oblikovanje, industrijsko oblikovanje" [Design, industrial design] and "Oblikovanje vizualnih komunikacij, grafično oblikovanje, celostna grafična podoba, znak in simbol" [Visual communications design, graphic design, graphic identity, sign and symbol], respectively) they very helpfully define and clarify the difficulties in this area.

10 Even so, this does not mean that information design is a kind of altruistic avocation: good information design can substantially improve the financial revenues of businesses and, through good solutions, not helps only the user but can also yield positive results for companies. As Jorge Frascara puts it in his essay: "Good design is not an expense – it is an investment" ("Data, Information, Design, and Traffic Injuries", p. 58).

that characterizes information design on the whole, namely, one of "improving communication" and not merely communicating messages.[11] Adolf Loos prescribed this attitude for architecture as far back as 1924, when he wrote that the architect's task is "to get to the bottom of life, to think through people's needs to the very end, to help the disadvantaged in our society" and not "to invent new forms".[12]

In the essay "Graphics with a Cause, and Universal Principles for Visualizing Information", Yuri Engelhardt writes with an almost childlike enthusiasm about the importance of information design and introduces us to the truly rich history of the discipline. At the same time, discussing two of the field's central figures, Otto Neurath and Hans Rosling, he explains to us the complex theoretical aspects of good communication on the basis of the universal principles of visual language. He shows us that the key lies in "understanding" and not merely in communication per se.

In the chapter "Transformational Information Design", Rob Waller explains the differences in the work process between information design and other design disciplines. He goes on to discuss details from separate information design fields related to the design of specific documents that do their job only when they are well designed, and unveils a number of concepts for addressing issues of this sort.

Our third speaker was Jorge Frascara, who in the chapter "Data, Information, Design, and Traffic Injuries" not only elucidates certain theoretical aspects of visual communications but also tackles a quite specific area in information design, namely, the design of traffic information. With his long experience

11 This is why in this book we use the phrase "visual communications" (*vizualne komunikacije*) and not "visual messages" (*vidna sporočila*), although the two terms are interchangeable in Slovene. In the case of information design, the term "visual communications" is more appropriate in that it suggests the interactive, two-way nature of communication, a dialogue between receiver and transmitter, and, what is very important, the action triggered by the communication as well as the user's role in the process. Thus, the term is more appropriate than the unidirectional phrase "sending messages". See also Berčon Potić, "Oblikovanje vizualnih komunikacij, grafično oblikovanje, celostna grafična podoba, znak in simbol", in Predan and Berčon Potić, eds., *Nazaj k oblikovanju*, p. 56.

12 Adolf Loos, "On Thrift" (1924), in *On Architecture*, ed. Adolf Opel and Daniel Opel (Riverside, Calif.: Ariadne Press, 2002), p. 183. The emphasis, then, is on needs, on the way a problem is resolved, and not on aesthetics and form. I am grateful to Barbara Predan for drawing my attention to this quotation, which she uses in her doctoral dissertation.

in the area, he makes us see that design can have a positive outcome only if it is undertaken on an interdisciplinary basis.

In the chapter "Designing Information about Medicine: The Role of Visual Design", Karel van der Waarde takes us into the quite unfamiliar world of the pharmaceutical and medical professions and their labyrinths of laws and procedures. And just as we are about to give up hope that any improvement can be made in this area, he offers us a fully concrete plan by which real changes could be made – through a better understanding of the processes involved and the establishment of legislative conditions in the European Union, which needs to start thinking in a categorically different way about the labelling and design of information for users.

In contrast to the other contributors here, Malcolm Garrett is a "designer/practitioner". He has a fascinating background of working as a designer for music groups, which is of course something we could not ignore (nor did we wish to). He is a first-rate example of how designers can cover very different areas in visual communications – his extemely creative and even revolutionary designs for the music industry are, indeed, in no way at odds with the kind of precise thinking he uses in developing system-wide solutions in the area of wayfinding. His contribution here, "Keeping It Real in a Virtual World", is of all the essays perhaps the most "hands-on" look at what happens in the kind of projects that affect the daily lives of those of us who live in cities – projects that help people find their way around a given space.[13]

We invited Karen Schriver to speak because of her seminal book *Dynamics in Document Design*[14] and her familiarity with the field of information design. Her contribution, *Reading on the web: Implictions for Online Information Design*, represents a true questioning of conscience for interactive designers, as she rigorously analyses what is needed for understanding the reading process and the needs of the user we design for. With her experience and precise research methods she creates an essay that, on the one hand, addresses general themes while, on the other, offers some very concrete answers. This is an excellent example

13 This is the problem treated by the information design area that is sometimes called "wayfinding", although Per Mollerup has, more accurately, called it "wayshowing" (in his book *Wayshowing: A Guide to Environmental Signage: Principles and Practices* [Baden: Lars Müller, 2005]).

14 *Dynamics in Document Design: Creating Text for Readers* (New York: John Wiley & Sons, 1997).

of cross-pollination between various research disciplines that can only deliver superior results when they work together in a coherent way.

If we wished to summarize all the essays, we would find that the two key notions connected with information design are "understanding" and "positive change". And this was also the fundamental desire of both the lecture series and this book: that the understanding of the discipline of information design should increase, develop, and actively transform our environment and our comprehension of the world.

Yuri Engelhardt

Graphics with a Cause, and Universal Principles for Visualizing Information

The diverse field of information design spans various subfields, including the design of user instructions, forms, signage, labels, and other communication artefacts. In the following, I concentrate on the subfield of information design that deals specifically with graphics. Think of anything from the subway map on a station wall, to charts in newspapers, to interactive 3-D data visualizations on the computer. I use the term "graphics" here to mean diagrams, maps, charts, graphs, tables, and other visualizations of information.

There are two aspects of graphics that I am personally very passionate about: *graphics with a cause* and the *universal principles for visualizing information*. I will discuss them both here. Concerning graphics with a cause, I will look at the use of graphics for increasing awareness and understanding of social and environmental issues, in particular the work of Otto Neurath and Hans Rosling. Concerning my second passion, the universal principles for visualizing information, I will examine visually coded objects and "meaningful spaces" as the quintessence of all graphics.

Graphics with a Cause: Neurath and Rosling

> *Millions of dollars yearly are spent in the collection of data. … We daily see facts presented in the hope of creating interest and action for some really worthy piece of work to benefit the people as a whole. … Unless the facts are presented in a clear and interesting manner, they are about as effective as a phonograph record with the phonograph missing. … If the facts were put in graphic form, … there would be infinite gain to society.*[1]

1 Willard C. Brinton, *Graphic Methods for Presenting Facts* (New York: McGraw-Hill Book Co. and Engineering Magazine Co., 1914), pp. 1–2.

It has been one hundred years since Willard Cope Brinton made these remarks about the potential of graphics to benefit society. Along similar lines, Jorge Frascara has talked about "the relevance of information design for things that matter in society" and argued that design's highest end is "to change an existing reality into a better one".[2] I couldn't agree more, with both Brinton and Frascara. So you may wonder: should information designers focus on "graphics with a cause" and "charts for change"? Would it be a good idea to have a Nobel Peace Prize for graphics that have helped to raise public awareness about urgent issues in our society? As a matter of fact, in 2007 the Nobel Peace Prize was awarded for work in which quantitative charts played a key role in raising public awareness about a global issue: Al Gore's work of spreading the "inconvenient truth" about the climate crisis we are facing. Let's have a look at two other well-known initiatives that produced graphics with a cause: Otto Neurath's pictorial statistics and Hans Rosling's "moving bubble charts".

Otto Neurath's pictorial statistics: Isotype

Otto Neurath, a key member of the group of philosophers known as the Vienna Circle (Wiener Kreis), has been described as "one of the most formidable, if controversial, intellectuals of the interwar period".[3] Neurath's work includes important contributions in diverse fields, such as political economy, theory of science, and social philosophy. In addition, Neurath is well known as a pioneer in information visualization. He believed that "visual education is related to the extension of intellectual democracy within single communities and within mankind".[4]

After directing the Museum of War Economy in Leipzig in 1918, Neurath founded and directed two museums in Vienna, both concerned with housing, city planning, society, and economics (the second of these can be seen as a continuation of the first). They were unique institutions that attempted to

2 J. Frascara, "Data, Information, Design, and Traffic Injuries" (lecture, Museum of Architecture and Design, Ljubljana, 16 March 2010); a video of the lecture is available online at http://videolectures.net/aml2010_frascara_diti/. Frascara's essay, under the same title, in the present book is based on this lecture.

3 N. Vossoughian, "Mapping the Modern City: Otto Neurath, the International Congress of Modern Architecture (CIAM), and the Politics of Information Design", *Design Issues* 22, no. 3 (2006): 48.

4 O. Neurath, "Visual Education – Humanisation versus Popularisation" (1945), *Empiricism and Sociology*, ed. M. Neurath and R. S. Cohen, Vienna Circle Collection 1 (Dordrecht, Netherlands: Reidel, 1973), p. 247.

introduce and explain socio-economic facts to local citizens through the use of graphics. Marie Neurath, his colleague and eventually his wife (they married in 1941), comments on their work for the Museum for Social and Economic Affairs (Gesellschafts- und Wirtschaftsmuseum):

> Our object was to make the general public acquainted with the problems the community of Vienna had to tackle (the housing shortage, the amenities needed for children and mothers, the high infant mortality and the tuberculosis), how they were dealt with, and with what success. In colourful charts, which were like simple puzzles which everybody could solve, such problems were

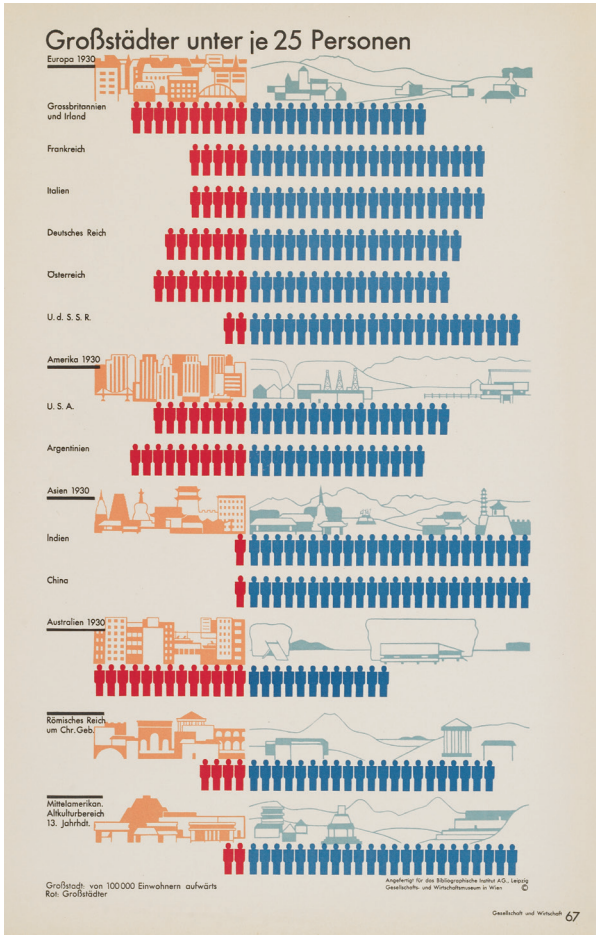

Fig. 1. An example of an Isotype chart: the urban population (red) vs. the rural population (blue) in different societies. (Page 67 from Otto Neurath's *Gesellschaft und Wirtschaft* [Society and economy], published by the Museum for Social and Economic Affairs, Vienna, in 1930.)

> brought nearer to general understanding than would have been possible with just words and numbers.[5]

While working for the museum's exhibitions, Neurath and his team, which included them the graphic designer Gerd Arntz, developed an iconic language of pictorial statistics, originally called the "Vienna Method" but later renamed the International System of Typographic Picture Education – Isotype. This iconic language (see fig. 1 for an example) uses simplified pictures and specific composition rules to "present some worthwhile information, show up some relationship or development in a striking manner, to arouse interest, direct the attention and present a visual argument which stimulates the onlooker to active participation".[6]

"The output of the Isotype movement as a whole," says Michael Twyman, "draws attention to two things which are of special interest to many designers today. First, it demonstrates that successful designing depends to a large degree on clarity of thinking; secondly, it provides support for the view that the graphic designer's primary role is to serve the needs of society."[7]

Hans Rosling's "moving bubble charts": Gapminder

A much more recent initiative, also based on "clarity of thinking" and the aim "to serve the needs of society" (to borrow Twyman's words), is Gapminder. As the website for the initiative has described it, "Gapminder is a non-profit venture promoting sustainable global development and achievement of the United Nations Millennium Development Goals by increased use and understanding of statistics."[8] The Gapminder Foundation was created in 2005 by the Swedish medical doctor and researcher Hans Rosling, with his son and daughter-in-law. Their software enables the visual exploration of statistical data such as infant mortality rates and income per capita for all countries of the world in interactive charts with coloured, moving bubbles, with each coloured bubble

5 M. Neurath, "Isotype", *Instructional Science* 3 (1974): 130.

6 Ibid., p. 146.

7 M. Twyman, (1975/1981) "The Significance of Isotype" (1975), in *Graphic Communication through Isotype*, 2nd rev. ed. (Reading: University of Reading), p. 17.

8 "About Gapminder", Gapminder website, http://www.gapminder.org (accessed 17 Dec. 2008).

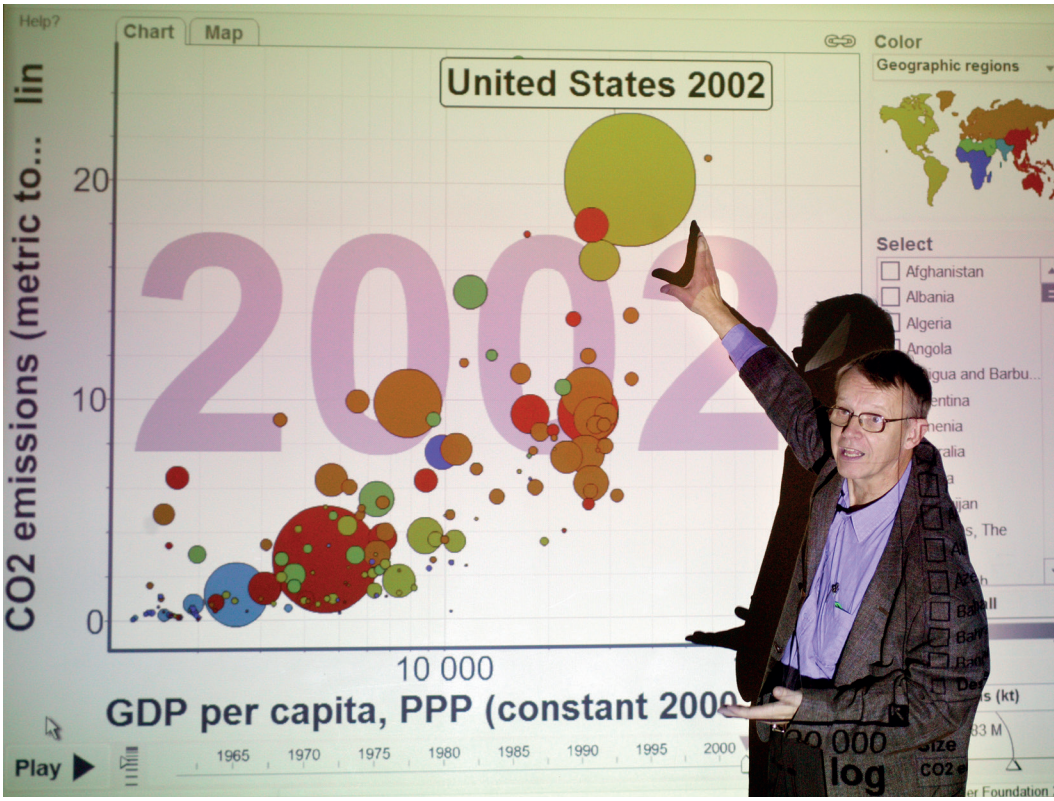

Fig. 2. Hans Rosling using an animated Gapminder chart in a presentation. Each coloured bubble represents a country. Here, average CO_2 emissions per person (from bottom to top) are plotted for each country against average income per person (from left to right). The size of the bubble stands for the total CO_2 emission in the given country and the colours stand for the different regions of the world.

representing a country (fig. 2).[9] These moving graphics, the data that they can explore, and – above all – Rosling's charismatic performances using them, in which he explains our world to us, have turned out to be very successful in attracting the attention even of people who usually are "allergic" to charts and statistics. The online videos of Rosling's presentations have been watched by millions and millions of people.

9 The Gapminder software is available for both online use and downloading at http://www.gapminder.org.

Seventy years apart – the same spirit

Although separated by about seventy years of turbulent human history, Neurath's and Rosling's efforts share a spirit that is independent of their time and of the technological means they use. Both Neurath and Rosling are energetic, inspiring, and unorthodox, with a great drive to communicate their ideas and serve society. Neurath's work was strongly connected to exhibitions and museums, and, interestingly, Rosling's team also presents Gapminder as a "museum": "We are a modern 'museum' that helps make the world understandable, using the Internet."[10]

Four things specifically connect Isotype and Gapminder: First, both Neurath and Rosling believe that factual statistical data should be accessible to everyone. Second, both believe that making people aware of certain statistical data can raise awareness about global issues. Third, they are both convinced of the power of the visual. And fourth, they both employ the latest media technology of their times. Let's have a closer look at each of these points.

1. Facts for everyone. In terms of access to statistical data, Neurath believes: "The ordinary citizen ought to be able to get information freely about all subjects in which he is interested, just as he can get geographical knowledge from maps and atlases. There is no field where humanization of knowledge through the eye would not be possible."[11] After realizing that most Austrians were not aware of national and global socio-economic issues, Neurath hoped to bring such information to the masses through museum exhibitions, so that "more than a few people will experience Austria as a unity with connections abroad".[12] Similarly, Rosling's team asserts that "all people, independently of their political agenda, should get free access to already existing statistics about global development to easily improve their understanding about the complex society".[13] There is a strong philosophical aspect to the ambitions of both Neurath and Rosling. As a key member of the Vienna Circle, Neurath was one of the main figures in the development and promotion of *logical positivism*, a

10 "About Gapminder".

11 O. Neurath, *Modern Man in the Making* (New York: A. A. Knopf, 1939), p. 3.

12 O. Neurath, quoted in N. Vossoughian, *Otto Neurath: The Language of the Global Polis* (Rotterdam: NAi Publishers, 2008), p. 59.

13 "Frequently Asked Questions", Gapminder website, http://www.gapminder.org/faq_frequently_asked_questions/ (accessed 13 Oct. 2011).

philosophical position characterized by its trust in rationality, logic, science, empiricism, "facts" and "truth". The trust in these concepts has been heavily criticized by other well-known philosophers since. In this context it is interesting that Gapminder's tagline – "For a fact-based world view" – and mission statement – "Fighting the most devastating myths by building a fact-based world view that everyone understands" [14] – could be interpreted as a revival of the *logical positivism* that was propagated by Neurath and the Vienna Circle.[15]

2. Raising awareness. Both Neurath and Rosling are convinced that disseminating statistical data and presenting it in comprehensible ways can play an important role in raising people's awareness about global issues. Neurath argues that "with visual aids, one could create something that is common to all, we could educate children in various countries ... in a way which gives them the feeling of having knowledge in common for human brotherhood. Because I believe that visual aids have this peculiarity, I wish to promote visual education, as an element of human brotherhood."[16] Along similar lines, Rosling argues: "We can change how the young generation understands the state of the world if we provide IT-tools that give them more complex and relevant moving images of world development in the form of animated statistics."[17]

3. The power of visual representations. Another similarity concerns the belief in the benefits of using graphics. Both Neurath and Rosling are passionate advocates of the visual. As Ellen Lupton notes, "Neurath held that vision is the saving link between language and nature, and that, hence, pictorial signs would provide a universal bridge between symbolic, generic language and direct, empirical experience."[18] Neurath believed that "communication of knowledge through

14 "Our Mission", Gapminder website, http://www.gapminder.org/about-gapminder/our-mission/ (accessed 13 Oct. 2011).

15 I am grateful to Jonathan Gray for drawing my attention to this.

16 O. Neurath, "Visual Education", p. 248.

17 H. Rosling, A. Rosling Rönnlund, and O. Rosling (2004): "New Software Brings Statistics Beyond the Eye", in Organization for Economic Cooperation and Development, *Statistics, Knowledge and Policy: Key Indicators to Inform Decision Making*, proceedings from the OECD World Forum on Key Indicators held in Palermo, Italy, 10–13 November 2004 (Paris: OECD, 2005), p. 526. The Roslings' paper is available online at http://www.oecd.org/dataoecd/39/48/33843977.doc (accessed 15 March 2008).

18 E. Lupton, "Reading Isotype", *Design Issues* 3, no. 2 (1986): 47.

pictures will play an increasingly large part in the future"[19] and famously stated: "Words make division, pictures make connection."[20] Rosling addresses visualization and animation as services that "unveil the beauty of statistics".[21] For Rosling, it is Gapminder's effective use of visuals that makes development statistics enjoyable and understandable. The Gapminder Foundation aims "to create animated graphics that not only reach and please the eyes, but that also transform statistics into understanding, i.e. goes beyond the eye to hit the brain".[22] This goal is shared by Isotype. As Frank Hartmann notes: "While the graphic designer wants to catch the eye, Neurath wanted to catch the mind. When, in 1936, Neurath talked about an 'education by the eye', his quest was not for better visuals but for getting 'the full picture' – through perception to imagination."[23]

4. Making use of the latest media technology. Would Otto Neurath have used YouTube and Twitter? I believe so. Neurath used a broad range of techniques for producing his displays and reaching his audiences, including the newest available media technologies at the time, especially when he was creating animated graphics for film. Neurath was already experimenting with animated graphics in the late 1920s in his museums in Vienna. Later, in 1941, having fled to Britain, he was approached by film-maker Paul Rotha, one of the key figures of British documentary film at the time. Neurath and Rotha started working together, with animated Isotypes designed by Otto and Marie Neurath being used in seventeen films between 1941 and 1947. Michael Burke and Toby Haggith say of these films that "at the time they were stylistically and technically revolutionary".[24]

19 O. Neurath, *From Hieroglyphics to Isotype: A Visual Autobiography*, ed. M. Eve and C. Burke (London: Hyphen Press, 2010), p. 5.

20 O. Neurath, *International Picture Language* (London: Kegan Paul, Trench, Trubner and Co., 1936), p. 18; available online at http://imaginarymuseum.org/MHV/PZImhv/NeurathPictureLanguage.html (accessed 16 Oct. 2011)

21 H. Rosling, "Visual Technology Unveils the Beauty of Statistics and Swaps Policy from Dissemination to Access", *Statistical Journal of the AIOS* 24 (2007): 104.

22 H. Rosling, Rosling Rönnlund, and O. Rosling, "New Software Brings Statistics Beyond the Eye", p. 2.

23 F. Hartmann, "After Neurath: The Quest for an Inclusive Form of the Icon" (lecture, the Stroom Foundation, The Hague, 31 October 2006); available online at http://www.medienphilosophie.net/texte/neurath.html (accessed 15 March 2008).

24 M. Burke and T. Haggith, "Words Divide, Pictures Unite: Otto Neurath and British Propaganda Films of the Second World War", *Imperial War Museum Review*, no. 12 (1999): 64.

Rosling, in turn, is employing state-of-the-art software for creating interactive graphics, and is broadcasting his ideas via YouTube and Twitter.[25]

Current media technology and Neurath's vision

Part of Neurath's vision was to engage ordinary people in actively reasoning with statistical data. Recently, we have seen the rise of "open data" and "data journalism", with data being available to the general public to an extent that was unimaginable in Neurath's time. And Neurath could not have foreseen the public availability of visualization software or how easy it is today to make data and graphics available through the Internet. While Isotype graphics were created by a few specialized visualization professionals, current do-it-yourself data-visualization software and the Internet now enable basically anyone with basic computer skills to obtain and visualize data, and to publish and discuss such visualizations with others online. Since 2007, many different websites have emerged where Internet users create, share, and discuss visualizations of data.[26] As Kristóf Nyíri points out: "The emergence of computer graphics and multimedia computer networking might lead to a fulfilment of Neurath's vision."[27]

Rosling's little men

In recent presentations, Rosling, possibly without realizing it, has been using Neurath's key visual language principle. In a presentation in June 2010,[28] Rosling explains population growth by lining up visual units (plastic boxes in this case; in later presentations he uses toilet paper rolls), with each visual unit standing for a fixed number of people (1 billion). While Neurath would have used human figures instead of boxes, Rosling's presentation could be seen as a 3-D Isotype graphic performed live on stage. In a presentation in December 2010,[29] Rosling actually uses a line-up of two-dimensional human figures

25 See Rosling's Twitter page at http://twitter.com/hansrosling.

26 For example, "Many Eyes" at http://www-958.ibm.com.

27 K. Nyíri, "From Texts to Pictures: The New Unity of Science", in K. Nyíri, ed., *Mobile Learning: Essays on Philosophy, Psychology and Education* (Vienna: Passagen Verlag, 2003), p. 45.

28 A video of the talk is available online at http://www.ted.com/talks/hans_rosling_on_global_population_growth.html.

29 A video of the talk is available online at http://www.ted.com/talks/hans_rosling_and_the_magic_washing_machine.html

(again, each one standing for 1 billion people), a method that strongly reminds us of Neurath's Isotype charts (fig. 3).

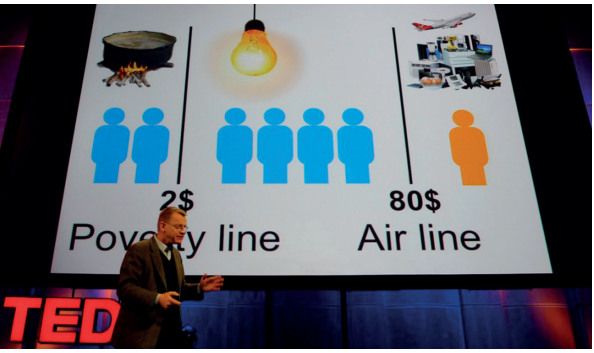

Fig. 3. Hans Rosling shows a line-up of little human figures, with each figure standing for one billion people. Rosling explains that two billion people, on the far left, live below the poverty line, while one billion people, on the far right, live above the "air line" – these are the customers of airlines. Photograph by Anab Jain (http://superflux.in).

Noting the various aspects they have in common, I have been discussing Neurath's Isotype work and Rosling's Gapminder work as examples of "graphics with a cause". Of course, in principle, every visual representation is designed with some goal in mind. How do designers use the available visual means to achieve their communicative goal? Are there universal principles of visualizing information, universal principles of the visual language of graphics? The search for such universal principles has been a main passion and focus of my research for more than fifteen years, and this will be the subject of the second part of my contribution here.

Universal Principles for Visualizing Information: Arranging Visually Coded Objects in Meaningful Spaces

> *The principles for a grammar of graphic presentation are so simple that a remarkably small number of rules would be sufficient to give a universal language.*[30]

Just as he pondered the potential benefits of graphics for society, Brinton also contemplated the universal principles of graphic presentation a century ago. Unfortunately, he did not tell us what these principles and rules might be. His assumption of the universality of visual communication seems to be shared by

30 Brinton, *Graphic Methods*, p. 3.

Neurath and Rosling. Critics of such assumptions of universality point out that any visual language is a social construct and greatly dependant on context and culture. And they are right, of course. It is not the case that all humans share a "universal visual language" (the visual sign languages used by deaf people also differ enormously throughout the world). This does not mean, however, that no shared basic principles can be found in the diversity of visual representations. In what follows, I propose such universal, shared principles for visualizing information. These ideas have evolved from my earlier work on the subject, where I present deeper explorations and refer to the abundant related writings by other authors.[31] Fasten your seat belts please – this is going to be compact and somewhat "technical".

Partly based on the existing literature, I propose the following six universal principles for visualizing information:

1. Any visual representation of information consists of *Visual Objects* positioned in a *Meaningful Space*.
2. A set of basic types of *Meaningful Spaces* can be identified (e.g. *Timeline*, *Map Space*, *Metric Axis*, etc. – see table 1), which can be combined with each other in various ways.
3. A set of basic types of *Visual Objects* can be identified (e.g. *Node*, *Link*, *Label*, etc. – see table 1), and the type of *Visual Object* determines how this object can be used in relation to *Meaningful Spaces* as well as in relation to other *Visual Objects*.

31 See Y. Engelhardt, J. de Bruin, T. Janssen, and R. Scha (1996): "The Visual Grammar of Information Graphics", in N. H. Narayanan and J. Damski, eds., *Proceedings of the AID '96 Workshop on Visual Representation, Reasoning and Interaction in Design* (Stanford, Calif.: Stanford University, 1996); as well as my articles "Meaningful Space: How Graphics Use Space to Convey Information", in *Vision Plus 4: The Republic of Information: March 26–29, 1998: Proceedings* (Pittsburgh: Carnegie Mellon University, School of Design, 1998), pp. 108–126; "Meaningful Space", in J. Abrams, ed., *If/Then: Design Implications of New Media* (Amsterdam: Netherlands Design Institute, 1999), pp. 72–74; "Objects and Spaces: The Visual Language of Graphics", in D. Barker-Plummer, R. Cox, and N. Swoboda, eds., *Diagrammatic Representation and Inference: 4th International Conference: Diagrams 2006* (Berlin: Springer, 2006), pp. 104-108; and "Syntactic Structures in Graphics", in J. R. J. Schirra, ed., "Computational Visualistics and Picture Morphology", special issue, *Image – Journal of Interdisciplinary Image Science* 5 (2007): 23–35; and my PhD dissertation, "The Language of Graphics: A Framework for the Analysis of Syntax and Meaning in Maps, Charts and Diagrams" (Institute for Logic, Language and Computation, University of Amsterdam, 2002).

4. A set of basic types of possible *Visual Properties* can be identified (e.g. *Size*, *Colour*, etc. – see table 1), which can be used as visual codings.
5. The type of information to be represented determines the types of *Meaningful Spaces*, types of *Visual Objects*, and types of *Visual Properties* that can be used to represent this information visually (see table 2).
6. "Playing with the options" concerning all of the above, in different combinations, yields a diversity of visual representation possibilities for any given information.

