SUMMARY

◆ Presents guidelines that should enable authors to create Web pages that their readers can understand
◆ Enables evaluators to judge the comprehensibility of Web pages

Guidelines for Authoring Comprehensible Web Pages and Evaluating Their Success

JAN H. SPYRIDAKIS

I n recent years, numerous articles, books, and even Web sites have offered advice for designing hypertext documents, multimedia, and Web sites. This advice is often based on common sense and professional experience, not research, though the same thing can be said about any type of instruction. But the bigger problem is that these guides spend only a few pages, if any, on actual writing topics—for example, content selection and organization, paragraph structure, word usage, tone, and so on.

To write comprehensible Web pages or to evaluate the comprehensibility of Web pages, writers and evaluators often rely on guidelines for writing and evaluating print documents. This default approach is based on the assumption that readers comprehend information in the same way from print and online documents, perhaps a sound assumption and perhaps not.

Research studies have analyzed the effect of the reading medium (paper versus screen) on many user outcome variables: comprehension, recall, speed and accuracy of search and retrieval, learning, task speed, reading strategy, attitude, motivation, and fatigue (for example, Gambrell and others 1987; Egan and others 1989; Foltz 1996; Aust and others 1993; Yang 1991–1992; Gijar and others 1998; excellent review articles have been written by van der Geest [1994] and Dillon [1992].) Whether medium has an effect on reader outcomes depends on the tasks and variables that researchers assess, as well as the equipment and materials used, but the results for comprehension and recall are equivocal: some studies find better comprehension and recall with print documents, some find the opposite, and some find no difference.

Many researchers in the 1980s claimed that print documents and hypertext significantly differed in terms of their structure, maintaining that print documents are linear while hypertext documents are not. Recently, however, there has been a discussion to the effect that linear text is not always linear and that the two mediums may be more similar than one might think. In print documents, readers jump around, looking at tables of contents, indexes, figures, tables, appendixes, footnotes, and glossaries. Reading of print materials can in fact be more nonlinear than reading of hypertext because the routes with print documents are endless and the routes in hypertext are constrained by links (Foltz 1996). Rouet and Levonen (1996) point out that perhaps printed text and hypertext do not differ greatly in terms of their linearity but that hypertext allows one to more easily take advantage of nonlinear features. The ease may involve the click of a mouse, but the very act of making and following navigation decisions in hypertext imposes an additional cognitive load on the reader.

Once users of a Web page locate the content they are seeking by scanning the page, they become real "readers" of the Web page, and like readers of print materials, they try to make sense of sentences, paragraphs, and pages. In fact, many components of the reading process should be quite similar for readers of print and online text. A brief review of how readers approach text and comprehend it will prove useful in understanding how Web pages can best serve their readers. (Readers desiring more detailed information than can be found here may find Britton and Graesser's [1996] *Models of understanding text* of interest.)

READING MODELS

Reading models describe the difficult tasks readers face. "Bottom-up" or "text-driven" models hold that readers start with the perception of letter features and eventually identify letters, words, syntactic units, and finally whole ideas that they place in long-term memory (Gough 1972). In contrast, "top-down" or "context-driven" models contend that readers' prior knowledge directs what information they take from a page, and that readers formulate hypotheses about what they will find and then sample enough text to confirm or reject the hypotheses (Goodman 1967). Although the models differ in their starting points, they share the notion that reading is a linear process consisting of many steps.

The "interactive-compensatory" model of reading hybridizes the bottom-up and top-down models, and allows for readers to work from the bottom up (beginning with text features), from the top down (beginning with their prior knowledge), or from the middle out (Stanovich 1980, Rummelhart 1985). Readers with strengths at one level of the process can rely on those strengths to help compensate for weaknesses at other levels. For example, readers who possess a great deal of knowledge about a topic would not have to decode the text from basic features because they could rely on information in their long-term memories (LTM) to guide inferences about incoming information. Alternatively, a reader who is facile with the language and syntax used in a text could rely on that ability to ease the process of linking new information to information in LTM. In fact, readers who have achieved automaticity of lower level steps, such as decoding words and interpreting syntactic relationships, have an easier time moving on to the steps involved in comprehension (LaBerge and Samuels 1974).

Once readers start to encode words and identify syntactic relationships in the text, they begin to build a hierarchical mental representation, or situation model, of the text (Kintsch and van Dijk 1978; Kintsch 1992; McKoon 1977; Meyer 1984). To build this representation, they collect bits of information from the text and connect them to other text-based information as well as to information in their LTMs (Kintsch and van Dijk 1978; Kintsch 1988). When the relationships among information bits in the text or between the text and the readers' prior knowledge are unclear, readers make inferences to further develop the information network in their LTMs (Kintsch 1988; Just and Carpenter 1976). Readers make these connections and inferences within and across sentences, paragraphs, pages, and so on.

As should be apparent, readers must allocate attention to a multitude of simultaneous tasks to encode and comprehend text. However, the human brain has a limited amount of processing capacity and, therefore, a limited amount of attention available at any one time. One huge task that demands extra cognitive resources for a hypertext reader is that of _selecting_ what information to access, _navigating_ the site, and _forming_ a text representation of information that crosses pages and sites. While all documents should be designed so as to ease the reader's attentional demands, Web pages in particular should be designed in this way so readers can have some cognitive capacity available for the additional reading tasks associated with reading text from Web sites.

Purpose and audience considerations

The effectiveness of some text features, however, will depend on a Web site's purpose and audience. For example, some readers are "reading to learn" and therefore will more actively engage in their reading than other readers who are "reading to do" and who therefore want succinct, action-oriented information (Redish 1989). A reader's patience with excess verbiage is considerably more limited when reading to do than when reading to learn.

Consider your own frustration when you are reading a Web page to find information that will allow you to take some type of action and you get stuck wading through long sentences and paragraphs. Just as with printed text, the amount and type of content, the organization, the style and tone, as well as the layout and graphics should vary given different readers and their differing purposes and abilities. Accordingly, writers or evaluators must consider the purpose and audience of a Web site to make appropriate authoring decisions or to evaluate the effectiveness of Web pages.

The guidelines

Authors and evaluators of Web pages will find the following guidelines and related text features to be helpful in maximizing readers' comprehension and improving the effectiveness of Web sites. In each section, the guidelines and features are explained and supported through a discussion of experimental studies involving either print or screen documents. At times the principles are gleaned from the results of usability studies conducted by experienced Web designers.

The first three guidelines address the selection of content, decisions about organization, and strategies for creating effective style. The fourth guideline suggests methods that enhance the credibility of Web pages. The final section provides brief guidelines for internationalizing the text of Web sites, acknowledging that separate and more complete guidelines are needed to sufficiently address this topic. This article closes with a quicklist version of the guidelines.

Please note that I use the terms "readers" and "users" synonymously in that a reader of a Web page is also a user of a Web page or site. Similarly, I may discuss a given

guideline from the viewpoint of a writer but the principle and the related text features would be equally effective when used by an evaluator to judge the effectiveness of a Web page.

1 SELECTING AND PRESENTING CONTENT

In selecting content and announcing its presence, Web authors should consider their readers' prior knowledge and interests. They should also consider how much information to put on each page.

1.1 Present content in such a way that readers can orient themselves and access relevant prior knowledge so they can comprehend new information when they arrive on a new page.
Effective text features
- An informative title at the top of each page
- An introduction or introductory sentence that announces the topic and specifies the intended audience
- Repetition of company or agency names, redefinition of specific terminology, and spelling out of acronyms on each page

Readers possess prior knowledge for both content and text structure that strongly influences how successful they will be in comprehending discourse. Numerous studies have shown that prior knowledge facilitates comprehension (Meyer 1984; Lawless and Kulikowich 1996; Voss and others 1986).

Through experience with different information and text structures, readers build content and structural schemata or frameworks (Ausubel 1968; see Williams 1994 for a review of schemata studies). When readers possess a preexisting content or structure schema that is relevant to the information they are reading, the reading task is easier and more successful. They identify high level information and form hierarchical frameworks in memory for incoming information more easily. However, with hypertext—which lacks typical text structures—readers may need to develop new strategies to identify top-level structural information (Esperet 1996).

Web pages, therefore, should contain some explicit content that can help readers to orient themselves; access relevant prior knowledge; access relevant content and structural schemata in LTM, or construct new schemata; and identify content relationships within and across pages.

Titles and introductions   An informative, concrete title helps orient readers, whether they have come from inside or outside a site. Readers also become oriented when they encounter an introduction or introductory sentence that specifies the topic and the intended audience. When readers follow a link entitled "Travel to Turkey Following the Earthquake" (http://www.cdc.gov/travel/turkey.htm), they find it extremely helpful to find the introductory sentence in the first paragraph of the linked page that announces the topic and the site's intended audience: "The U.S. Department of State recommends that U.S. citizens defer travel to areas surrounding the epicenter of the earthquake which struck western Turkey on August 17 1999." The sentence confirms that they have arrived at the content they expected, and they can begin to flesh out the information framework they had started to build when they first read the link title.

