

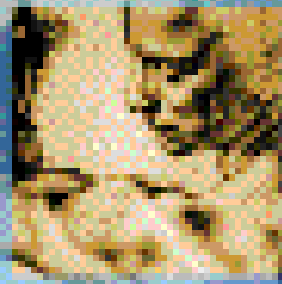
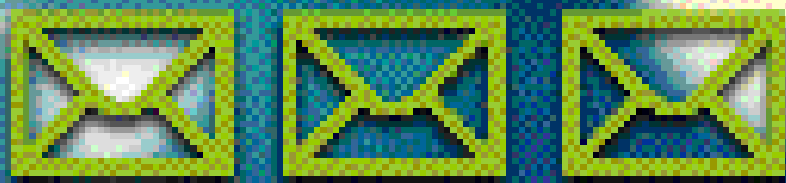


Photo: Robert Vizzini

The ways of handling information that work well in

“Old Media”

(print and broadcast) do not always translate gracefully into new media environments. Although entertainment (in video games and CD-ROMs) and communication (on the Internet and on-line services) are finding new forms and new configurations in the new media, information (news, reference, education), which still relies largely on text, usually takes on forms native to print environments. These can appear very awkward in new media. **This article compares people's relationships to digital media and print media; it also examines information and people's needs for and expectations of information, with an eye toward adapting information design to suit new media environments. This concerns not so much the death of print as it does fitting the interface to both the medium and the message—which some would say are the same thing.**



Home | World | Business | Politics | Sports | Entertainment

September 12 5:11 p.m. EDT

International Summary

TO Strikes Continue Serbs hammered Bosnian Serb military
 with heavy attacks Tuesday and said it had expanded its
 attacks on communication camps northwest of Sarajevo and
 in a western suburb. Local Serb officials say the
 Russian stepped up pressure for a halt
 to a reported secret memo by
 members of

Sharing the
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Information Design and the New Media

Melinda McAdams

Media A useful basic distinction can be made between active and passive, or between users and consumers. The old media are massified; they broadcast on a one-to-many model, and I don't really get to choose what I want, except on the widest level. The mass media deliver information on their own terms and on their own schedule, assuming the existence of a passive consumer on the receiving end. All periodicals and broadcast media select subsets of information from the vast pools available, and transmit these subsets in complete packages that they create, in a format of their choosing. The most active thing that I, as a consumer, can do is go out and choose a package. After I have it, I can't add to it. I can't rearrange its contents. I can't respond to it except inside my own head.



Marshall McLuhan [5] separated “cool” media, which demand active participation and an “involvement in process,” from “hot” media, like print, which come in complete packages and encourage passive consumption. In McLuhan’s view, roads and vehicles, money, and weapons are media, just as movies, books, and radio are. Media act as extensions of the human body, and electric media are extensions of the human nervous system.

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McLuhan, who did not live to see the proliferation of personal computers, set television on a pedestal as the “coolest” of the electric technologies, one he referred to as “the mosaic mesh.” He credited TV with breaking up the linearity of human lives and thinking, a linearity that had evolved from print culture—from centuries of words set in type, set in lines, set in pages that followed one another in invariable numerical order. The increasing use of new media continues this breakup; new media, in fact, reveal the relative linearity of television (and all time-based media) and offer far more possibilities for an information mosaic. As oral cultures became print cultures after Gutenberg [3, 7], print cultures are now becoming electronic cultures.

Evidence of this change lies in the way we prefer to receive and process information. Are you impatient with long articles? Do you turn the page when you see there are no subheadings to break up the long columns of type? Do you like to flip channels on the TV set? Have you noticed how more movie previews take the form of montage, images strung together to a bold musical score with a lot of cutting from scene to scene and not much dialogue, and afterward you feel as if you’ve seen the whole movie?

These preferences, and this way of thinking, demand new ways of presenting information so that people will be able to use it. As we move away from the book and from print culture, many questions come up: How will people seek and find information when they are no longer “looking it up”? How can we search for images and sounds without reading text descriptions of them? How will education change? How will the meaning of “news” be affected?

When we talk about users, we’re assuming that they use something. They don’t passively

read or view or consume; they actively use. The worst kind of CD-ROMs assume a passive viewer; they provide slide shows in a completely linear format, a perfect example of what happens when a designer does not understand the medium. A disc cannot be called interactive just because the user clicks a button labeled “next” to go to the next picture. Information users expect to be able to explore and discover, to seek and find. Otherwise, they go back to being information consumers.