The universal "ingredients" of visual representations of information		
Meaningful Spaces:	**Visual Objects:**	**Visual Properties:**
Picture Space	Node	Size-coded
Map Space (metric or ordered)	Link	Colour-coded
	Line Locator	Shape-coded
Timeline (metric or ordered)	Surface Locator	Brightness-coded
	Bar	Proportionally Repeated
Metric Axis	Container	...
Ordering Axis	Grid Mark	
Categorization Axis	Label	
Proportionally Divided Space	Character	
	Pictorial Element	
Text Space		
Random Space		

Table 1: The universal "ingredients" of visual representations of information.

Let us look at the Isotype and Gapminder graphics as examples. The typical Gapminder charts (e.g. fig. 2) consist of bubble-shaped *Nodes* (a type of *Visual Object*) which are *Size-coded* and *Colour-coded* (these are *Visual Properties*) and positioned inside a *Meaningful Space* that is defined by a horizontal *Metric Axis* and a vertical *Metric Axis*. Notice that the Gapminder charts are dynamic and that changes over time are – quite appropriately – represented by changes over time during the presentation of the chart. Most Isotype graphics (e.g. fig. 1), in turn, consist of *Pictorial Elements* (a type of *Visual Object*) which are *Proportionally Repeated* (an *Object Property*) and positioned inside a *Meaningful Space* defined by a *Metric Axis* (e.g. horizontally) and possibly a *Timeline* or *Categorization Axis* (e.g. vertically).

Meaningful Space

Imagine sitting in a bar and using the arrangement of empty beer glasses on the bar table to explain, say, the location of Berlin with respect to London and Paris. The positioning of only two beer glasses, standing for London and Paris, creates a *Meaningful Space* – every position on the bar table has been assigned a geographical meaning. This *Meaningful Space* extends even beyond the bar table – a person at a nearby table may now happen to be "sitting in Africa". Similarly, when we start to make a financial chart and draw two labelled axes (e.g., one for the months of the year, the other for expenses in dollars), a *Meaningful Space* is created: every position in the still-empty chart has been assigned a meaning even before we have any data. The face of a clock also constitutes a *Meaningful Space* – it assigns meaning (time) to every spatial position along a circle. In technical terms, a *Meaningful Space* could be defined as a space that involves an interpretation function from spatial positions to one or more domains of information values. Moving higher up inside a visual representation, for example, may mean further north (in the case of a map), later in time (in the case of an evolution tree), or higher expenses (in the case of a financial chart). I feel honoured that my proposal of this notion of *Meaningful Space* and its construction (see below) has been taken up by a few key authors in the field of visualization and visual thinking, including Stuart Card, in his writings on information visualization, and Dave Gray, in the book *Gamestorming*.[32]

Basic types of Meaningful Spaces and their combination

The degree to which spatial positions are meaningful varies with the type of meaningful space. In the space along a *Metric Axis*, the exact positions and distances of visual objects are meaningful. In the space along an *Ordering Axis*, only spatial ordering is meaningful, not the exact spatial positions and distances. In the space along a *Categorization Axis*, it is only meaningful in which subregion a visual object is positioned. In *Proportionally Divided Space*, it is not the spatial positions but the relative surface areas that are meaningful.

32 S. K. Card, "Information Visualization", in J. A. Jacko and A. Sears, eds., *The Human-Computer Interaction Handbook* (Mahwah, NJ: Lawrence Erlbaum Associates, 2003), pp. 544–582; and D. Gray, S. Brown, and J. Macanufo, *Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers* (Sebastopol, Calif.: O'Reilly Media, 2010).

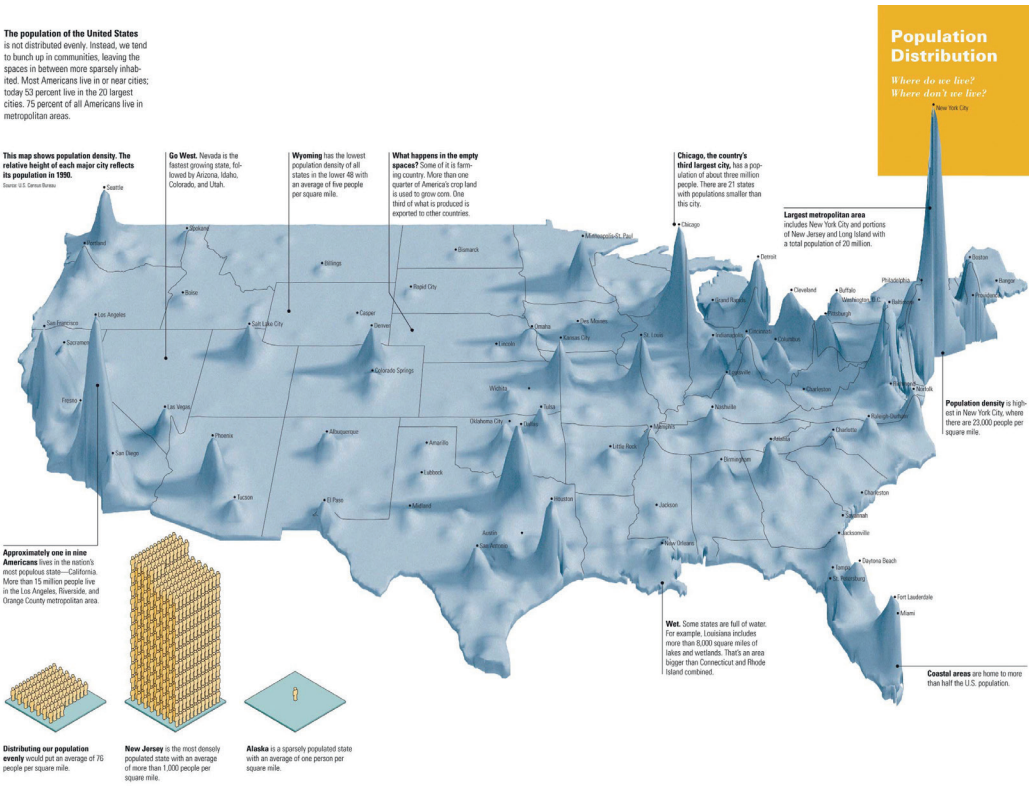

Fig. 4. Population density in the United States in 1990. The graphic was created by the design firm Agnew Moyer Smith (now ThoughtFormDesign.com) for Richard Saul Wurman's book *Understanding USA* (Newport, RI: TED Conferences, 1999). The *Meaningful Space* here is a perpendicular combination of a horizontal *Map Space* (to show geographic location) and a vertical *Metric Axis* (to show population density).

Finally, in *Random Space*, visual objects can be moved around without changing the meaning of the representation.

Along a *Timeline*, the position of a visual object stands for a point in time. A *Timeline* may be a *metric Timeline*, which means that distances along the timeline are meaningful, as in a time chart, for example. A *Timeline* may also be an *ordered Timeline*, as in a comic strip – the individual panels are chronologically ordered, but the time that has passed between two panels is usually

not proportional to the distance between the panels. In *Picture Space* and *Map Space*, the position of a visual object in the representation stands for a position in physical space. Again, a *Map Space* may be a *metric Map Space*, as in a topographical map, or it may be a distorted, *ordered Map Space*, as in a subway map. In the ordered space of the subway map the relative distances between the stations can be quite distorted – it is the represented relative order of stations that is meaningful.

Basic meaningful spaces can be combined with each other to form more complex meaningful spaces. One possibility is perpendicular combination. For example, the perpendicular combination of a vertical *Metric Axis* with a horizontal *metric Timeline* is a common two-axis chart. The perpendicular combination of a horizontal *Categorization Axis* with a vertical *Categorization Axis* is a matrix or table, with columns and rows. The 3-D population density map in fig. 4 is a perpendicular combination of a horizontal *Map Space* (to show geographic location) with a vertical *Metric Axis* (to show population density).

In addition to perpendicular combination, meaningful spaces can be combined by embedding smaller meaningful spaces inside another larger meaningful space. In the 3-D population density map in fig. 4, for example, we see *Text Spaces* embedded inside the larger meaningful space – a very common practice. Another example of embedding is the comic strip: A comic strip uses *Picture Spaces* that are embedded in a space that is defined by a horizontal *ordered Timeline*.

Table 2 shows how the choices of *Meaningful Spaces*, *Visual Objects* and *Visual Properties* depend on the type of information that needs to be represented. Table 3 shows examples of various types of graphics and their basic construction from these ingredients, including Edward Tufte's "small multiples" and Charles Joseph Minard's famous chart of the losses suffered by Napoleon's army in Russia.[33]

33 In-depth discussions of the different types of *Visual Objects and Meaningful Spaces*, and how they are used, can be found in the works cited in n. 31.

This type of information:	**can be represented by *Visual Objects* that are:**
Point in time	positioned along a *Timeline*, or – in a dynamic visual representation – that change their position in *Meaningful Space* and/or their *Visual Properties* over time
Quantity	*Size-coded* (e.g. *Bars*) or *Proportionally Repeated* or positioned along a *Metric Axis*
Proportion	*Size-coded* and/or positioned in segments of a *Proportionally Divided Space*
Ranking	*Brightness-coded* or positioned along an *Ordering Axis*
Categorization	*Colour-coded* or *Shape-coded* or positioned along a *Categorization Axis* or positioned in *Containers*
Physical arrangement	*Pictorial Elements* and/or positioned in a *Picture Space* or a *Map Space*
Path or Hierarchy	connected by *Links* and/or positioned along an *Ordering Axis* or positioned in nested *Containers*

Table 2: The possible choices of *Visual Objects, Visual Properties,* and *Meaningful Spaces* (on the right) depend on the type of information that needs to be represented (on the left).

Types of Graphics	**Visual Objects**	**Inside a Meaningful Space:**
picture	*Pictorial Elements*	inside a *Picture Space*
text	*Characters*	inside a *Text Space*
timeline	anything	inside a space defined by a *Timeline* (*ordered* or *metric*)
comic strip	*Pictorial Elements* (plus *Characters* in *Text Spaces*)	inside *Picture Spaces* which are, in turn, embedded in a space defined by a horizontal *ordered Timeline*
map	*Nodes* and/or *Line Locators* and/or *Surface Locators*	inside a *Map Space*
subway map	*Nodes* and *Colour-coded Links*	inside an *ordered Map Space* (preserving order, not metrics)
network graph	*Nodes* and *Links*	often inside a *Random Space*
flow chart	*Nodes* and *Links*	sometimes inside a space defined by an *ordered Timeline*

family tree	*Nodes* and *Links*	inside a space defined by a vertical *ordered Timeline*
columns	anything	inside a space defined by a horizontal *Categorization Axis*
table / matrix	anything, usually with *Grid Marks*	inside a space defined by a horizontal *Categorization Axis* and a vertical *Categorization Axis* (like this table!)
Venn diagram	intersecting *Containers*	inside a *Random Space*
scatter plot	*Nodes*	inside a space defined by a vertical *Metric Axis* and a horizontal *Metric Axis* or *metric Timeline*
Gapminder bubble chart	*Size-coded* and *Colour-coded Nodes*	inside a space defined by a vertical *Metric Axis* and a horizontal *Metric Axis*
line chart	*Line-Locator(s)*	inside a space defined by a vertical *Metric Axis* and a horizontal *metric Timeline*
bar chart	*Size-coded Bars*	inside a space defined by a vertical *Metric Axis* and a horizontal *metric Timeline* or a *Categorization Axis*
pie chart	*Size-coded Surface Locators*	inside a *Proportionally Divided Space*
treemap	*Size-coded Surface Locators*	inside a *Proportionally Divided Space*, embedded recursively
Isotype chart	*Proportionally Repeated Pictorial Elements*	usually inside a space defined by a *Metric Axis*, possibly combined with a perpendicular *Timeline* or *Categorization Axis*
quantity map in 3-D	*Surface Locator(s)*	inside a space defined by a horizontal *Map Space* and a vertical *Metric Axis*
small multiples	anything	inside a meaningful space which is repeated and embedded in a space defined by a *Timeline* and/or a *Categorization Axis*
the Napoleon march map	*Size-coded* and *Colour-coded Connectors*	inside a *Map Space*, which is supplemented by a space defined by a *Metric Axis* (for showing temperatures)

Table 3: Examples of common types of graphics and how they are constructed from the universal "ingredients" of visual representations. (For simplicity, *Labels, Text Spaces,* and *Grid Marks* – which are almost ubiquitous – have largely been left out of this table.)

Conclusions

For designers of graphics it can be useful to be aware of – and be able to "play with" – the diversity of visual representation possibilities that arise from choosing and combining the different types of *Meaningful Spaces* and *Visual Objects* proposed here. What really matters in the end, however, is the kind of impact graphics have. We have discussed Neurath's Isotype and Rosling's Gapminder as examples of how graphics may be used to raise public awareness and understanding regarding social and environmental issues. Of course, making charts about socio-economic statistics is not the only way in which information designers can try to do something for people and the planet. There are many other possibilities. Among my favourite initiatives are those where tools and visuals are created that can help us to assist vulnerable populations, to make ethical consumer choices, to serve the public interest, and to hold governments accountable. To me, such "graphics with a cause" are fine examples of what Jorge Frascara has expressed as "the relevance of information design for things that matter in society".[34]

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Acknowledgements: Above all, I am grateful to my colleague Raul Niño Zambrano for our joint work, which I present here with his kind permission: many sections of the part "Graphics with a Cause: Neurath and Rosling" are edited versions of sections from our joint paper "Diagrams for the Masses: Raising public awareness – From Neurath to Gapminder and Google Earth", in G. Stapleton, J. Howse, and J. Lee, eds., *Diagrammatic Representation and Inference* (Berlin: Springer, 2008), pp. 282–292. In addition, I would like to thank Anab Jain and Don Moyer for allowing me to use their visual materials, and Anders Bouwer, Jonathan Gray, Frank Hartmann, Wim Jansen, Jaap Meijers, Ingrid von Engelhardt, and Rawley Grau for their very helpful comments on the draft versions of this text.

34 See footnote 2.

Rob Waller

Transformational Information Design

There is growing recognition that information design makes a vital contribution to modern industrial and digital societies. Good information design helps people cope with the complex decisions they need to make in today's world. Poor information design makes everyday life more difficult, disadvantages those with less education, and can even cause accidents.

In this essay I want to make a case for the importance of information design and raise some issues about the skills information designers need and their role within organizations that produce complex information.

What Is Information Design?

Firstly, what is information design? This may seem a superfluous question in a book about information design, as there will no doubt be other definitions in other chapters, and by now you may have constructed your own. But this is my interpretation.

For me, information design is the application of a design process to the task of informing people. Sometimes the significance of definitions is in what they do *not* say – information design is *not* just what you get when you give a graphic designer some information to arrange. The information (that is, the words, the data, the document) does not exist before the process starts; it emerges during the process, which starts with a need for someone to know something or to explain something.

Communication involves both a communicator and an audience. And there is always an agenda – a purpose or goal that may be different for each side. This is what differentiates information design, in very different ways, from both literature and legislation. Literature is expressive and often celebrates imprecision;

legislation prioritizes accuracy over ease of understanding. But information design needs to be both affective and accurate. It offers to change the state of knowledge in its audience ("offers to", not "seeks to", as the audience has choices about whether to attend to a message, heed it, and remember it).

Because "design" is part of the name, information design is often thought of as a subset of graphic design. But for information designers, it is the other way around. The information design process includes:

- defining objectives;
- defining audiences: their goals, their experience, their abilities;
- structuring communication journeys: routes through complex concepts or communication events within some other process (for example, installing software, applying for social security, choosing a phone, travelling by train);
- writing words;
- drawing diagrams;
- making or selecting pictures;
- arranging information in pages;
- testing designs with audiences;
- specifying and managing systems of information.

Distinct from graphic design, it draws on a wide range of specializations for its knowledge base, tools, and techniques. It is both visual and verbal, and it is concerned with user needs more than artistic expression. Often invisible until something goes wrong, information design is a demanding and difficult field that is underrepresented in education and training.

Why Information Design Matters

Most of us have at some time misunderstood certain information – on a sign, in a document, or on a website. Sometimes it doesn't matter very much – we can correct our mistake. But sometimes it matters quite a lot, resulting in missed flights or broken machines. And sometimes the consequences are disastrous – a drug overdose or an industrial accident.

Let's take just a couple of examples. In elections held in Scotland in 2007, voters were given two ballot papers, one for their local council, the other for the

Scottish Parliament. Each of these two elections used a different, and new, system of proportional representation – in a country where voting had traditionally involved just putting an "X" next to one candidate in a list. Because the ballot papers were poorly designed, around five percent of the votes were wasted. This was greater than the winning margin in some places. In the United States, voting is even more complicated, and there are well-publicized stories of the problems some voters have in registering and in casting multiple votes in each

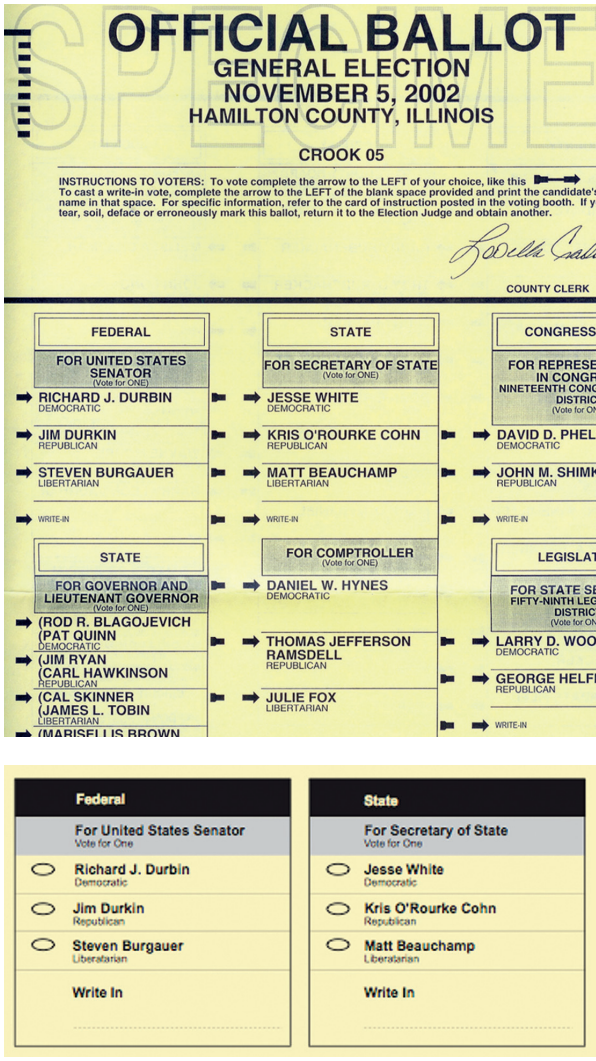


Fig. 1. Above: Here voters were supposed to fill in the middle part of the arrow to the left of their preferred candidate, but many did not understand this or used the arrow on the right.
Below: A better solution that uses AIGA Design for Democracy guidelines.

election. The American Institute for Graphic Arts runs a Design for Democracy programme linked to elections, in which information designers volunteer their time to help states and counties produce more usable ballot papers (fig. 1).[1]

Poor information design can also have more serious consequences. In his foreword to David Berman's book *Do Good: How Designers Can Change the World*,[2] the information designer Erik Spiekermann describes a fire at Düsseldorf airport in 1997, in which sixteen people died because they could not see the small, poorly placed and poorly lit exit signs. And Karel van der Waarde, in his chapter in this book, describes the consequences of poorly designed medicine labels.

Information Design and Literacy

Information design matters in less dramatic ways as well – to help us cope with the complexity of modern life. It has become a cliché to note that we have been suffering from an information explosion over the last few decades. Not so many years ago, we had the choice of a single telephone company and there was only one thing you do with the phone – make a phone call. We bought insurance through an agent who did the work for us. We bought train tickets at the railway station and had a simple choice of travel class. Now, we have numerous phone companies, phones, and tariffs; we go online to buy complex financial products; and, in the UK at least, we are faced with complicated train fares based on time of day, advance purchase, and the flexibility of booking terms.

These choices depend on clear information and the ability to use it. We have all suffered from unclear information, but what may be more surprising is that a significant proportion of the population also lack the reading skills they need. Most developed countries claim a literacy level of close to one hundred percent, but this only means passing the most basic test of reading and writing. Functional literacy is a better measure of how effective those reading skills are. It comprises three parts: *prose literacy* refers to the ability to read linear text; *document literacy* is the ability to solve problems using information in documents; and *quantitative literacy* is the ability to understand simple arithmetic,

1 See the programme's website: http://www.aiga.org/design-for-democracy.

2 Published by New Riders (Berkeley, Calif.) in 2009.

such as percentages. When you extend the concept of literacy in this way, the figures come crashing down.

The International Adult Literacy Survey was conducted in the late 1990s and defines five levels of literacy (level 1 being very basic, with level 5 being the most sophisticated). Level 3 is the critical level, which is defined by the OECD

> as a suitable minimum for coping with everyday life and work in a complex, advanced society. Denotes roughly the skill level required for successful secondary school completion and college entry. It requires the ability to integrate different sources of information and solve more complex problems.[3]

Around fifty percent of the population in countries such as the US and UK are below level 3, and the situation is worse in Slovenia. According to the Slovenian Institute for Adult Education:

> Research results showed that from 65 to more than 70% of adult population in Slovenia do not attain literacy level 3, which is indispensable for equal participation in modern society. According to these outcomes Slovenia was ranked at the tail end of countries under investigation.[4]

Document literacy involves strategic reading. This means reading with a purpose, supported by a monitoring process known as *metacognition*: being aware of whether we understand what we are reading, then re-reading or slowing down if we do not; skimming ahead for an overview; interpreting what we read in the light of our own purpose and what we know of the writer's motives.

Good information design supports and encourages strategic reading, which is easier if, for example, there are clear headings that work together as a set and layouts that show the structure of the content; it is also important that readers' questions and problems are anticipated and dealt with. In fact, given that literacy normally reflects the ability both to read and to write, we might say that organizations who fail to supply well-designed information are themselves illiterate.

3 Organization for Economic Cooperation and Development, *Literacy in the Information Age: Final Report of the International Adult Literacy Survey* (Paris: OECD, 2000), p. xi.

4 Slovenian Institute for Adult Education, *CONFINTEA Mid-term Report: Slovenia*. (Ljubljana: Slovenian Institute for Adult Education, 2003), pp. 32–33.

An Example: Financial Contracts

Financial communications often suffer from poor information design. For example, credit card marketing often combines persuasive messages in large type with contracts in type that is too small to read and written in a language that ordinary people cannot understand. Elizabeth Warren, the head of the Consumer Financial Protection Agency in the USA, was asked whether she was underestimating the intelligence of the American consumer. She replied: "I teach contract law at Harvard Law School, ... but if you put me under oath now, I tell you, I don't know what the effective interest rate will be on my credit card next month because I can't read it in the contract."[5]

Most financial contracts are written in language that is too difficult for the reading ability of ordinary people; these documents can also be extremely long. Warren cites one US credit card agreement with over twenty-nine thousand words. I suggested earlier that graphic design is only one of the skills that information designers need. A financial contract is a good example of this: no matter how legible the font or elegant the layout, it will remain incomprehensible unless a process of deliberate and careful user-centred design is also applied to the words.

Information designers need to challenge everything; they need to take the side of the reader and believe that there is always a better way. This may mean the daunting task of challenging the legal team in a large organization, writing clearer text (or finding a good writer to work with), and negotiating the detail. But it also means working at a structural, or architectural, level to organize the information in a way that matches the needs of the typical user – chunking information under clear headings that match users' questions, or using diagrams when they would be clearer than words alone.

Let's think for a moment about the user's needs with a credit card agreement. Any encounter with information follows a pathway of some kind – this is sometimes called the *user* (or *customer*) *journey*. It can be extremely brief in the case of a simple sign: we notice a sign saying "PUSH" on a door; we push

5 Elizabeth Warren, "Secret History of the Credit Card", interview conducted 20 Sept. 2004, *Frontline*, http://www.pbs.org/wgbh/pages/frontline/shows/credit/interviews/warren.html (accessed 20 Sept. 2011).

the door open; we forget we ever saw the sign or even the door. Or it can last a lifetime in the case of a bank account or pension plan.

The customer journey for a credit card starts with the decision to apply for the card and may one day end with its cancellation. In between there are regular events (receiving bills, paying them) and irregular events (problems, disputes, changes). So information has to support a decision, explain and establish a routine relationship, and also act as a reference source for specific events.

These functions are usually fulfilled by a variety of information sources from inside and outside the credit card company. The decision is supported by marketing material from the credit company and, perhaps, also by comparative reviews in magazines or on websites. The relationship is managed through letters, bills, online information, and perhaps a leaflet or set of FAQs. But lurking in the background is the credit agreement – the long legal document that seems specifically designed to be inaccessible and illegible. This may be the only source – and it is certainly the only legally defensible source – of reference information in the case of a dispute.

Designers almost never engage seriously with the communication function of legal contracts; instead, they often present them in a jokey, embarrassed way that belies their seriousness (fig. 2). Or they make them visually tidy, treating



Fig. 2. Companies often use the informal term "the small print" to make light of the fact that we are dealing with a serious contract. It seems that the larger the headline, the smaller the print actually is.



Fig. 3. The designer of this contract has regarded the elegant white space at the top of the page as a priority over legibility or a good access structure.

them as an element in an elegant design, rather than as content that needs to be visually structured to help the reader (fig. 3).

Most people sign credit agreements, install software, or rent cars with barely a glance at the small print in the contract – even though by signing they declare that they have "read and understood" the terms. A recent survey in the UK found that, whereas most people admitted that they do not read contracts in full, twenty-three percent said they had experienced problems as a result.[6] In other words there is a mismatch between the marketing promises on which people base their decisions and the legal contract that actually governs the product. Elizabeth Warren calls these mismatches "tricks and traps", while the designer Alan Siegel has called them "stealth clauses".[7]

If designers engaged seriously with the task of designing a contract, we would expect to see legible type, diagrams (for example, for time periods and procedures), comparative tables, large headings relating to specific questions

6 Office of Fair Trading, *Consumer Contracts*, Report OFT1312 (London: Office of Fair Trading, 2011).

7 See Elizabeth Warren, "Elizabeth Warren on Credit Card 'Tricks and Traps'", interview by David Brancaccio, *Now on PBS*, week of 2 Jan. 2009, extended and edited version of interview by the US Public Broadcasting Service, http://www.pbs.org/now/shows/501/credit-traps.html (accessed 15 Oct. 2011); and Alan Siegel, "Let's Simplify Legal Jargon", video-recorded lecture, Feb. 2010, *TED*, http://www.ted.com/talks/alan_siegel_let_s_simplify_legal_jargon.html (accessed 20 Sept. 2011).

the customer might have, layered information (larger summaries with smaller detail), and so on. In fact, it would look much more like a user guide.

Some Key Concepts: Genre, Architecture, Affordances, and Patterns

One reason why contracts do not receive this level of attention is because, in fact, few documents do. Most documents necessarily conform to a strong set of genre conventions that have evolved over time and that tend to be copied without the writers going back to first principles each time.

In information design, *genre* simply means a type of document that is common enough to have acquired a name: *magazine*, *newspaper*, *form*, *user guide*, *catalogue letter*, *bill*, *leaflet*, and *poster* are all names for document types that carry very clear expectations about their size, content, organization, seriousness, and communicative intent. Online documents are still developing, but already we distinguish between blogs, chat rooms, auctions, shops, and community pages.

The usefulness of genres lies in the fact that they are a design shortcut: by using a strong genre convention, the designer does not have to think everything through from scratch. What's more, the user can also recognize the genre and know exactly what kind of approach to use – in a newspaper, sport will be at the back, for example.

This means that, in contrast to some interpretations of graphic design, information design never sets out to be innovative as a matter of principle. It often has to be so in order to solve a problem, but innovation carries risks that need to be weighed up carefully. Imagine, for example, if every airport in the world used symbol systems that were completely innovative and different from everywhere else. A traveller leaving one airport, transiting in another, and arriving at a third, would have to decipher three different sets of symbols for arrivals, departures, baggage hall, toilet, and so on. Airports are an obvious example, but every genre, every information context, carries some degree of expectation that cannot be ignored.

On the other hand, while genres are an essential starting point, we cannot accept them unquestioningly. For one thing, because they depend on precedent and convention, genres can only work within discourse communities or cultural contexts where they are well known. Moreover, some genres (such

as contracts) have failed to evolve in response to new needs (for example, the fast-changing competitive marketplace for mobile phones or credit cards). And others may need to adapt to a new channel of communication.

In such cases, we need to design from first principles. This means defining the problem or creating a design brief, and finding a source for possible solutions.

Information design problems (and information genres) are motivated by three key participants in the communication process. There is the writer, publisher, originator, or topic owner (the person or organization who has something to say, however we define them); then there is the audience, the people who need to know something.[8] And finally, there is the communication channel itself, whether this is a sign, a page, or a smart-phone screen. Although not a person, the channel (by which I mean both the device and the necessary processes for using it) is always a major constraint on what may be said, how much can be viewed at once, and how it may be accessed – it is as strong an influence on the designer as are the sender (the writer, publisher, etc.) and the audience.

Each participant will influence the design: the content may have a natural *topic structure* that needs to be represented graphically – through the narrative structure, diagrams, page divisions, or layouts. The audience will bring their own purposes and demand an *access structure* to match. And the channel will impose what I call an *artefact structure* that constrains the other two: a simple example would be the limit on the length of lines or pages. Together these sources of structure, mediated by the creative process of the designer, will lead to the *information architecture* of a document (whether paper or online).