In contrast to this relatively clear example, visitors to the Web site for the U.S. Department of Internal Revenue may actually become disoriented when they arrive on the site's home page. Although the page contains numerous titles and even a short article, the page does not clarify that it is, in fact, the Internal Revenue Service home page. Readers expect a straightforward factual page that

1. Explains what this government department is (the taxation department)

2. Provides links to services and tax forms

What they get is an online version of what looks like a very colorful tabloid (Figure 1) that has no apparent relationship to the purpose of the site. The content, visuals, and overall tone are so unexpected for a government site that many visitors may think they have arrived at the wrong site. Unfortunately the type of information the visitor seeks (for example, tax regulations and forms) is buried at the bottom of the page in a horizontal list of links in small type.

Repetition of information across pages   One can also help orient readers on subordinate pages by repeating company and agency names, redefining specific terminology, and spelling out acronyms on each page (Gaharn 1999). A logo that occurs on every page and consistent page design across multiple pages also help to orient readers. (See the article by Farkas and Farkas in this issue for more information.) Writers should always remember that visitors to a given page can come to that page from anywhere and that they need contextual reinforcement to help them comprehend information on the new page.

1.2 Select content that will be interesting and relevant to the audience.
Like all authors, Web authors need to identify information that will interest their readers. This task can be very difficult because authors are sometimes unsure about who a site's audience is, often because the site serves multiple audiences. Regardless, readers' interest in text affects their comprehension: readers comprehend better and retain more information when they are interested in the topic of the passage (Asher 1980; Stevens 1980; Baldwin, Peleg-Bruckner, and McClintock 1985). Further, the more relevant readers find content to be, the more they focus their attention

Figure 1. Home page of the U.S. Internal Revenue Service (http://www.irs.gov).

and comprehension processes (Celsi and Olson 1989).

One study found that Web readers with a specific task would use a Web site for that purpose only (Rajani and Rosenberg 1999). "Unnecessary information . . . prevented users from finding what they were looking for even if it was right in front of them" (http://www.december.com/cmc/mag/1999/jan/rakros.html). Readers also tended to stay with a page if it contained interesting information. These findings speak to the need to avoid unnecessary content but also to make content visually accessible.

Sometimes uninteresting and irrelevant content appears on Web sites because authors have too much information and neglect to filter out unnecessary content. Existing documents are easy to put into HTML and place onto the Web, but they often do not serve Web users well. Numerous corporate, non-profit, and educational sites prominently display irrelevant information (for example, mission statements, organizational structure charts) long before a reader even knows what the site is about. These elements may be desirable for some sites but certainly not at the top level of the site.

The Web site for the U.S. Centers for Disease Control (CDC) clearly demonstrates this problem. On the home page (http://www.cdc.gov/default.htm), the reader immediately encounters uninteresting information with no orienting fea-

tures. The home page first spotlights an article on the 23rd Great American Smokeout and then presents an article on epilepsy. Scrolling past abstracts of these two articles, the reader who still wants to find out what the CDC is or does will probably click on the "About CDC" link. By following this link, the reader encounters the "About CDC" page title and the following first sentence (in small italicized type):

> *The Centers for Disease Control and Prevention (CDC), located in Atlanta, Georgia, USA, is an agency of the Department of Health and Human Services.*

Still in small italicized print, the next sentence, in the next paragraph, states:

> *The Centers for Disease Control and Prevention (CDC) performs many of the administrative functions for the Agency for Toxic Substances and Disease Registry (ATSDR), a sister agency of CDC, and one of eight federal public health agencies within the Department of Health and Human Services. The Director of CDC also serves as the Administrator of ATSDR.*

Then the site visitor sees the headings CDC Mission, CDC Pledge, CDC Core Values. Sentences or lists follow these

headings. The only remaining text on the "About CDC" page lists links to the CDC Centers, Institute, and Offices. The reader cannot find out what the CDC is or does on this "About Us" page or on the home page. Had the authors thought about what and how much background knowledge visitors might possess or what content they would find interesting and relevant, they would have realized that the first statement necessary on the "About CDC" page, or preferably on the home page, would have introduced the CDC and concretely stated what the CDC does. Few visitors to the site would be interested in abstract mission statements and pledges—and most will certainly not immediately be seeking information about the 23rd Great American Smokeout when they first arrive on the home page.

The irrelevant and disconnected information on these pages is unfortunately quite typical of many sites. Designers can all too easily lean on information that is current and relevant to people inside the organization but is irrelevant to outsiders who visit an organization's Web site. Designers of Web pages must keep their audience in mind and recognize that visitors to the site may need help to conjure up their related prior knowledge and that they will not stop on a page or stay with it if the content is not immediately interesting or relevant.

1.3 Minimize the amount of information per page.
Effective text features
◆ Short pages instead of long pages (in general)
◆ Only a few examples of a concept versus exhaustive coverage
◆ Summaries or abstracts with links to longer articles or discussions

Short versus long pages   Web style guides herald the short page (Lynch and Horton 1997; Levine 1996). Some content, of course, needs long pages—for example, online journal articles. The amount of content on a page to some degree relates to the overall site design and the total number of pages.

Some studies have shown an advantage to short pages. Morkes and Nielsen (1998) studied users' performance with two versions of a Web site that contained essentially the same information but varied in organization (number of pages) and concision. One site contained three pages with about 4,500 words; the other contained eight pages with about 2,500 words. Users of the eight-page, more concise site had faster task times, fewer errors, higher recall and recognition scores, and greater satisfaction than users of the three-page site. Apparently, readers work quite effectively with shorter pages but because pages were shortened by the manipulation of two variables simultaneously (the use of more pages and style revisions), we cannot conclude whether the results were due to the separation of

the information across more pages, the revisions for conciseness, or a combination of these manipulations.

Avoiding the confound of manipulating both the amount of information per page and the stylistic conciseness simultaneously, Dee-Lucas (1995) examined the effect of different amounts of information per page. She found that readers retain different types of information depending on the length of hypertext pages. Subjects performed differently when they read the same unedited information, divided across 9 pages (1 top level page and 8 second level pages) or across 22 pages (1 top level page, 8 second level pages, and 13 third level pages). The 9-page hypertext contained longer pages and more general titles than the 22-page site. Dee-Lucas found that readers of both versions recalled a similar amount of information; however, readers of the 22-page version recalled more information from third level pages while readers of the 9-page version recalled more general information. Readers of the 9-page hypertext selected more pages unrelated to the task than readers of the 22-page hypertext. Additionally, readers of the 22-page version selected the third level pages most often, the pages that were most relevant to their tasks— perhaps because the page titles were more specific. Readers of the 9-page version may have visited more unrelated pages because the small number of pages made it easy to check all pages versus readers who had to be more selective with 22 pages.

The overall conclusion is two-fold. Less information on a page—and hence more pages—allows users to more easily find the information they need and read and retain it than a site with a lot of information on a long page. However, a longer page can provide users with a wide range of content from which they can develop a broader view of the information, retaining a similar amount of information overall as readers of shorter pages. A writer must weigh these tradeoffs given a site's purpose, content, and audience.

Nielsen has consistently called for short pages. His 1994 "discount usability" study (see Nielsen 1977) found that users were often overwhelmed by too much information on a page, and that they liked lists and disliked scrolling. Recently, in "'Top ten mistakes' revisited three years later" (1999b), Nielsen back-peddled a bit, noting that "most Web users now know that pages scroll and that important links sometimes are not visible 'above the fold'" (http//:www.useit.com/alertbox/990502.html). Regardless, Nielsen still defends his recommendations for short pages, stating once again that "we have repeatedly found that users do not read online. Instead they scan the text, picking out highlights and hypertext links, and only read selected paragraphs." Levine (1996) states, "For presentations that must grab people's attention to be successful, don't make the page longer than a win-

dow" (http://www.sun.com/styleguide/tables/Page_Length. html;$sessionid$BQGOMEYAADWXVAMTA00E3NQ). Lynch (1997) states that "readers will print anything longer than half a page rather than read the text online."

Creating the short page There are numerous approaches to content selection and design that reduce the amount of information on a page. Often one can break content apart into separate pages and supply links to those pages as Morkes and Nielsen and Dee-Lucas did. The Web page that discusses the ballpark where the Seattle Mariners baseball team play (http://www.mariners.org/newpark/ default.html) is ripe for this type of revision. It is one long page—much of it lacking headings. The writer could easily break out some paragraphs into linked subordinate pages—for example, the paragraphs on location, playing field surface, naming of the field, and so on. Summaries or abstracts with links to fuller discussions can also be used to produce shorter pages. Of course, one can delete subordinate information and tighten-up wording. Often, a few examples of a concept may suffice instead of exhaustive coverage.