To address this difference, we need to consider responsiveness (an effective alternative to the overused “interaction”). The Internet and online services offer an ad hoc form of responsiveness: Messages can be sent and received in a free-form way between those who produce information products and those who use them. CD-ROMs can be responsive, too, but in a different way: By allowing the users to set the agenda, to look for things that interest them and entirely skip the things that don’t, even this contained medium provides more responsiveness than a newspaper, book, or television program.

Media are extensions of ourselves. Media are like long arms extending out from our bodies. Some media, like highways, enable an extension of an individual’s world. With old information media (the mass media), the extensions reach out to us, from their point of production, and drop products onto us, the audience. Because of the participatory nature of new media, extensions come from both directions—from producer and user—and meet at a midpoint.

Information

There are two ways of talking about information: the engineering view, which is largely about the transmission of signals, and the

meaning view, which concerns how people think about information. New media producers need to concentrate on the latter.

In the broadest sense, everything is information: sounds, smells, tastes, and anything else that enters our sense organs. But most people would define information as something that has meaning—that is, it must make sense or have significance. Meaning is, of course, relative; what has meaning to one person may have none to another. Meaning also has nothing to do with importance or relevance; news of a war in a foreign country has meaning, but that news may be neither of use nor of interest to any number of people.

An often quoted definition of information says it is “a difference which makes a difference” [1]. But even “makes a difference” presents us with at least two possible meanings: that some change is brought about, or that someone cares (in the sense opposite to the statement “It makes no difference to me”). The second is probably closest to what most people have in mind when they go looking for information (or when they express dissatisfaction with the information available to them); they want something that makes a difference to them. In the context of one person’s search for something that will be of use or of interest to him or her, all the endless gigabytes of information in the world are meaningless junk except for the bits that fulfill the purposes of that person’s search.

We can define the standards people use to judge the information that is available to them: They want information that is either useful or interesting or both. That is the standard they will use to measure whether information they get is satisfactory or not. Although they may also apply other standards, such as truth and completeness, they will probably do so after they have determined whether the information is of use or of interest—or they will choose their source in the first place based on whether they believe it to be reliable or complete.

Recognizing that information is something that has meaning, but also that not all information is of value to all people, we can start thinking about information overload and what people want from information.

Too much is not enough. “We live in a world

of proliferating information and shrinking sense,” Jean Baudrillard [2] wrote in 1980. There is more information out there—more TV channels, more magazines, more books—than was available fifty or even ten years ago. Baudrillard called it “bombardment by signs” and referred to “a state of perennial emulsion.”

Much of this information is useful or interesting to someone, but for each individual, very little is of use or of interest. In addition, at the same time that they are being bombarded with more than they can take in, people also lack information that they need or want. Sometimes they don’t even know what they want, but they experience a vague sense of dissatisfaction, as if there’s more they should know, but they don’t know what that “more” is or where to look for it.

Richard Saul Wurman, a graphic designer and creator of innovative guidebooks, notes that many people waste a great deal of time and effort learning things that do not really interest them, out of some social compulsion to feel informed or up to date [8]. They act, he says, as if they think there will be a test.

W

e can make a useful distinction between noise and redundancy in this context.

Both interfere—in different ways—with

people’s ability to get meaningful information [4].

“Noise” is any information that is neither interesting nor useful to us, getting in the way of what we

really want. “Redundancy” is too much information

that is too much the same, like 10,000 articles

about how to get skinny.

Noise not only makes it more difficult to find what we want, but it also makes us feel overloaded, numb, and powerless. For any subject, some people will want more information about it, but many will want less (or none). The existing mass media do not provide people with filters to block what they do not want. People find that they have no time to “keep up with the news”—to read a newspaper or the magazines they subscribe to, or to watch all the TV programs they have taped.

Excessive redundancy makes people try to shut things out—maybe the things they most want (or need) to know. In the mass media, the two extremes are superimposed: much of the noise is redundant, and much of the redundancy is noise.

Time-based media require a lot of redundancy; the eleven o'clock news always repeats much of what was on the six o'clock news, and today's newspaper has to assume that you did not read yesterday's. With hypertext links, new media can avoid at least redundancy (if not noise); links that change in appearance (as in some World Wide Web browsers) to show that you have already followed them can help.

Within a contained product, such as a CD-ROM, redundancy can be avoided. But in any dynamic form, redundancy is a danger.

Noise can also be avoided in new media more easily than in the old, because of the difference between a user and a consumer. Users can determine quickly whether a particular site or segment will be interesting or useful, and if neither is the case, the user can just as quickly move on. Channel surfing is the mode of operation native to new media. Users are cruisers at high speed.