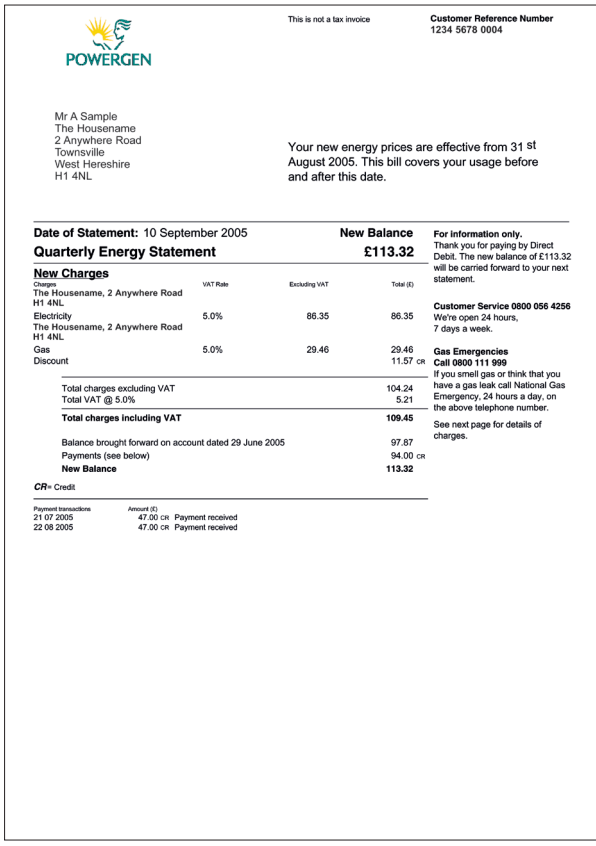
Information architecture maps out the ideal structural relationship between elements in a document, which then needs to be realized at the surface level. Some web designers distinguish between the *wireframe* (which is one of the tools for specifying information architecture) and the *skin* – the graphic surface as represented by the choice of font, colour, and so on. Information designers, because they are concerned equally with language and graphic design, need to also consider the *text surface*: the use of clear language principles.

A useful concept to bring in at this point is *affordance*. Associated with the psychologist James J. Gibson and popularized among interaction designers by

8 Some people use the terms *sender* and *receiver*, which are a useful shorthand. But I think this sounds too much as if communication is a one-way street and less conversational than it actually is in most cases.

Don Norman, affordance is based on the idea that the human perceptual system looks for "action possibilities".[9] Everything around us has potential utility and potential significance, and this is as true of marks on a page as it is in the physical world. Affordance theory is influenced by the Gestalt psychologists' classic observations of perceptual principles in the 1920s: things may be associated through proximity or similarity, for example.[10]

Fig. 4a: The original bill, which customers found confusing.



POWERGEN

This is not a tax invoice

Customer Reference Number
1234 5678 0004

Mr A Sample
The Housename
2 Anywhere Road
Townsville
West Hereshire
H1 4NL

Your new energy prices are effective from 31 st August 2005. This bill covers your usage before and after this date.

Date of Statement: 10 September 2005

Quarterly Energy Statement

New Balance
£113.32

New Charges

Charges	VAT Rate	Excluding VAT	Total (£)
The Housename, 2 Anywhere Road H1 4NL			
Electricity	5.0%	86.35	86.35
The Housename, 2 Anywhere Road H1 4NL			
Gas	5.0%	29.46	29.46
Discount			11.57 CR
Total charges excluding VAT			104.24
Total VAT @ 5.0%			5.21
Total charges including VAT			**109.45**
Balance brought forward on account dated 29 June 2005			97.87
Payments (see below)			94.00 CR
New Balance			**113.32**

***CR*= Credit**

Payment transactions	Amount (£)	
21 07 2005	47.00 CR	Payment received
22 08 2005	47.00 CR	Payment received

For information only.
Thank you for paying by Direct Debit. The new balance of £113.32 will be carried forward to your next statement.

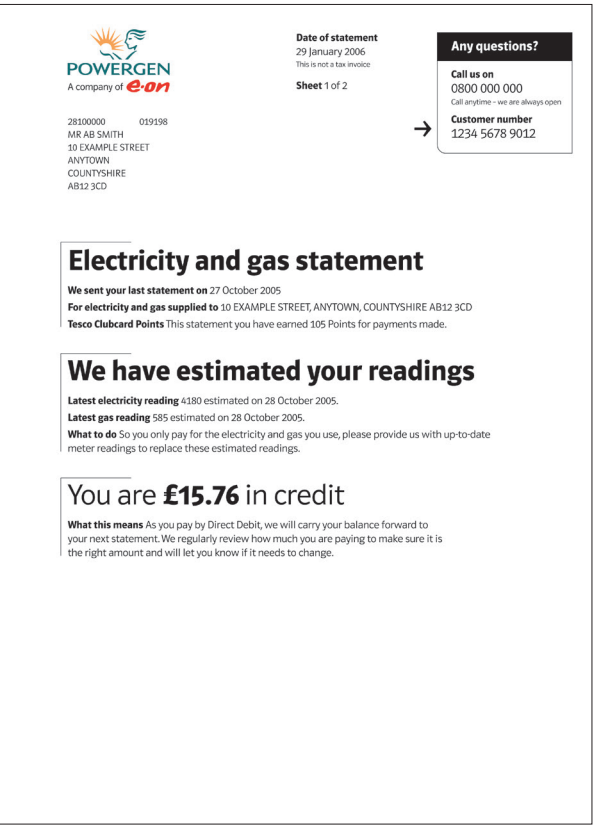
Customer Service 0800 056 4256
We're open 24 hours, 7 days a week.

Gas Emergencies
Call 0800 111 999
If you smell gas or think that you have a gas leak call National Gas Emergency, 24 hours a day, on the above telephone number.

See next page for details of charges.

9 See James J. Gibson, "The Theory of Affordances", in R. E. Shaw and J. Bransford, eds., *Perceiving, Acting, and Knowing* (Hillsdale, NJ: Lawrence Erlbaum Associates, 1977); and Donald A. Norman, *The Design of Everyday Things* (New York: Doubleday, 1999).

10 See Max Wertheimer, "Laws of Organization in Perceptual Forms", in W. Ellis, ed., *A Source Book of Gestalt Psychology* (London: Routledge and Kegan Paul, 1938), pp. 71–88; originally published in German as "Untersuchungen zur Lehre von der Gestalt II", *Psychologische Forschung* 4 (1923): 301–350.


POWERGEN
A company of e·on

28100000 019198
MR AB SMITH
10 EXAMPLE STREET
ANYTOWN
COUNTYSHIRE
AB12 3CD

Date of statement
29 January 2006
This is not a tax invoice

Sheet 1 of 2

Any questions?
Call us on
0800 000 000
Call anytime – we are always open
Customer number
1234 5678 9012

Electricity and gas statement

We sent your last statement on 27 October 2005
For electricity and gas supplied to 10 EXAMPLE STREET, ANYTOWN, COUNTYSHIRE AB12 3CD
Tesco Clubcard Points This statement you have earned 105 Points for payments made.

We have estimated your readings

Latest electricity reading 4180 estimated on 28 October 2005.
Latest gas reading 585 estimated on 28 October 2005.
What to do So you only pay for the electricity and gas you use, please provide us with up-to-date meter readings to replace these estimated readings.

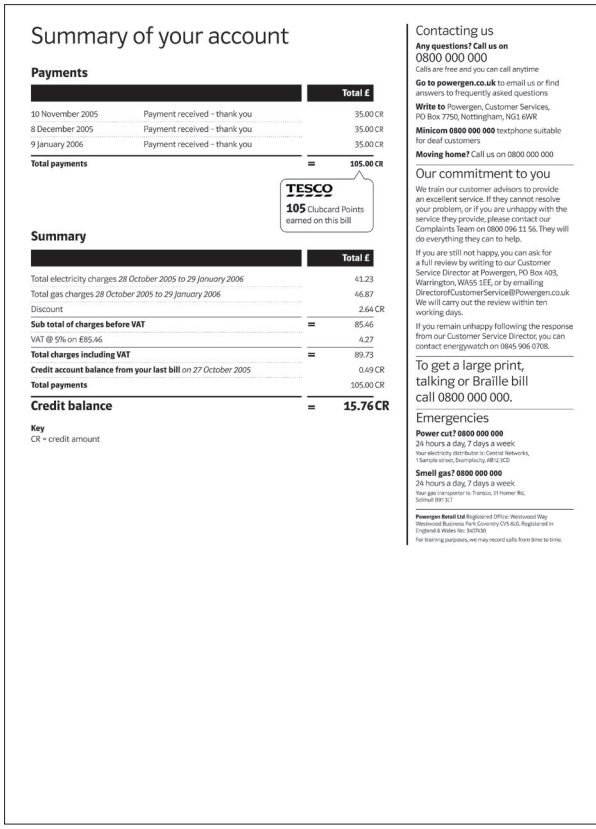
You are **£15.76** in credit

What this means As you pay by Direct Debit, we will carry your balance forward to your next statement. We regularly review how much you are paying to make sure it is the right amount and will let you know if it needs to change.

Fig. 4b and 4c: The front and back of the new bill. (Design: Simon Letherland and Richard Bland, Enterprise IG, for E.on UK.)

Good affordance is critical at the point where information architecture – the desired relationship between the elements in a document – needs to be made real. Information designers must master a set of tools that can help make information understandable and usable: language tools, such as rhetoric, grammar, cohesion, and vocabulary; pictorial tools, such as line, texture, and composition; and design tools, such as typography, colour, proportion, space, and grids. And of course, they also need a corresponding understanding of how users will interpret the text, pictures, and pages they create with these tools. This means a basic insight into such concepts as the reading process, cognition, perception, and memory.

Information design solutions, then, are generally based on both cultural and functional sources, which, in this (over-)simplified account, I have represented by genres and affordances.



Summary of your account

Payments

		Total £
10 November 2005	Payment received – thank you	35.00 CR
8 December 2005	Payment received – thank you	35.00 CR
9 January 2006	Payment received – thank you	35.00 CR
Total payments	=	**105.00 CR**

TESCO
105 Clubcard Points earned on this bill

Summary

		Total £
Total electricity charges *28 October 2005 to 29 January 2006*		41.23
Total gas charges *28 October 2005 to 29 January 2006*		46.87
Discount		2.64 CR
Sub total of charges before VAT	=	85.46
VAT @ 5% on £85.46		4.27
Total charges including VAT	=	89.73
Credit account balance from your last bill *on 27 October 2005*		0.69 CR
Total payments		105.00 CR
Credit balance	=	**15.76 CR**

Key
CR = credit amount

Contacting us

Any questions? Call us on
0800 000 000
Calls are free and you can call anytime

Go to powergen.co.uk to email us or find answers to frequently asked questions

Write to Powergen, Customer Services, PO Box 7750, Nottingham, NG1 6WR

Minicom 0800 000 000 textphone suitable for deaf customers

Moving home? Call us on 0800 000 000

Our commitment to you

We train our customer advisors to provide an excellent service. If they cannot resolve your problem, or if you are unhappy with the service they provide, please contact our Complaints Team on 0800 096 11 56. They will do everything they can to help.

If you are still not happy, you can ask for a full review by writing to our Customer Service Director at Powergen, PO Box 403, Warrington, WA55 1EE, or by emailing DirectorofCustomerService@Powergen.co.uk We will carry out the review within ten working days.

If you remain unhappy following the response from our Customer Service Director, you can contact energywatch on 0845 906 0708.

To get a large print, talking or Braille bill call 0800 000 000.

Emergencies

Power cut? 0800 000 000
24 hours a day, 7 days a week
Your electricity distributor is Central Networks, 1 Sample street, Examplecity, AB12 3CD

Smell gas? 0800 000 000
24 hours a day, 7 days a week
Your gas transporter is Transco, 31 Homer Rd, Solihull B91 3LT

Powergen Retail Ltd Registered Office: Westwood Way Westwood Business Park Coventry CV5 8LE. Registered in England & Wales No. 3407430
For training purposes, we may record calls from time to time.

Fig. 4 shows an electricity bill, in its original and redesigned versions. The old bill is complicated and full of numbers (phone numbers, the account number, meter readings, prices, and totals). But it does actually conform to many of the conventions of the electricity bill genre in the UK. The problem is that the bill genre has not evolved very far. The new design ignores the genre completely; it is based on a functional approach that reflects the typical user journey as reported by customers. The front page summarizes the key facts customers look for (messages are selected from a bank of possible texts, using data-driven rules). The more complex billing details are provided on the back, so customers can check them if they want.

Within the studio, this arrangement was known as the “news headlines”; it’s a simple technique that can be applied across other kinds of complex documents. Most designers have a repertoire of solutions they draw from when

faced with problems they have met before. In certain other fields, such solutions have been formalized as *pattern libraries*. When organized hierarchically (with higher-order patterns for whole documents and lower-order patterns for smaller components), they are sometimes called *pattern languages*.

Pattern languages originated with the architect Christopher Alexander, who wanted a way to record successful architectural solutions that may have simply evolved in an unplanned way in order to make them available for more purposeful planning.[11] A design pattern includes common problems along with recommended solutions and examples. Most importantly, it is a naming exercise that allows us to describe and discuss ideas that were previously grasped only tacitly. Although the notion of pattern language was not widely adopted within architecture, it has been taken up within software engineering and interaction design to ensure consistency and save effort.

Design patterns may originate within particular genres as functional solutions that have proved successful. Their use in other genres has the effect of "quoting" the pattern's home genre and, therefore, importing its functionality and signalling an appropriate reading strategy to the user.

Let me give an example. A recipe book conventionally lists the ingredients you will need in a table at the beginning. A cook can check if they have these items at hand before they start cooking. If you treat this as a "shopping list" design pattern, it becomes more easily available when designing a completely different document. For example, a shopping list at the start of a form can tell the form-filler that they are going to need their social security number, their last three payslips and their bank details. So the pattern language approach allows us to raid different genres and describe their successful design patterns in a way that makes them sharable not only across other genres but also other channels.[12]

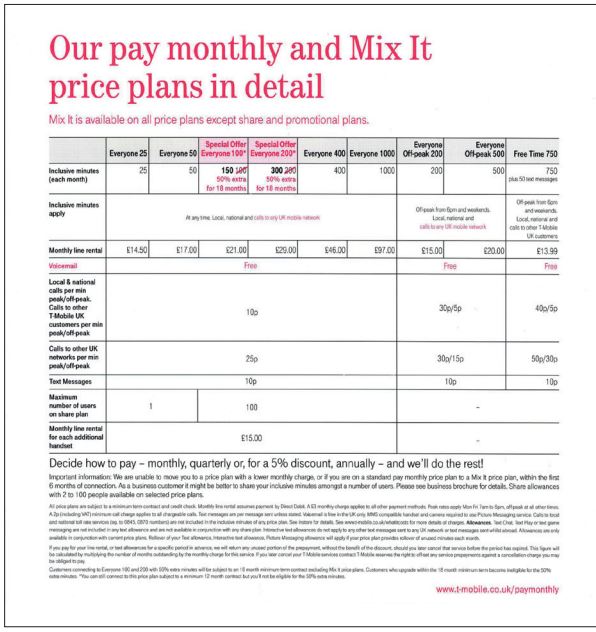
Fig. 5 provides another example – a complicated table of options for mobile phone price plans is made simpler by applying the "123" design pattern we usually associate with the user manual genre.

11 See Christopher Alexander, Sara Ishikawa, and Murray Silverstein, *A Pattern Language: Towns, Buildings, Construction* (New York: Oxford University Press, 1977).

12 For more about applying pattern language to information design, see Robert Waller and Judy Delin, "Towards a Pattern Language Approach to Document Description", a paper presented at the conference Multidisciplinary Approaches to Discourse, Moissac, France, 2010 (proceedings in press); available for downloading from my website, http://www.robwaller.org/writing.html.



Fig. 5. What had previously been a complex table is transformed into a decision support tool, with the 123 structure found in user manuals. (Design: Iain Roe, Enterprise IG, for Vodafone UK.)



Transforming

The example in Figure 5 is transformative – that is, the designer has not simply taken the original content and arranged it more elegantly; rather, he has taken it completely apart, reconsidered its purpose, and even its content, and built a new, best-practice solution to the problem of helping customers choose a mobile phone price plan.

The information designer is an intermediary between content owners and information users. In some organizations, the roles of editor and graphic designer are limited to the simple optimization of the material provided by the author. But successful information design often requires a much more radical transformation in which content is completely reframed and reshaped.[13] There is little point in applying a band-aid if major surgery is required. And there is little point in plain English text and legible type if the wrong information is provided in the wrong order to the wrong people.

In this particular case, the client was keen to simplify their price plans, and a process of real transformation was possible. But this is rare. For one thing, there are risks in transformation – the content is not exactly the same as it was, so something important may be missed. Complex documents usually have a history, which may be poorly recorded, and it can later emerge that there was actually a valid purpose for something the designer has left out.

This means that information designers, if they are to be information transformers, need a degree of confidence, control, and respect within the organization they work for. Apple has become one of the world's largest companies not because it has different technology but because it has understood and prioritized the user experience. The technology only exists to deliver that experience.

The *information transformer*, as a defined role, actually predates the term *information designer*. It originated with the Isotype Institute, the pioneers of information graphics, when founder Otto Neurath realized the need for a specialist communicator who could mediate between the data experts and the graphic artists who developed their charts. His wife Marie Neurath was

13 In a recent conference paper, I list a range of different transformation strategies; see Robert Waller, "Simplification: What Is Gained and What Is Lost", in Thomas Porathe, ed., *Applications of Information Design* 2008 (Eskilstuna, Sweden: Malardalen University Press, 2008), pp. 219–230; available for downloading from my website, http://www.robwaller.org/writing.html.

the first *transformer*, and she perfected the role.[14] She was able to represent the user in discussions with scientists and sketched clear explanations that a skilled designer then developed into diagrams. The role is perhaps similar to that of a film director, who must understand each specialist role well enough to give instructions and yet retains an overall vision of the narrative that audiences will see.

The Challenge for Information Design Education

Although information design addresses a very fundamental human need, there is remarkably little education or training that prepares people to be information designers. In Europe, many thousands graduate as graphic designers, at technical, degree, or postgraduate levels, but only a handful attend specialist classes in information design.

The history of information design is about the convergence of different traditions – in particular, graphic design, plain language, and usability research. Karen Schriver provides a useful timeline in her seminal book *Dynamics in Document Design*.[15] These disciplines, in turn, draw on a wide range of theoretical approaches, including cognitive psychology, linguistics, semiology, cultural studies, behavioural economics, design methods, and design history. Their research methods may be experimental, ethno-methodological, historical, or analytic. And to be effective, designers also need to understand organizational change, branding, marketing, and other business concepts that will enable them to manage their role in organizations.

Obviously this is a potentially massive syllabus. The reality is that, rather than try to master it all, information designers use a set of methods, heuristics, and design patterns that, while traceable to the academic traditions just listed, do not depend on a mastery of them.

So, in conclusion, we can say that information design has a broad scope and a transformative ambition.

14 See Marie Neurath and Robin Kinross, *The Transformer: Principles of Making Isotype Charts* (London: Hyphen Press, 2009).

15 Karen A. Schriver, *Dynamics in Document Design* (New York: Wiley Computer Publishing, 1997).

Otto Neurath described the transformer as the "trustee of the public", and this is something that motivates the information designer. Information design is not about creativity, personal expression, or awards; it is about solving problems and simplifying life in the information age. Nearly forty years ago, in an analysis of the transformer's role, Michael Macdonald-Ross wrote:

> Our message is humanistic: break down the barriers in the interests of the reader. Take responsibility for the success or failure of the communication. Do not accept a label or a slot on a production line. Be a complete human being with moral and intellectual integrity and thoroughgoing technical competence. Be a transformer![16]

16 Robert Waller and Michael Macdonald-Ross, "The Transformer Revisited", *Information Design Journal* 9 (2000): 188; the essay, which was written in 1974, was originally published in the Penrose Annual in 1976.

Jorge Frascara

Data, Information, Design, and Traffic Injuries

The following essay is based on a lecture I delivered at the invitation of the Architecture Museum of Ljubljana (now the Museum of Architecture and Design) on 16 March 2010. As such, it is directed at a wide range of people interested in design but not at design experts. There are five sections: a personal introduction; part 1, which explores some ideas about a contemporary notion of design; part 2, which offers some definitions and examples of information design; part 3, which discusses the difference between data and information and considers the role of persuasion in information design; and a conclusion.

A Personal Introduction

I entered design through studies in the fine arts and art education. Upon graduation, because I was able to draw well, I worked as an illustrator for book covers, a draftsman for a publishing firm, and an animator for a film studio; at the same time, I began to teach art and design.

With this background, I first saw my role as a designer as the beautification of visual communications. Later, I realized that I should be more concerned instead with the clarity and appropriateness of the messages. Later still, I realized that "clarity" was not a universal concept; what was clear to some people could possibly be obscure to others. Further on, I realized that there was something else beyond clarity: every communication is aimed at producing a reaction in people, which could be connected to their knowledge, attitudes, feelings, or behaviour. At that point I realized that I needed to get to know people more than graphics. I realized that it is easier to master the visual grammar of graphic forms, colours, and typography, than it is to master people's reactions. These require a never-ending dedication to learning, for they can always be

surprising. I realized that, while my studies in perception and developmental psychology came in handy, I also needed to look into cognitive psychology, as well as sociology and anthropology.

On this basis, I found it was necessary to redefine the objectives of design and its working methods. It is not by chance that I use the plural when referring to objectives and methods. I am no longer seeking universal truths, but an understanding of the plurality and complexity of the issues we have to confront.

A Contemporary Notion of Design

Design is not concerned with objects but with the impact those objects have on people

We have to stop thinking of design as the construction of graphics, products, services, systems, and environments, and think about these things as means that enable people to behave in a certain way, to realize their wishes, and to satisfy their needs. It is the needs and wishes of people that we have to serve: the objects of design must be seen only as means. This requires a better understanding of people, society, and the ecosystem. The necessity of extending the designer's area of competence – from a knowledge of form, technique, and manufacturing processes to the understanding of social, psychological, cultural, economic, and ecological factors that affect life in society – tells us we must implement an interdisciplinary approach to education, research, and practice in visual communication design.

Operational impact and cultural impact

Every design project has an operational objective: it is supposed to affect the knowledge, attitudes, or behaviour of people in a certain way. But any object deployed in the public space, be it communicational or physical, has a cultural impact or side effect. This cultural impact affects the way people operate with other people, as well as with things, and creates a cultural consensus. More must be done to understand this cultural impact if designers are to operate more responsibly in society.

Not transmitter–receiver, but producer–interpreter

We must recognize that people are not electronic devices, and that Claude E. Shannon's terminology (transmitter–receiver),[1] which comes from information science, does not recognize cognitive styles, cultural differences, expectations, feelings, intentions, value systems, and levels of intelligence. The messages we broadcast are not merely *received*; they are *interpreted by people*.

Partnership and Negotiation

If visual communication design is concerned with affecting people, then it should do this in an ethical way, seeking partnership in the process of change instead of issuing authoritarian messages. Authoritarian communications transform the receivers into objects instead of respecting them as subjects; the result is non-ethical communications. In ethical communications, the producer of the message connects with the interpreter in an interactive dialogue. Rather than communicating things *to* people, designers should communicate *with* people about things, in a context of partnership.

The process of communication should be seen as a negotiation where the position of the originator of the information and that of the interpreter enter into contact and search for common terrain. Unidirectional communication is unethical and inefficient, and it promotes a passivity that in the long run will weaken our culture.

Relevance

Design must be relevant so as to rise above fads and fashions and penetrate all dimensions of life with a view to improving it. There is design to make life possible, design to make life easier and design to make life better. Irrelevant design is a liability for the profession and for the environment. If we want to strengthen the position of design among other human activities, we will have to review the relevance of design projects and foster work in those areas where design could actually make a difference for the better.

1 As presented in Claude E. Shannon, "A Mathematical Theory of Communication", pt. 1, *Bell Systems Technical Journal* 27 (1948): 379–423, and elaborated in Claude E. Shannon and Warren Weaver, *A Mathematical Model of Communication* (Urbana, Ill.: University of Illinois Press, 1949).

Planning and self-organization

Every design problem involves planning and self-organization: it is not possible to continue believing that planning can solve everything or that self-organization can solve everything either. Understanding the capacity of things and people to organize themselves when thrown into a given situation puts planning in an interesting perspective. The team model from organized sport or the rigid Panzer Division plan are insufficient, and the chaotic model of Calcutta is neither desirable nor sustainable. In design, we should look more at the way in which things interact with each other and at the dynamics of large complex systems, such as cities, ecologies, or the stock market, and search for better conceptual models to replace the old linear planning strategies.

Problem-solving vs. problem-reducing

We are used to hearing that designers are "problem-solvers". To speak with precision, we must admit that we do not really solve problems; we reduce them. If a chair is uncomfortable, we design one that is more comfortable. If there are too many traffic collisions, we design communication campaigns directed at reducing the number of injuries. The types of problems we normally deal with cannot be solved; they can only be reduced. Some professionals will keep using the "problem-solver" slogan, but it is important to be clear about the real aim of our actions: to reduce problems.

Reducing problems vs. identifying problems

The most important problem in design is to decide what the problem is. If designers base their work exclusively on clients' requests, they limit themselves to the clients' parameters. This will normally exclude potentially interesting areas for design action. Above and beyond preparing students' to respond well to clients' requests, design education needs to develop their ability to identify the problems that can be addressed by design action. We should help our students develop an inquisitive ability to observe and analyse reality. They should be able to discover opportunities for design action that offer room for positive contributions to society.

Form, materials, and self-expression vs. content and context

The major preoccupations of the avant-garde/fine-arts-based design education of the 1920s were form, materials, and self-expression. We now realize that graphic design education today, ninety years later, is very frequently concerned with the same issues to the detriment of a formalized education about content and context and how they condition design action. We have enough collective experience today with form and materials; we need to move from self-expression to resourcefulness and inventiveness regarding the visual language so we can speak the language of the public we are addressing. We also need to concentrate on formalizing and codifying the problems of content and context, learning and teaching how to transform them into conscious elements of the design process.

Design as product vs. design as process (iterative design)

As stated above, design solutions are always partial solutions. Every design solution can be surpassed by others when the problem being addressed is better understood or the designer in charge is more capable. Regarding the design of administrative forms, it is usual to speak of "iterative design", that is, a design that is developed, produced, used, evaluated, and corrected – as many times as is necessary – until it is decided that further testing and correcting will not improve the instrument's performance significantly enough to justify the effort.

Debate vs. conversation

Debate and conversation are two different modes of communication. Debate is characterized by opposition and the concealing of differences within each position; it is centred on winning and losing. Conversation is centred on understanding; it admits a plurality of views and ends without winners or losers. In team work, it is far more efficient to use the conversation model to organize the process of working together. If we understand communication as a form of team work between producers and the public, then the same applies: our model should be conversation.

The hidden dimensions of the economy: Design as investment

In the 1980s, the Australian Institute for Communication Research found that every error made by people filling out insurance forms cost about Aus$14 to

correct.[2] A better design was able to dramatically reduce the number of errors made by users, resulting in substantial savings for insurance companies. The Department of Transport of the Australian state of Victoria, which invested Aus$6 million in a traffic safety campaign, saved Aus$118 million in compensations during the first year of the campaign.[3] We need to continue studying the economic benefits of design in order to demonstrate that good design is not an expense – it is an investment.

From the design of objects to the design of situations and activities: The dematerialization of design

Designers have moved from a concern with objects to a concern with people. The design of an object is only the means to meet a need that affects people. We have to understand people's needs and wishes and create the objects that satisfy them, while at the same time realizing that every object in the public space has both an operational and a cultural impact, which the designer must evaluate.

In the field of education, we have moved from designing teaching aids to designing teaching situations. The success of a learning experience cannot be entrusted to the design of a teaching aid. The whole activity must be planned so that the teaching aid contributes its best to the experience. Many details enter this terrain, but certainly the teacher's actions, the students' actions, and the environment in which the intervention occurs must be seen as part of the design problem. This intervention is not only intellectual, but also emotional. We know that people learn better when they want to learn. We should think not only in cognitive terms when designing teaching aids, but also in motivational terms. The material should motivate the teacher to teach and the student to learn.

Something similar affects the working environment. We have moved from the design of work stations to the design of work. Despite all we know today about ergonomics, it is still impossible to invent and design the perfect chair on which a person could sit eight hours a day, five days a week, without becoming physically fatigued one way or another. It would be wiser to design a

2 This information comes from a private conversation with David Sless, director of the Australian Institute for Communication Research.

3 Greg Harper and Leon L'Huillier, "Road Safety: The Transport Accident Commission Campaign", in Advertising Federation of Australia, *Effective Advertising: Casebook of the AFA Advertising Effectiveness Awards 1990* (North Sydney: Advertising Federation of Australia, 1991), pp. 191–205.

work pattern that, while including the design of furniture and tools, is centred on the design of the activities to be performed.

Conclusions

The implications of the above points are many. To begin with, design problems are clearly interdisciplinary. The scope of the graphic design field has been extended partly because of changes resulting from new technologies in the field itself and partly because of changes in our understanding of the nature of designing.

Recognizing the interdisciplinary character of design leads us to conceive educational programmes with multiple options. The twentieth century, which began by showing the designer to be a master of applied arts, ended by showing the profession to be a field that includes not only art and engineering, but also technology, administration, and the social sciences. We cannot expect less from the people who constantly conceive and build the information, objects, and spaces that surround us and who contribute so greatly to the quality of our lives.

Information Design: Definitions and Examples

Having discussed design in general, let me now turn to some specific topics in information design. Here I will use examples from my own work to illustrate the kinds of concerns and problems that must be confronted in this practice. I will also describe certain work processes and methods.

Some premises about information design

The first premise of information design is that it must be user-centred. This, in turn, requires an ethical stance from the designer. Why so? Because the first principle of ethics is the recognition of "the other" as independent of oneself, different, and worthy of respect. Once we agree about this, we can begin to talk about the details. But if we truly embrace the principle and strive to recognize all the ways in which the public is different from ourselves, questions about the details – when we possess the necessary knowledge – are properly resolved.