A case for the long page Decisions about page length should ultimately depend on the purpose, use, and audience of a site. An example of three contrasting yet similar sites exhibits the effect of page length decisions on the user. The content on the index pages in the Web sites of three real estate companies is almost identical but actually quite different in level of detail and related page length, and therefore its usefulness. Although the short page is generally heralded, in this case, the long page serves the reader best. All three sites seek to provide users with a way of identifying properties they might be interested in purchasing, but the sites are not equally effective.

The first site, with the shortest index page, is much less helpful to its reader than the third site with the longest index page. The first site (Figure 2) contains a property reference number that is meaningless to the user, a three- to four-word property description, the general property location, and a comment column that at most contains a flashy yellow icon containing the word "new." To determine whether the property is affordable or whether it provokes interest, the user must go to a subordinate page to find a longer description of the property, see a picture, and learn the price.

The second site (Figure 3) is a bit more helpful: its index page shows a small picture of the property, a short code number, the city where the property is located, and the price. This site is better than the first site because the picture and price provide users with some clue about whether the property could possibly meet their needs.

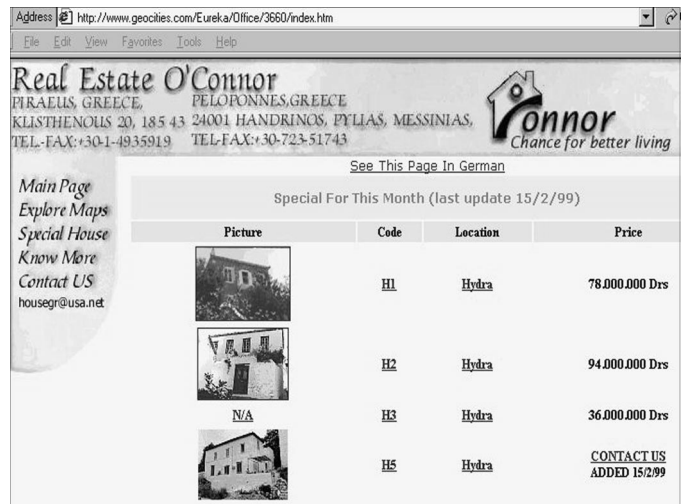**Figure 2.** Real estate index with unhelpful content (http://www.hellenic-reality.com/house.htm).

Figure 3. Real estate index with somewhat helpful content (http://www.geocities.com/eureka/office/3660/index/htm).

However, to read any verbal description and obtain an exact location, the user must still go to a subordinate page.

The third site (Figure 4) serves its users best. Its index page presents a three- to four-line property description that also includes location, price, and a photo. Of course, the user can find more detailed information on subordinate pages. The authors of this third site realized that users did not need to see obscure real estate company codes and flashy icons that simply said "new," and that users would
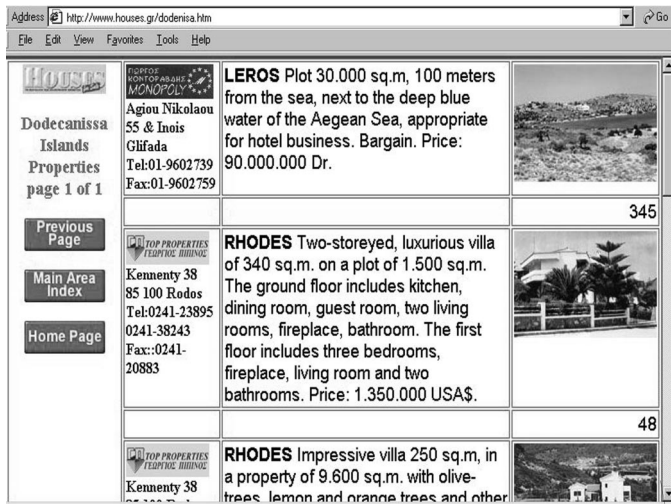
Figure 4. Real estate index with very helpful content (http://www.houses.gr/dodenisa.htm).

benefit most from immediately being able to read a short description, see a small photo, and learn the price. With this amount and type of information on the index pages, users can skim the index page and identify properties that may meet their needs and avoid going to second level pages only to discover from the descriptions, photos, or prices that a property is inappropriate.

2 ORGANIZING CONTENT ON THE PAGE

Web authors should be concerned with grouping and ordering information and then revealing the structure of the organization to the reader.

2.1 Group information to help readers create hierarchical frameworks for storing incoming information in long-term memory.
Effective text features
- Five or fewer items per group at one level of the organizational hierarchy
- Grouped ideas on one page at the same conceptual level

Chunks of information   Many studies have shown that people's memories are taxed when they must retain more than 7 ± 2 equivalent information items and that the memory load is reduced when the items are grouped or chunked (Miller 1956). Others have found that the memory bottleneck occurs at about five items (Mandler 1970; Fuqua and Phye 1978). Thus, readers can retain more information and discriminate among ideas best

when the number of items at any one hierarchical level is five or less. We know that readers organize information in LTM in a hierarchical fashion (McKoon 1977). Chunking or grouping information items facilitates the reader in building these LTM frameworks and decreases attentional demands because readers can perceive the text structure more easily.

The Web designer's grouping task first starts with overall site design and the number of levels and pages a site will be divided into. This decision relates to how much content each page will contain. Because sites often contain hundreds of nodes, designers often favor breadth over depth in site organization (see the article by Farkas and Farkas in this issue for more information on this topic), thus, somewhat by necessity, violating the guidelines for five or fewer items at one level of the hierarchy.

After the content for each page is determined, then that content must also be grouped.

Classification logic   Designers should use a logical classification scheme to group conceptually related items. A list of links to general health topics for the Centers for Disease Control reveals a clear violation of this principle:

> *Adolescents and Teens*
> *Environmental Health*
> *Foodborne Illnesses*
> *Infants and Children*
> *Información sobre la salud*
> *Injuries*
> *Men's Health*
> *Occupational Health*
> *Senior Health*
> *Traveler's Health*
> *Women's Health*

The order of links is alphabetical, including the one link in Spanish, but most readers would have a hard time finding the topic they seek because the list is based on many overlapping classification schemes (for example, gender, age, language). Certainly a Spanish speaker would not look for the one link to pages written in Spanish in a list of links written and alphabetized in English!

Users would need to read every link to find the topic they seek and because the groups are not mutually exclusive they could make many mistakes in their selections. The links could have first been grouped by a single principle (such as age, gender, type of illness) and then subordinate link lists could have been further grouped by other principles. While link lists demonstrate the need for a clear classification scheme that can help readers find their way, the need for logical grouping of related information also arises for content on individual pages.

2.2 Create order *within* and *across* grouped content.
Effective text features
- Information the reader is likely to know placed before new information (within sentences, paragraphs, and pages)
- Deductive organization, reinforced with a topic sentence
- Important information near the tops of paragraphs and pages

Known information before new information   Hypertext, by its very nature, removes much of the coherence and cohesion that printed texts have, and places the responsibility for "connecting the dots" on the reader. Writers can help readers find coherence and retain information by placing known, or old, information before new information. The "given-new" contract contends that new information is best retained when it is linked to given or "old" information, in other words, when words and ideas presented by the text connect to earlier words and ideas in the text (Clark and Haviland 1977; Just and Carpenter 1980). In fact, sentences that relate to previous context are processed more quickly (Albrecht and O'Brien 1993; Suh and Trabasso 1993) and are remembered more frequently (Trabasso and van den Broek 1985) than sentences that do not relate to the previous context. These studies suggest that the more an author does to order information in ways that will orient readers and help them follow connections, the better off the reader will be. This recommendation is true for order of information within and among sentences, paragraphs, and other elements on a page.

Interestingly, a few studies have shown the opposite to be true—that some readers, particularly highly knowledgeable readers, perform better without the cohesion provided by the placement of known information before new information. McNamara and others (1996) found that readers of biology texts who possessed high levels of background knowledge performed better on most tests with texts that were less coherent locally and globally than with more coherent texts. The less coherent texts lacked cohesion at the sentence level and organizational cues across the text. Magliano, Schleich, and Millis (1998) cite a few other studies that have found similar results for narrative text.

The high-knowledge readers in these studies apparently learned more when they were more actively engaged in the comprehension process and could make inferences about text coherence. These results suggest that highly knowledgeable people might fare quite well even with incoherent hypertext. The fact that the readers in these studies were "reading to learn," not "reading to do" (Redish 1989), may explain why they actively engaged in identifying structure and coherence on their own. McNamara and

others (1996) suggest that highly knowledgeable readers may have so much prior knowledge about information in a given text that they then elaborate less, form fewer inferences, and thus develop a poorer situation model for new texts. We must remember though that (1) visitors of Web sites will often not be highly knowledgeable and that (2) they have less attention available to focus on actively identifying coherence, even when they are "reading to learn" because they are forced to share their reading task with navigation tasks. Web site visitors would most likely benefit from the coherence achieved when sentences and paragraphs progress from known information to new information.