Use of Information

Not all users who enter an information environment have the same goal. Some come in hoping to find a particular thing, to answer a specific question, to research a certain topic. Others come in to enjoy themselves, to browse what's available, to see what's new. These two types of activity in an information space are not exclusive, and any user who comes in for one type of activity may want to switch to the other at some point. Moreover, both searching and browsing consist of various activities.

A searcher wants, first, to find. But finding includes several steps. The searcher needs search tools—not only a text search for words and phrases, but also ways to find sounds and images, subject categories, and material related to the primary topic. Then, when the set of search results is in hand, the searcher may need to evaluate which items deserve further attention; for example, if the search returns a large set of documents, the searcher usually does not

want to read every one of them. What if the set is not satisfactory? Can the user modify the search from this point and go deeper, or does she have to start over?

With the finding stage completed, the searcher wants to study the found items. Are the items presented in a form that's good for this purpose? Can the searcher save or store the set of found items? Can she make notes for herself as she's examining them? Can she call up related items without losing her place? Can she connect those in this set to other items—so that she can refer to them later, or pass them on to a friend?

Browsing too comprises several activities. Being casual, the browser doesn't want to spend a lot of time configuring the system or evaluating items he comes across. A browser's environment requires few words, appropriate images, and easy movement. However, once the browser sees something of interest, he wants to stop and look at it more closely. He wants to switch modes—but this does not necessarily transform him into a searcher.

Some browsers may not want to browse everything, but may want to limit their information space to certain subjects, or to a certain time frame. Others may want to have a wide field, but will prefer to eliminate, or screen out, certain subjects that do not interest them. These filters, then, are of two kinds: one lets things in, and the other keeps things out.

In some cases, the browser will become a searcher in the same session. Something he comes upon may make him want to initiate a search. A searcher may also wish to suspend searching temporarily and browse, perhaps in an exploratory way, to determine whether this particular space contains suitable or sufficient information.

For both kinds of users, an information space must do more than provide access to information; it must be organized and navigable, and it must provide comfortable ways to handle the information once it is called up. If users cannot

meet their goals—if, either as searchers or as browsers, they cannot find what is of use or of interest to them—then the information space fails. It is a mistake for developers to complain that users are at fault if they can't figure out how to function effectively in the environment.

A well-designed information space is one that (like any well-designed environment) is consistent, predictable, and transparent.

Don Norman [6] identifies four principles of good design that can be applied to an information environment to make it self-explanatory and not frustrating: (1) visibility, so that users can see clearly what state the system is in and what it is possible to do next; (2) a good conceptual model—that is, the metaphor the designer chooses to present to users; (3) good “mappings,” so that users can figure out and anticipate relationships between their actions and the results they will get; and (4) feedback, so that users always know what their actions have caused to happen.

Organization

An information space, whether dynamic (on-line) or static (nonrewritable media) begins with a large collection of information. The first step must be to organize the information in a logical and useful way.

Wurman's “five ways of organizing information” are by category, by location (for example, maps), by continuum (that is, from best to worst, largest to smallest, and so on), alphabetically, and chronologically. In a new media environment, some kinds of information can be organized in all five ways simultaneously, and users can choose which organizational scheme they prefer. It's important to remember that in an electronic space, organization can be virtual; that is, the way the information appears to be organized does not need to have any relation to the way it is stored in digital form.

Ways of organizing information are also ways of understanding, as Wurman points out. When people can move easily from one topic to another, or from one source to another, they build mental connections that reinforce learning and comprehension.

Some new media products take feeble steps in this direction. CD-ROM encyclopedias, for example, often offer a time-line view as an

option to a subject-oriented view. But the time line is not integrated across all the entries; users cannot switch from every entry to a precise point on the time line, and choosing a point on the time line does not take them to an array of all concurrent articles.

Great promise for information environments lies in new media's ability to show connections and relations among multiple, simultaneous sets. Hypertext naturally plays a part in the organization of a new media information environment. Much has been written about using machine intelligence to construct these connections, but it may be that human experience will always provide a better framework for building information sets that will be interesting and useful to other humans—especially given the myriad possibilities presented by large sets containing overlapping information.

In searching for relevant texts, software systems can use word occurrence to bring back only texts that are primarily about a requested topic, rather than texts that merely mention the topic. But software is unlikely to be able to tell which of five, or ten, or one hundred articles about a topic presents the best introduction or overview, and software also seems an inadequate judge of which additional articles will complement, rather than reiterate, the information found in the overview.