What is the scope of information design? Information design makes information easy to read, understand, remember, and use (on things such as forms, legal documents, signs, non-prescription drug leaflets, computer

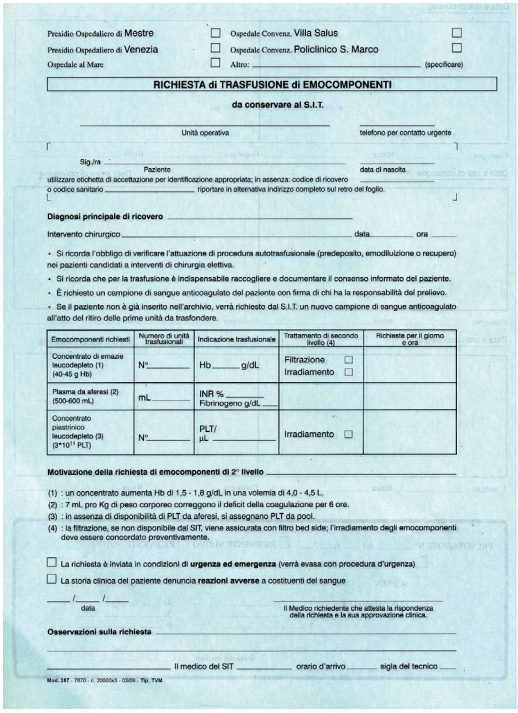
interfaces, control panels, technical information, user manuals, and operating instructions). Information design uses evidence-based methods and strategies to make information accessible, appropriate, attractive, believable, complete, concise, relevant, timely, understandable, and usable. It is impossible to create a universal method for information design that would ensure that its objectives are met. Each situation, each targeted public, will need attention; the general principles will need to be adapted to the specific case. If we do not do this, if we do not make the effort to adapt the design to the public we are addressing, the result is bad information design. Bad information design produces forms that are incorrectly completed and costly to process, instructions that cause frustration and may even be hazardous, education materials that do not aid learning, ambiguous scientific and technical data, websites that are difficult to navigate, and even control displays that do not alert operators about dangers.

Form and content

One of the central problems in information design is that visual communication designers, while trained to deal with the visual presentation of information, are not trained to confront the complexities of language communication, a problem that must be dealt with for the job to be done well. The medical doctors who design a hospital form usually have no training in communication of any kind. They are so conversant with the topic and purpose of the form that they are unable to judge it for clarity, completeness, or cognitive load for the user. The designer, then, must become a mediator who understands what the doctor intends to say and what the user of the form needs to comprehend, and the means by which these things can come together. This does not hinge on layout or typographic choices, although these are certainly important in the creation of a well-performing form. In sum, information design does not focus on appearance, but on users, tasks, contexts, and purposes. The main point is not *what one has to say,* but *what people must understand, remember, and do*.

My wife, Guillermina Noël, and I were recently involved in the redesign of a form for an Italian hospital. While many of the fifty-two modifications we introduced were related to the placement of items and other graphic issues, our main effort, in terms of the time dedicated to the project, was to understand exactly what was intended by every line of text, what all the functions of the form were, who was responsible for what, and how all of this could be stated

clearly so as to facilitate the tasks of all users. The project lasted six months and involved eight meetings with users. This allowed us to produce a working prototype that not only included the fifty-two improvements to the document but that also represented a work process for designing this type of document – a process that could be applied to the other fifteen hundred or so forms in use at the hospital. (Figs. 1 and 2.)



Presidio Ospedaliero di Mestre
Presidio Ospedaliero di Venezia
Ospedale al Mare
Ospedale Convenz. Villa Salus
Ospedale Convenz. Policlinico S. Marco
Altro: _____ (specificare)

RICHIESTA di TRASFUSIONE di EMOCOMPONENTI

da conservare al S.I.T.

Unità operativa
telefono per contatto urgente

Sig./ra _____ (Paziente) data di nascita

utilizzare etichetta di accettazione per identificazione appropriata; in assenza: codice di ricovero o codice sanitario _____ riportare in alternativa indirizzo completo sul retro del foglio.

Diagnosi principale di ricovero _____

Intervento chirurgico _____ data _____ ora _____

- Si ricorda l'obbligo di verificare l'attuazione di procedura autotrasfusionale (predeposito, emodiluizione o recupero) nei pazienti candidati a interventi di chirurgia elettiva.
- Si ricorda che per la trasfusione è indispensabile raccogliere e documentare il consenso informato del paziente.
- È richiesto un campione di sangue anticoagulato del paziente con firma di chi ha la responsabilità del prelievo.
- Se il paziente non è già inserito nell'archivio, verrà richiesto dal S.I.T. un nuovo campione di sangue anticoagulato all'atto del ritiro delle prime unità da trasfondere.

Emocomponenti richiesti	Numero di unità trasfusionali	Indicazione trasfusionale	Trattamento di secondo livello (4)	Richieste per il giorno e ora
Concentrato di emazie leucodepleto (1) (40-45 g Hb)	N°_____	Hb_____ g/dL	Filtrazione ☐ Irradiamento ☐	
Plasma da aferesi (2) (500-600 mL)	mL_____	INR % _____ Fibrinogeno g/dL ___		
Concentrato piastrinico leucodepleto (3) ($3*10^{11}$ PLT)	N°_____	PLT/ µL _____	Irradiamento ☐	

Motivazione della richiesta di emocomponenti di 2° livello _____

(1) : un concentrato aumenta Hb di 1,5 - 1,8 g/dL in una volemia di 4,0 - 4,5 L.
(2) : 7 mL pro Kg di peso corporeo correggono il deficit della coagulazione per 6 ore.
(3) : in assenza di disponibilità di PLT da aferesi, si assegnano PLT da pool.
(4) : la filtrazione, se non disponibile dal SIT, viene assicurata con filtro bed side; l'irradiamento degli emocomponenti deve essere concordato preventivamente.

☐ La richiesta è inviata in condizioni di **urgenza ed emergenza** (verrà evasa con procedura d'urgenza)
☐ La storia clinica del paziente denuncia **reazioni avverse** a costituenti del sangue

_____/_____/_____ (data)
Il Medico richiedente che attesta la rispondenza della richiesta e la sua approvazione clinica.

Osservazioni sulla richiesta _____

_____ Il medico del SIT _____ orario d'arrivo _____ sigla del tecnico _____

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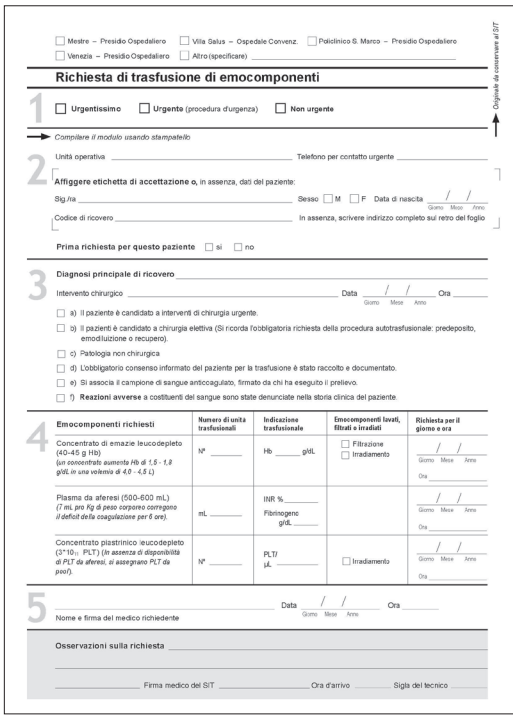


☐ Mestre – Presidio Ospedaliero ☐ Villa Salus – Ospedale Convenz. ☐ Policlinico S. Marco – Presidio Ospedaliero
☐ Venezia – Presidio Ospedaliero ☐ Altro (specificare) _____

Originale da conservare al SIT

Richiesta di trasfusione di emocomponenti

1 ☐ **Urgentissimo** ☐ **Urgente** (procedura d'urgenza) ☐ **Non urgente**

→ *Compilare il modulo usando stampatello*

2 Unità operativa _____ Telefono per contatto urgente _____

Affiggere etichetta di accettazione o, in assenza, dati del paziente:

Sig./ra _____ Sesso ☐ M ☐ F Data di nascita ___/___/___ (Giorno Mese Anno)

Codice di ricovero _____ In assenza, scrivere indirizzo completo sul retro del foglio

Prima richiesta per questo paziente ☐ sì ☐ no

3 **Diagnosi principale di ricovero** _____

Intervento chirurgico _____ Data ___/___/___ Ora _____

☐ a) Il paziente è candidato a interventi di chirurgia urgente.
☐ b) Il paziente è candidato a chirurgia elettiva (Si ricorda l'obbligatoria richiesta della procedura autotrasfusionale: predeposito, emodiluizione o recupero).
☐ c) Patologia non chirurgica
☐ d) L'obbligatorio consenso informato del paziente per la trasfusione è stato raccolto e documentato.
☐ e) Si associa il campione di sangue anticoagulato, firmato da chi ha eseguito il prelievo.
☐ f) **Reazioni avverse** a costituenti del sangue sono state denunciate nella storia clinica del paziente.

4

Emocomponenti richiesti	Numero di unità trasfusionali	Indicazione trasfusionale	Emocomponenti lavati, filtrati o irradiati	Richiesta per il giorno e ora
Concentrato di emazie leucodepleto (40-45 g Hb) *(un concentrato aumenta Hb di 1,5 - 1,8 g/dL in una volemia di 4,0 - 4,5 L)*	N° _____	Hb _____ g/dL	☐ Filtrazione ☐ Irradiamento	___/___/___ (Giorno Mese Anno) Ora _____
Plasma da aferesi (500-600 mL) *(7 mL pro Kg di peso corporeo correggono il deficit della coagulazione per 6 ore).*	mL _____	INR %_____ Fibrinogeno g/dL _____		___/___/___ (Giorno Mese Anno) Ora _____
Concentrato piastrinico leucodepleto ($3*10^{11}$ PLT) *(in assenza di disponibilità di PLT da aferesi, si assegnano PLT da pool).*	N° _____	PLT/ µL _____	☐ Irradiamento	___/___/___ (Giorno Mese Anno) Ora _____

5 _____ Data ___/___/___ Ora _____
Nome e firma del medico richiedente

Osservazioni sulla richiesta _____

_____ Firma medico del SIT _____ Ora d'arrivo _____ Sigla del tecnico _____

Fig. 1. The existing form. (Reproduced by permission.)
Fig. 2. The final prototype.

The performance specifications we devised for the new form were that it should be easy:

a) to read all texts,
b) to find any specific piece of information,
c) to follow the requests properly,
d) to fill out all items in the form,
e) to transcribe the information, and

f) to be able to confirm that procedures and actions have been properly followed.

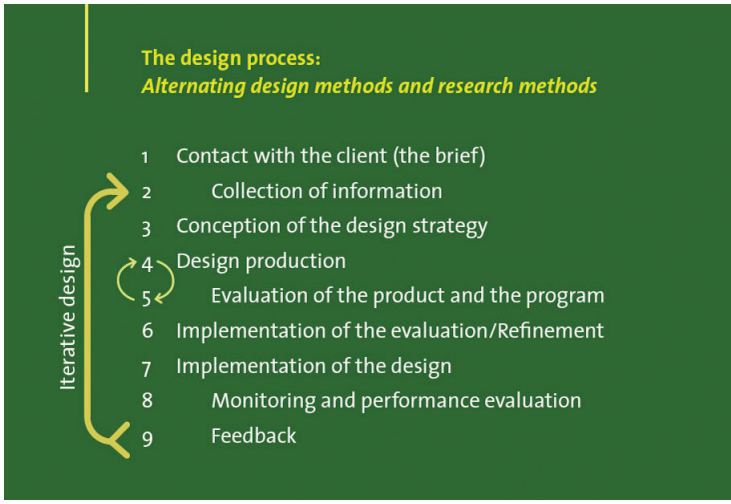
The design process

The beginning of the design process is either the first contact with the client or, in rare cases, the initiation of the project by the designer. In the first working contact with the client all project aims and requirements should be discussed and then a letter of agreement or contract should be drafted and signed. It is essential to put everything in writing. Never begin work until all the conditions required for a good project are clearly spelled out. At this point, the designer's first objective is to create a sense of trust. That sense of trust will emerge from the client's perception that the designer is well prepared to perform the job well and efficiently.

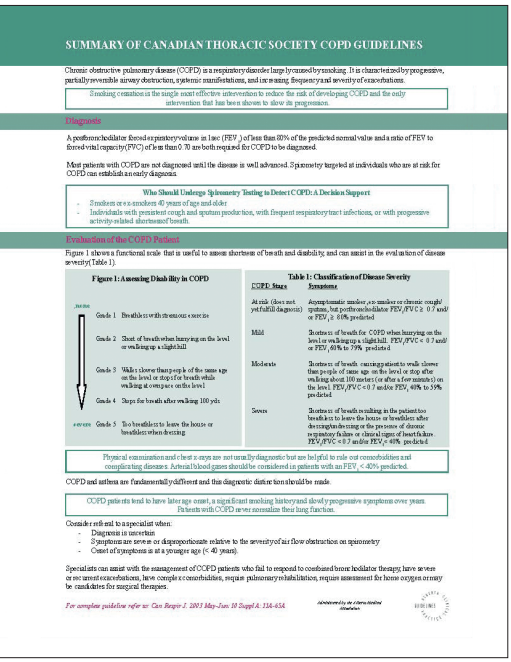
Once all details are agreed upon, the second stage is the collection of information. This requires the triangulation of information derived from interviews with the creators of the communication, the users of the communication, and everyone who at one level or another has a stake in the communication process and its outcomes. Several methods can be used for this: interviews, focus groups, observing users, etc. Once the designer is satisfied with the amount and quality of the information collected (when clear operational objectives can be stated for the project and when possibilities and constraints have been evaluated), it is time to develop a design strategy. This design strategy will outline the performance specifications for the communication to be designed. From this there follows the production of a prototype, which is then evaluated. This evaluation serves as the basis for improvements to the prototype before it goes into final production, which occurs when it seems that no further improvements are possible with the information at hand. It is always advisable to monitor the final implementation of the design product, because only at that stage can one truly measure its quality. (Fig. 3.)

Evaluation is an important part of information design because the design must be shown to perform as expected. In a project I developed for the provincial Drug Utilization Program in Alberta, Canada, the evaluation showed clearly the operational differences between the existing design and the new one. The document that needed to be redesigned was an information sheet given to doctors about the use of pharmaceutical drugs for the treatment of

Fig. 3. The design process.



different ailments; specifically, the information related to chronic obstructive pulmonary disease (Fig. 4). When redesigning a document, it is always advisable to devise ways in which the superiority of the solution can be measured objectively and not only through users' opinions, which are often contaminated by a "novelty effect". In the case of the information sheet, it was found that doctors used it basically for two functions: getting updated and quick consultation. The document, therefore, had two main performance requirements: it had to be clear and memorable, and specific pieces of information had to be found quickly. The evaluation, which was based on memory tests and tasks given to users, showed that: a) the average time required to complete all search tasks was shorter when using the new design (77 seconds) than when using the existing one (139 seconds); b) when attempting to recall the number of sections in the sheet, no subject was able to do this with the existing design, while all subjects were able to do it with the new prototype; c) when attempting to remember the titles of the sections, while no subject was able to do this completely, there was a higher accuracy with the new design; d) regarding their opinions, subjects in general found the new design easier to read; e) they also approved of the colour coding, the colour palette, and the colours used for the type in the new design; f) on a scale of 1 to 5, with 1 being "not easy to use" and 5 being "easy to use", the existing sheet was assigned an average of 3.3, and the new one, an average of 4.75. (Fig. 5.)



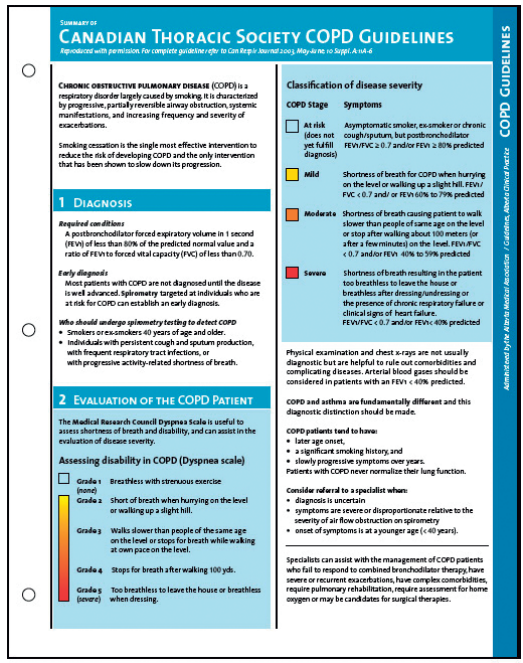


Fig. 4. Front side of existing form.
Fig. 5. Front side of the redesign.

Data, Information, and Persuasion

This section begins with a discussion of diagrams as a means to present information clearly and concisely. We will look at deception in graphics, as well as the distinctions and connections between data, information, and persuasion. Traffic safety communication design is used to illustrate the complexity and significance of the kind of social problems information design can address.

Data and information

Data are isolated facts or figures: information is difference that makes a difference. To do this, it requires context. Data without context are not information. It is one thing for a newspaper headline to say, “43,100 deaths!!!” and quite another thing to say, “43,100 deaths were caused last year by traffic collisions in the USA.” In the second headline, the numbers make sense – not total sense, perhaps, but more sense. They do not make total sense because,

given the information, we still do not know if this number is a lot, a little, or the norm. To get to this point we need a context; we need comparisons (fig. 6).

But comparisons can be deceiving if they are not the right comparisons. In fig. 7, the graph looks quite different from the one in fig. 6 because it takes population size into account; thus it approaches a fairer representation of the reality.

Fig. 6. Comparing absolute numbers.

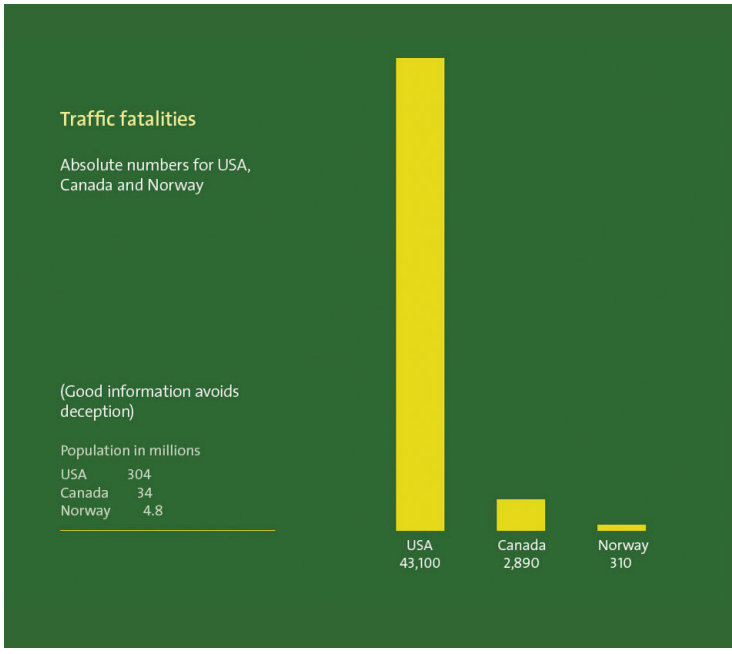
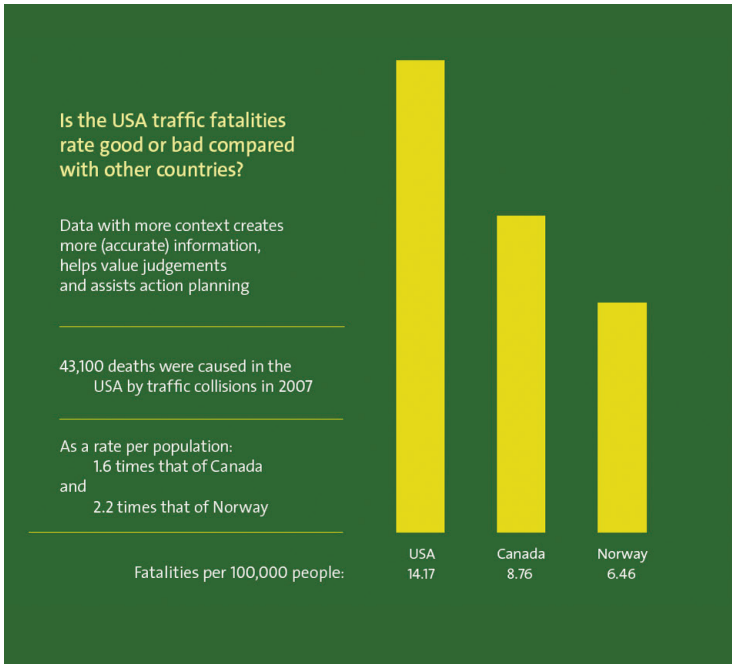


Fig. 7. Comparing rates.



Before tackling a given problem that might lead to a mass-media campaign and other supporting programmes, it is advisable to see if the problem is, in fact, significant. Here, information design can again help to visualize the data. The chart in fig. 8 shows clearly that traffic injuries are a significant problem, since they are the leading cause of death for people under 35 years of age – about three times as high as heart disease and cancer combined for the 14-to-24 age bracket.

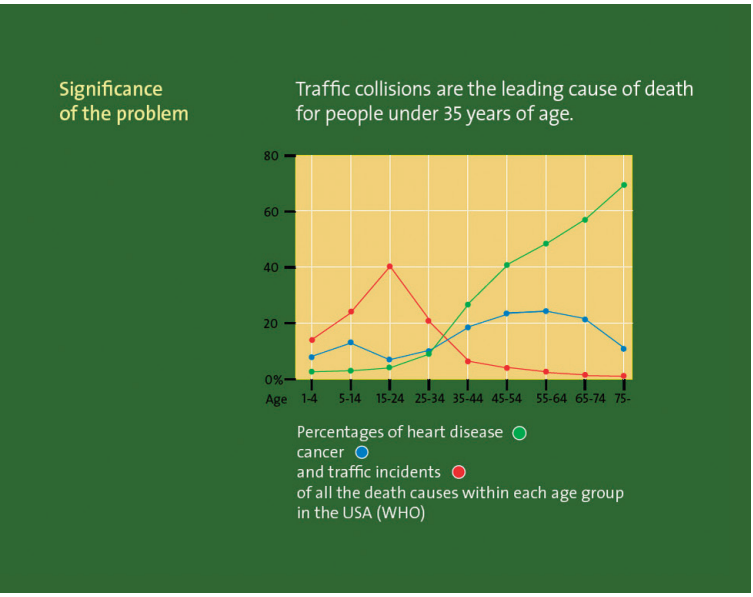


Fig. 8. The significance of the problem.

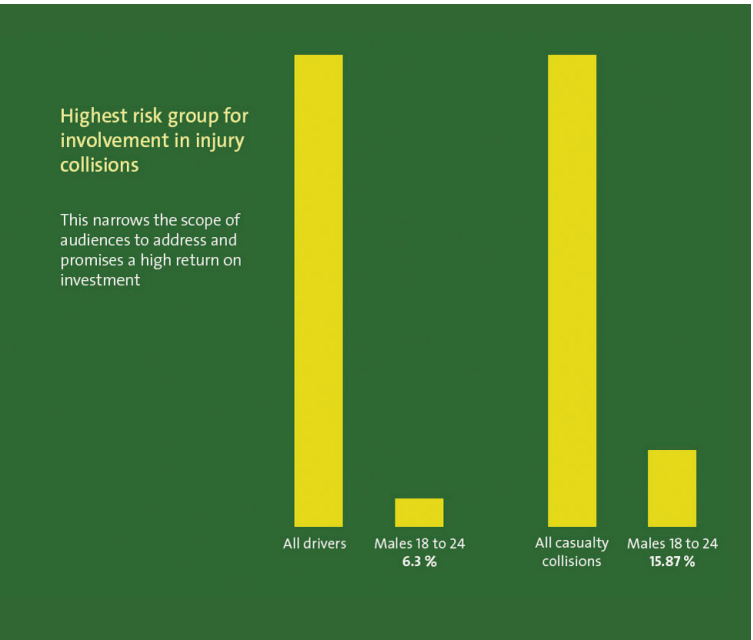


Fig. 9. The highest risk group.

Once we have such data, we know only that we have a problem and that the problem is significant, but we do not know how to confront it. In this case, as often happens, if we want to use information design to assist with decision-making processes, we need more information. We need to identify a point of entry to the big problem that allows us to conceive a strategy. We can look at places where incidents of injury occur, at the types of vehicles involved, at times of the day, days of the week, months of the year, or groups of drivers. If we decide to look at groups of drivers and divide drivers by age group and gender, we find that males age 16 to 24 are disproportionately represented in the statistics for collisions that result in injuries. If the idea is to plan a mass-media campaign, it is more effective, then, to focus on drivers in the 18–24 age range, since, in Canada at least, younger males can be reached through the high school system. This age group represents 6.3 percent of all drivers, but appears in 15.87 percent of all injury-causing collisions, showing to be roughly 2.5 times more at risk than the average population of drivers (fig. 9).

The data allow us to realize that a good communication effort directed at males in the 18–24 age group would be more effective than one directed at other age or gender groups. But at this point, if we want to do something, we need qualitative information. A general developmental and psychological profile of young men age 18 to 24 is useful, but it does not necessarily match that of the 3 percent of that cohort who become involved in injury-causing collisions. As far as information design is concerned, the basis for action requires finding out what information should be presented to that cohort in order to affect their driving behaviour. It becomes clear that the problem does not centre on *how* to present the information, but on *what* information should be presented. This requires in-depth research on the sensitivities of this group to different possible arguments in favour of safer driving.

Two other things must be made clear. First, visual communications, even when superbly crafted in every aspect, cannot generate behavioural change in a target population; there is always a need for related measures. In the case of reducing traffic collisions, these will involve police control, social programmes, hospital outreach activities, and journalistic pressure, to name just a few necessary areas. Second, such traffic incidents are often caused by hardened criminals whose behaviour is not easy to change.

When planning mass-media campaigns we must be sure that the affected population is *significant, reachable, reactive, and measurable*. Unless the affected population is *significant*, our efforts will not be worthwhile. Their being *reachable* means that we know what channels to use to communicate with them. Their being *reactive* means that change is possible if our arguments are well crafted, although there will always be non-reactive members in any target population. Finally, the *measurability* of the population allows us, at the end of the day, to evaluate the success of the campaign.

Returning to our discussion of traffic safety and the presentation of data, contexts, and information, let us now consider a different dimension of the problem, namely the cost of injuries (fig. 10).

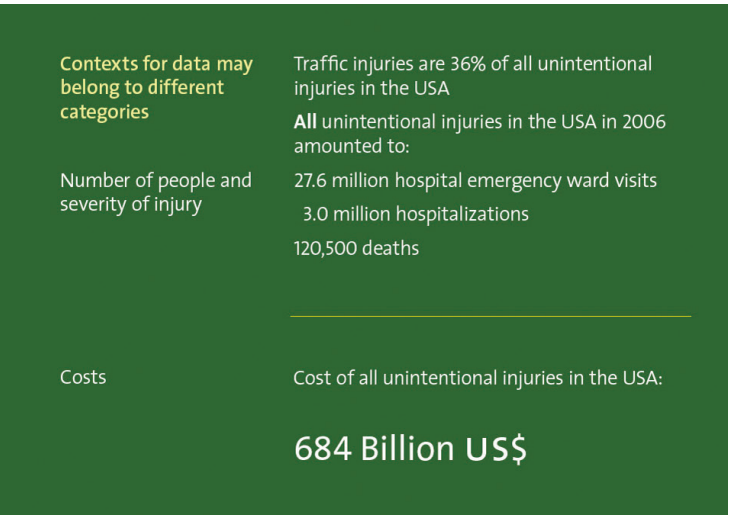


Fig. 10. The cost of injuries.

The cost of injuries in the USA is 4.82 percent of the country's gross domestic product – higher than the US military budget. Why is there no organized action in most countries to curb unintentional injuries? Is it because the data has not yet become information in the public's mind? International experience tells us that traffic injuries can feasibly be reduced by 50 percent. The media are not helpful. There was a lot of hype in 2009 about the swine flu that killed a few dozen people, while there has been little mention of the high death toll from traffic collisions, which kill 118 people every day in the USA.

If these injuries were reduced by 50 percent, the society could fund 165,000 new hospital beds and 62,000 new teachers, improving health care and general education. Could the privatization of medical services be the problem? In a privatized context, injuries are good business, as people once said in the 1960s about war. I do not want to be too cynical about the problem, but what other reason could there be for the lack of action in so many countries?

We know that the Australian state of Victoria initiated a major traffic safety campaign in 1990 and continues to support it. Car insurance there is run by the government, and they realized they were spending too much money on compensations. The solution was either to raise insurance costs (a politically unpopular decision) or reduce incidents of injury. They took the second option. In the Canadian province of Alberta, by contrast, there were twenty-seven insurance companies operating when I lived there in the 1990s. None of them was willing to contribute substantially to the cost of a traffic safety campaign. The insurers' association was willing, but only to a point. Alberta showed 28 collisions per 100,000 cars, while Ontario – which serves as the basis for financial plans because it is the largest province – showed 26 collisions per 100,000 cars. The insurers' interest was in lowering the Alberta collision rate to fit their financial programme, but they were not interested in eradicating collisions. As a consequence, during the seventeen years I was active as a consultant on traffic safety, neither they nor the provincial government ever contributed the necessary funds to do something at the required level.

While the design of information can sometimes go far toward improving life in society, we must recognize the existing limitations and conditions and decide to act as designers when these conditions are right. Otherwise, the focus of our efforts should be directed toward improving the existing conditions, if possible. This is something Karel van der Waarde has been trying to do in connection with information leaflets for medicines in the European Union. Rather than simply designing them as best as he can within the European guidelines, he draws attention to the flaws in the guidelines themselves.[4]

4 See Karel van der Waarde, "Designing Information about Medicine: The Role of Visual Design", in the present book.

Information and persuasion

Data, it seems, should be not only clear, but also convincing. Information design always has a persuasive component. A text must be clear, but it must also be inviting. At a workshop I taught recently with my wife at the University of the Arts in Philadelphia, the students discovered many interesting things when they met the users of the information they were designing. In one case, students who were redesigning the insert for the medicine Advil discovered two things: first, the users (the elderly) preferred the existing leaflet to the one the students had designed with greater care for elegant typography, and, second, the users did not normally read the leaflet anyway. When the students learned this, the design problem had to be reframed: before they could think about how to make the information clearer, they needed to find a way to make it more inviting. In other words, if you cannot persuade the public that it is worth their while to read a leaflet – to engage in the effort of reading it – anything else you do will fail.

Attention to the persuasive/inviting component of information design requires us to adapt the design to the profile of the readers. We might, for instance, think that the form of the message will help: tables for accountants, prose for politicians, charts for statisticians, and diagrams for designers. But this refers only to the form; the content must also be crafted to encourage the proposed action. It must appeal to the cultural value systems of the readers, and it must speak their language.