Deductive organization   Another concern regarding order of information is the placement of topic information within paragraphs. Studies of printed text reveal that readers perform better with a deductive organization—with topic sentences appearing at the beginning of paragraphs and important information being presented at the beginning of a text (for example, Dee-Lucas and Larkin 1990; Kieras 1978; Lorch and Lorch 1985). Readers organize information in long-term memory hierarchically, verifying topical information faster and more accurately than detail information (McKoon 1977, Van Dijk and Kintsch 1983). Deductive organization should aid readers in developing these hierarchical frameworks.

A study of Web sites by Morkes and Nielsen (1997) revealed that several participants, when given a search task, read only the first sentence of paragraphs. Such results, however, might be expected, given the nature of the task. Logically though, with so many readers scanning Web sites before they read, deductively organized paragraphs would best facilitate successful searching. And once a reader is in a paragraph, the topic sentence should serve as an anchor to which readers link upcoming information, just as they do with printed texts. This anchor could be quite critical for hypertext readers who may follow links in the middle of a paragraph and never get very far past the first sentence.

These studies align with Nielsen's recommendations (1996) that paragraphs be structured with the inverted pyramid principle, "starting with a conclusion." Nielsen envisioned each page as a single inverted pyramid paragraph linked to similarly designed pages.

Physical location of information   Readers also retain different amounts of information depending on the physical location of information in a text. Isakson and Spyridakis (1999) found that readers recalled the most information from the first paragraph in one passage and from the first and last paragraphs in another passage. Similarly, Freebody and Anderson (1986) found that recall of propositions in

the text was significantly highest from first to last to middle propositions in two of eight passages. Another prose study found only primacy effects (Frase 1969) and yet another study found both primacy and recency effects (Deese and Kaufman 1957).

It is difficult to interpret how and whether these findings for readers of print documents would apply to Web readers who often scan before they read. However, it certainly cannot hurt to place important information in the first paragraph and perhaps the last—and it may very well pay off!

2.3 Use organizational cues to make text visually accessible and scannable (easily skimmed or quickly read through at a top level); and to facilitate search tasks, comprehension, and recall. Do not distract readers with unnecessary cues.

Effective text features

- Headings and subordinate headings
- Introductions
- Overview (preview) and topic sentences
- Lists or tables
- Link labels
- Tables of contents, overviews, or site maps

Organizational cues   Organizational cues, or signals, help readers to

1. Select information to encode
2. Understand content relationships
3. Perceive information importance
4. Build hierarchical frameworks in memory
5. Call on relevant schemata for understanding the incoming information

Common organization aids include headings, introductions, overview sentences, tables of contents, lists, and topic sentences. Many of these aids have been shown to facilitate comprehension, speed, or search tasks in print documents (for example, Lorch and Lorch 1995; Meyer 1984; Hartley and Trueman 1983; Spyridakis 1989; Mayer, Dyck, and Cook 1984). Effective layout also helps reveal the organization of a page.

The same organizational cues that are effective in print documents are also effective in Web pages, except that Web pages probably need even more cues than print documents because readers are constantly traveling to and from different pages and sites. Headings, introductions, overview sentences of page content, topic sentences, site maps, and link labels can effectively direct the weary traveler. As readers scroll, they become lost, and headings help mark the way. Headings, like link labels, must be concrete enough to help readers predict what content will ensue. Just as link labels help readers decide whether to pursue

As a result, Web pages have to employ **scannable text**, using

- highlighted **keywords** (hypertext links serve as one form of highlighting; typeface variations and colors are others)
- meaningful **sub-headings** (not "clever" ones)
- bulleted **lists**
- **one idea** per paragraph (users will skip over any additional ideas if they are not caught by the first few words in the paragraph)
- the <u>inverted pyramid</u> style, starting with the conclusion
- **half the word count** (or less) than conventional writing

Figure 5a. Nielsen's suggestions for creating scannable text (1997b).

content on another page, headings help readers decide whether to pursue content on the current page.

Scannable pages   Nielsen proclaims the need for scannable pages (1997). In one study, Morkes and Nielsen (1997) found that only 3 of 15 participants read text word-by-word without scanning. It is important to note that this study was not based on a search task—participants were asked to read a Web page to identify the author's three main points and to answer a set of questions. Morkes and Nielsen tested five design versions of the same site, including an extremely scannable version (bulleted lists, boldface highlighted keywords, photo captions, short text sections, more headings). Participants who used the scannable site performed tasks significantly faster, made significantly fewer task errors, had significantly higher information recognition and recall scores, and reported significantly higher satisfaction with the site than participants who used the control version (a site with promotional language—this study is further discussed in the next section).

To create scannable text, Nielsen suggests the use of highlighted keywords, subheads, bulleted lists, clear paragraph organization, and concise language. An example of his suggestions appears in Figure 5a, an excerpt from a Nielsen (1997b) "Alertbox" (http://www.useit.com/alertbox/9710a.html).

While many of Nielsen's suggestions are useful, the suggestion about using highlighted words should be taken with caution. As shown in his own text in Figure 5a, highlighted words constantly pull the reader out of the syntax of the sentence and interrupt the reader's processing of the overall meaning. They also make the reader try to determine why the highlighted words are important, while losing sight of the overall text representation. Some readers may mistakenly think that all highlighted words or phrases are hot. If the elements in the list had been stated more concisely, the list would have been quite scannable and the
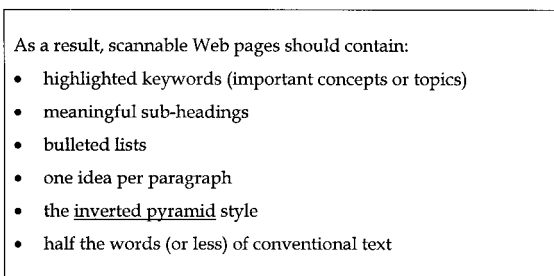
As a result, scannable Web pages should contain:

- highlighted keywords (important concepts or topics)
- meaningful sub-headings
- bulleted lists
- one idea per paragraph
- the <u>inverted pyramid</u> style
- half the words (or less) of conventional text

Figure 5b. Nielsen's suggestions for creating scannable text rewritten with good stylistic principles applied.

main concepts would have been readily available to the reader without the use of the distracting bold face type. The application of good style principles (Figure 5b), as discussed in the next section, can negate the need to use excess highlighting as an organizational signal.

3 MANIPULATING STYLE

Writing style concerns the way in which authors manipulate language to most effectively communicate their message. Style topics of specific interest to Web writers concern word choice, syntax, conciseness, and tone.

3.1 Use words that readers can easily and accurately understand.

Effective text features

- ◆ Concrete words
- ◆ Words that appear frequently in the language
- ◆ Short words (fewer syllables)
- ◆ Pronounceable words
- ◆ Link labels that create clear context for the linked page
- ◆ Words that readers are familiar with (the audience's vocabulary set)

Authors of Web sites may not have the luxury to sit and ponder all the words they will use, but they can spend some time carefully choosing meaningful words for headings, links, and page titles. When readers can easily read and understand the printed word, they can automate the decoding task. They will then have more attention available for higher level reading and comprehension tasks.

Concrete, frequent, short, and pronounceable words
Research with printed text has shown that words that represent concrete concepts are encoded more quickly and accurately, recalled more often, and comprehended better than words that represent abstract concepts (for example, Marschark and Paivio 1977; Holcomb, Kounios, Anderson, and West 1999; Gee, Nelson, and Krawczyk 1999). Research on word features has also shown that high-fre-

quency words (words that are used frequently in the language), short words, and words with fewer syllables are easier for readers to recognize and comprehend than their low-frequency or longer counterparts (Zipf 1949; Hudson and Bergman 1985). In the English language, these word features often correlate: high-frequency words tend to be shorter, more pronounceable, and more concrete, and they contain fewer syllables. A reader's decision as to whether to look at a given site, follow a link, or stop on a page in part may relate to the concreteness or specificity of words used in titles, headings, and links.

Wording of link labels   If readers choose to follow a link, they should have an accurate idea concerning where they are going (see the article by Farkas and Farkas in this issue for more information). Link labels provide the initial context that cues readers to locate related prior knowledge in their long-term memories as they travel to a new page. Ideally, embedded links should be concrete enough that readers can grasp their meaning without having to read surrounding text (Levine 1996).

In the following examples, the first link about insect bites provides context for readers: the concrete link terminology tells readers what to expect if they follow the link.

> *Protecting yourself against <u>insect bites</u> will help to prevent these diseases.*

In contrast, readers have a hard time forming an expectation about what they will find if they follow links that are phrased abstractly, as shown below.