Whether this kind of selectivity is welcome depends on the users' preferences. Searchers will often want the complete list of relevant items and will want to evaluate all of them. More casual users may prefer to have the best or the clearest or the most recent selected for them.

The less repetition, or useless redundancy, a user finds in a set of information, the more valuable it must be. The same is true of noise. It is probably too much to expect that machine intelligence will be able to configure sets with low factors of noise and redundancy. Thus organizing information for use is likely to remain a highly skilled task, even more so

than the work of determining subject labels for library card catalogues.

Whenever whole texts originally produced in print environments are linked together, redundancy is inevitable. If the texts can be broken down into smaller segments, some of the redundancy can be avoided. If the texts are created specifically for the new media environment, then they should be developed with linking in mind, and also with consideration for browsing users, who will want to move quickly from text to text. Even though some texts do not lend themselves to incorporation of embedded hypertext, most can be broken up into smaller segments that will retain their meaning.

Although use of hypertext can cut down on redundancy, much of the hypertext found on the World Wide Web introduces a lot of noise, and thus offers little improvement from old media environments. Gratuitous or excessive use of links does no user a favor; rather, it will discourage many users from following links. Designers of an information space need to find a balance between allowing for serendipitous discovery and providing a frustratingly large number of options. One way to do so is to evaluate the entire set of links in each segment and eliminate those that are redundant. The elimination of such links does a great service to the user.

Organizing the whole of the information space constitutes only one level of an information designer's task. Each element in the space must have its own internal organization; elements that belong to one set must be organized as a set; sets that are related to one another must have appropriate connections. Finally, the users must be able to come into the full space, or collection, and find a form of organization that makes sense to them so that they can move around comfortably within it.

Navigation

Although organization has some bearing on navigation, it is not the only factor affecting navigation. Because users have different goals and desires when they enter and while they are within an information space, they need a variety of navigational tools and options.

The word navigation invokes an image of an explorer or a traveler. Some insight into

navigational options may be derived from a travel metaphor:

- If you know exactly where you're going, or what you want to see, you want to get there quickly and directly, with as little trouble as possible.
- When you get there, you want to stay for a while and to have the chance to go deeply into the local culture and history.
- If you're more interested in the scenery, in seeing the country, you want to keep moving. You don't want to get stuck in the station. But you also want to be able to get out at will and linger if the urge strikes you.
- No one likes to be really lost. A little bit lost, temporarily, is all right.
- A traveler is different from a tourist. Tourists want everything to be arranged in advance, never to deviate from the plan. Tourists want someone else to show them the sights—even to decide which sights are worth seeing. Travelers like to guide themselves and make their own decisions. That does not mean they shun advice. But they don't want to follow another person's itinerary.

Because much of our information is still conveyed most efficiently in the form of text, a number of print conventions for navigation appear in new media environments. Some of these work fine; a table of contents, for example, can serve as a kind of map to let users know what to expect in this space. If users can jump from any information segment back to the appropriate section of the table of contents, they will always be able to orient themselves.

Few things are less inviting, however, than a very long, multilevel table of contents in outline form. Some sites on the World Wide Web use these, making each line a hypertext link, but the form of presentation overwhelms the user. A better strategy would be to present the top levels only (Roman numerals I, II, III) and have each of those link to a short overview, followed by the next level (A, B, C), which would lead to an overview of the sublevel (1, 2, 3), and so on, eventually taking the user to the individual segments. In this way, the user gets to choose how

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deep to go and also gets to take in and evaluate information quickly, actively.

A full index is equally tedious on a computer screen. Indexes require a great deal of scrolling or paging even if the user can jump to a selected letter of the alphabet. Instead, the user could initiate a search for a word or phrase that would bring up the information directly. Although serious researchers may want some form of index, the print model is inadequate when we consider the power of electronic text: the user's entry of a search term could trigger a search for all related terms and synonyms, if the search tool had been configured appropriately.

Browsing users do not necessarily want any form of map or index. As discussed earlier here, they are more likely to want to set parameters—if the mechanism for setting them can be made reasonably straightforward—to constrain their browsing to subjects in their range of interests. Even so, when browsers move from one place to another, they will want to have some feeling of control; that is, they will seldom want to skip about completely at random. Some environments force randomness on the user by giving inadequate information about the options for the next step. For example, some hypertexts highlight a single word as the link to another segment, and that word alone is often insufficient to provide a meaningful expectation of what it may lead to. Other environments not conducive to browsing are those that provide only an option to go to the “next” segment or to return to the “top,” and those that don't offer any expansion of the current segment, but lead only to related topics. This last flaw is typical of CD-ROM encyclopedias, which many users find to be enticingly broad, but disappointingly shallow.