The importance of context

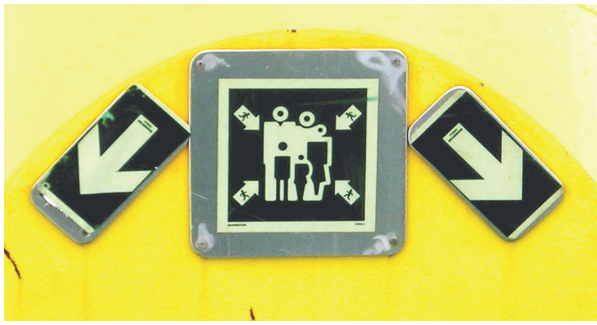
Context is a very broad notion. As far as information is concerned, context can be physical, cultural, or cognitive, and can also pertain to specific settings and situations. For example, figs. 11 and 12 show the importance of the setting for the comprehension of a pictogram: in some cases, it is difficult to evaluate the comprehensibility of a pictogram apart from the context of its implementation.

Fig. 13, meanwhile, illustrates the importance of the cognitive context. On hilly roads in the Canadian province of Quebec, “escape routes” into sand bays are provided for trucks before they come to a slope; these serve to stop the truck if its brakes are not fit for the grade of the slope. If you are unfamiliar with this road safety feature, you will not be able to understand the symbol, no matter how clearly it is drawn. Although the evaluation of the pictogram’s

Fig. 11. The same pictogram in context.



Fig. 12. A pictogram without context.



performance could be initiated in isolation, its effectiveness can only be assessed in its proper context. The physical context of the design's implementation, then, must also be considered part of the information design problem.

Conclusion

Information design does not use any universal recipes; it must consider purpose, content, context, and the public in projects that can relate to facilitating cognitive tasks or fostering changes in behaviour. Facilitating cognitive tasks is easier if the designer is conversant with the culture of the targeted public, if the public is motivated to perform the cognitive task, if the designer is able to



Fig. 13. Here the cognitive context is required.

observe all the situations of use, and if the designer, as researcher, can combine structured interviews with performance tests and anthropological observation and engage in an iterative approach to designing.

Fostering changes in public behaviour is more difficult and requires that the public be significant, reachable, reactive, and measurable. In addition, the content must be connectable to things the public already understands (as Richard Saul Wurman said at the Icograda conference in Zurich in 1977: "One can only understand things that relate to things one already understands"); the message must be presented in the verbal and visual language of the public; and, where action is needed, the public must recognize themselves in the message and see a personal benefit in the adoption of the action.

Data without context is not information, and, while the contexts at play can partly be created by the designer, they are also introduced by the public, the objectives, and the situations of use.

Information design, to be truly good and effective, must be ethical; it must acknowledge and understand the users and attend to their needs, their possibilities, their limitations, and their wishes.

It is only by working *with* the people and not *for* the people that one can use design for its highest end: to change an existing reality into a better one.

Karel van der Waarde

Designing Information about Medicine: The Role of Visual Design

Why Is Visual Information about Medicine So Problematic for Design?

If a patient needs to take a medicine, certain information must be provided: an explanation of what it is supposed to do, instructions about how to take it, warnings to be aware of, circumstances to be avoided, and storage requirements. At present, this information is provided on packaging and package leaflets, as can be seen in the two fairly recent, and by no means extraordinary, European examples in figs. 1 and 2.

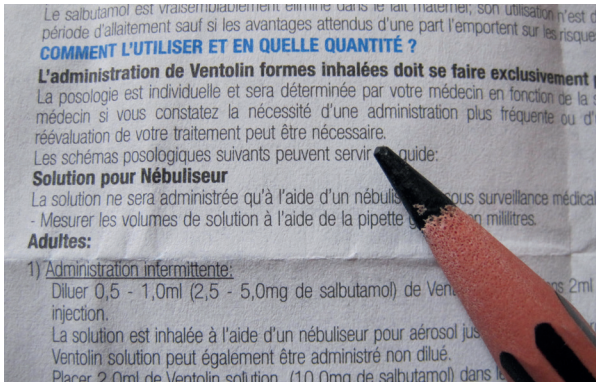

Le salbutamol est vraisemblablement éliminé dans le lait maternel, son utilisation n'est d
période d'allaitement sauf si les avantages attendus d'une part l'emportent sur les risque
COMMENT L'UTILISER ET EN QUELLE QUANTITÉ ?
L'administration de Ventolin formes inhalées doit se faire exclusivement
La posologie est individuelle et sera déterminée par votre médecin en fonction de la
médecin si vous constatez la nécessité d'une administration plus fréquente ou d'
réévaluation de votre traitement peut être nécessaire.
Les schémas posologiques suivants peuvent servir
Solution pour Nébuliseur
La solution ne sera administrée qu'à l'aide d'un nébuli
- Mesurer les volumes de solution à l'aide de la pipette
Adultes:
1) Administration intermittente:
Diluer 0,5 - 1,0ml (2,5 - 5,0mg de salbutamol) de Ven
injection.
La solution est inhalée à l'aide d'un nébuliseur pour aérosol ju
Ventolin solution peut également être administré non dilué.

Fig. 1. Detail of a package leaflet for an inhaler in Belgium. Here the type size, line length, line spacing, capitalization, and use of colour all hamper the reading of the text. The type size and line spacing are too small, and the line length is too long. The use of colour and capitalization to emphasize headings are unlikely to help readers find the information they need in the long sections of text that follow them.

For anyone trained in visual design, it is fairly easy to suggest improvements to the presentation of the information on such leaflets and boxes. It does not take much time to redesign instructions, warnings, names, and a visual identity in a configuration that is clear, effective, and probably even attractive. Why, then, are the practical knowledge and experience of visual designers not being used to benefit patients? Why is such information designed in a way that will likely cause problems?

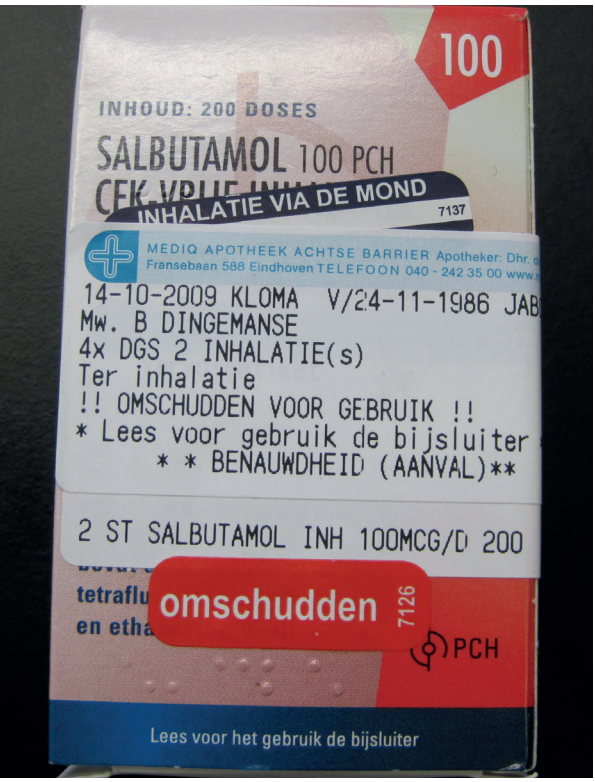


Fig. 2. The front of a box for an inhaler in the Netherlands. A pharmacist has added three labels to the cardboard box: a dark-blue one: "inhalation via the mouth" (*inhalatie via de mond*), a red one: "shake" (*omschudden*), and a large white one with the patient's name and some instructions. The lack of any visual structure to show what is most important and in what sequence the information should be read makes it very hard to extract any information. What is more, the placement of the labels, which cover up information and Braille printed on the package itself, is another hindrance for patients.

And in daily practice such problems are very real. Fatalities, errors, increases in hospital admissions, medicine-related health problems, and high costs for both patients and the society are the most evident consequences of poorly designed medicinal information.

The present article attempts to clarify the role of visual designers in the development of this kind of information.

Design Involvement: Setting the Scene

Information about medicines is rigorously regulated. Initially, the regulation took place on national levels, but currently, it happens globally through the co-operation of various regulatory authorities like the European Medicines Agency (EMA) in Europe and the Food and Drug Administration (FDA) in the United States. This development in regulation has been going on for quite a

few years, and detailed reviews have provided various perspectives on the current situation.[1]

The European legislation on medicines and the supporting guidelines mention the importance of the visual design of information. There are not many other laws in which visual design is so acknowledged. The European law states: "The package leaflet must be written and designed to be clear and understandable."[2] Meanwhile – and this is of course good news for information designers – the guideline on the readability of medicinal labelling advises: "Companies are encouraged to seek advice from specialists in information design".[3] Both statements show that legislators accept the idea that visual design has a crucial role to play in the provision of information about medicines.

The position of design in the process of developing information about medicines is further described in the current legislation and guidelines. The legislation appears to be based on at least three assumptions about the role of design:

- first, "visual design" is limited to decisions about the appearance of certain visual elements;
- second, "visual design" is somehow related directly to writing and testing; and
- third, a single, well-designed information source is sufficient to support a range of activities by a range of different stakeholders.

Let us now consider each of these three assumptions in turn.

1 See especially D. K. Raynor et al., "A Systematic Review of Quantitative and Qualitative Research on the Role and Effectiveness of Written Information Available to Patients about Individual Medicines", *Health Technology Assessment* 11, no. 5 (2007): 1–160; and Susanne Sommer, "Package Leaflets: Testing and Harmonisation in Relation to the Overall Business Process in Regulatory Procedures: An Example of the Impact of Changing Regulatory Requirements" (MA thesis, Faculty of Mathematics and Natural Sciences, University of Bonn, n.d.).

2 Directive 2004/27/EC, *Official Journal of the European Union*, L 136 (30 April 2004): 49.

3 European Commission, *Guideline on the Readability of the Labelling and Package Leaflet of Medicinal Products for Human Use: Revision 1, 12 January 2009* (Brussels: European Commission, Directorate General for Enterprise and Industry, 2009), p. 7.

Strict regulations exist, but do they really support the decisions of visual designers?

The current legislation provides advice about the dimensions of texts. There is some general advice in the European legislation and more specific advice in the Readability Guideline. The 2004 European legislation includes the sentences: "The package leaflet must be written and designed to be clear and understandable" and "The package leaflet must be clearly legible in the official language of the Member state".[4] This seems like a clear-enough law, but in practice it is very hard to define exactly what is "legible" or what "clearly" means. For this reason, a Readability Guideline was published in 2009 to "assist applicants and marketing authorisations holders when drawing up the labelling and package leaflet". This Readability Guideline seeks to help designers in the pharmaceutical industry to select a type size; it states: "The type size should be as large as possible to aid readers. A type size of 9 points, as measured in font 'Times New Roman', not narrowed, with a space between lines of at least 3 mm, should be considered as a minimum."[5]

Designers might well find it difficult to follow this kind of guidance. In combination, the guideline and the legislation suggest that a type size that is "as large as possible, but with a minimum of 9 points, as measured in font 'Times New Roman'" is "clearly legible". But this conflicts with practical knowledge. Why nine points? Why "as measured in font Times New Roman"? The designer's easiest option would be to ignore the guidance, but this is not permitted. The regulatory authorities simply reject applications that do not follow the guidelines, which means that a medicine does not receive a licence and so is not allowed onto the market. Such delays are very expensive.

The example of choosing a type size is typical of how the designer is portrayed in the current legislation and guidelines. They imply that information designers need guidance in selecting the appropriate type size. Other statements in the guidelines contribute to this image and suggest, for example, how such elementary things as bulleted lists, pictograms, and headings should be designed. The first use for the guidelines, then, is as advice about "how to design".

4 Directive 2004/27/EC, p. 49.

5 European Commission, *Guideline on the Readability of the Labelling and Package Leaflet*, pp. 6–7.

A second use is as a checklist. The guidelines are used by pharmaceutical companies and regulatory authorities in their assessments of the visual design. The number of things that can be checked, however, is limited to the same kind of elementary items.

Both uses – as advice and as a checklist – seem to be based on a rather restricted view of the activities of visual designers. The guidelines look separately at a limited number of visual elements and label them "design". The assumption is that the activity of visual designers is limited to a few fairly minor decisions about a few visual elements.

Evidence-based design: Is it part of design?

The second assumption we find in the legislation and the guidelines is that information about medicines must always be "evidence-based", that is, it must be based on verifiable experimental results. This idea likely originates from historical experience: there is a long tradition of medicine manufacturers trying to deceive patients with extraordinary claims about the effects of their product. That is one reason why the regulatory authorities examine all the evidence for every medicine before it is allowed to be sold. The same evidence-based approach is applied to the design of medicinal information.

To provide evidence that information is "clearly legible", a user test must be conducted. Such tests are very beneficial: real people must use the designed information and provide feedback. This is a second unique feature of the European legislation. Not only does the legislation acknowledge the role of visual design, but it also makes usability testing mandatory. Different test methods are possible, but the most common one is a combination of depth interviews and usability observations.

The user tests have undoubtedly improved the quality of information about medicines in Europe. The leaflets have become easier to read because most of the jargon has disappeared and larger type sizes are being used. Furthermore, greater attention is being paid to such activities as visual design and translation.

There are, however, still a number of major issues that need to be addressed. For example, tests usually show that in most situations a nine-point type size is not needed to make a leaflet "clearly legible". Most people, even the elderly, can read smaller texts using their normal glasses. This is not to say there is anything wrong with nine-point type, but it does show that careful

typographical considerations may conflict with the overall guidelines. Every test also shows that other factors, such as page layout, the use of white space, and illustrations, are just as important as type size. Above all, tests show that the knowledge, experience, and circumstances of the reader must be considered in order to determine what is "clearly legible".

In general, designers are not used to conducting tests to see how well – or how poorly – a specific design "works". In addition, when test results and guidelines are in conflict and need to be brought into line, they might be at a loss to provide arguments for why something works. Developing convincing arguments that consider both options – whether to be "evidence-based" or to follow the guidelines – is not a common practice in current visual design practice.

Although testing is essential in situations where the visual information is of vital importance, we need to ask whether it is an integral part of the designer's work, or if it should be undertaken by specialists. Developing written arguments to persuade the regulatory authorities that the information is "clearly legible" also seems to fall outside normal design activities. The regulations make the assumption that designing, testing, and persuasive writing are closely related activities and consistent with evidence-based practice.

Multiple stakeholders: Unwarranted expectations about possible effects?

The third assumption is related to the effects of the visual design. At the moment, the information that accompanies medicines is allowed to appear only on the package leaflet and the packaging. The assumption is that all the relevant information for everyone who deals with the medicines can be provided on these two carriers alone.

Most medicines, however, are handled not only by patients, but also by a range of other people. At least nine other groups are involved, and they each contain distinct smaller categories. All of the following groups are likely to read the information on the packaging and package leaflets:

- doctors (various specialisms: anaesthetists, general practitioners, radiologists, etc.);
- pharmacists (various business configurations);
- hospital pharmacists (various kinds of hospitals);
- nurses (various specialisms)
- caregivers (parents, children, family, neighbours)

- pharmaceutical wholesalers
- pharmaceutical companies that develop and sell medicines
- the regulatory authorities that monitor whether the practice conforms to the legislation and guidelines
- the governments who develop the regulatory framework (politicians, lawyers, etc.)

Experiments and user testing with these groups show that each one has different ideas about what is "clearly legible"; it seems to depend on the actions they want to perform and the circumstances that require these actions. For example, a night-shift nurse who wishes to check a dosage detail on a package leaflet needs the information in a different format from a parent who wants to find out if the baby's medicine should be kept in the refrigerator. A single design is unlikely to benefit all groups. The assumption that a single design is appropriate for all users perhaps overestimates, or underestimates, the effect of design. The "one size fits all" approach might need to be questioned.

These three assumptions might be part of the reason why visual designers prefer not to be involved in the development of information about medicines. Visual designers find it hard to live up to such questionable expectations: they usually do not have to conform to strict regulations, or conduct tests and write arguments, and only rarely do they have to consider so many different stakeholders in a single product. Given these conditions, it is understandable why designers are hesitant to take on such projects.

From this brief description of the position of visual design we can conclude that at least three expectations form the basis for the design of information about medicines, namely:

- Visual designers are required to follow regulations and guidelines that focus only on a few visual elements. This might be a limited view of the activities of designers.
- Visual designers must provide empirical evidence of the effectiveness of their design through user testing and must develop written arguments. This might be an overstated view of the activities of designers.
- A single visual approach should be sufficient to support a range of activities by a range of different stakeholders.

All three expectations have one thing in common: the role of a visual designer and the potential influence of visual design are not clearly understood; hence, such dubious expectations.

What Information Designers Do: Activities and Reflections

For people involved in medicinal information who wish to understand the role of visual design, one of the first things they might do is to consult the available literature. This, however, is relatively hard to find and access; a database like Medline/PubMed does not yet exist for design. What is more, literature about visual design seems, at present, to have two shortcomings in this regard.

One academic field that might be expected to provide definitions and descriptions of visual design is design research, which has produced many general descriptions of the activities of designers. Design research can be traced back to publications by Herbert Simon and Donald Schön who looked for a "science of design" and sought to describe how professional practitioners work.[6] Design areas like engineering, architecture, and product design provided the main data and heavily influenced these descriptions. Unfortunately, visual design is rarely linked to mainstream developments in design research, and a literature search is unlikely to provide descriptions about the role of visual designers in the development of information about medicines.

The second issue is that publications about commercial design often use such buzzwords as "innovation", "design thinking", "sustainability", and "creative industries". Graphic design (visual communication design) and information design have their own relationships to these "magic bullets" of business, although they are rarely elaborated. Unfortunately, such buzzwords tend to reinforce the idea that "design" is merely a fashionable and superficial decorative enhancement to a product.[7]

These two issues – the lack of clear descriptions of visual design in mainstream design research and the view that design is mainly a short-lived business

6 See Herbert Simon, *The Sciences of the Artificial* (Cambridge, Mass.: MIT Press, 1969); and Donald Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983).

7 Michael Bierut, "Innovation is the New Black", *Observatory*, 20 Nov. 2005, http://observatory.designobserver.com/feature/innovation-is-the-new-black/3857 (accessed 4 Aug. 2011).

fad – make it difficult to develop the kind of representation of visual design practice that could be incorporated into regulations and guidance.

A possible description of visual design

The following description is based on the preliminary results of research conducted in the Netherlands from August 2007 to May 2011 as part of an ongoing project that aims to describe visual design practice. Visual designers – who operate under a range of titles such as "graphic designer", "information designer", "interaction designer", and "web designer" – have provided the data. The research uses observations of practice and depth interviews with practitioners to find out how such designers actually work.[8] The description, which is still being tested and discussed, will be updated on the basis of subsequent findings.

The aim is to develop an approach that can help to restructure the legislation and guidance about visual design, with the long-term goal of involving visual designers in this area so that the problems we saw in figs. 1 and 2 can be avoided.

The research so far indicates that visual designers seem to follow two main patterns: they consider visual configurations and they make professional reflections. The first is specific to visual designers, while the professional reflections are more general. Below is a brief description of both patterns.

Considering the visual configuration: Three activities

Visual designers undertake three activities when they work on a project:

- they consider visual elements;
- they consider visual strategies; and
- they consider the dialogue between the commissioner of the project and the beholder.[9]

They are constantly switching between these activities to achieve a combination in which all considerations are dealt with satisfactorily in a single visual configuration.

The three activities can be further detailed as follows.

8 See Karel van der Waarde, *Listening to the Reader* (Breda, Netherlands: AKV St. Joost, 2009).

9 The word "beholder" is used here to indicate the viewer or reader, or more generally, the information user.

Activity 1: Considering visual elements. There are only four kinds of visual elements: text elements, image elements, schematic elements, and "inseparable combinations". Visual designers choose, and sometimes create, these elements and combine them. Text elements are shaped through the conventions of typographical design. Image elements include all visual materials that can be interpreted as pictures: photographs, illustrations, symbols, etc. Visual elements that have no direct meaning but provide structure and decoration – such as lines, colours, frames, and borders – are "schematic elements". The last group, "inseparable combinations", are visual elements that combine elements from the other three kinds but that are used as a whole unit. Examples are logos with a brand name, diagrams, and maps. Designers either use these as complete elements or redesign them as complete elements. In the digital realm, these four kinds of visual elements may also be considered in combination with sound or movement.

Activity 2: Considering visual strategies. Visual strategies combine three aims: identity, representation, and orientation. In most projects, one of these aims will be dominant. However, all three need to be considered. The first aim of visual design is to identify the commissioner or speaker. It must be made clear – through the use of recognizable visual-identity elements – who the originator of a message is. The second aim is to present the content of the complete message in a visual format or structure. This format or structure represents the structure of the information. The third aim is to make it possible for the reader/user/beholder to navigate through the information. People must be able to orient themselves so they know where to start and how to continue. Visual designers always have to consider a combination of these three aims when they develop a visual strategy.

Activity 3: Considering the dialogue between the commissioner and the beholder. The third activity of visual designers is to consider the position of the commissioner in relation to the people they want to communicate with. Visual designers make this position visible.

All three activities take place in conjunction with each other and constantly influence each other, as illustrated in diagram 1. For example, a decision about a typographic element will have consequences for the visual strategy and the visual dialogue between the commissioner and the user. And vice versa: decisions about the position of the commissioner in relation to the beholder will

influence choices about the typographic elements: for example, text set in very large type may imply that the reader lacks competence or that the commissioner is condescending.

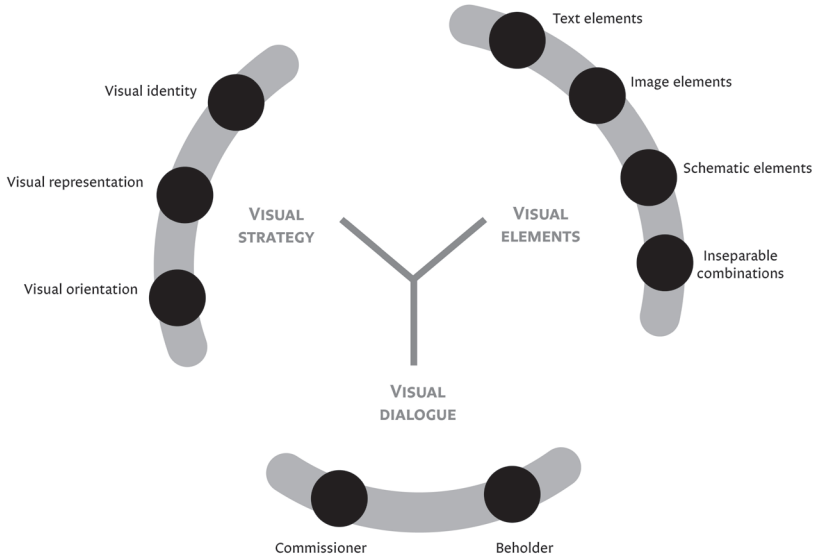


Diagram 1. Graphic designers develop visual concepts through a simultaneous consideration of visual elements, visual strategy, and visual dialogues. This process aims to combine these three forms of visual argument into a single, all-encompassing idea or "concept".

Nine reflections

A second pattern was observed and confirmed during the interviews with visual designers; this revealed that considering visual configurations is only part of their activities. While it may be their main focus, it cannot be done without other activities as well. There are at least another eight "reflections" necessary to the design process, as listed below.

Reflection 1: Considering the visual configuration. This is described in the previous section. It is what visual designers see as the core of their activities.

Reflection 2: Planning and management. Every project must deal with financial matters, time management, and organizing various people's activities.

This combination involves planning in advance, monitoring during the project itself, and evaluation afterwards.

Reflection 3: Presentation and argumentation. Every project must be presented to the commissioner of the project. The presentation must include arguments as to why a specific visual configuration was developed and how it benefits the commissioner. The presentation must be carefully considered; it must present all relevant arguments that will allow a commissioner to assess and approve the project. The same arguments can be used later in more public discussions, if it is necessary to explain the configuration in the media, in design contests, or in a portfolio.

Reflection 4: Evaluation and testing. Evaluating a design to establish its effectiveness is a separate activity. This can range from a very informal check with colleagues to full usability testing with tangible prototypes. Benchmark tests, as described by David Sless and Ruth Shrensky, also belong here.[10]

Reflection 5: Modification for production. Production, distribution, and implementation must all be considered. The related opportunities and limitations will affect the visual configuration and must be taken into account during the design process. Production facilities, distribution channels, and implementation strategies will very likely influence a project.

Reflection 6: Considering the situation. Designers, commissioners, and beholders are active in the larger context, which may include the languages of the text, financial structures, social structures, the political situation, and a host of other influences that need to be known and considered before the visual information can be developed. With information about medicines, for example, the relationships between governmental bodies, industry, doctors, insurers, pharmacies, and patients create a context that provides a basis for designing information.

Reflection 7: Considering the problem. Within the given context, the designer focuses on a specific problem. Selecting this problem from a range of other possible choices requires careful consideration. For example, "visual information about medicines for patients" is a problem within the European health care situation.

10 See David Sless and Ruth Shrensky, *Writing about Medicines for People*, 3rd ed. (Melbourne: Communication Research Institute, 2006).

Reflection 8: Considering a strategy. The approach to the specific problem must also be considered. Very likely there are many possible approaches to a problem. For example, if European diabetic patients need information about their medicines, can mobile telephones be used to support this, with what kind of information, and in what precise way?

Reflection 9: Personal development and company development. Before, during, and after every project, the designer also reflects on the value and suitability of a project from a personal point of view ("Do I like doing this work?") as well as from the company's point of view ("Is this work profitable and beneficial for the company?"). This reflection considers whether an activity fits into the designer's personal development and/or the development of the company.

The designer's professional work involves the quick consideration of each of these "reflections" as well as frequent switching back and forth between

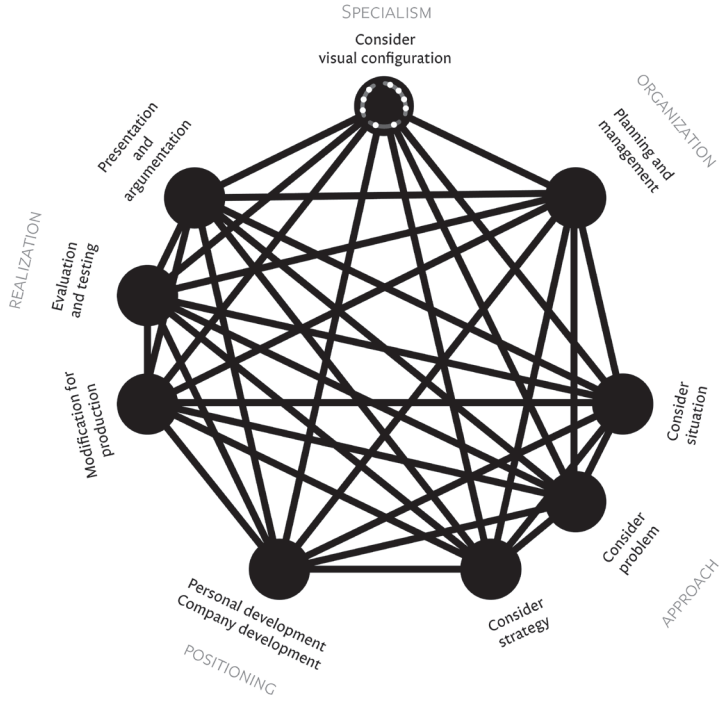


Diagram 2. The "web of reflections" shows the activities of graphic designers necessary to make the development of visual concepts possible.

them. The design process, it seems, is not a more-or-less linear activity with a number of successive and recurrent steps;[11] it is more like a "web of reflections" in which the sequence is determined by all sorts of influences, such as experience, subject knowledge, and skills.[12] The starting point for this "web" is not set beforehand and may differ from project to project. Indeed, any starting point is acceptable and will very likely lead directly to other reflections. Diagram 2 illustrates this web of reflections.

Not all these reflections need to receive the same weight of attention, and some might not be considered relevant for a particular project. However, it is possible to point to these reflections in every project undertaken by visual designers.

This preliminary description of two patterns – the consideration of the visual configuration and these nine reflections – appears to cover the findings so far of the research into the activities of visual designers in the Netherlands.

Applying the Description to Medicines: Packaging, Inserts, Regulations, and Guidelines

If the above description is an accurate representation of visual design practice, it should be possible to apply it to designing information about medicines. Doing so should reveal both successful and problematic areas. First let's examine the three assumptions mentioned earlier in the discussion about European legislation.

How current legislation limits visual design decisions

The first assumption was that the current regulations present a limited view of the activities of visual designers. In the regulations, visual design appears to involve decisions only about a few specific visual elements.

We can safely conclude that the regulations focus only on certain aspects of only some of the visual elements presented in diagram 1. The regulations

11 For a review of several diagrammatic models, see N. Crilly, A. Maier, and P. J. Clarkson, "Representing Artefacts as Media: Modelling the Relationship between Designer Intent and Consumer Experience", *International Journal of Design* 2, no. 3 (2008): 15–27.

12 This notion is based on the ideas of Donald Schön, who writes about a "web of moves" (*The Reflective Practitioner*, p. 102).

refer mainly to "text elements" and "visual elements", stating, for example, that "type must be at least 9 points"[13] and that "the outer packaging and the package leaflet may include symbols or pictograms designed to clarify certain information".[14] The regulations do not, however, consider combinations of visual elements, such as the addition of a text to a pictogram or illustrations with headings and captions. Other forms of visual elements such as illustrations, infographics, and diagrams are not mentioned at all. Nor is there any advice on visual strategy or regulations about the visual dialogue that consider the positions of the commissioner and the beholder.

A consequence of this focus on a limited number of visual elements is that the front of the box shown in fig. 2 is considered acceptable according to the regulatory authorities. It fulfils all the requirements for each of the regulated visual elements. But if we apply the description presented in diagram 1, a different view emerges.

Visual elements. Although the type sizes of the texts on the package in fig. 2 might be large enough to read, other typographical issues could be raised. The use of capitals, different typefaces, punctuation, and abbreviations seems confusing. Also, the relationships between the visual elements, in terms of their sequence, proximity and prominence, make it difficult for the beholder to find a starting point for reading.