> *See <u>above</u> for more detailed information about water filters.*
> *See <u>Do's</u> above for more detailed information about water filters.*
> <u>*Click here.*</u>

Spool and others (1997) recommend that content links, which take readers to a new page of information, contain 7 to 11 words so as to provide more trigger words. Spool and others (1997) found that users performed better on sites with links that contained more words and with links that were followed by descriptive sentences versus sites that simply listed a batch of short links. While these results and their implications seem logical, the validity of the results cannot be judged because the researchers do not provide sufficient detail about their methodology. Clearly, a link should contain only the number of words necessary to convey sufficient meaning for the reader to form a concrete expectation of what the new page will contain. (See the article by Farkas and Farkas in this issue for further discussion of length of link titles.)

Vocabulary for specific audiences The decision as to whether to read a page may also relate to whether the language appears to be part of the reader's vocabulary set. Many elementary school children might quickly leave the "Kid's Zone" page on the Seattle Mariner's site because, as shown in the excerpted paragraph below, many of the words (for example, *assembly, established, comprehensive, vehicle*) may be too difficult for them. The word choice in this paragraph is aimed at an adult audience, yet the intended audience is children.

> *In 1998, the Seattle Mariners continued their popular elementary school assembly program entitled "The Mariner Moose's D.R.E.A.M. Team." The Moose's D.R.E.A.M. Team, established in 1996 with the Washington State Principals Association, is a comprehensive educational program that uses the team's popular mascot as a vehicle to stress the importance of the D.R.E.A.M. principles. . . .*

Writers must remember that nonnative speakers of English may visit their Web site. Readers from all cultures fare best with common words that have only one meaning and with shorter sentences. While writers must decide these factors given their audience and topic, it is interesting that one participant in a Morkes and Nielsen study (1997) wanted more "down-to-earth" language; another participant wanted less formal writing so that the reader would not have to read every word.

If writers have access to some potential users, they can conduct usability tests to identify the vocabulary set of the Web site's audience. Wixon and Ramey (1996) describe many appropriate usability methods for determining whether the vocabulary used is appropriate for the audience. The trap to avoid is that of using language specific to one discourse community (jargon, acronyms, and so forth) unless a site seeks to communicate only with its own discourse community.

3.2 Use syntax (grammatical order) that readers can easily understand.
Effective text features
- ◆ Active voice verbs
- ◆ Few embedded relative clauses (*relative clause inside another clause*—for example, "The boy, *who is tall*, fell down,")
- ◆ Few embedded links
- ◆ Important information placed in independent clauses

Active and passive voice Many believe that active voice is more effective than passive voice; however, the research literature to support this folklore shows inconsistent results. Active voice has been found to be more effective in oral studies with listeners who are impaired, young, stressed, or exhausted (for example, Precious and Conti-Ramsden 1988; Pleszewska 1985; Ryman, Naitoh, and Englund 1985). Slobin (1968) found that adults generally retold stories in active voice when passive voice sentences included actors. However, passive voice stories with no mention of the actor were generally retold in passive voice. Other studies have found better performance with active voice when sentences were read individually and without context (Gough 1966; Coleman 1965).

Blount and Johnson (1971) found verbatim recall was best for active sentences, but recall of content in general was equivalent for both active and passive sentences. Rhodes (1997) found equivalent comprehension for subjects who read either active or passive versions of four expository passages. Although Bostian (1983) found no comprehension differences between readers of active and passive versions of passages, readers were faster with the active versions, preferred the active style, and judged the active versions more familiar than the passive versions. The shorter reading time may be due to the fact the active voice sentences are usually shorter than their passive voice counterparts.

Examining functional documents, where the reader is "reading to do," Flower, Hayes, and Swarts (1983) had readers orally interpret a government regulation. Subjects frequently revised the written text and structured their sentences around people performing actions (that is, they gave active voice interpretations to the passive voice statements in the original text). The study also compared the number of people and action-based scenarios in a government regulation to those in a revised regulation written by expert writers that had been "praised as easy to read" (Kintsch 1993). They found that the revised regulation focused on people and actions almost twice as often as the regulations written by nonexpert writers. In other words, the revised regulations contained clauses with people as subjects and human actions for verbs (for example, "The homeowner must make mortgage payments . . . .") versus the nonexpert regulations, which were more likely to approach information inanimately (for instance, "Mortgage payments are due . . . .").

While the literature on the effect of active versus passive voice is mixed, active voice can be effectively used in Web writing. Not only do readers move more quickly through active voice text, but they prefer it and feel more familiar with it. Readers may even encode passive voice text in active voice. Writers can save space on the page and mental effort for the reader by using active voice when it suits the content's purpose.

Embedded relative clauses The position of relative clauses in sentences appears to affect recall and comprehension. Specifically, readers make more comprehension errors with em-

bedded relative clauses—clauses that contain a relative pronoun such as *who*, *that*, or *which* and that are embedded in the middle of another clause ("The report *that John wrote* won an award")—than with relative clauses that appear at the end of a sentence ("The society gave an award to the report *that John wrote*") (Creaghead and Donnelly 1982). Larkin and Burns (1977) also found decreased recall and comprehension of information in embedded relative clauses. Rayner, Carlson, and Frazier (1983) found that readers have difficulty when reading embedded relative clauses and show a high proportion of eye movement backwards in relative clauses. Embedded relative clauses interrupt the syntax of the clause they are embedded in. It is not surprising that they can cause problems. In contrast, when relative clauses are placed at the end of a sentence as opposed to being embedded within the sentence, the information they contain is more likely to be recalled (Creaghead and Donnelly 1982; Isakson and Spyridakis 1999). If writers choose to use relative clauses, they are most effective and least bothersome when placed at the ends of sentences.

Embedded links   Just like embedded relative clauses, links embedded in the middle of a sentence can disrupt the reader's processing of overall sentence syntax. Lynch (1997) suggests that embedded (associative) links can foster a kind of attention deficit disorder, "creating casual, easily distracted 'surfers' instead of committed, engaged readers" (p. 115). To follow the path of embedded links, readers must have sufficient background knowledge (their own prior knowledge or knowledge supplied by the site designer) to understand the linked page on arrival. "Following associative links can be the Web's equivalent of traveling without an itinerary" (Lynch, p. 116). Lynch comments that embedded, associative links may slow down readers who are scanning because they will need to stop and read text surrounding the embedded link. If authors want to place links inside sentences, they should place them at the end of the sentence where they will least disrupt the syntax of the sentence.

Notice how the embedded link in the following sentence, appearing as the topic (and first) sentence of a paragraph, immediately grabs the reader's attention. Without knowing what the paragraph is about or how it relates to the previous paragraph, readers will most likely skip the introductory transitional phrase about "miserable statistics," and go to what looks most important: "users do benefit from the Web." They might even follow the link before they ever discover that the paragraph discusses users' inability to find information on the Web and the likelihood of sites being poorly designed.

> *Despite these miserable statistics, <u>users do benefit from the Web</u> since they spend most of their time on the good sites. (http://www.useit.com/alertbox/981018.html)*

Although the next sentence (also a topic sentence) contains an embedded link, its placement at the end of the sentence is less disruptive than in the previous example. Even though the link can still distract a reader, the link does not make much sense without the reader's going back and reading the first part of the sentence. By backtracking to the beginning, the reader can understand the point of the paragraph. But even here, because the embedded link calls attention to itself with its color and underscore, the reader will still probably read the link title first, thus reading the sentence syntax out of order.

> *Linkrot definitely reduces the usability of the Web, being cited as one of the biggest problems in using the Web by <u>60% of the users in the October 1997 GVU survey</u>. (http://www.useit.com/alertbox/980614.html)*

Information in independent versus dependent clauses   The type of clause structure a writer uses can affect recall and comprehension. Isakson and Spyridakis (1999) found that information in independent clauses had a significantly higher likelihood of being recalled than information in dependent clauses. Creaghead and Donnelly (1982) found poorer comprehension of important information contained in dependent clauses. Townsend, Ottaviano, and Bever (1979) found faster verbatim recall for information in independent versus dependent clauses. In addition, readers reacted more quickly to a question concerning information in independent versus dependent clauses, indicating that information in independent clauses is more readily available to readers. Web authors should realize that they can help readers to retain information by placing it in independent clauses.

3.3 State ideas concisely.
Effective text features
- ◆ Omission of unnecessary detail
- ◆ Concise wording
- ◆ Short sentences

Another style issue that Web writers should address is that of conciseness. The goal of conciseness should be to improve clarity by deleting unnecessary words, phrases, and excess detail, and by manipulating syntactic structures.

Morkes and Nielsen (1998) tested the effect of concision on Web users by revising a three-page, approximately 4,500 word Web site into an eight-page, approximately 2,500 word site, and then testing subjects for speed, error rate, recognition, recall, and satisfaction level. To make the text more concise, Morkes and Nielsen state that they tightened language and removed overly detailed information from the original text. As a result of these changes, however, other subtle textual differences occurred, as

shown in the following original and concise paragraphs taken from their study.

Original paragraph

Facilities management also portend high growth. To be sure, microprocessors can be found today in electronic thermostats, intercom systems, automatic sprinkler systems, stand-alone light timers and alarm systems that themselves are linked to a central monitoring station. But picture a home network that ties all these things—and more—together into a coordinated facilities and environmental control system.