The navigation needs of a browser, then, are very different from those of a searcher, and yet any user may become a browser or a searcher at any time. The challenge in a robust information environment is to provide useful tools for both and to make all the tools accessible all the time.

Formatting Information

One last consideration about the design of an information space concerns the basic units of the space, or the building blocks—the individ-

ual blocks of information themselves. In some cases these are sounds and in other cases, images, either still or moving. But in many cases they are text, and one of the biggest differences between printed text on a page and electronic text on a screen is that it does not scan the same way. Scrolling up and down differs greatly from turning pages, and the screen provides less space than most pages (if the text is displayed at a size that will not strain the eye, as it should be). In this transition period, as we are poised between the print era and the electronic era, many of the electronic texts available have been dumped in from print environments, and their format is ill suited to electronic reading.



The use of “white space,” or empty space, has become more and more popular in print since the 1960s, and now even newspapers (which used to cram the columns so close to each other, they almost touched) recognize the improved readability that results. In electronic environments, a full line of space between paragraphs makes a huge difference between a readable text and an unreadable one. A narrower line-width, too, is easier to read (and scan) than a longer one—that also holds true in print.

Contextual use of display type aids a browser of electronic texts. Use of headings should be increased over print—but not randomly. Each heading should say something meaningful about the text below it, so that the user can make an informed decision about whether to read it. There is more reason to make every word count in the subheadings of a scrolling document than there is on the front page of a newspaper. Even the use of italics and boldface and, of course, color, within the body of the text can be increased far more than any print designer would ever permit, because this is not print, even though it is text, and the reading patterns are different.

Graphics can serve a wide variety of iconic uses. Small graphics inserted at the beginning of a section or paragraph can tip off the user to a type of

content—a globe could mean geography, a pair of human profiles could mean “related thinkers.” The larger and more diverse an information space is, the more useful such cues could be.

Even a focused searcher may begin scanning at any moment, and visual cues that aid in scanning increase the value of the information space to its users. The implication is not that no one will want to read deeply, but, rather, that the information designer should strive to help the user avoid reading extraneous material and to make it easier to locate material that is of real value to that user.

Summary

New media information environments are very different from print and broadcast environments, even when much of the content of the

new media environment is text. For this reason, designers of information spaces can benefit from thinking about the capabilities of new media, the qualities of information, and the goals and desires of users of information.

There is excessive information available to most people; not only is it available, it is intrusive. Merely providing information or access to information is, therefore, not enough. The information space must be well organized and easily navigable, and the form of the information (not only its content) must be useful to those who find it. Because different users of information will have different goals, and any one user may have different goals at different times, it's important to provide adequate, flexible tools to enable the users to accomplish what they want.

If we resist the urge to equate text with print media, and recognize the full potential of electronic media—for searching, for providing navigation options, for setting filters, for linking sets of information, for offering hierarchical paths through large collections of related data—we will design information spaces that are effective and satisfying. ☺

References

- [1] Bateson, G. *Steps to an Ecology of Mind*. Ballantine Books, New York, 1972.
- [2] Baudrillard, J. The Implosion of Meaning in the Media and the Implosion of the Social in the Masses. In *Questioning Technology: Tool, Toy or Tyrant?* (Zerzan, J., and Carnes, A., eds.). New Society Publishers, Philadelphia, 1991. [Article originally published in *The Myths of Information*, 1980.]
- [3] Eisenstein, E. L. *The Printing Revolution in Early Modern Europe*. Cambridge University Press, Cambridge, U.K., 1983.
- [4] Klapp, O. *Overload and Boredom: Essays on the Quality of Life in the Information Society*. Greenwood Press, New York, 1986.
- [5] McLuhan, M. *Understanding Media: The Extensions of Man*. McGraw-Hill, New York, 1964.
- [6] Norman, D. A. *The Design of Everyday Things*. Doubleday, New York, 1988. [Originally published as *The Psychology of Everyday Things*].
- [7] Ong, W. J. *Orality and Literacy: The Technologizing of the World*. Routledge, London, 1982.
- [8] Wurman, R. S. *Information Anxiety: What to Do When Information Doesn't Tell You What You Need to Know*. Bantam Books, New York, 1989.