Visual strategy. In the example in fig. 2, the identity of the speaker is not clear and the provenance of the information is ambiguous. The information might come from the pharmaceutical company that designed the box, from the pharmacist who added the labels, or from a doctor who told the pharmacist what to print on the label. Furthermore, the poor visual structure makes it difficult to navigate through the information: there is no clear starting point and no clear path. Whether the information achieves the third aim of visual strategies, the representation of the content, is also questionable. Several instructions and warnings are repeated: for example, the instruction "to shake" (*omschudden*) appears twice, as do the instruction to "read the insert before

13 European Commission, *Guideline on the Readability of the Labelling and Package Leaflet*, p. 7.

14 Directive 2001/83/EC, *Official Journal of the European Union*, L 311 (28 November 2001): 87.

using" (*lees voor gebruik de bijsluiter*) and the notice "for inhalation" (*inhalatie via de mond*; *ter inhalatie*).

The visual dialogue. Because the identity of the source of the information is not made clear, it is also not clear who is being addressed. Some of the information seems aimed at pharmacists; other information seems to address the patient. This puts patients in a slightly awkward and unsettling position, where they must ask: "If this information is intended for me, what should I do with it? If it is not for me, can I safely ignore it?"

In order to make regulations and guidelines useful for visual designers, it is essential that they relate to the normal professional activities of designers. It seems worthwhile, therefore, to investigate how these three activities – organizing the visual elements, developing a visual strategy, and creating a visual dialogue – can be incorporated into regulations and guidelines to make sure that they provide both helpful guidance as well as a relevant checklist for the regulatory authorities.

How current legislation conveys a misleading idea about the activities of designers

The second assumption made by the regulatory framework is that designing, testing, and persuasive writing are closely related activities. Unfortunately, the relationships between them are not elaborated. This assumption leads to several consequences that conflict with the practical reflections presented in diagram 2.

First, the regulations suggest that writing, designing, and testing are a simple *linear process*. A text is written, then designed, and then tested. In practice, writing, designing, and testing are part of the designer's "web of activities" and are contemplated together nearly simultaneously.

Second, the regulations and guidelines describe writing, testing, and designing as *separate and unrelated activities*: there is no description of the relations between them or how they are coordinated in a project. Ideally, however, these activities must be integrated and considered along with the other reflections. Without considering the other reflections, it is not possible to define a given situation or develop benchmarks and performance-based criteria. Separating the activities of writing, designing, and testing does not allow for the optimal development of visual information.

Third, in current practice the testing of package leaflets is required only at the end of the development process; *it is seen as the last hurdle before registration*. Unfortunately, this means that the results of the testing will not have much influence on the design, since it simply occurs too late for major modifications to be made.

Fourth, at present, testing is undertaken with *too little notice of the practical context* in which medicines are used. Medicines are all treated in a very similar way regardless of whether they are intended for use at home, in hospitals, or in emergency situations. Medicines for life-threatening situations receive similar treatment as convenience medicines, medicines for chronic illness, and those for one-time use. Current regulations simply do not allow for the consideration of the context in which the information will be used.

A fifth consequence of the separation of writing, designing, and testing is that *the criteria for these activities are unclear*. Information about medicines for people should be "performance driven": whatever works best should be developed further. This can only be achieved when writing, testing, and designing are coordinated and integrated into all reflections.

Finally, the regulations assume that *testing automatically leads to better information*. The interpretation of the test results, however, requires a reconsideration of all the reflections we have discussed. In practice, this is very rarely done.

Diagram 2 shows the kind of responsibilities information designers usually take on in a project. These activities are undertaken in collaboration with various specialists who try to reach the best compromise through a back-and-forth process. Collaboration and coordination during a project are essential.

The regulatory framework presents a very different perspective: the process is a linear one; activities can be separated; testing can be done at the end of the process; testing can be done without a context; the criteria are not related to user actions; and the application of the test results is unproblematic.

It seems worthwhile, therefore, to investigate how the nine reflections in diagram 2 can be incorporated in the regulations and guidelines to make sure that they are both helpful guidance as well as a relevant checklist for the regulatory authorities.

Getting an accurate idea of the possible effects of visual designers' activities and visual design

The package leaflet in fig. 1 can be analysed with the aid of both diagrams. An analysis that uses only the visual criteria presented in diagram 1 would not provide the complete picture. Yes, the type is too small, but diagram 1 suggests no visual arguments could provide the basis for this assessment. This can be found only by applying the reflections presented in diagram 2.

With regard to the leaflet in fig. 1, the type size appears to have been determined not as a visual design decision but by a combination of the production requirements (reflection 5) and the constraints of the situation (reflection 6). The limitations of the production equipment determine the size of the leaflet. It is simply too expensive to modify the production system to accommodate a larger leaflet or a booklet. The legal framework, however, determines the amount of information that is included in a package leaflet; it lists the information that must be mentioned and how this should be done. The combination of both concerns – a great deal of text on small-size paper – results in the selection of very small type sizes. For this to change, the legal framework or the production requirements – or both – must change.

The description of the activities of designers in the two diagrams explains why the current influence of visual designers is not sufficient to increase the type size. A similar argument can be applied to most of the shortcomings in the current information about medicines for patients. By taking both diagrams together, it is possible to point to issues that are likely to cause problems in the provision of information about medicines.

Conclusion

The above description of the activities of visual designers can be used to discuss the visual designer's role in developing information about medicines. If the visual design of medicinal information is important, then it is necessary to take the activities and reflections of visual designers as the starting point for the development of regulations.

The description of visual designers' professional practice in three activities (diagram 1) and nine reflections (diagram 2) leads to the following conclusions: The current regulatory framework focuses only on a very limited part of the

activities of visual designers, mentioning only certain issues related to textual elements and image elements. If regulations need to cover the visual design of information about medicines, then they must take account of all kinds of visual elements, as well as the importance of visual strategies and visual dialogues. Their neglect of these issues has led to designs for package leaflets and packaging that make it more difficult for users to act appropriately.

By mentioning writing, designing, and testing as separate activities and by focusing only on these activities, the current regulatory framework misrepresents how visual designers actually work and ignores other reflections that are fundamental in the development of visual information. Furthermore, the linear presentation of writing, designing, and testing as three successive steps in the process makes it difficult to develop information that is suitable for people.

The two diagrams help us to discuss an integrated approach, one that acknowledges that different people do different things and so need different kinds of information. Visual information about medicines should be based on a thorough consideration of visual elements, visual strategies, and visual dialogues, in combination with a thorough consideration of the nine reflections designers must make.

This approach could be used in the coming years to influence the revision of the European legislation and guidelines. The European Commission is obliged to reconsider the legislation and make "an assessment report on the current shortcomings in … the package leaflet and how they could be improved in order to better meet the needs of patients and healthcare professionals".[15] This is the next step in the search for better ways to inform people about medicines and enable them to act appropriately.

15 Directive 2010/84/EU, *Official Journal of the European Union*, L 348 (31 Dec. 2010): 75.

Malcolm Garrett

Keeping It Real in a Virtual World

I just want to say, first of all, thank you very much to the organizers of BIO 22 for inviting me to Slovenia.[1] I've been here all week serving on the jury to select the winners in this year's exhibition. It's been a fabulous experience, and I was extremely impressed by the quality of the work we had to review. I also want to thank the British Council, who have generously supported my visit to Ljubljana.

Where Did It All Begin?

I guess we should start at the beginning.[2] Well, it all started with the record sleeves I designed while I was still at college back in 1977, for a then-little-known local band called Buzzcocks (fig. 1).

At presentations like these people want me to talk about work that is now over thirty years old. But rather than go through a detailed history of all that work in the music industry, mostly from two decades ago, let me just mention the work I did for Duran Duran from 1981 to 1988, creating all of their record sleeve designs, packaging, and promotional materials for many countries around the world.

With most of the campaigns prior to their greatest hits CD, which I called just *Greatest*, the sleeve was always the starting point and a logical basis for the

1 Malcolm Garrett presented his talk in the lecture series "On Information Design" in October 2010; at the same time, he was a member of the international jury for the 22nd Biennial of Industrial Design. *(Editors' note.)*

2 Garrett's body of work as a designer is remarkably diverse and encompasses a broad period of time. Although the present book focuses on information design, we thought it wise in any case to present readers also with a part of Garrett's career that is practically at the opposite end to what he worked on later. We take it as proof that designers can devote themselves to very different fields over the course of their careers. *(Editors' note.)*



Fig. 1a. Buzzcocks, *Orgasm Addict*, 1977, 7" record sleeve, front, United Artists Records, Montage by Linder.

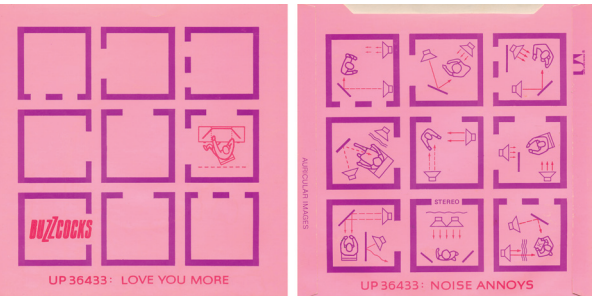


Fig. 1b. Buzzcocks, *Love You More/Noise Annoys*, 1978, 7" record sleeve, front and rear, United Artists Records. This latter sleeve would later inform the development of the brand identity and wayfinding for the Sharp Project building in 2010.

design theme. Here, instead, I approached it from the perspective of billboard advertising and TV commercials, using the video as a starting point and developing the sleeve from there.

Having worked in the music industry for over a decade, I had been continually trying to escape its clutches, especially throughout the late 1980s, as I became increasingly interested in working with digital media. However, I wasn't able to escape completely and soon found myself working on websites, webcasts and enhanced CDs for numerous bands just as the digital media were finding their feet.

With the shrinking record sleeve, we looked at ways of putting information, and more, on the CD itself, and introduced a format called *enhanced CD*, which could be played on a computer. Among the dozens we produced for various bands was one for the Spice Girls, just before Geri Halliwell – Ginger Spice – left the band in 1997 (or was it 1998?). The "Do you really want to quit?" screen you see when you close the CD featured an image of her as our fun reference to her departure.

Nowadays I only really design record sleeves for friends. One such friend is Martyn Ware, founder of the Human League, an electronic punk band – very futuristic, very inspirational, and an important influence. Martyn left Human League after two albums and formed Heaven 17, and later introduced me to the Macintosh computer around 1986, so I have a lot to thank him for.

And lastly, to illustrate that I can't ever get away from the music scene and am now apparently destined to document this part of my career, I have recently produced the book *Duran Duran Unseen*, about Duran Duran and the early days of the New Romantics in Birmingham in 1980 and 1981, as well as one about the band Magazine, for whom I am also doing posters to promote their tour now that they've re-formed.

Now on to the real stuff. The Applied Information Group, where I currently work,[3] are becoming quite well known for their innovative work in wayfinding design, and particularly in pedestrian wayfinding for cities.

I'd like to show two or three projects, which cover transport, wayfinding for interior environments, and wayfinding for pedestrians.

What I hope to illustrate is that, with projects of this kind, we always put people first: we design *for* people, not *at* people. If you can understand the way people actually think, you can present information in a way they can understand. Your job as a designer is to make things comprehensible and to deliver comprehensive information clearly.

Thinking about the Way People Think

We were invited by the Dublin-based design company Image Now to review the information for the bus system across Dublin. This was a crucial part of

3 This lecture was presented in October 2010; Garrett left AIG the following year. *(Editors' note.)*

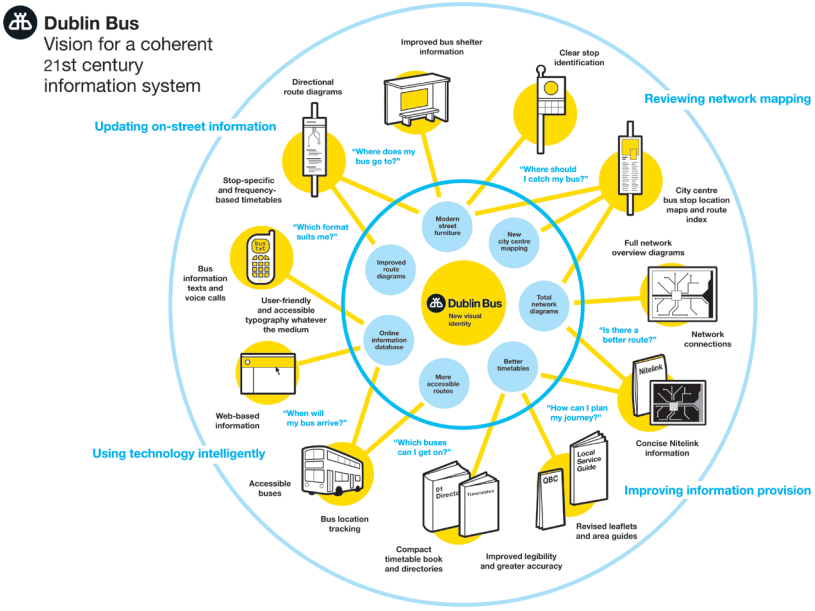


Fig. 2. Dublin Bus – Network Vision Diagram, 2008. Showing relationships between bus users and the various output formats and media across the entire network.

the identity development that Image Now were working on, some of which had already been completed. It would eventually embrace other things, like the future GPS tracking of buses, and our involvement lasted nearly two years. We produced the diagram in fig. 2 at the beginning to help visualize the scope and complexity of the process that had been embarked upon.

Many people in different departments of the organization might be concerned only with their small part yet would benefit greatly from understanding the bigger picture; this is why we developed this network overview diagram (fig. 2) to help everyone see where they fitted in. It was also available to the press and general public, so they could understand how the bus system was developing. We take this same approach in every project we do, as it helps everyone visualize all the parts and how they fit together.

In the centre are various aspects of the bus network that needed to be improved. Next, we considered the type of questions that people on the street might be asking about the bus services, so in the outer ring are the different

components that help answer those questions and we show how they link up to one another. Some of these components are physical objects on the street, some are digital objects, some are paper products, and some are the buses themselves.

So how do you start a project like this? Well, the first step was to go to Dublin and explore it first-hand. You have to understand the city if you want to develop useful and useable information for it. Of course, there are elements of duplication in all projects, but you can't proceed without detailed knowledge of the city in question. So one thing I did was to take a map of Dublin and the bus timetable book and just study the bus routes and how they traversed the city. What we found quite quickly was that almost eighty percent of the buses went down one particular street and over one particular bridge in the centre of town. This meant there was a huge bottleneck and serious traffic problems, but I also concluded that the entire street could be seen as a terminus for almost all of the buses.

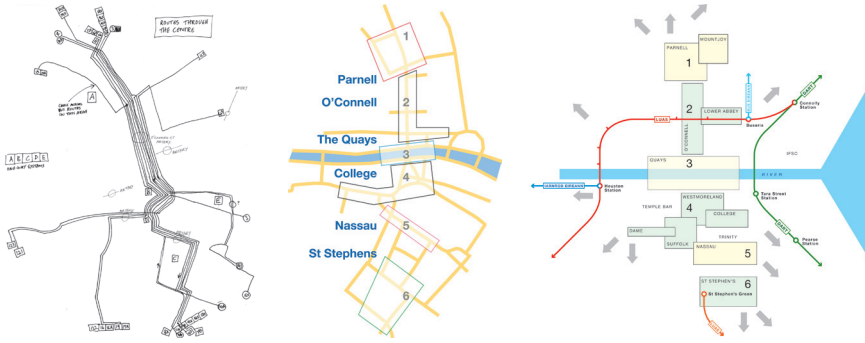


Fig. 3. Dublin Bus – Reading the City, 2007. Visual analysis of the bus routes through the Dublin city centre, identifying the confluence of routes, main passenger embarkation areas, and other transport connections.

Then we started looking at all the different areas of the city that were connected by this central shaft, looking at the city's geography and how the various other transport systems related to it. From here, we saw that you could think of the centre of Dublin as six distinct zones, where various routes terminated or interconnected (fig. 3).

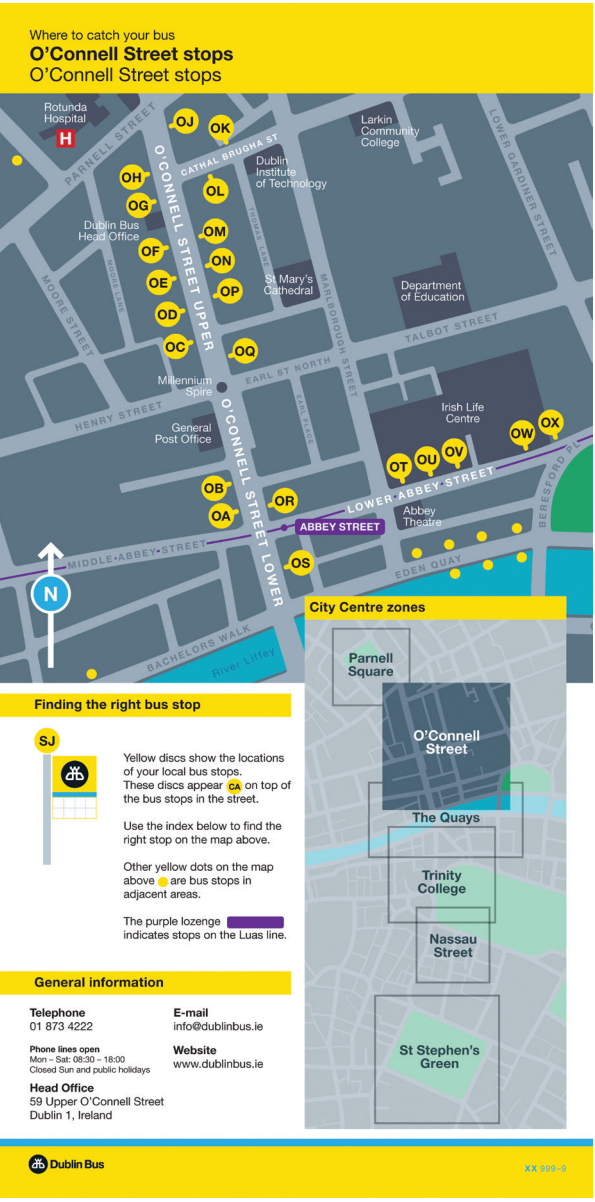


Fig. 4. Dublin Bus – City Centre Zones, 2008. Six separate zones were identified in Dublin city centre. Individual maps, labelling all the bus stops in the given zone, allow bus users to make quick decisions about where to board.

Each zone could be singled out on a detailed street map, noting all the bus stops in the zone, with an overview to show how each zone relates to the others. So if you were shopping on O'Connell Street and, say, crossed the River

Liffey to the south side and continued your shopping there, you could readily see how to get home again without having to cross back over. You could quickly see how the bus routes connect together.

In 2006, we started work on the full network diagram. Dublin Bus had never really had a usable diagram showing where every bus route went. This was the piece of work that took the longest to execute. We went through same process, painstakingly connecting the main routes, and again we saw another main corridor in the south-east direction out of the city. We started to look at how we could bundle these routes and make sense of this massive amount of data. It's not as simple as a train map where you have fewer stop points and fewer lines. Here you have one road with twenty buses going down it. Eventually we got to something with all the bus routes marked on it and the city highlighted in the centre so you could relate the routes to the city centre zones and see which buses go in which direction from there (fig. 4). It is important to remember that this is a diagram and not a map: the further out you go from the city centre the more you can condense the detail, so the geography becomes indicative rather than actual.

This diagram then went back to Dublin Bus and the route managers so they could check our accuracy. It ended up going through several iterations. In parallel, we looked at the way to use colour and considered accessibility issues, as this was a very complex and detailed piece of work. You can see in the diagram that the central zone shows too great a density of routes, so we just showed where they enter and leave. We also began to identify parts of the suburbs where similar confluences occur.

The full Dublin Bus network diagram was published at the beginning of this year. It took two years, all told, and of course as soon as it was published it was out of date. The bus company, like everyone else, is suffering from financial stress and cutbacks, so they're already looking at rationalizing a number of routes.

True to Irish form, the first version we did was for the night buses, rather than the day buses. We were guided by the corporate identity from Image Now and were asked to use dark colours. My way of thinking was that, as this is for use at night, we should use brighter colours as it's harder to read in the dark. The night buses are very important in Dublin, as people like to go out at weekends and are not necessarily so sober by the end of the night and need



Fig. 5. Dublin Bus – Route Diagrams, 2008. Example of route diagram and timetables for bus stops. There are approximately 140 routes serving a hundred city centre bus stops with up to three panels at each stop to display routes and timetables.

10 Towards **UCD Belfield**
Faiche Stiofáin, Domhnach Brock (Ollscoil)

	Monday – Friday	Saturday	Sunday
Buses leave terminus at	06:30 06:35c 06:40 06:45 06:45 06:50c 07:05 07:25	06:50c 07:00c 07:12 07:15c	08:45 09:15 09:45
And then run about every	8–15 minutes	11–16 minutes	15–20 minutes
Buses leave terminus at	23:15 23:30c	20:28 20:45 21:05 21:16 21:32 21:48 22:04 22:20 22:40 22:55 23:10 23:25c	23:15 23:30c

Route Variations
c To City Centre (Route 10c)
p From Parnell Square

Infirmary Rd. » 10 mins » North Circular Rd. » 10 mins » O'Connell St. » 15 mins » Baggot St. » 20 mins » Stillorgan Rd.

All times are off peak estimates. Operative Date 11/10/07

10a Towards **Stillorgan Shopping Centre**
Faiche Stiofáin, Domhnach Brock (Ollscoil)

	Monday – Friday	Saturday	Sunday
Buses leave terminus at	06:35 06:55 07:15 07:35 07:45 07:55 08:05 08:15 08:27	No service	No service

Infirmary Rd. » 20 mins » O'Connell St. » 35 mins » UCD Belfield » 10 mins » Stillorgan Shopping Centre

All times are off peak estimates. Operative Date 11/10/07

116 Towards **Sandyford Industrial Estate**
Stigh Lorgan, Eastát Tionscail Áth an Ghainimh, Baile Mhic Amhlaoibh, Dún Droma, Baile an tSaoir,

Monday – Friday. No Saturday, Sunday or holiday service

From Parnell Square to Sandyford Industrial Estate	07:35
From D'Olier Street to Sandyford Industrial Estate	09:15 16:12
From D'Olier Street to Whitechurch Estate	15:10 17:05
From D'Olier Street to Ballinteer	17:35

Parnell Square » 25 mins » Stillorgan Rd. » 25 mins » Sandyford Industrial Estate » 15 mins » Ballinteer

All times are off peak estimates. Operative Date 11/10/07

58c Towards **Dún Laoghaire**
Domhnach Broc, Br. Stigh Lorgan, Lána na Cille, Asc. Bhaile an Róistigh, Bóthar Radharc an Teampaill

	Monday – Friday	Saturday	Sunday
Buses leave terminus at	17:17	No service	No service

Mountjoy Square » 30 mins » Donnybrook Rd. » 20 mins » Stillorgan Rd. » 30 mins » Dún Laoghaire

All times are off peak estimates. Operative Date 11/10/07

145 Towards **Kilmacanogue**
Domhnach Broc, Br. Stigh Lorgan, Lána na Cille, Asc. Bhaile an Róistigh, Bóthar Radharc an Teampaill

	Monday – Friday	Saturday	Sunday
Buses leave terminus at	06:30 06:50 07:10 07:30 07:45 08:00c 08:10 08:30	07:00 07:20 07:40 08:00c 08:15 08:30	09:00 09:20 09:50 10:15 10:30 10:45 11:00 11:30
And then run about every	10–15 minutes	10–15 minutes	20 minutes
Buses leave terminus at	18:45 19:10c 19:30 19:55p 20:20c 20:50c 21:20c 21:40p 22:00c 22:20c 22:40c 23:00p 23:20c	19:00c 19:30c 19:50c 20:10c 20:35c 20:55c 21:10c 21:25c 21:50c 22:20c 22:40c 23:20c	20:30c 21:00c 21:30c 22:00c 22:30c 23:00c 23:20c

Route Variations
b Via Bray Dart Station
p From Parnell Square

Mountjoy Sq. » 20 mins » Stillorgan Rd. » 20 mins » Loughlinstown » 20 mins » Bray Station » 20 mins » Ballywaltrim

All times are off peak estimates. Operative Date 11/10/07

63 Towards **Kilternan**
Cnoc Mhuirfean, Carraig an tSionnaigh, Carraig Mhaighin, Baile Uí Ógáin, Gleann na Muc, Cill Tiarnáin

	Monday – Friday	Saturday	Sunday
Buses leave terminus at	08:10 09:20 10:45 12:00 13:20 14:30 15:50 17:15 18:30 19:55 21:10 23:15	08:50 10:50 11:50 13:00 14:10 15:20 16:30 17:35 18:50 21:10 23:10	11:00 13:00 15:05 17:25 21:30 23:20

Route Variations
v Via Foxrock Village

Mountjoy Sq. » 30 mins » Stillorgan Rd. » 30 mins » Kilternan

Fare information
Minimum fare applies:
Monday – Friday 16:00, 17:15 and 23:15
Passengers boarding:
From City Centre **€1.70**
From Merrion Square normal fares apply

All times are off peak estimates. Operative Date 01/06/05

Dublin Bus
Telephone 01 873 4222
Website www.dublinbus.ie
Opening hours
Mon 08:30 – 17:30
Tue–Fri 09:00 – 17:30
Sat 09:00 – 14:00
Closed Sun and public holidays
Head Office
59 O'Connell Street
Dublin 1
OG 60/59-1

help getting home. All the night buses go from one of three locations, which is quite handy for the public as it makes it easier to remember, and there are just the red, green, and blue routes. The timing was such that we needed to address the night buses first, before the main bus network, but because this is a simpler map, it really helped us a lot on the other map – sorry, *diagram*.

Then we started to look at the information on the street. These are the old carousels they used to have at the bus stops. They are somewhat antiquated. They supposedly carried all the information for a particular bus route on a single rotating carousel. However, the information was dense and unintelligible and didn't tell you where the bus was going to – it told you were it came from. It showed all the timetable departure times for when the bus left the depot, but if you know anything about the traffic system in Dublin you will know that this is no use to you at all, as you can't calculate how long it takes a bus to get from the depot to the bus stop. Although the information was very accurate and thorough, it was quite useless.

We set about rethinking what information should be there and what you really wanted to know, which is: What bus numbers stop at this bus stop and where do they go? So no information about where the buses come from, only about where they are going to.

We looked at how to use colour – but not to colour-code the routes, as there are about 140 routes and you can't use 140 different colours, believe me. We chose a series of colours that could be used in a particular sequence in order to distinguish the routes from one another side by side. When considering what those colours would be we simulated various types of colour blindness so our choice would still clearly alternate from dark to light. We showed them against a white background, a yellow background (Dublin Bus's new identity colour), and a black background.

They ended up looking like this on the new bus panels (fig. 5). There are more than 140 bus routes, over a hundred bus stops in the city centre and each stop has up to three panels. For every single bus stop, we had to work out what buses stopped there, what their destination was from that particular stop, and how best to combine those bus routes across the panels, as each panel is unique to its stop – ah, that was a lot of fun!

On the left in fig. 5, you can see some of the timetables we were required to add to these panels. What we wanted to do was move towards a system that

just told you how long you had to wait for the bus. No one needs to know there are three hundred buses a day and to see every conceivable time they leave; if you are at a bus stop in the rain, all you want to know is: Will I be here four minutes or twenty minutes?

Although the bus company was quite happy to move in this direction and bring in interval timetabling, we faced resistance from the bus depot managers, who were mainly concerned that their drivers leave on time; also, the bus drivers didn't want to be accountable for any schedule beyond the time they leave the depot. So who suffers? The people at the bus stops. Nevertheless, we have continued to make progress and move towards more interval-based timetabling.

Stating the Obvious

The next project I want to talk about is very interesting, with a great story about how it originated. Tim Fendley, the founder of the Applied Information Group, tended to forget to pass on important information to colleagues like me. So it was on a Thursday afternoon, about three o'clock or maybe four, when he suddenly told me about a presentation that was happening the following morning: "We've been invited by the immigration authority to re-look at public information at Stansted airport and Dover sea port. But the presentation is in Croydon tomorrow at eleven-thirty." Naturally, I thought we could not do this in time and angrily stormed off to my desk, but I also thought that, if we were to win the contract, it would have to be with a simple idea, something that would somehow "state the obvious" and be easy to present, and, more importantly, be easy to comprehend.

The information at the immigration checkpoints was quite appalling. It always seems strange to me that even though less than 0.01 percent of us *are* terrorists, they treat 100 percent of us as if we were. Although this imbalance is wrong, you kind of understand that there is good reason for it and that they can't take any chances. It occurred to me that even after you landed, even though you have arrived, you are still not *there*. People should be told this, and there should be a sign that says you are still outside the UK – a sign that defines the actual border. State the obvious: "*This* is the UK border." I suggested we use the colours of the police force to convey this information, and so make



Fig. 6. UK Border, 2006–2008. Photograph by Philip Vile. Stansted Airport passport control desks: The initial visualization shows a before-and-after view, which directly informed the development of the UK Border information system, including the actual immigration desks.

it clear that whilst we are welcoming you into our wonderful country, we still need to make a few checks.

This was my first visual (fig. 6), and I felt quite pleased with myself. So we did make the presentation, after all. There were some reservations about calling it "UK Border", as the concept was bold – so bold that it was scary – but the clarity of the thinking impressed them, and this is what Stansted now looks like. It is incredibly close to my little visual. They have even changed the name of the whole organization to the UK Border and Immigration Authority.

From there, we went through the following process: We mapped out the visitor journey. Visiting the location, acting as the people we are designing for, we travelled the routes from plane to control desks. We walked the walk, and along the way we took the photos – of all the disconnected, temporary, and plainly useless signs – as evidence of what not to do. After establishing the physical requirements, we tried to adopt the mind-set of people arriving – asking the questions any visitor would ask, feeling a sense of relief at arriving and the trepidation of having your bags searched, and so on. We started thinking

about what people think about. Then we were able to address the specific questions they might be asking, because if you know what the questions are, you have a chance to give the right answers.