Concise paragraph

Facilities management will also rely on new devices. Electronic thermostats, intercom systems, automatic sprinkler systems and alarm systems all will be tied into a coordinated control system linked to a central monitoring system.

Unlike the original paragraph, the concise paragraph starts with a clear topic sentence that leads smoothly into the next sentence, honoring the old-new contract of presenting old information before new information. Its second sentence explicitly states a relationship between the control system and monitoring system that is only implied in the original. In other words, the concise paragraph is better written than the original for many reasons. Morkes and Nielsen (1998) found that users of the eight-page, more concise site had faster task times, fewer errors, higher recall and recognition scores, and greater satisfaction than users of the three-page site.

In another study, Morkes and Nielsen (1997) compared five versions of a Web site and again found that concision helped. They designed the concise site by cutting "less-important" information from their lengthier control site that contained promotional language (further discussed in the next section on tone) and tightening wording (for instance, "the mansion on the site" became "the site," "was the embodiment" became "embodied"). The concise site had 50 percent fewer words than the promotional site and, in general, shorter sentences. Participants who read the concise site performed tasks significantly faster, had significantly higher scores on recognition and recall tests, recalled the site's structure significantly more quickly, and reported significantly higher satisfaction with the site than participants who read the longer, promotional language control site.

The lesson to be taken from these examples is that in seeking to create effective Web pages, authors should focus on clarity and principles of good technical writing—in this case the use of concise language, clear topic sentences, explicitly stated relationships, logically ordered information, and short pages.

3.4 Choose a tone that fits the message and the audience.
Effective text features
◆ Objective tone instead of promotional tone (for informational Web sites)
◆ Personal tone using the pronoun *you* (when appropriate)
◆ Plain instead of inflated, pseudointellectual language
Tone should always be selected for a given audience and message. The concept of tone relates to what "voice" the reader hears while reading—what perception the reader has of the author's attitude about the content and the reader.

Objective tone   Morkes and Nielsen (1997) tested the effect of two different tones by examining promotional versus "objective" writing style in Web pages. They designed and assessed five versions of a Web site:
1. A control version using promotional language
2. An objective version
3. A highly scannable version
4. A concise version
5. A concise, objective, and scannable version

The promotional site "contained exaggeration, subjective claims, and boasting, rather than just simple facts," a style Morkes and Nielsen claim many Web pages use (p. 11). The objective site was "stripped of marketese" and "presented information without exaggeration, subjective claims, or boasting" (p. 11). An examination of a promotional and objective paragraph from a Web page used in their study is informative in understanding Morkes and Nielsen's use of the terms "promotional" and "objective." The following paragraphs from the promotional and objective sites discuss tourist attractions in Nebraska, specifically those related to Buffalo Bill Cody (http://www.useit.com/papers/webwriting/studyfiles/travelnebraska/promotional/attractions.html and http://www.useit.com/papers/webwriting/studyfiles/travelnebraska/objective/attractions.html).

Promotional style

Tales of his [Buffalo Bill Cody's] prowess spread, and before long, Cody was persuaded to demonstrate his talents on stage. His theater act made him wealthy, and he began developing a ranch in North Platte, Nebraska. Here in 1882, Cody organized a rodeo event that evolved into his Wild West Show. Handsome and wearing his elegant buckskin outfits, the sharpshooter was the star of this extravaganza for 30 years as it toured the U.S. and Europe.

Objective style

Tales of his [Buffalo Bill Cody's] skill spread, and Cody started to demonstrate his talents on stage. His theater act made him wealthy, and he developed a ranch in North Platte, Nebraska. Here in 1882, Cody organized a rodeo event that evolved into his Wild West Show. Wearing buckskin outfits, Cody performed in the show for 30 years as it toured the U.S. and Europe.

The objective paragraph contains fewer words, less detail, and less promotional language than the promotional paragraph. In this example, the objective paragraph contains 15 percent fewer words (62 compared with 73); fewer adjectives (for example, "handsome" and "elegant" were deleted); and less promotional hype (for example, "persuaded to demonstrate" was changed to "started to demonstrate," and "star of this extravaganza" was deleted). The syntax also differs, with the objective site using less passive voice ("was persuaded to demonstrate" changed to "started to demonstrate") and using more concrete verbs ("began developing" changed to "developing"; "was the star" changed to "performed").

While there were no statistically significant differences in reader performance (five variables were measured) between the promotional site and the objective site, Morkes and Nielsen note that users tended to perform better with the objective site on most measures. In contrast, users of the other three sites (scannable, concise, or combined) did have significantly higher scores than users of the promotional sites on many measures. In other words, scannability and conciseness positively affected users more than objective versus promotional language alone. (For further information on the study results, see http://www.useit.com/papers/webwriting/writing.html.)

To definitively assess readers' performance and views of promotional versus objective language, further study is needed with different types of sites, users, task goals, and settings. Researchers should carefully operationalize the variable of "promotional language" and ensure that only one aspect of language is varied at a time when they create objective language versions. It would also be useful to compare different levels and types of promotional language, and the relationship of promotional language to a Web site's purpose. In this way, Web designers and developers could better understand exactly what aspects of promotional or objective language most benefit readers.

While the warning against promotional language is understandable and even quite logical, the appropriate tone for a Web site must be governed by the purpose and audience of the site. Some promotional language, when tastefully selected, may be appropriate in certain contexts—for example, with e-commerce sites. If, however, the Web site seeks to provide neutral information, then a neutral, nonpromotional tone would be appropriate.

Personal tone   If an author wants to actively draw the reader into the information on a page, then a personal tone—a tone in which personal pronouns are used—can be quite effective. The U.S. Internal Revenue Service (IRS) site often addresses the reader as "you" and uses a conversational tone, a tone that our student reviewers appreciated. But at times, the site uses personal tone in extreme ways that become overly cute; the tone then becomes silly and annoying, a complaint made by our student reviewers. The example below reveals the first content on the IRS home page at the end of January 2000 (http://www.irs.gov/). The narrative quality, the pronoun mix (first, second, and third person pronouns) that show different voices, the athletic metaphor, and the play on words (for example, "ten mile," "Justin Tyme"—just in time) actually confuse readers and interrupt the message: If you file your taxes electronically, you get a tax refund (if you are due one) more quickly.

High School Coach Shaves One Week Off Record Time

TEN MILE, TN   Winning high school track coach, Justin Tyme, recently beat his best time. "No, not our track record!" exclaimed the proud coach, "My tax refund record." The Coach explained the quantum improvement, "I filed my tax return electronically, with IRS e-file."

*   The Coach learned that refunds take half the usual time with IRS e-file, even less time with direct deposit. "It's not just the refund that's fast." He beamed, "You get proof that your return is accepted within 48 hours; e-file is accurate, less chance of getting a letter from the IRS; and your privacy and security are assured."*

Inflated tone   Finally, writers should avoid an inflated tone brought on by the use of pseudointellectual language and difficult syntax. Earlier in this article, a guideline advised writers to use words with few syllables; instead, the guideline could have told writers to avoid polysyllabic terminology. Such pompous language would have impeded the communication and distanced the reader.

Even simple language can create an inflated tone through the use of convoluted syntax. Pity the recently divorced person looking in the IRS index trying to find information about his or her U.S. tax responsibilities. The link that the individual is looking for and the explanation that accompanies it is shown below. More than likely, this Web user will not select this link because of its pompous label. Although the individual words are not extremely

complex (except for "spousal"), the way they are put to-gether—in this case, a noun stack—creates an inflated tone that makes the information difficult to understand.

Spousal Tax Relief Eligibility Explorer

Check to see if you might qualify for relief from spousal tax liability by answering a few interactive questions. (http://www.irs.gov/ind_info/index.html)

Another page in the IRS site also shows inflated and cryptic language. The page for IRS bulletins states, "The Internal Revenue Bulletin (IRB) is the authoritative instrument of the IRS for announcing all substantive ruling[s] necessary to promote a uniform application of tax law." The tone created by the wording in these examples is extremely distancing and inflated, and ironically, it is in extreme opposition to the inappropriate, overly friendly tone created on the home page with the tabloid like layout (Figure 1). Writers should strike the appropriate tone in a Web site and consistently maintain that tone across all pages.

4 ESTABLISHING CREDIBILITY

Web sites establish credibility in many ways, from issues concerning overall site design and functionality to issues concerning page content, organization, and style.

Make pages trustworthy. Readers are more likely to continue reading and return to a page if they feel the information is credible.
Effective text features
- Author's name, credentials, and e-mail address
- Date that site was posted or last updated
- Citation of sources when appropriate
- Statement regarding Web site's use of reader's personal information
- Up-to-date information
- Links to relevant outside sites
- Accurate information
- Lack of typos, grammatical errors, and spelling mistakes
- Lack of "hyped-up" language

The credibility of a Web page is easily affected by the presence or absence of certain content. For some, the credibility of a company or institution may begin with its Web sites. People may choose a graduate school or a future employer, or purchase a specific brand of product in a large part because of how credible the company or agency appears to be in its Web site. An e-commerce study (Cheskin Research and Studio Archehtype/Sapient 1999) maintains that the future success of the Web "will depend in part on gaining and maintaining the trust of visitors."