We identified three main types of information. There is the general *campaign information*, which makes visitors feel comfortable, as if someone actually wanted them to be in the country. The next type is *guide information*, which directs people of different nationalities – if you're from the United States you go here and if you're from the EU you go there, etc. The last type is *command information*, e.g. you *must* do this, you must *not* cross this line, you must *not* abuse the staff, you must *not* use your mobile phone, etc., etc. From there, the job was easy.

Today, if you enter any airport in the UK, it will look something like that. The range of information provided is complex and comprehensive, but it is designed to actually help you with the immigration process, whereas before it seemed designed to scare you off. We also managed to change the attitude of the Immigration Authority a little, so you can now use your mobile phone while queuing up, as the one thing you want to be able to do is phone your friends on the other side to let them know you have arrived. In turn, this helps people relax and ultimately also helps the Authority do their job.

Real World and Virtual World

I am now going to talk about what was one of our biggest projects. Something I have been doing for fifteen to twenty years is working with digital media and navigation through interactive space, but what I want to talk about today is the fact that the way people walk through real space is not dissimilar to the way you mentally navigate through interactive space. You have to use your brain to create mental constructs of where people want to go and what they might encounter next. So even though you are in the real world, the world you are walking through is actually also in your head.

AIG have been working towards the project Legible London (fig. 7) since before I joined them, and a project that developed out of that is a tool called the Living Map, which I will come back to.

At the start of Legible London, we proposed analysing issues particular to London with a view to create a mapping system that was as useful to pedestri-



Fig. 7. Legible London – Prototype, 2007. Photographs by Philip Vile. The initial prototype for the Legible London walking maps consisted of nineteen locations in the Oxford Street–Regent Street–New Bond Street area of central London. The signs are in two sizes: the larger "monolith" sign is deployed at tube stations and other major pedestrian confluences, while the smaller "minilith" sign is convenient for most locations.

ans as the tube map is to users of the underground rail network. That's almost an impossible task, but it's good to have it as a goal.

We quickly discovered some thirty or forty different existing sign systems, all sitting alongside each other. Different signs had different ways of identifying how far you are from a given place: some in minutes, others in metres. Many signs had been vandalized, many had spelling mistakes, and there was a vast array of old signs, signs that were out of date, temporary signs, route signs, landmark signs, information signs, etc.

One thing this highlighted, though, is that you can't, for instance, just take away all those different signs and have only one style. Preserving local charm and detail is something you want to be able to embrace.

I guarantee that one hundred percent of the people who visit London for the first time use the tube diagram to get around. It's a beautifully designed diagram – extremely clear and more or less accurate – and you *can* use it to find your way around London, but what it doesn't do is help you to understand the greater magnificence of the city as you go down one hole and come up another. You don't connect the parts.

We first looked at the immediate vicinity around the tube stations and how these areas overlapped and how we could join them together for people. We conducted our own research: we timed our journeys on foot between stations and compared these times with the published journey times by tube. We found that, for something like 135 journeys between stations within the centre of London, it's quicker to walk.

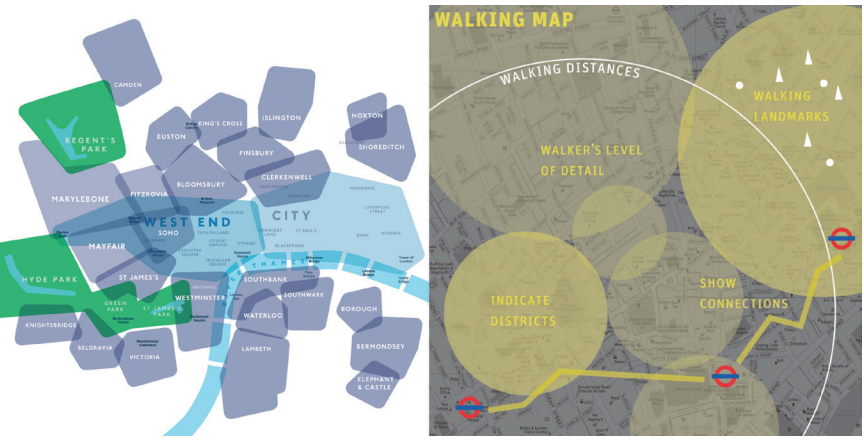


Fig. 8. Legible London – Analysis of Passenger Surveys, 2007. Preliminary surveys and an analysis of people's general perception of London's many districts – how they link together and where they overlap – informed the development of the Legible London walking maps.

We took this information back to Transport for London. Although it set off alarm bells, when you have an incredibly congested network there is a need to do something about managing the number of people who use it. The London Underground is old and creaky – it's the oldest rapid transit system in the world – and it's very hard to upgrade it. Encouraging people to walk relieves the strain on the network, and having better information for pedestrians keeps them on the street and connects the city.

A newcomer in the city soon knows two locations and a single path between them. As they get a little bolder, they can start to connect several different locations along several paths, and start to interconnect all those places together. By asking people to draw a "mind map" of what they knew about the area of London they lived in, we started to get a better understanding about the way people imagined where they were – and it was quite surprising.

Understanding the overlaps of various places in a city is a key that tells us what a walking map needs to have. The amount of detail is different from what a motorist would want to see; landmarks both large and small are important, so major buildings are drawn in 3-D. We ended up with a full walking map of the entire centre of London, with every detail geographically accurate (fig. 8).



Fig. 9. Legible London – Walking Maps, 2007. Maps are produced in two scales for each location and are entirely pedestrian-focused. They show locations that are within a five-minute and fifteen-minute walk, respectively, presenting useful landmarks in 3-D and always orientated towards the direction of view.

Roads are the correct width, and those with pedestrian access are marked, as are all the pavements, every pedestrian crossing, every bollard, every bus stop – in short, everything useful to a pedestrian is there, down to every building the public can enter.

Our aim was to place manageable chunks of this information at various points on the streets of London.

There are two scales of map: the five-minute walking distance scale, so you can see, "I am here and these are the things nearby," and the fifteen-minute walking distance scale, so you can decide whether to take a bus or the tube, or stay healthy and walk (fig. 9).

For the original roll-out we placed signs at nineteen locations, around the Oxford Street–Regent Street–New Bond Street shopping area. London is divided into lots of different boroughs, and there was initial resistance from those who wanted people to recognize when they were in a different borough; they thought a common system would erode this – until they saw how the system worked and that it helped visitors travel from one borough to another, rather than confuse or alienate them.

More recently, London's new mayor has introduced a new city-wide bike scheme, and, lo and behold, our maps have turned up on the cycle hire racks too. The whole idea at the beginning – to introduce a legible pedestrian-orientated mapping system – is really taking hold.

We are often asked why we didn't just use Google Maps. Google is great – it covers the world, but its base is a road map. It's more a map for motorists, not a walking map. On a Google map, Oxford Street, which is arguably the most important road in London, the major shopping street, can hardly be seen – it's little more than a white strip. Google doesn't fully recognize it because you can't drive down it. There are also lots of mistakes with Google, and data is often inaccurate. It shows streets that don't exist, buildings in the wrong place, etc. In this context, maps need to show where you can walk, not just the roads but every piece of information that's related to pedestrians. The requirements for a walking map are quite different, which is why it is obvious to us that, while Google is ubiquitous, it's flawed for our purposes.

There is always the potential to link up with commercial and cultural bodies, and opportunities to work with something that is totally accurate and updatable are exciting. With this in mind, we have been working on a digital map-creation tool that we call Living Map. We have a vision of a comprehensive mapping system that has several outputs: paper, digital, and online. The maps I have been showing you are very useful and legible, but they are time-consuming to produce. There are various stages in gathering the information, from aerial photography, field survey, and cartographic interpretation, to actual drawings in which you can add local data. From there you should be able to apply style sheets for any requirements. This is a long-term project, with a team of guys analysing digital map data.

An example of what we have in mind is the Walk Brighton map we repurposed as an app (fig. 10). We initially made this as a demo for Brighton, re-creating the beautiful Walk Brighton maps on an iPhone. An interesting feature is that you can walk around and then switch layers. There is the Shopping layer, where you can see all the shops. Zoom in, and you can click on a particular shop, get information from that shop or go to their website. When we switch to Nightlife, it changes colour, so you can see that different style sheets have been applied for different types of information. Same map, different output.



Fig. 10. Walk Brighton, 2009. The Walk Brighton iPhone app has separate layers which can be switched in order to display information about different types of locations.

An ongoing concern when producing maps manually is the editing. Maps are constantly changing, but they live in the real world, which is why we call this project Living Map. The idea of being able to go back to the data, re-edit it, and re-output it, is very appealing. As well as being completely focused on delivering information accurately, usefully, and for the benefit of the pedestrian, we are realizing that an intelligent system for controlling the information – which can be handled by the city council or other third parties, who maintain the information directly within the same system – is something really useful.

One Last Thing

I thought I would finish with one last project – one I am working on at the moment. This is for a building that used to be the headquarters and distribution centre for Sharp, the Japanese electronics company, in Manchester. It has lain empty for many years and the Manchester City Council are redeveloping it as a media centre that will house film studios and a range of different spaces for different types of media companies. They have invited me to work on this, the

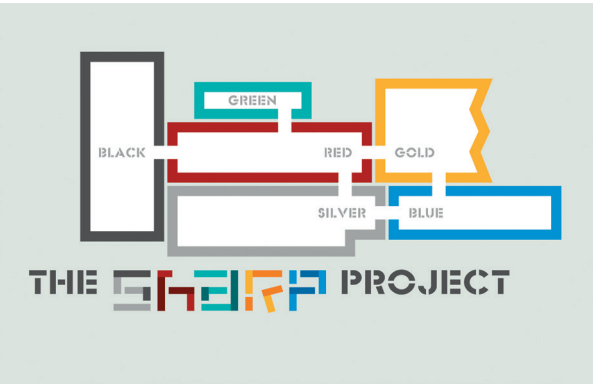


Fig. 11. The Sharp Project, 2010. The logo is based on the footprint of the building, linking the brand directly with the wayfinding directions required within the complex building structure.

idea being, that, as I went to university in Manchester and am identified with the fledgling media industry from the 1970s, it would be nice if one of the "sons of the city" came back and worked on this high-profile project for them.

The reason I'm showing you this quickly is that I decided that the wayfinding system for this building could be based on the architecture itself, so it's both *about* the architecture and reflected *in* the architecture. The visual starting point is actually a record sleeve I designed for Buzzcocks in 1978, while I was still at college in Manchester.

Given that they wanted me because of my connection with the city and that the record sleeve is a little bit iconic, I thought it would be a good idea to use it as a consciously referential starting point for both developing a brand for the building and for designing the actual wayfinding system. I considered the architectural variety throughout the building and the way it was structured for different purposes. Referring directly to the floor plan, I began pulling the various pieces of the building apart and came up with this as a logotype for the building and an actual map of the site (fig. 11). From there, I looked at using these same components to make the lettering; so the whole building becomes The Sharp Project and represents itself. It's an iconographic rendering of the building – each part of the building is quite different in structure and use from every other part. There are six different areas, each with its own character, which in turn is indicated in the colour-coding of those areas.

The next stage will be to develop the building directory and internal signage, which will extend this "industrial" approach, with bold typography on panels of industrial metal cable-ducting bolted to the walls.

Karen Schriver

Reading on the Web: Implications for Online Information Design

Introduction

Over the past few decades information design has been in transition – moving from the creation of mainly paper-based communications to today's mix of paper and electronic artefacts. Information designers' repertoires must now include visual and verbal strategies for the Web. This shift in media compels us to consider what reading looks like in an electronic environment and to take seriously how information design can better support peoples' diverse reasons for engaging with Web content.

In this essay, I will argue that if information designers are to create effective electronic communications, they need a more nuanced understanding of reading on digital platforms. To set the stage, let me present two vignettes that raise some important issues about reading on the Web.

Vignette 1: The night the bed fell

It all started the night the bed fell. Nora was lying in bed one night when suddenly she heard a crack, a thud, and dead silence. She wondered what happened and jumped out of the bed. Even in the darkness she could see that one side of the bed had fallen to the floor and the beam holding the mattress in place had cracked in half. The bed had tipped and the mattress was sliding off. The frame was ruined. Unable to sleep, she went to her computer and decided to go shopping for a new bed. She had to work the next morning and was too busy to drive around to different stores, and she preferred shopping online anyway. So she started looking at websites.

The bed that fell was Amish in design in the Mission style of furniture making. (Amish furniture in America gained attention in the 1920s and is still



Fig. 1. From a website for purchasing Amish furniture.

valued today for its simplicity and elegance.) Because she adored the clean lines of Amish woodworking, she searched for a bed similar to her original. She first went to Google and searched "Amish beds". Fig. 1 shows one of the first websites she visited.

As we can see in fig. 1, this website desperately needs to be rewritten and redesigned by an information design professional. Notice the lack of visual structure, the miniscule search box, the randomly positioned margins, the arbitrary line lengths, the chaotic mix of centred text and left-justified text, the overuse of boldface, and the word "testimonials" set in all capitals and rainbow colours. Perhaps worse is the text itself – not very informative and not written from the user's point of view. Content that should be on interior pages appears on the homepage and content that should be on the homepage is missing.

From the note next to the secretary's photo, it is clear that the company was proud that its secretary had learned to design a website after just one class. This is not surprising, given that organizations have tended to undervalue skilled writing and design. Many organizations are insensitive to good

information design and unaware of the expertise an experienced professional can bring.[1]

From Nora's point of view, the website was frustrating because it did not help her accomplish her purpose (to compare bed options). Nora was not impressed that she had to click into the site to see photos of the company's product line. Although this e-commerce retailer may have excellent products, the information design of its content failed to inspire confidence, leading Nora to conclude this was not the place to buy a bed.

Instead of giving up, Nora kept looking. She gave herself a time limit and hoped to find a bed in about three hours, though not necessarily in one sitting. Nora perused many websites and was intrigued by one that emphasized their manufacturing process. It described how they built Amish beds using hand tools and sustainable lumber. Those details interested her and spoke to her values, leading her to explore more of the website. Eventually after inspecting many beds, she found one in the Shaker tradition, almost as lovely as the original that had fallen apart.

Vignette 2: Going to hospital

A few months ago a friend of mine went into hospital for what he thought was a routine operation. He was supposed to be in for two or three days. On the day he was to be released, I called the hospital and asked about coming to get him. The nurse who answered said my friend had suffered a setback: "There's a complication. He has an AV block." I said, "A what?" She repeated, "He has an AV block and if you want to come by this afternoon we can talk about it." My years of information design projects for the consumer electronics industry initially led me to think "AV" meant "audiovisual" or "audio/video" rather than what it meant here: "atrioventricular". Once at hospital, the nurse said an AV block meant that the pulse rate was very slow and that he needed to be constantly monitored in intensive care.

I then used my smartphone to search Google for more information about atrioventricular blocks. I began my search on Wikipedia. As shown in fig. 2, the content is confusing. Notice that "first-degree AV block", or "PR prolongation",

1 See my article "What We Know about Expertise in Professional Communication", in V. W. Berninger, ed., *Past, Present, and Future Contributions of Cognitive Writing Research to Cognitive Psychology* (New York: Psychology Press, 2012), pp. 275–312.

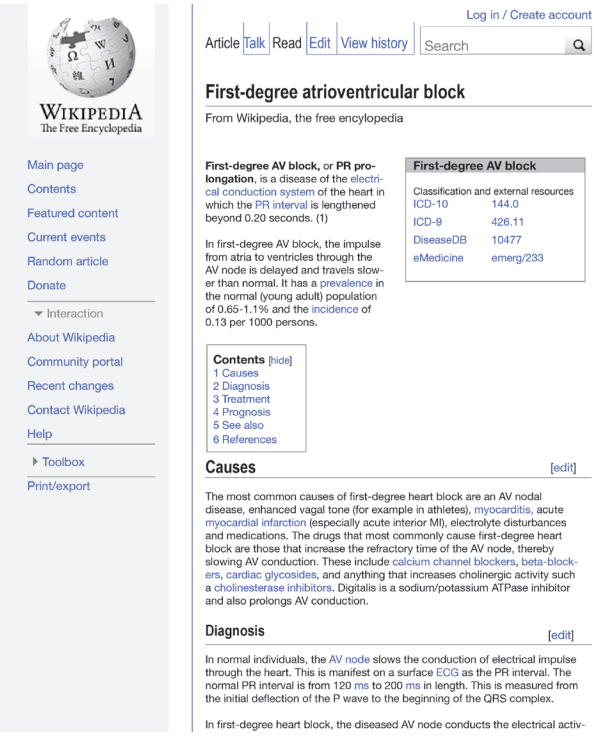


Fig. 2. From a search for the phrase "AV block": the Wikipedia article. Retrieved August 1, 2010.

is a disease of the "electrical conduction system" of the heart in which the "PR interval" is lengthened beyond 0.20 seconds. I thought, "What could this mean?"

Usually the content in Wikipedia is not so technical. After rereading the information I concluded that I still did not understand what a *PR interval* or the *electrical conduction system* was. I read to the bottom of the entry and realized that I did not fully comprehend the main point. This hard-to-understand content led me to look elsewhere on the Web. About two hours later, I had enough information to ask an informed question about my friend's condition.

Purposes Drive Reading or Not Reading

As the two vignettes illustrate, an individual's purpose for going to the Web shapes the kind of reading they do when they land on a webpage. When Web users are motivated by a driving purpose, they may persist in looking at many

websites and may be willing to inspect the content in detail in order to answer a question or solve a problem.

As information designers, we can help people answer their questions by designing the content in ways that support their diverse purposes. As we saw in the first case, Nora sought to make an informed purchase of a bed, which led her to comparison-shop, delving into the details of optional products and their manufacturing process. In the second case, I wanted to understand the medical terminology well enough to ask good questions about it.

This essay explores how good information design can help make people's experiences with reading on the Web more satisfying and less burdensome. To begin, I discuss a few stereotypes about reading on the Web and characterize certain emerging trends. Next, I summarize two research studies; the first reviews some of the research on the characteristics of good writing and design, while the second surveys how people talk about online reading and their purposes for engaging with Web content. I conclude with two examples that show implications for online information design.

Stereotypes about Reading in Everyday Settings

Even a casual encounter with popular accounts of reading in everyday settings could lead one to draw the conclusion that no one reads anymore. Some of the frequently repeated stereotypes suggest that people never read texts such as:

- labels on food, toys, and other consumer products,
- instruction manuals,
- disclosure statements from banks and investment firms,
- privacy notices from banks, websites, and credit card companies,
- loan and mortgage applications, and
- insurance policies.

Granted, we rarely prefer to read such texts, but increasingly, we recognize that we may have to read them if we don't want to be cheated or taken advantage of (by banks or other industries). Texts of this sort are important to millions of people, helping them to understand and take action at work and in their personal lives. Unfortunately, texts from both business and government share the legacy of being written and designed in confusing ways, even for highly skilled readers. To address this problem and show the US government's commitment

to clear communication, President Barack Obama signed the Plain Writing Act into US federal law in 2010.[2] His goal was to encourage government agencies to simplify their public communications. In this way, average citizens will more readily understand, for example, their Veteran's benefits, without having to hire an attorney. Although we may not look forward to reading texts about quotidian topics such as benefits, policies, and procedures, we do read these sorts of texts some of the time.

Popular accounts of everyday reading also lament that adults hardly ever pick up a newspaper and that even college students rarely read a lengthy book. And when it comes to the Web, no one ever reads anything. Rather, people merely skim and scan, hoping something will attract their eye.

Instead of construing Web users as engaging with content that interests them while ignoring content that does not, popular accounts have tended to portray people as mindlessly navigating from link to link, never paying attention to what they see. In fact, some have claimed that the Web is making people stupid. Nicholas Carr, for example, argues that the Internet is chipping away at our capacity to concentrate.[3] He asserts that people do not have the patience for long-drawn-out arguments anymore.

Space constraints prohibit me from elaborating the counter evidence to these claims about reading (and the prominent role of poor information design in discouraging reading). Here I offer a few examples that contradict some of these sweeping generalizations.

Setting the Record Straight

People do read labels (sometimes)

A study conducted by the US Food and Drug Administration found that in 54% of cases, people say they often read food labels, particularly before they buy

2 I am currently completing a detailed report on the subject, "The Ebb and Flow of Plain Language in the United States: A Brief History from 1940–2012"; those interested in obtaining a copy may contact me at kschriver@earthlink.net. A version of the report has been published in Estonian in K. Hallik, ed., *Selged Mõtted, Selge Keel: Artiklite Kogumik* [Clear thinking, clear language: Collected articles] (Tallinn: Eesti Keele Instituute ja Autorid, 2012), pp. 63–76.

3 In his book *The Shallows: What the Internet Is Doing to Our Brains* (New York: W. W. Norton and Co., 2010).

a product for the first time.[4] In addition, anecdotal evidence suggests that the flood of unsafe toys from China (containing lead-based paint or dangerous chemicals) have prompted parents in the United States to read the packaging and labels before purchasing toys.[5]

People do read the news (sometimes)

Despite the decline in readership for the print versions of newspapers, most people are not abandoning the news. Rather, they are turning to different information channels for viewing, listening, or reading (e.g. television, radio, and the Web).[6] While most people who read news on the Web access it through the browser on their laptop or desktop computer, more and more people are reading for information and leisure using such multipurpose appliances as iPads, Kindle Fires, or large-screen e-readers, such as the Kindle DX.[7]

In 2009, a study carried out under the auspices of the Pew Research Center examined the online activities of six generations of Internet users (more than 1,500 people) in the age cohorts of 18–32, 33–44, 45–54, 55–63, 64–72, and over 73. The goal was to understand the generational differences in participation in online activities – such as using email, looking for health information, or reading the news. They found that for some activities, the youngest and oldest cohorts differed a lot. For example, younger people tended to use email less often than older people because younger people preferred text messaging.[8]

4 US Food and Drug Administration, "Fact Sheet: Key Findings from 2002 and 2008 U.S. Food and Drug Administration's Health and Diet Survey" (last updated 2 March 2010), http://www.fda.gov/Food/LabelingNutrition/ucm202780.htm (accessed 10 Sept. 2012).

5 B. Meier (New York Times News Service), "Reading the Label These Days: You Have to Read Between the Lines to Understand Whether a Toy Can be Harmful to Your Child", *SunSentinal.com*, 29 Jan. 1990, http://articles.sun-sentinel.com/1990-01-27/features/9001210334_1_toy-part-toy-industry-small-parts (accessed 10 Sept. 2012).

6 S. M. Kirschoff, *The U.S. Newspaper Industry in Transition*, Congressional Research Service report R40700, 9 Sept. 2010; available at http://www.fas.org/sgp/crs/misc/R40700.pdf (accessed 10 Sept. 2012).

7 P. Carton, "Impact of the Apple iPad vs. the Amazon Kindle on the e-Reader Market", *Investor Place*, 30 Nov. 2010, http://www.investorplace.com/2010/11/apple-ipad-vs-amazon-kindle-e-reader-market/ (accessed 10 Sept. 2012).

8 S. Jones and S. Fox, "Generations Online in 2009", Pew Internet and American Life Project, Pew Research Center, 28 Jan. 2009; available at http://www.pewinternet.org/~/media//Files/Reports/2009/PIP_Generations_2009.pdf (accessed 9 Oct. 2012).

However, when it came to reading news online, a 2010 Pew study showed similar patterns across all generations. People of all ages were turning to online sources for their news, with many people contributing to the creation of news (37%), commenting on stories (25%), tagging content (11%), creating original material (9%), or tweeting about the news (3%). The Pew researchers also found that 33% of mobile phone users reported using their handheld devices to access content.[9] Table 1 shows the percentage of mobile phone users who reported using the Internet for news and other types of current events (since users could report more than one type of content, the percentages total more than 100%.)

Type of information	% of mobile users (who get this kind of news on a mobile device)
Weather	26
News and current events	25
Application for news content	18
Sports scores and stories	16
Traffic info	13
Financial info	12
News via emails and texts	11

Table 1. Kinds of news mobile users (n = 1,891) accessed on their cell phones, ca. 2009. (Source: K. Purcell et al., 2010, p. 8).

Students do read lengthy books (sometimes)

More and more, schools and universities are digitizing their curricula for display on desktop computers, laptops and e-readers. By replacing paper texts with electronic ones, educators hope to create unique interactive educational experiences for students. While reading is fundamental to all levels of education, research on how students read textbooks online and, particularly, their

9 K. Purcell, L. Rainie, A. Mitchell, T. Rosenstiel, and K. Olmstead, "Understanding the Participatory News Consumer: How Internet and Cell Phone Use Have Turned News into a Social Experience", Pew Internet and American Life Project, Pew Research Center, 1 March 2010, pp. 7–8; available at http://pewinternet.org/~/media//Files/Reports/2010/PIP_Understanding_the_Participatory_News_Consumer.pdf (accessed 9 Oct. 2012).

use of e-readers is just beginning to emerge.[10] Because e-textbooks are less expensive than their hardback counterparts, educators are opting for digital books, asking students to read lengthy complex texts online.

Despite this trend, most versions of e-readers and tablet PCs do not currently support academic reading very well. Instead, most e-readers are aimed at the market of leisure reading (such as reading on the beach). As manufacturers recognize the limitations of the current generation of e-readers, they will develop new technologies and better software for using e-readers for academic purposes (such as taking notes or building a list of references).

While not all students prefer to read their textbooks electronically, the trend toward online education continues to develop. Similarly, many older adults are using e-readers as continuing education devices, allowing them to develop new knowledge in subject matters of interest. And if sales on Amazon.com are an indicator of things to come, we should note that the online retailer's e-book sales for the first time surpassed those of printed books in the spring of 2011, according to a statement by Amazon CEO Jeff Bezos to the *New York Times*.[11] So much for people not reading online.

A Different Perspective to Reading on the Web

As we can see, an alternative to Carr's gloomy characterization of reading on the Web is emerging. Instead of construing the digital age as destroying reading, we might view it as enabling *reading differently* – expanding and transforming our ways of engaging with content. As the examples above make clear, evidence is accumulating that people will read when they need to or want to.

Moreover, people are developing strategies for managing their reading activities – recognizing strengths, limitations, and the "feel" of reading on different platforms. For example, people may read shorter texts on smartphones, while turning to laptops, tablets, Kindles, or iPads for reading longer texts. They

10 A. Thayer, C. P. Lee, L. H. Hwang, H. Sales, P. Sen, and N. Dalal, "The Imposition and Superimposition of Digital Reading Technology: The Academic Potential of e-Readers", paper presented at the ACM Conference on Human Factors in Computing Systems (CHI), 7–12 May 2011, Vancouver, Canada.

11 C. C. Miller and J. Bosman, "E-Books Outsell Print Books at Amazon", *New York Times*, 19 May 2011; available at http://www.nytimes.com/2011/05/20/technology/20amazon.html?_r=1 (accessed 9 Oct. 2012).

may prefer larger screens when they need to compare multiple documents or when examining tabular information. They may move to smaller screens when on the go and reserve the luxury of reading on paper for weekends.

One study of four million people who used the application Read It Later (now called Pocket) showed that users had saved over 100 million items to "read later" on their browser, smartphone, or tablet computer. It also found that people who used the service to read on laptops tended to read during the day, while people who owned iPads tended to read most often in the evening.[12] People now time-shift their reading just as they do their TV programming or recording of podcasts: they save Web content to be viewed or read later.

What people do depends on their purpose for reading, the technology available, and even the time of day. Interestingly, there was a gap between what people intended to read later and what they actually came back to and read later. The key predictor in what brought people back to a site was the quality of content, especially good writing.[13]

Indeed, even without services such as Read It Later to manage our reading, Web users need to be good at filtering what to read and what not to read. As Read It Later founder Nate Weiner put it, "The flood of content disrupts us all day as if we have a maniacal paperboy throwing new editions on our doorstep every 15 seconds."[14] Because people are increasingly more willing to read on the Web – whether they read things right away or save them for later – it is crucially important for professional communicators to develop strategies for presenting clear and compelling content designed to persuade readers to linger longer. We need to pay attention to the ways in which good writing and design influence people's motivation to stick with our content. We want readers to be more than "drive-by" visitors to our messages. In the spirit of Malcolm Gladwell,[15] we want

12 N. Weiner ("Nate"), "Is Mobile Affecting When We Read?", *Pocket Blog – Trends*, 12 Jan. 2011, http://getpocket.com/blog/2011/01/is-mobile-affecting-when-we-read/ (accessed 9 Oct. 2012).

13 C. Krumme and M. Armstrong, "Who Are the 'Most-Read' Authors?", *Pocket Blog – Trends*, 8 Dec. 2011, http://getpocket.com/blog/2011/12/who-are-the-most-read-authors/ (accessed 9 Oct. 2012).

14 Weiner, "Is Mobile Affecting When We Read?"

15 M. Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference* (New York: Little, Brown & Company, 2002).

to know what kinds of information design are the "stickiest" – what encourages people to read.

Let's now turn to some of the strategies people develop for engaging with Web content.

Characteristics of Online Reading

The research on how people use the Web suggests that we come to websites by either browsing or searching. When we browse, we typically follow links without concern for where we are going. When we search, we are more focused on how we navigate because we are usually guided by an explicit goal – a particular question or task that directs our interests.[16] For some Web searching, we know where to go to answer our questions because we have bookmarked a site or visit it so often that we remember the URL. But in other cases, we start by navigating to search engines such as Google, Bing, or Yahoo and then type in a query using keywords to narrow our search.

Once we land on content of potential interest, we tend to skim and scan it to inspect its relevance. We may continue our navigation by searching opportunistically or by foraging. *Searching opportunistically* refers to the practice of starting a search in one place, but through serendipitous associations, ending it in another. Put differently, the "scent of information" guides our attention and enables us to make connections among disparate content in ways that are revealing.[17]

For example, a user might be interested in the history of blues music. That might suggest looking in the arts section of the online version of a favourite newspaper, in which, for example, information about the Memphis blues might be profiled, perhaps with details about a few famous blues artists. That content might provide links to content about the development of the blues in Liverpool, England. And that content might provide links to the origin of the blues in other countries, leading, for example, to content about how Portuguese Fado music is often considered a kind of blues. Although along the way each site is related to the next, the user had no intention of learning about Fado music.

16 J. C. Redish, *Letting Go of the Words: Writing Web Content that Works*, 2nd ed. (San Francisco: Morgan Kaufmann/Elsevier, 2012).