Information about the author Readers are more likely to trust information from sites that contain an author's name and particularly an affiliation that the reader can check out, as well as the author's contact information. In researching the state-of-the-art for this article, for example, I quickly passed over the countless Web sites about writing for the Web that contained no author names or information about the authors.

Dates, sources, and requests for personal information Additionally, sites should be dated so readers know how current the information is. Readers also expect to see an author cite sources when applicable. When Web pages ask readers to submit personal information (for instance, Web site registration pages), credibility is strongly enhanced if the page includes a statement regarding the Web site's intended use of the personal information.

Links to other sites Nielsen (1999a) suggests that providing links to other sites "is a sign of confidence, and third-party sites are much more credible than anything you can say yourself." He then states that "Isolated sites feel like they have something to hide." In contrast, Spool and others (1997) discourage the practice. They found that the greater the number of links on one page, the harder it was for users to answer test questions; additionally, they found a negative correlation between the number of embedded links and user success in finding information. Unfortunately, Spool and others provide little information about their methodology, so it is difficult to judge the validity of the results. Regardless, unnecessary links to other sites may confuse or annoy readers, slow them down, and damage credibility. But when links to outside sites are carefully chosen, and when they are current and functional, they can further a site's credibility.

Accuracy of information Readers expect information on Web pages to be accurate and free from typos and other errors that reveal carelessness or ignorance. For example, users will run from sites that contain sentences like the following: "If you own a computer hardware related Web and would **ike** [*sic*] to be added to this list all you have to do is add our site to your links and send us an *E-Mail* **where is located our link** on your site and on approval we will add your link" (http://optimize.bhcom1.com/english/misc/links.htm). Readers would probably also be leery of another site that boldly displays quotes from Ralph Waldo Emerson on each page but varies the spelling of Emerson's name across the pages of the site: Ralph Waaldo Emmerson, Ralph Wlado Emerson, and Emerson. The final approach was apparently deemed safest, but the errors and inconsistencies across pages draw the reader's attention away from the important information on the page and raise doubts about the author's credibility.

Tone   As discussed earlier, tone affects site credibility. Morkes and Nielsen (1997) maintain that promotional tone damages credibility while objective tone enhances credibility. Even with e-commerce sites where promotional tone can be appropriate, readers immediately lose respect for sites that use hyped-up language such as "scientific breakthrough," "miraculous cure," "ancient remedy," "or free and low cost" ("Vital signs" 1999). The Web site for the Consumer Protection Division of the U.S. Federal Trade Commission (http://www.ftc.gov/bcp/menu-internet.htm) and the Quackwatch Web site (http://www.quackwatch.com.) abound in consumer protection articles that discuss Web site credibility.

5 COMMUNICATING WITH INTERNATIONAL AUDIENCES

Web authors may want to consider globalizing or localizing a Web site so that it can be understood by an international audience. Some designers will choose to keep a site domestic and target a limited audience, and that decision may be appropriate given the purpose of the site and the nature of its content. Other Web designers, however, will grab the opportunity to extend their Web sites to readers in other cultures. Whether one intends a site to be international or not, by default it is—readers from around the world can and may access it.

A *globalized* Web site is a single site designed to work for readers from all cultures. Globalization of repair manuals is the idea behind the Boeing Company's decision to create one version of each airplane maintenance manual for use in all countries. The manuals are written in Simplified English, a restricted language that accepts only certain words and syntactic structures. Globalizing a Web site is a bit harder, though, because the readers vary so greatly in their backgrounds and their purposes for coming to a Web site. Not all cultures want the same type of information at the same level of detail, or the same internal organizations for paragraphs or even sentences.

In contrast to globalized sites, *localized sites* are written by first creating a culturally-neutral site and then having it translated for different cultures. Many companies, however, go one step further and completely redesign their Web sites for different cultures, changing content, organization, graphics, colors, and so on.

To globalize a site or prepare it for localization, Web authors can revise the site or make design decisions with globalization in mind from the start. The following briefly examines a few of the decisions that writers must make regarding the content, organization, and style of Web pages for international audiences, fully admitting that separate and more complete guidelines are needed. For in depth coverage, readers should see some of the well known books on internationalization (for example, del Galdo and Nielsen 1996; Nielsen 1990; Hoft 1995). Readers

may also enjoy an interesting case study of the process involved in internationalizing a Web site (Alvarez, Kasday, and Todd 1998) and an examination of cultural markers in Web sites (Barber and Badre 1998).

5.1 Select content that is relevant to the audience and purpose of the site.
Effective text features
- ◆ For globalized sites, culturally generic content (that is, lack of culturally specific content)
- ◆ For localized sites, content that serves a specific culture's interests

A Web site's content should serve the audience and purpose of the site. In "Global Web: Driving the international network economy" (1998b), Nielsen points out that Web sites should clarify what market they are interested in reaching and tell readers whether products are location-specific.

Globalized sites   Sites that are designed to serve readers from different cultures should contain content that is appropriate for all cultures. Specifically, writers should remove all content that is culturally specific—for example, humor, historical figures or events, local geographic or political references, national sports, and perhaps even health issues.

Localized sites   For sites that will be translated for different cultures, writers should select or adapt content to meet the interests of specific cultures. As an example, when *Men's health* magazine started selling a Russian edition, it toned down its content as compared to its American counterpart. The first Russian issue, in January 1998, highlighted a lesson on uncorking a champagne bottle (adding pointers about how to win a drunken brawl). The magazine was to focus "first on sex, careers, relationship advice and adventure travel, then ease into fitness and diet restraint" (Williams 1998). This approach reflects somewhat different priorities from the American version, but it targets the interests of its audience.

Information that may be important to readers in one culture may be seen as irrelevant by readers in another culture. Having analyzed many German documents, Hein (1991) contends that German readers want a "wealth of information. They need background information that discloses the roots of ideas, products, and services. They need contextual information that shows them how ideas, products, and services fit into the overall scheme of their businesses, their jobs, and their personal lives" (p. 126). An analysis of German versus American advertisements reveals a similar pattern: German ads cite more product specifications and are more precise than their American or French counterparts (Smith and Klein-Braley 1995).

Thatcher (1999) discusses the need for providing sufficient context when selecting information for readers from different cultures. He found that accountants from five South American countries failed to understand accounting information translated from English documents because "they lacked sufficient contextual and historical information" (p. 183). Even though South Americans are assumed to represent a "high-context" culture, capable of reading meaning from the implicit communication context and therefore not needing or desiring lots of explicit contextual information, the accountants wanted more examples and concrete details. (See Hall 1976 for more information on high versus low context cultures.)

Finally Web designers may want to determine the amount of information they place on individual Web pages by examining users' linguistic contexts (Gillette 1999). Gillette specifically points out that in some cultures people may share computers, print out pages for group discussion, or have limited time on the Internet. He suggests that an arrangement of all information on a few long hypertext pages or placing all information in PDF format would facilitate such user practices.

5.2 If localizing a site, consider using an organizational structure suited to the preferences of readers in the target culture.

Studies of contrastive rhetoric have shown that writers from different cultures use different organizational patterns in documents. Kaplan (1966) noted different organizational styles in English prose written by native speakers of French, Arabic, English, and Asian languages. Kachru (1983) noted differences in Hindi and English paragraph structures. Many researchers (for example, Hinds 1990; Maynard 1996; Kamimura and Oi 1996) have found Japanese expository texts to be inductively organized, with thesis or topic statements appearing late in the text, particularly when texts emphasize authors' viewpoints. One study, however, found that some Japanese expository texts are deductively organized, particularly if thesis or topic statements are factually supported (Fukuoka and Spyridakis 1999).

Ulijn (1996) found that Dutch and French, novice and expert writers used different organizations when organizing a list of chapters from a user manual. The Dutch preferred a direct linear organization, and the French preferred a more digressive organization. When participants performed tasks and expressed preference for either the Dutch or French structure in another service manual, all participants performed the tasks more successfully with the Dutch structure, yet task execution time was unaffected by structure. Of interest is the fact that the Dutch participants preferred the Dutch structure, and the French participants preferred the French structure.

Readers develop structural schemata for the organization of information through their experience with text. McClure, Mason, and Williams (1983) investigated culture-based structure schemata and found that readers who did not possess the structural schema used in a given story exhibited poorer comprehension because of the mismatch between the reader's and the story's structural schemata.