17 P. Pirolli and S. K. Card, "Information Foraging", *Psychological Review* 106, no. 4 (1999): 643–675.

Foraging, by contrast, refers to users who form an intention or goal and then search for content specific to that goal.[18] People interested in a particular news story may search the key terms for that story. For example, they may search "Chilean miners" to look for content about the fate of the Chilean miners who were trapped underground in October 2010. For other types of news stories, they might use a different search strategy.

How people search is important because it influences in important ways the amount of time and effort people are willing to spend with the content they encounter. The design of the content needs to create a positive impression at first glance; otherwise, users will take their attention elsewhere. In fact, some research suggests that users may make a decision about the visual appeal of a website in as little as fifty milliseconds.[19]

Once people arrive at a web page, they typically skim and scan it to identify whether the content matches their goals. To attract readers, information designers can structure the content so it signals its parts both visually and verbally in ways that anticipate readers' likely goals. An explicit structure allows readers to readily see the content's hierarchy, making it easier to infer a possible match between their purpose and the site's content.

As readers scan to figure out what might be relevant to them, they focus on key words and phrases, as well as dominant images and photographs. At this point reading is a kind of mental sorting process in which people try to infer the content's structure – filtering out irrelevant information and looking for points of entry. If readers decide to continue, they may read portions of the text and inspect the visuals more carefully, attempting to integrate what they see. And as people spend more time online, their reading is increasingly characterized by behaviours such as browsing and scanning, key-word spotting, nonlinear reading, and selective reading.[20]

Today's digital landscapes invite users to put together their own version of the beginning, middle, and end of a story. Good information design helps people

18 Ibid.

19 G. Lindgaard, G. Fernandes, C. Dudek, and J. Brown, "Attention Web Designers: You Have 50 Milliseconds to Make a Good First Impression!", *Behaviour and Information Technology*, 25, no. 2 (2006): 115–126.

20 See Z. Liu, "Reading Behavior in a Digital Environment: Changes in Reading Behavior over the Past Ten Years", *Journal of Documentation* 61, no. 6 (2005): 700–712.

build a coherent understanding of the content and contributes to a memorable experience.

Current Research

I would now like to provide a snapshot of two ongoing studies I have been pursuing that shed light on the role of information design in improving people's experience with their everyday reading. The first is a review of the empirical evidence about reading online from 1980 to 2010. The second uses the Google Alerts service to survey the purposes people bring to reading on the Web. In both studies, my aim is to understand how information design may help or hinder readers as they carry out their purposes.

Study 1: Research review on writing and visual design

To better understand how information design may influence people's experiences as they use the Web, I consolidated the research literature from 1980 to 2010 in two important areas: good writing and good visual design. Examining the research on these issues required an interdisciplinary perspective. This led me to explore the literature not only from the field of information design, but also from those of technical communication, rhetoric, reading and literacy, library science, cognitive psychology, educational psychology, human–computer interaction, psycholinguistics, and technology studies.

First, I integrated the empirical research on good writing. I focused on the characteristics of writing and the text features that help people to understand, remember, and appreciate online content – from words to whole-text considerations. My aim was to identify the empirical backing for writing decisions, asking what the research says about the impact of audience-oriented writing choices and the use of particular text features.

Next, I examined the research on the visual display of content and consolidated the research on visual design and graphic issues – from typography to the overall visual impression (e.g. typeface, grouping, hierarchy, contrast). I integrated the literature on how visual design and typographic design influence people's interpretations of what is important as they read.

The review sheds light on what we have learned about good writing and design that could be helpful in designing online content. Because space limi-

tations prevent discussing the study in detail, let me offer a snapshot of my findings.

Highlights of the research on writing. The research shows quite clearly that writing choices matter a lot when it comes to helping readers make sense of content. For example, word-level characteristics such as word length, word frequency, and concreteness are important predictors of how difficult a text will be, particularly for less able readers and those unfamiliar with the topic. The persistent use of longer words with many syllables may create comprehension problems for less able readers and irritate even good readers, causing either group to stop reading.

Similarly, word frequency is an important variable in cognitive processing. High-frequency words are recognized and understood more quickly than low-frequency words. For example, the English word "promise" has a much higher frequency than the word "hypothecate". Using low-frequency words – such as jargon from law, medicine, science, or technology – should be avoided unless the text is geared to experts in the subject matter (lawyers, doctors, scientists, or engineers).

When writers use abstract language (e.g. "inspiration", "friendship"), the ideas and concepts have no physical referents and readers' interpretations vary widely. When they employ concrete language ("baby", "sun"), ideas and concepts can be identified through the senses and are more vivid, easier to visualize, and easily understood. Research also suggests that the more concrete the language is, the more readily readers will grasp the main points.

At the sentence level, there have been many studies of particular features that make sentences hard or easy to understand (e.g. syntax, grammatical voice, the use of negatives, and conditionals). The research shows, for example, that complex and embedded sentence structures are less effective than simple and straightforward ones. It reminds us that the active voice is usually more intelligible than the passive. It suggests that readers can be slowed down by having to make sense of multiple negatives. Similarly, the use of conditionals – such as *if-then* structures, where "*if* ..." presents a condition, followed by "*then* ..." as a consequence – tends to confuse readers and lead them to incorrect inferences about the meaning.

At the whole-text level, the research shows that features such as headings, previews, and summaries are very important to readers. For example, they rely on headings and previews to guide them in determining what the content will be about. Readers look for a match between their goals and what they see in the text. When headings are composed using concrete keywords that resonate with readers' goals, they are more likely to inspect the sentences and paragraphs. Similarly, well-written leads, captions, labels, and other explanatory texts allow readers to more rapidly get a sense of the whole.

Highlights of research on design. The research literature on the visual display of text investigates the many ways that design matters in people's appreciation and understanding of content. For example, there have been a number of studies about design choices such as typography and grouping. This research can help information designers make more effective choices for their audiences.

In the research on typography, one finding appears repeatedly in the literature. Studies comparing serif and sans serif typefaces find that readers pay more attention to the degree of contrast among styles within a typeface (e.g. light, medium, bold, extrabold, black) than they do to the distinction between serif and sans serif faces.[21] Research shows that when the typographic resolution is excellent, serif or sans serif typefaces are equally legible and equally fast to read. The legibility of either serif or sans serif typefaces at a certain point size may differ, for example, depending on the resolution of the computer monitor, smartphone screen, tablet computer, or video projector. It is common for type displayed on high-resolution screens to appear smaller but crisper, while type displayed on low-resolution screens appears larger but fuzzier.

Legibility matters a lot when busy readers must distinguish between pairs of characters such as *o* and *e*, *8* and *6*, or *0* and *o*. Practical situations in which readers must make rapid discriminations between numbers or characters include email addresses, URLs, credit card numbers, serial numbers, order numbers, and prescription numbers. Even though there is no difference in the legibility of serif and sans serif type when screen resolution is good, people still

21 See my book *Dynamics in Document Design: Creating Texts for Readers* (New York: John Wiley & Sons, 1997), and Ole Lund, "Knowledge Construction in Typography: The Case of Legibility Research and the Legibility of Sans Serif Typefaces" (PhD thesis, University of Reading, Department of Typography & Graphic Communication, 1999).

have preferences. And whether they are young or old, most people prefer sans serif type when they read online.

Research also suggests that visual grouping gives readers a sense of the overall structure.[22] When text and graphics are organized into meaningful semantic clusters, it makes it easier for readers to "chunk" the content.[23] Grouping can also reduce cognitive load by helping readers to remember content, thus making it seem less complex and resulting in fewer errors and increased satisfaction.[24]

When content is grouped in ways that allow readers to form meaningful relationships among the elements, they often make connections across the content that might otherwise be missed. Grouping content spatially makes it more coherent, allowing readers to recognize how the pieces of the message fit together.[25] In this way, grouping helps make apparent certain structures that might otherwise be invisible to the reader.

Grouping not only organizes the content, it also renders it visually conspicuous – which is quite important for busy readers, impatient readers, less able readers, and those reading in a second language. How the content is grouped may also influence readers' first impressions of the message,[26] setting in motion positive or negative attitudes about the content.[27] For this reason, as mentioned earlier, it is important to catch the reader's attention and make a good impression at first glance.

22 T. S. Tullis, "Screen Design", in M. Helander, T. K. Landauer, and P. Prabhu, eds., *Handbook of Human-Computer Interaction*, 2nd ed. (New York: Elsevier Science, 1997), pp. 503–531.

23 M. Kahn, K. C. Tan, and R. J. Beaton, "Reduction of Cognitive Workload through Information Chunking", in D. Woods and E. Roth, eds., *Proceedings of the Human Factors and Ergonomics Society 34th Annual Meeting* (Santa Monica, Calif.: Human Factors and Ergonomics Society, 1990), pp. 1509–1513.

24 M. Niemela and J. Saarinen, "Visual Search for Grouped Versus Ungrouped Icons in a Computer Interface", *Human Factors* 42, no. 4 (2000): 630–635.

25 K. A. Schriver, "What Do Technical Communicators Need to Know about Information Design?", in J. Johnson-Eilola and S. Selber, eds., *Solving Problems in Technical Communication* (Chicago: University of Chicago Press, 2013), pp. 495–531.

26 Lindgaard et al., "Attention Web Designers".

27 Schriver, *Dynamics in Document Design*.

Study 2: Google Alerts "reading on the Web" study

In a second study, I have been exploring how people reported on their experiences about reading online over a four-year period (2009–2012). To collect the data, I used Google Alerts, a notification service offered by the search engine company Google. The service requires users to select a search term (or set of terms) for the alerts they want. Once users are registered, Google automatically notifies them by email when new content on the Web matches their search terms. Google Alerts (and now also Giga Alerts) can be used for monitoring anything on the web – from tabloid gossip to information about people, products, trends, or news stories.

My concern in this study was to better understand how people talk about their experience of reading on the web. I wanted to know more about what motivates people to read online and their different reasons for coming to Web-based content. The study had two phases, each lasting roughly two years.

Phase 1

Talking about reading online generally (on computers, mobile devices, and eReaders)	Number of alerts
Timeframe 1: August 2009 – September 2010	5,030
Timeframe 2: October 2010 – July 2011	4,993
	10,023

Phase 2

Talking about purposes for reading online (for pleasure or more serious purposes)	Number of alerts
Timeframe 1: May 2010 – July 2011	6,183
Timeframe 2: August 2011 – August 2012	in progress
	6,183

Table 2. Overview: Google alerts "reading on the Web" study.

The first phase sought to capture people's talk about reading online, especially as they discussed this in blogs, on listservs, on websites, and in the news. I focused on what people said about reading online generally, especially as they talked about their experiences with laptop or desktop computers, mobile

devices, tablet computers, and e-readers. The Google Alerts I collected in the first phase also revealed a variety of purposes motivating people's engagement and experiences with online content.

The second phase examined these purposes in detail. Table 2 presents an overview of the two phases and their duration. The study is still in progress. Here I present the highlights so far.

Phase 1: Talking about reading online. Phase 1 of the study looked broadly at reading on the Web by searching phrases associated with digital reading (e.g. "reading online") and with reading on mobile devices or e-readers (e.g. "reading on cell" and "reading on Kindle") (see fig. 3). I collected the data from 2009 to 2011 (see table 2). Phase 1 had two timeframes, each lasting about one year. As table 2 shows, the two years generated over 10,000 alerts.

Phase 2: Talking about purposes for reading online. About nine months into Phase 1, a preliminary assessment of the data led me to collect alerts about people's purposes for reading online. Phase 2 focused on both the light-hearted and the serious, for example, "reading for fun" and "reading to compare" (see fig. 3). As in Phase 1, these data were collected over a two-year period,

Google Alerts Search Terms

PHASE 1

Reading online generally

- ❑ "reading online"
- ❑ "reading on a screen"
- ❑ "reading on web"
- ❑ "reading on the web"

Reading on mobiles and eReaders

- ❑ "cell phone reading"
- ❑ "reading on cell"
- ❑ "reading on mobile"
- ❑ "reading with mobile phone"
- ❑ "reading on phone"
- ❑ "wireless reading"
- ❑ "reading on Blackberry"
- ❑ "reading on iPhone"
- ❑ "reading on Sony"
- ❑ "reading on Kindle"
- ❑ "reading on iPad"

PHASE 2

Reading online with a purpose

- ❑ "reading for fun"
- ❑ "reading for pleasure"
- ❑ "reading to buy"
- ❑ "reading to understand"
- ❑ "reading for understanding"
- ❑ "reading to comprehend"
- ❑ "reading to analyze"
- ❑ "reading to compare"
- ❑ "reading to decide"

Fig. 3. Search terms employed in the Google alerts "reading on the Web" study.

from 2010 to 2012 (see table 2). As of July 2012, only data from the first timeframe of Phase 2 (2010–2011) had been consolidated. This period generated over 6,000 alerts.

In my study of reading on the Web, I was concerned with the information landscapes people were negotiating and what made it easy or difficult for them to carry out their goals. I looked for comments that referenced what they were reading and their evaluations of what they found. I also sampled the hyperlinks associated with their comments to get a sense of the texts and graphics people were dealing with. I collected users' positive and negative statements about their experiences.

The limitations of the approach. A limitation with using Google Alerts to collect data is that it only captures what people say they are doing, not necessarily what they are actually doing. As an after-the-fact account of an experience, what people say could be true, false, or partly true. The method is also skewed by the search terms I used. Obviously there are many ways to phrase the activity of reading online and I may have inadvertently missed some of the important ones.

In addition, people often aim to achieve multiple goals while reading online, such as to understand and compare (e.g. inspecting alternative health plans to understand their differences and see which ones have the best coverage for the lowest price). In such cases, readers may not use the word "compare" in the comments that show up in a Google Alert, although when we inspect the trail of their comment, we see that they were comparing. Even with these limitations, however, Google Alerts proved to be a useful, non-intrusive tool that allowed for the collection of longitudinal data on a variety of topics about reading online.

The results of Phase 1. Phase 1 generated 10,023 alerts. Their distribution is presented in table 3. The data provided a wealth of information about people's experiences with reading in digital environments. Here let me summarize a few trends. People tended to discuss reading on computers generally (e.g. "reading online", "reading on the Web", "reading on a screen") about 65% of the time (6,488 alerts). By contrast, people mentioned reading on mobiles and e-readers about 35% of the time (3,535 alerts). As shown in table 3, reading on mobiles (e.g. phones, cells, iPhones, Blackberries, wireless devices) and e-readers (e.g. iPads, Kindles, Sony e-readers) were discussed more often in Timeframe 2.

Phase 1	Timeframe 1 (August 2009 – September 2010)	Timeframe 2 (October 2010 – July 2011)	Total / %
Alerts collected	5,030	4,993	10,023
Computers	69%	60%	65%
Mobiles & e-readers	31%	40%	35%

Table 3. Proportion of alerts focused on reading on computers vs. mobile devices and e-readers.

Of the 3,535 alerts focused on mobiles and e-readers, 64% were about reading on mobile devices while 36% were about e-readers. The trend toward reading on mobile devices and e-readers will likely continue to grow as the prices for accessing the Web on various platforms come down.

A striking aspect of the Phase 1 data was that people frequently mentioned a purpose for reading online. In particular, users of Web content discussed purposes such as reading to understand, analyse, decide, compare, buy, play, explore, escape, and have fun. These data prompted me to generate ideas about aspects of reading online to explore in Phase 2.

The results of Phase 2. Timeframe 1 in Phase 2 generated 6,183 hits about reading for different purposes (see table 4). The results showed that when people discussed reading online, they mentioned reading for fun or escape most of the time, with 66% of the comments directed to the lighter side of reading (4,089 alerts).

Phase 2	Timeframe 1 (May 2010 – July 2011)	Timeframe 2 (August 2011 – August 2012)	Total / %
Alerts collected	6,183	n/a	6,183
Reading for fun	66%	n/a	66%
Reading for serious purposes	34%	n/a	34%

Table 4. Proportion of alerts focused on reading for fun vs. more serious purposes.

Comments about reading for pleasure tended to be devoted to talking about reading books over the summer, on the beach, or late at night – mysteries, romance novels, magazines, and fiction. Surprisingly, thousands of comments focused on reading horoscopes, reading tarot cards, and reading about how to play games (mainly poker games, such as Texas Hold 'em).

By contrast, people discussed reading for more serious purposes (e.g. understanding ideas) 34% of the time (2,094 alerts). Table 5 shows the proportion of the data focused on different purposes.

As shown, "reading for understanding" dramatically dominated discussion of all other purposes. The data underscore the need for plain language and clear visual design on the Web.

Purpose	% of alerts
	(n = 2,094)
Understanding	83
Analysing	2
Buying	8
Deciding	3
Comparing	4

Table 5. Talking about reading for serious purposes.

Users' talk about their more serious purposes indicated that they typically came to the Web to answer a question or solve a practical problem. Here are a few examples:

- I was *reading to understand* salmonella and wondered what causes it.
- I resent needing to *read to analyse* risky investment strategies when my broker should have done it.
- How can I get started in *reading to buy* a hydroponic system for my organic garden?
- I have to do a lot of *reading to decide* to see if it is worth spending the extra money for the better chip in my laptop.
- If I want to improve my dyslexic's son's reading, what books should I *read to compare*?

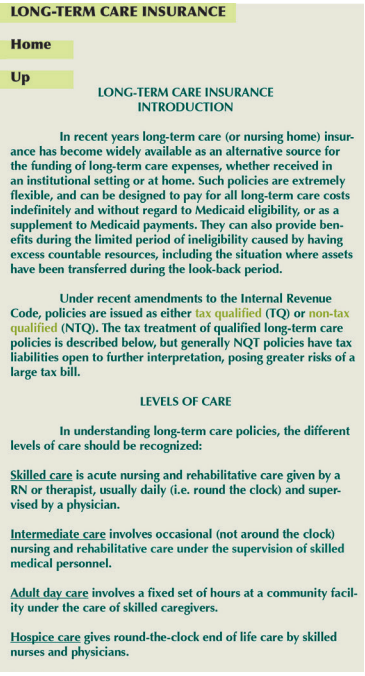
Comments often referred to particular websites, which led me to explore whether the information design of the sites supported users in accomplishing

their purposes. Space constraints prevent me from detailing people's experiences here. I will elaborate my findings in a forthcoming book.[28]

Let me conclude with two examples that illustrate how information design moves can help or hinder people in using Web content as they wish.

Example 1: Reading to understand and compare

The first example comes from a young woman who wrote about her goal of needing to sort out what kind of long-term health insurance to buy for her aging mother. She mentioned that her mother was an independent soul who preferred to stay in her own home as long as she could. The young woman –



LONG-TERM CARE INSURANCE

Home

Up

LONG-TERM CARE INSURANCE
INTRODUCTION

In recent years long-term care (or nursing home) insurance has become widely available as an alternative source for the funding of long-term care expenses, whether received in an institutional setting or at home. Such policies are extremely flexible, and can be designed to pay for all long-term care costs indefinitely and without regard to Medicaid eligibility, or as a supplement to Medicaid payments. They can also provide benefits during the limited period of ineligibility caused by having excess countable resources, including the situation where assets have been transferred during the look-back period.

Under recent amendments to the Internal Revenue Code, policies are issued as either tax qualified (TQ) or non-tax qualified (NTQ). The tax treatment of qualified long-term care policies is described below, but generally NQT policies have tax liabilities open to further interpretation, posing greater risks of a large tax bill.

LEVELS OF CARE

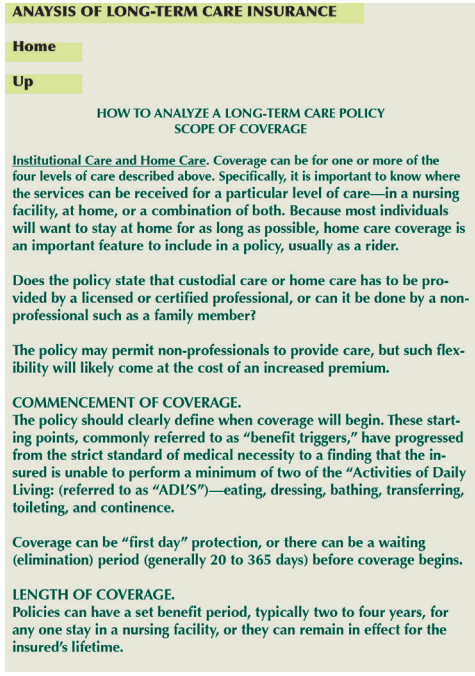
In understanding long-term care policies, the different levels of care should be recognized:

Skilled care is acute nursing and rehabilitative care given by a RN or therapist, usually daily (i.e. round the clock) and supervised by a physician.

Intermediate care involves occasional (not around the clock) nursing and rehabilitative care under the supervision of skilled medical personnel.

Adult day care involves a fixed set of hours at a community facility under the care of skilled caregivers.

Hospice care gives round-the-clock end of life care by skilled nurses and physicians.



ANAYSIS OF LONG-TERM CARE INSURANCE

Home

Up

HOW TO ANALYZE A LONG-TERM CARE POLICY
SCOPE OF COVERAGE

Institutional Care and Home Care. Coverage can be for one or more of the four levels of care described above. Specifically, it is important to know where the services can be received for a particular level of care—in a nursing facility, at home, or a combination of both. Because most individuals will want to stay at home for as long as possible, home care coverage is an important feature to include in a policy, usually as a rider.

Does the policy state that custodial care or home care has to be provided by a licensed or certified professional, or can it be done by a non-professional such as a family member?

The policy may permit non-professionals to provide care, but such flexibility will likely come at the cost of an increased premium.

COMMENCEMENT OF COVERAGE.
The policy should clearly define when coverage will begin. These starting points, commonly referred to as "benefit triggers," have progressed from the strict standard of medical necessity to a finding that the insured is unable to perform a minimum of two of the "Activities of Daily Living: (referred to as "ADL'S")—eating, dressing, bathing, transferring, toileting, and continence.

Coverage can be "first day" protection, or there can be a waiting (elimination) period (generally 20 to 365 days) before coverage begins.

LENGTH OF COVERAGE.
Policies can have a set benefit period, typically two to four years, for any one stay in a nursing facility, or they can remain in effect for the insured's lifetime.

Figs. 4a and *4b* show portions of a website she visited to explore these goals.
Fig. 4a. An excerpt from a webpage about long-term health care insurance.
Fig. 4b. The continuation of the content shown in fig. 4a.

28 *Information Design Moves for the Web: Evidence-based Practice* (manuscript in preparation).

who had had no prior experience with long-term care insurance – set about learning exactly what it was and what the options were. She turned to the Web with two general purposes:

- to understand what long-term health care insurance was, and
- to compare prices so she could buy the best policy for her mother at the lowest cost.

An important thing to notice about these pages is that the creator of the website has failed miserably in designing the content. Obviously, someone has simply uploaded a print brochure ("brochure-ware"). The underlined elements are not hyperlinks. The paragraphs wander and present the content in a list-like fashion rather than integrating it for the reader. The poorly written and poorly displayed headings (e.g. the buried "Introduction" in fig. 4a) make it hard for readers to acquire a good sense of the content by scanning. The headings are also organized around topics rather than around readers' questions. Table 6, below, shows how the topic-oriented headings could be more action-oriented, allowing readers to recognize more quickly whether their purpose for coming to the website will be satisfied.

As we can see, both the writing and design of the website needs quite a bit of work, especially if people are to use its content effectively and efficiently.

Original headings	Revised headings
Introduction	Finding the right policy
Levels of care	Understanding differences in available care
Skilled care	Skilled care
Intermediate care	Intermediate care
Adult day care	Adult day care
Hospice care	Hospice care
Scope of coverage	Knowing your costs and benefits
Institutional and home care	Caring for a loved one at home or in hospice
Commencement of coverage	When will the policy start?
Length of coverage	How long with the policy last?
Amount of benefit	How much will the policy pay?

Table 6. Revising topic-oriented headings to make them action-oriented.

Example 2: Reading to compare and decide

A second example comes from a man who expressed the goal of acquiring a new credit card with a low interest rate. He wanted to compare the benefits and features of different credit cards so he could make a wise decision. He mentioned that he was trying to improve his credit rating and was having trouble putting together the information about credit cards that he was finding on the Web. Although he did not go into details, when we look at a website he mentioned, we can see why he was having trouble. Fig. 5 shows a portion of a website devoted to helping consumers choose a good low-interest credit card.

As shown, the website profiles different cards that offer low interest rates. The simple design makes it look easy to follow the three-step procedure at the top of the page. On the surface, the site appears to be very user-oriented.

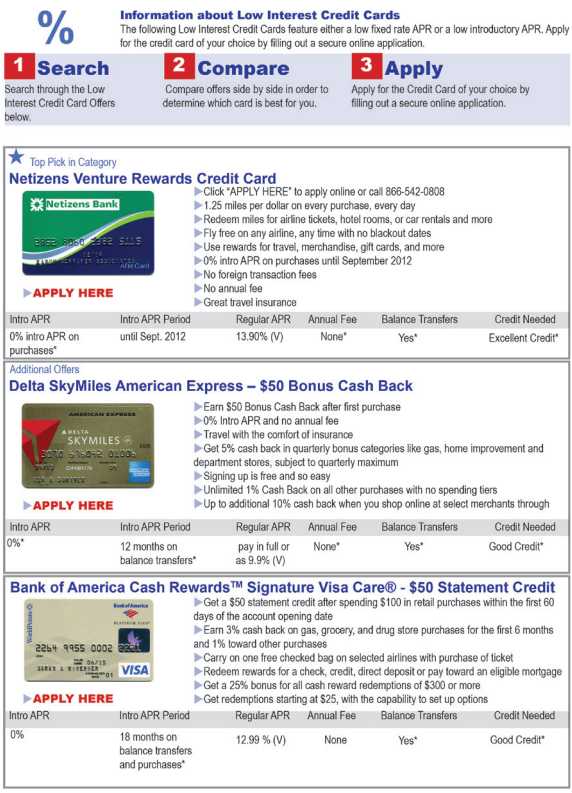


Fig. 5. An excerpt from a website that allows you to compare credit cards.

However, upon reading the itemized content, we quickly find that the listed features are not parallel from credit card to credit card and each list seems to present random bits of information of questionable value. Put differently, the structure of the itemized content makes it hard to draw comparisons.

Fortunately, the content below the shaded grey bars does allow users to compare interest rates quite easily. Additionally, the content about interest rates (e.g. "Intro APR Period") is consistent across cards. Still, the text assumes that users know that "(V)" means "variable" interest rate. And users have to click on the credit card issuer's website to learn that the bank can raise the rate when it wishes or when markets fluctuate. As we can see, some information is not delivered at the point where users need it.

At its root, however, the problem may lie not with the choices made by the site's designers, but with the information made available to them by the credit card issuers in the first place. The problem of getting consistent and comparable information suggests a need for plain-language regulations about public information from the financial sector. Banks have tended to make it hard for consumers to compare their financial products – a fact that prompted the creation of the US Consumer Financial Protection Bureau in 2009.[29] Clearly, information designers face significant challenges in making financial information clear and compelling.

Conclusion

My purpose here has been to bring to the fore a number of issues about reading online. First of all, online engagement is not always about socializing or having fun. While people use the Web for building communities, making new friends, ordering pizza, or playing Angry Birds, they also use it for much more. Importantly, the data from my research shows that at least some of the time, people come to the Web with serious purposes in mind, such as reading to understand, reading to solve a practical problem, or reading to answer a nagging question.

For these more serious purposes, reading online may involve searching, scanning, comprehending, integrating, and interpreting. Such activities,

29 For a discussion, see my report *The Ebb and Flow of Plain Language in the United States*.

which in themselves can be cognitively demanding, are made even more difficult by websites that are poorly written, tortured by jargon and insider language, confusing to look at, and not organized in ways that help people accomplish their goals.

The research I have presented tells us that good writing and good visual design can help people carry out their serious and even not-so-serious purposes on the Web. Expert information designers have an important role to play in shaping experience and enabling people to accomplish their goals – whether skimming the text and graphics to get the gist or scrutinizing the content to interrogate its relevance. The examples discussed here, from the worlds of e-commerce, health, insurance, and finance, show why skilled information design is sorely needed across both the public and private sectors. They also remind us that in developing a content strategy for the Web, organizations need more than a plan for good visual design or good writing. Visual and verbal content must be carefully orchestrated so that people can envision how the information will help them achieve their goals. Simply put, information design on the Web matters.

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Rob Waller studied typography and graphic communication at the University of Reading in the early 1970s before joining the Textual Communication Research Group at the Open University under Michael Macdonald-Ross. During this time he completed a doctorate at Reading and founded the *Information Design Journal*, which seeks to bring together the various disciplines (both academic and practising) relevant to information design, defined as words and graphic design working together to communicate complex information. Waller was a co-founder of the Information Design Association in 1991 and has been closely involved with the Information Design Conference in the United

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Malcolm Garrett, born in Northwich, England, studied typography at the University of Reading from 1974 to 1975 and graphic design at Manchester Polytechnic from 1975 to 1978. His first important professional work was designing for the punk rock group Buzzcocks. From 1978 to 1994, he was the design director of Assorted iMaGes. His work there included graphic identity design, exhibition design, television graphics, and book design. His clients included such high-profile musical artists as Magazine, Duran Duran, Boy George, Simple Minds, and Peter Gabriel. The album sleeves he designed for Duran Duran (1981–1986) include the band's first four albums and associated singles such as "Planet Earth", "Is There Something I Should Know?", and "The Reflex". In the early 1990s, he became increasingly attracted to digital technology and in 1994 teamed with Alasdair Scott to form AMX, an interactive media production company. Garrett left AMX in 2001, when the company merged with Zinc to form Arnold Interactive. He then worked at I-mmersion in Toronto, art-directing interface design for interactive cinema and multi-us-

er online environments. He returned to London in 2005, where he was a creative director at Applied Information Group till 2011. He is Master of Faculty of Royal Designers for Industry (2013), a fellow of the International Society of Typographic Designers (ISTD), and a visiting professor at the University of the Arts in London. He was the creative director of i-Design, an interactive media conference at the London Design Festival from 2007 to 2009 and is a member of the Sir Misha Black Awards Committee. In 2011, he became a creative director at IMAGES&Co in London. http://www.images.co.uk

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Yuri Engelhardt **Graphics with a Cause, and Universal Principles for Visualizing Information**

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