The effects of readers' structural schemata are also seen in studies that examine readers' attitudes about or comprehension of text with different organizational patterns. Hinds (1983) found that native Japanese speakers gave higher ratings to inductively organized text than did native English speakers. Kobayashi and Rinnert (1996) found that native Japanese and English students and teachers rated the quality of inductively and deductively organized texts differently. In general, subjects with the least exposure to English rhetorical instruction rated the quality of the inductive passages the highest while subjects with the most exposure to English rhetorical instruction rated the inductive passages the lowest. Fukuoka and Spyridakis (submitted for publication) found that Japanese engineers recalled more information from an inductively organized text versus its deductively organized counterpart.

Thatcher (1999) found that South American accountants preferred instructions and definitions that were organized as detailed narratives versus the original English form or an abstract hierarchical, direct U.S. rhetorical form. Thatcher elaborates about the need for the communicator to contextualize both content and organization for South American readers.

As is apparent, a fair amount of literature suggests that text structures vary across cultures and affect readers' performance and preferences. Unfortunately, the implication for Web authors is not really known. We are just beginning to draw conclusions regarding the implications for print documents. If Web writers intend to localize sites, they should examine readers in their target audience to determine what type of page and site organization will best suit them.

5.3 Use a style that is culturally generic and is easily translatable.
Effective text features
- Measurement terminology in either international units (for example, the metric system, 24-hour military-time clock) or units specific to different cultures
- Internationalized words and phrases
- Lack of jargon, abbreviations, and idioms
- Lack of cute wording, titles, and phrases
- Simple sentence structures

Many books and style guides for internationalization address the technical issues of internationalization, such as the handling of fonts, character sets, time zones, monetary

formats, and so on. While such topics are important, the focus here concerns the writer's style of writing.

Internationalized language A globalized site and an internationalized site (hence, localizable) should have a lot in common in terms of writing style. Sites should "avoid terminology that does not lend itself to translation such as lingo, slang, jargon, buzzwords, abbreviations, colloquialisms, regional English, euphemisms, acronyms, idiomatic phrases, clichés, proverbs, similes, metaphors, military and sports terminology" (Borelli 1997). For example, the following statement from a Japanese Web site may not be immediately understood by Western readers in its current phrasing:

> _Professor Aki Michimoto retired under the age clause._

The term "age clause" should probably be clarified or rephrased. Common words with only one meaning work best in communicating across cultures.

Humor To communicate politely and accurately with audiences from many cultures, Web pages should avoid humor. Humor does not translate well, and different cultures receive and adapt to humor in different ways. For example, with advertisements, "Germans will tend toward serious, factual persuasion, rather than using catchphrases or slogans common to American advertising" (Lewis 1996, p. 106).

Simple syntax The sentence syntax should be simple enough to communicate with nonnative speakers and aid translators in understanding and translating the intended meaning. Del Galdo (1990) cautions against the use of noun stacks of three or more nouns and telegraphic writing style that leaves out articles such as _the_. Del Galdo also recommends not using an overly friendly writing style that directly addresses the reader, correctly pointing out that some cultures would consider it condescending and irritating. Although the recommendation was originally directed at writers of instructional software interfaces, Web authors should consider the culture when addressing the reader. Finally, we must remember that the quality of translated text relates to the quality of the original text (Fisher and Chong 1996; Mackin 1989).

QUICKLIST FOR AUTHORING COMPREHENSIBLE WEB PAGES

KEY CONCEPTS

Reading process All parts of the reading process use a reader's attentional resources, a limited commodity. If a reader can devote less attention to lower level tasks such as decoding letters, words, and syntactic structures, he or she will have more attention available for higher level tasks, such as com-

bining text-based information with other text-based information and also with information stored in long term memory.

Tradeoffs Writers' decisions can amount to tradeoffs between the use of effective and less effective text strategies. Effective text strategies ease the reader's load and make more attention available for more difficult reading tasks. The following guidelines describe numerous effective text strategies, not all which an author will choose to use. Authors and evaluators, though, should recognize that some strategies are more effective than others, and understand that the degree of effectiveness relates to context and audience.

Context: Audience and purpose All writing decisions or evaluations of effectiveness must be made in the context of the abilities and knowledge set of the intended audience, and the purpose of the Web site.

Internationalization Writers must decide whether they want a Web site to serve audiences beyond a specific English speaking audience. If so, they may want to internationalize the Web pages (remove content and concepts specific to only one culture) and then localize the pages (translate the pages to meet the needs of different cultures). Alternatively, they may want to globalize the pages, making them readable by readers in any culture who speak English.

1 SELECTING AND PRESENTING CONTENT

1.1 Present content in such a way that readers can orient themselves and access relevant prior knowledge so they can comprehend new information when they arrive on a new page.
Effective text features
- An informative title at the top of each page
- An introduction or introductory sentence that announces the topic and specifies the intended audience
- Repetition of company or agency names, redefinition of specific terminology, and spelling out acronyms on each page

1.2 Select content that will be interesting and relevant to the audience. Readers will attend to and retain such content better than content they find less interesting and relevant.
Many authors reuse content from existing printed texts or Web sites just because they have the information. Readers are often not interested in an organization's mission statement or management chart, topics common to many Web sites.

1.3 Minimize the amount of information per page.
Effective text features
- Short pages instead of long pages (in general)

◆ Only a few examples of a concept versus exhaustive coverage

◆ Summaries or abstracts with links to longer articles or discussions

2 ORGANIZING CONTENT ON THE PAGE

2.1 Group information to help readers create hierarchical frameworks for storing incoming information in long-term memory.

Effective text features

◆ Five or fewer items per group at one level of the organizational hierarchy
While this ideal number may be difficult to achieve with the overall site design, information on pages can often fit within the ideal. Readers retain more information and discriminate among ideas best when the number of items at any one hierarchical level is five or fewer.

◆ Grouped ideas on one page at the same conceptual level

2.2 Create order *within* and *across* grouped content.

Effective text features

◆ Information the reader is likely to know placed before new information (within sentences, paragraphs, and pages)

◆ Deductive organization, reinforced with a topic sentence

◆ Important information near the top of paragraphs and pages

2.3 Use organizational cues to make text visually accessible and scannable (easily skimmed or quickly read through at a top level); and to facilitate search tasks, comprehension, and recall. Do not distract readers with unnecessary cues.

Effective text features

◆ Headings and subordinate headings

◆ Introductions

◆ Overview (preview) and topic sentences

◆ Lists or tables

◆ Link labels

◆ Tables of contents, overviews, or site maps

3 MANIPULATING STYLE

3.1 Use words that readers can easily and accurately understand.

Effective text features

◆ Concrete words

◆ Words that appear frequently in the language

◆ Short words (fewer syllables)

◆ Pronounceable words

◆ Link labels that create clear context for the linked page

◆ Words that readers are familiar with (the audience's vocabulary set)

3.2 Use syntax (grammatical order) that readers can easily understand.

Effective text features

◆ Active voice verbs

◆ Few embedded relative clauses (a relative clause inside another clause—for example, "The boy, *who is tall*, fell down.")

◆ Few embedded links

◆ Important information placed in independent clauses

3.3 State ideas concisely.

Effective text features

◆ Omission of unnecessary detail

◆ Concise wording

◆ Short sentences

3.4 Choose a tone that fits the message and the audience.

Effective text features

◆ Objective tone instead of promotional tone (for informational Web sites)

◆ Personal tone using the pronoun *you* (when appropriate)

◆ Plain instead of inflated, pseudointellectual language

4 ESTABLISHING CREDIBILITY

Make pages trustworthy. Readers are more likely to continue reading and return to a page if they feel the information is credible.

Effective text features

◆ Author's name, credentials, and e-mail address

◆ Date that site was posted or last updated

◆ Citation of sources when appropriate

◆ Statement regarding Web site's use of reader's personal information

◆ Up-to-date information

◆ Links to *relevant* outside sites

◆ Accurate information

◆ Lack of typos, grammatical errors, and spelling mistakes

◆ Lack of "hyped-up" language

5 COMMUNICATING WITH INTERNATIONAL AUDIENCES

5.1 Select content that is relevant to the audience and purpose of the site.

Effective text features

◆ For globalized sites, culturally generic content (that is, lack of culturally specific content)

◆ For localized sites, content that serves a specific culture's interests

5.2 If localizing a site, consider using an organizational structure suited to the preferences of readers in the target culture.

5.3 Use a style that is culturally generic and is easily translatable.

Effective text features

◆ Measurement terminology in either international units (for example, the metric system, 24-hour military-time clock) or units specific to different cultures
◆ Internationalized words and phrases
◆ Lack of jargon, abbreviations, and idioms
◆ Lack of cute wording, titles, and phrases
◆ Simple sentence structures T**C**

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JAN H. SPYRIDAKIS is a professor in the Technical Communication Department at the University of Washington. She teaches courses and offers industry seminars on style in technical writing, advanced technical writing, the conduct and interpretation of research in technical communication, and international technical communication. She conducts research on usability, comprehension, and document and screen design issues. She has received teaching and publication awards, and is a fellow of STC. Contact information: jan@uwtc.washington.edu